ENVIRONMENTAL RESOURCE PERMIT
APPLICANT'S HANDBOOK
VOLUME I
(GENERAL AND ENVIRONMENTAL)

This Volume, including Appendices G, H, I, L, M, N, and O only is incorporated by reference in subsection 62-330.010(4), F.A.C.

Effective _____

FOR:

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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PART I -- BACKGROUND AND PROCEDURES

1.0 Introduction

The Florida Department of Environmental Protection ("Department" or "DEP") and Florida's five water management districts ("Districts" or "WMDs") developed this Applicant's Handbook to help persons understand the rules, procedures, standards, and criteria that apply to the environmental resource permit (ERP) program under Part IV of Chapter 373 of the Florida Statutes (F.S.).

The Department and each of the Districts implement the ERP program. Several local governments also implement the ERP program under the delegated authority in Section 373.441, F.S. The Applicant's Handbook refers to these entities collectively as "Agencies" and also refers to one or more water management districts as "District" or "Districts" (capitalized), respectively. The term "district" (lower case) generally refers to the main or field offices of either the Department or District. These and other terms are defined in Section 2.0 of this volume of the Applicant's Handbook (hereinafter referred to as "Volume I," or "this volume").

Part IV of Chapter 373, F.S., regulates the construction, alteration, operation, maintenance, abandonment and removal (hereinafter referred to as "activities") of stormwater management systems, dams, impoundments, reservoirs, works and appurtenant works (hereinafter referred to as "projects"). Such projects include dredging and filling in wetlands and other surface waters, as those terms are defined in Sections 373.403(13) and (14), F.S.

The primary ERP program rules are adopted by DEP as Chapter 62-330, of the Florida Administrative Code (F.A.C.), and are also rules of the Districts and delegated local governments in accordance with the authority under Section 373.4131, F.S. The Applicant's Handbook is incorporated by reference in subsection 62-330.010(4), F.A.C., and therefore operates as a rule of the Agencies.

The Districts are:

- Northwest Florida Water Management District (NWFWMD)
- Suwannee River Water Management District (SRWMD)
- St. Johns River Water Management District (SJRWMD)
- Southwest Florida Water Management District (SWFWMD) and
- South Florida Water Management District (SFWMD)

Responsibilities of these Agencies are divided in accordance with Operating and Delegation Agreements incorporated by reference in Chapter 62-113, F.A.C., accessible at: https://floridadep.gov/ogc/ogc/content/operating-agreements. These Agreements operate so that only one agency is responsible for permitting, compliance, and enforcement of an activity, and identify which Agency is responsible for the various types of activities. See Section 1.2, below for additional information on the division of responsibilities between the Agencies.

Chapter 62-330, F.A.C., will control in cases where the information in the Applicant's Handbook conflicts with that rule chapter.

1.1 Overview of Applicant's Handbook

This is Volume I of a two-volume ERP Applicant's Handbook. This volume and Chapter 62-330 F.A.C., are adopted by DEP and apply statewide to all activities regulated under Part IV of Chapter 373, F.S. This includes those activities for which the Districts and the delegated local governments are responsible for the review and agency action.

This Volume I provides general background information on the ERP program, including points of contact, a summary of the statutes and rules used to authorize and implement the ERP program, and the forms used to notice or apply to the Agencies for an ERP authorization. This Volume also provides discussion on:

- Activities regulated under Chapter 62-330, F.A.C., and Part IV of Chapter 373, F.S.;
- Types of permits, permit thresholds, and exemptions;
- Design and performance standards and criteria for water quality;
- Procedures used to review exemptions and permits, and that are applicable to inspections, compliance, and enforcement;
- Conditions for issuance of an ERP, including the environmental criteria used for activities located in wetlands and other surface waters;
- Erosion and sediment control practices to prevent water quality violations;
- Operation and maintenance requirements.

Applicant's Handbook Volume II is adopted separately by DEP (for use within the NWFWMD) and by the SRWMD, SJRWMD, SWFWMD, and SFWMD (for use within the geographical area of each applicable District). These separate Volumes address regional differences in hydrology, soils, geology, and rainfall specific to each District. Each Volume II provides design and performance standards specific to the geographical area of each District. Volume II applies whether an ERP application is processed and acted on by DEP, a District, or a delegated local government. Generally, it provides:

- Design and performance standards and criteria for water quality and quantity, including those for specific types of stormwater management systems, dams, impoundments, reservoirs, works, and appurtenant works;
- Design and dimensional criteria for water quality treatment systems;
- Standards and criteria pertaining to special basins that may exist within the geographic area of each District;
- Standards and criteria pertaining to flood protection; and
- Design and performance standards for dams.
- The design and performance standards and criteria above are also applicable to inspections, compliance, and enforcement.

Volume II primarily applies to activities that require the services of a registered professional to design a stormwater management system. A stormwater management system is defined in Sections 373.403(10) and 403.031(16), F.S., as "a system that is designed and constructed or implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, overdrainage, environmental degradation, and water pollution or otherwise affect the quantity and quality of discharges from the system." This includes most activities that create new impervious surface or that alter surface water flows.

Volume II generally is not applicable to the construction, alteration, modification, maintenance, or removal of projects that cause no more than an incidental amount of stormwater runoff, such as:

- An **individual**, single-family residence, duplex, triplex, or quadruplex **that is not part of a larger plan of development**.
- A "stand-alone" seawall, riprap revetment, other shoreline stabilization structure, and docks and piers.
- "Stand-alone, in-water" projects such as channel dredging, channel markers, mooring piles and buoys, and water testing equipment. Dredged material disposal sites are subject to specific design and performance standards (see **Volume II**).
- Activities that do not add more than a de minimis amount of impervious surface, such as the installation of overland and buried electric and communication transmission and distribution lines.
- Activities that qualify for an exemption in Rule 62-330.051, F.A.C. (see additional discussion in **sections 3.2 through 3.2.7 of this Volume**).
- Activities that qualify for a general permit (as provided in Rules 62-330.410 through 62-330.635, F.A.C., and discussed in **sections 3.1.3 and 4.2.2 of this Volume).**

Activities that qualify for the "10/2" general permit in Section 403.814(12), F.S., are not regulated under Chapter 62-330, F.A.C. (see Section 3.1.3 of this Volume for additional information on this general permit).

Many Districts have "special basins." Activities within those basins must comply with the applicable special basin criteria. Those basins are listed below; detail on the allowable activities in those basins is described in more detail in the Volume II for each District:

- Within the Northwest Florida Water Management District – Special Basin Criteria for Sensitive Karst Areas, **sections 6.0 through 6.4**, including Appendix A, in Volume II
- Within the Suwannee River Water Management District – Section 5.9 of Volume II and Chapter 40B-4, F.A.C. (Works of the District)
- Within the St. Johns River Water Management District – Chapter 40C-41, F.A.C. (Surface Water Management Basin Criteria) and **Sections 13.0 through 13.8.3** of Volume II
- Within the South Florida Water Management District –
  - Chapter 40E-41, F.A.C., Surface Water Management Basin and Related Criteria
  - Chapter 40E-62, F.A.C., Works and Lands of the District Management Plans
  - Chapter 40E-63, Everglades Program
  - Rules 62-312.400 through 62-312.460, F.A.C. – activities within the Outstanding Florida Waters of Monroe County

Neither volume of this Handbook applies to "grandfathered activities" as described in **section 3.1.2**, below, except where those projects are modified, altered, abandoned, or removed in such a way as to require a permit under Chapter 62-330, F.A.C.

Throughout the Handbook Volumes, whenever there is a reference to the primary number of a section (such as "section 1.3"), the reference shall apply to all subsections of that section (such as 1.3.1 through 1.3.6), unless specified otherwise. In addition, for brevity, all future references to "this Volume," "Volume I," and "Volume II," represent references to the respective Volume or Volumes of the Applicant's Handbook.

1.2 Contacts and Division of Responsibilities

Applications, notices, and inquiries should be sent to the Agency that is responsible for the type of activity, as described in the Operating or Delegation Agreement in effect at the location of the project. The Operating and Delegation Agreements between the Agencies are incorporated by

reference in subsection 62-330.010(3), F.A.C., and are accessible at https://floridadep.gov/ogc/ogc/content/operating-agreements. They identify which Agency is responsible for the review and agency action on particular types of activities. The Operating Agreements between DEP and the SRWMD, SJRWMD, SWFWMD, and SFWMD are fundamentally similar; the Agreement between DEP and the NWFWMD differs due to funding limitations within that District. Each Delegation Agreement is specific to the respective local government that has been delegated to implement the ERP program on behalf of DEP or District.

The geographic boundaries, and office responsibilities, and contact information for the Agencies are shown in **Appendix A**. Section 373.069(2), F.S., contains legal descriptions of the boundaries of each District.

ERP staff of the Agencies may be contacted for additional information regarding such things as:

- How and to whom to submit applications and notices;
- Permit requirements and processing procedures;
- Assistance with interpreting the ERP rules, and completing an application or notice;
- Pre-application meetings;
- The status of applications and notices received; and
- Complaints related to potential violations under Part IV of Chapter 373, F.S.

Copies of application and notice forms, other documents incorporated by reference in Chapter 62-330, F.A.C., and copies of the rules that apply to the ERP program may be obtained at https://floridadep.gov/water/water/content/water-resource-management-rules#ERP.

1.3 Other Authorizations and Relationship to Other Governmental Entities

Issuance of a permit or verification of qualification for an exemption or general permit under Chapter 62-330, F.A.C., does not:

(a) Convey or create to the person any property right, or any interest in the real property;

(b) Authorize any entrance or activities on property that is not owned or controlled by the person; or

(c) Relieve persons from obtaining all other required licenses, permits, and authorizations under applicable state, federal, or local statute, rule, or ordinance. Persons are advised to obtain all required authorizations prior to constructing, altering, operating, maintaining, removing, or abandoning projects regulated under the ERP program.

Additional information on the distribution of permit applications to, and coordination with, other governmental agencies is discussed in sections **5.3.5 and 5.5.2 through 5.5.2.2** of this Volume.

1.3.1 U.S. Army Corps of Engineers (USACE)

Applicants may wish to consult with the applicable processing office of the USACE (see the Jacksonville District Regulatory Division Sourcebook online), and the local government if they have a wetlands regulatory program regarding any additional permitting and mitigation design considerations that may need to be addressed before, or concurrently with, submitting an application to the Agencies. Such coordination may avoid the need to redesign and modify the project to meet the requirements of those other regulatory agencies.

1.3.1.1 Federal Coordination, Water Quality Certification, and Coastal Zone Consistency Concurrence

The USACE, DEP, and the Districts have an Operating Agreement to coordinate the exchange of information between these agencies regarding permitting, compliance, and enforcement of activities regulated under Part IV of Chapter 373, F.S., that also require a Department of the Army (DA) permit under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, or Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972. Among other things this Agreement:

(a) Provides the process by which the Agencies and the USACE will facilitate sharing of information.

(b) Discusses how issuance of an ERP (including a general permit) shall also constitute a water quality certification or waiver thereto under the Clean Water Act for the required DA permit. The DA permits described above cannot be issued without a state water quality certification or waiver thereto.

The State of Florida has waived water quality certification for activities that are exempt from ERP permitting requirements. See the Operating Agreement for additional information. Additional information on the federal permitting program is available online in the Jacksonville District Regulatory Division Sourcebook.

The State of Florida has provided regional conditions applicable to water quality certifications for the Nationwide Permits issued by the USACE for use in Florida as well as for numerous regional and programmatic general permits issued by the Jacksonville District of the USACE. The Nationwide Permits can be found online in the Jacksonville District Regulatory Division Sourcebook. Applicants are advised that activities that qualify for USACE Nationwide, Regional, or General Permits are still subject to applicable ERP and any other state, local, or regional permitting requirements.

(c) Discusses how issuance of an ERP (including a general permit) in coastal counties also constitutes a finding of consistency or waiver thereto of the State's statutory authorities under Florida's federally approved coastal zone management program. Any required DA permit cannot be issued without applicable coastal zone consistency concurrence or waiver. Pursuant to Section 380.23(7), F.S., applications for federally permitted or licensed activities that qualify for an exemption under the ERP program are not eligible to be reviewed for federal consistency with Part IV of Chapter 373, F.S. The Corps or any designated Federal, State or local agency administering general permits on behalf of the Corps under 33 C.F.R. § 325.2(b)(2) may presume the Florida's coastal zone consistency concurrence for exempt activities, provided the activity receives any applicable authorization to use and occupy state-owned submerged lands under Chapter 253, F.S., and, for activities located within an Aquatic Preserve, Chapter 258, F.S., and the rules of the Florida Administrative Code adopted thereunder. The Corps or any designated Federal, State or local agency administering general permits on behalf of the Corps can act on the DA permit before the applicable authorization under Chapter 253, F.S., and, as applicable, Chapter 258, F.S., is obtained or granted, because it is understood such authorization must be obtained prior to persons using or occupying state-owned submerged lands.

1.3.1.2 State Programmatic General Permit (SPGP) and Programmatic General Permits (PGPs)

The USACE has issued a permit (a SPGP) that delegates to certain Agencies the authority to verify whether certain activities qualify for a federal dredge and fill permit under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. The SPGP streamlines permitting by not requiring persons who are conducting the activities to be subject to separate permitting review of qualifying activities by the USACE.

The procedures and scope of the SPGP, including any coordination agreements between the USACE and the Agencies to implement the SPGP, can be viewed at https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/content/federal-permits-and-coordination and online in the Jacksonville District Regulatory Division Sourcebook.

The Agency will determine upon receipt of an ERP application or notice if the activity qualifies for the SPGP. These activities are subject to several conditions and limitations, so not all projects within the SPGP activity categories will qualify for the SPGP.

If the requested activity does not qualify for the SPGP, the Agency will notify the applicant so the applicant may submit a separate application to the USACE so they may begin processing any required USACE permit.

The USACE also has issued other PGPs, some of which authorize the Agencies to further eliminate the need for separate federal permitting, for example SAJ 111 within the St. Johns River Water Management District.

More information on the SPGP and other PGPs is available at https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/content/federal-permits-and-coordination and online in the Jacksonville District Regulatory Division Sourcebook.

1.3.2 Relationship to National Pollutant Discharge Elimination System (NPDES) Permit Program

In October of 2000, the U.S. Environmental Protection Agency authorized DEP to implement several components of the National Pollutant Discharge Elimination System (NPDES) permitting program, several of which are related to activities regulated under the ERP program. Although delegated to DEP, NPDES permitting *is a separate federal permit program;* ***it is not linked to the state ERP***. It also is not delegated to the WMDs at this time. Therefore, applicants are advised to obtain *both* any required NPDES and ERP prior to construction.

Sections 1.3.2 through 1.3.2.2 of this volume are purely informational and are intended to make ERP applicants aware of possible interactions between ERP and NPDES regulatory requirements. In all cases, the procedures, standards and criteria of the applicable NPDES program, as adopted under state and federal law, shall control.

1.3.2.1 NPDES Stormwater Construction

The following construction activities are subject to NPDES stormwater permitting, under Section 403.0885, F.S. (see https://floridadep.gov/Water/Stormwater):

An NPDES stormwater construction generic permit is required for any construction activities

that:

(a) **Disturb** (includes soil disturbance, clearing, grading, and excavating) one or more acres of land, or disturb less than one acre of land that is part of a **common plan of development or sale**; and

(b) Discharge stormwater to surface waters of the state or to surface waters of the State through a municipal separate storm sewer system (**MS4**).

Responsible Authorities must apply, separately from the ERP, either for an individual NPDES stormwater construction permit or for coverage under the "Generic Permit for Stormwater Discharge from Large and Small Construction Activities" under paragraph 62-621.300(4)(a), F.A.C., and found at https://www.flrules.org/Gateway/reference.asp?No=Ref-04265, also referred to as the Construction Generic Permit (CGP). The Responsible Authority of a construction activity is ultimately responsible for obtaining and complying with either permit, in addition to all applicable ERP requirements. The CGP allows you to discharge surface stormwater and, optionally, produced groundwater associated with **large** or **small** construction activity to waters of the State, either directly or through an MS4. More information on the CGP is available at https://floridadep.gov/Water/Stormwater.

1.3.2.2 NPDES Dewatering

A generic permit has been issued under subsection 62-621.300(2), F.A.C., for any person constructing or operating a system discharging produced ground water (i.e., a dewatering system) from any non-contaminated site activity that discharges by a point source to surface waters of the State; this generic permit is associated with activities that are designed and operated in accordance with the general conditions in Rule 62-621.250, F.A.C. Additional information on this permit is available at: https://floridadep.gov/water/industrial-wastewater. NPDES permit coverage for dewatering operations can also be obtained via the CGP for construction activities, as described in **1.3.2.1, above.**

1.3.3 Linkage with State-owned Submerged Lands Authorizations

Activities located on sovereignty submerged lands (as defined in subsection 18-21.003, F.A.C.,) also require a proprietary authorization from the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees) to use such lands under Chapter 253, F.S., and Chapter 18-21, F.A.C., and, if located in an aquatic preserve, Chapter 258, F.S., and Chapter 18-18 or 18-20, F.A.C. For the purposes of Chapter 62-330, F.A.C., and the Applicant's Handbook, those lands are referred to as "state-owned submerged lands," in Section 2.0(a)94, below. With the exceptions in Section 253.03(7)(b), F.S., and paragraph 18-21.005(1)(a), F.A.C., proprietary authorization is required for most activities on state-owned submerged lands, whether it requires a regulatory permit under Part IV of Chapter 373, F.S., is exempt from permitting, or falls below permitting requirements.

DEP and the Districts act as staff to the Board of Trustees, and, in accordance with the Operating Agreement between the Agencies, will process all applications involving work on state-owned submerged lands (see Appendix A of this Handbook). These Agencies have delegated authority from the Board to approve or deny most projects, but for some types of projects, the final decision to approve or deny the state-owned submerged lands authorization rests with the Governor and Cabinet, who serve as the Board of Trustees (see Rule 18-21.0051, F.A.C.).

The application form adopted as Form 62-330.060(1), includes an application for a permit under Part IV of Chapter 373, F.S., as well as a request for authorization to use state-owned submerged lands, when such lands are involved; applicants are not required to submit a separate application for such authorization. Upon receipt of the application, or of a notice to use a general permit or a determination of an exemption, staff will examine the application or notice to determine whether the activity appears to be located, in whole or in part, on state-owned submerged lands. Where necessary, staff will request a title determination from DEP's Division of State Lands. Staff will then determine if authorization is required to perform the activities on those lands, or if it is automatically authorized [as a Consent by Rule—see subsection 18-21.005(1)(b), F.A.C.]. Activities located in one of the state's Aquatic Preserves must receive a separate written authorization in accordance with Chapter 258, F.S., and Rule 18-18 (within the Biscayne Bay Aquatic Preserve) or 18-20, F.A.C., (in all other Aquatic Preserves) prior to initiating any work. Other activities on state-owned submerged lands are subject to needing a letter of consent, an easement or lease, in accordance with Rule 18-21.005, F.A.C., and Chapter 253, F.S.

The approval or denial of an individually processed ERP application is linked with the approval or denial of any required state-owned submerged lands application under Section 373.427, F.S. This linkage is described in Rules 62-330.075 and 18-21.00401, F.A.C. Activities that require an individually-processed ERP cannot become complete until all required state-owned submerged lands information has been submitted as part of the permit application. In addition, the ERP cannot be issued unless a determination has been made that the related state-owned submerged lands application also can be issued. If an activity meets all the requirements for issuance of an ERP, but does not meet all the requirements for issuance of the state-owned submerged lands authorization, the ERP must be denied. Conversely, if the activity meets all the state-owned submerged lands requirements, but does not meet the conditions for issuance of the ERP, the state-owned submerged lands application and the ERP will be denied.

Activities that qualify for a general permit or an exemption are not linked. In such cases, even though an activity may be authorized by the general permit or exemption, construction, alteration, modification, maintenance, operation, abandonment, or removal of the project may not commence until the required state-owned submerged lands authorization also has been granted.

1.3.4 Consumptive Uses of Water

Section 373.406(1), F.S., states that "Nothing herein, or in any rule, regulation, or order adopted pursuant hereto, shall be construed to affect the right of any natural person to capture, discharge, and use water for purposes permitted by law."

A water use or consumptive use permit, and possibly a water well construction permit, may be required from the applicable District prior to constructing, altering, or operating projects regulated under Chapter 62-330, F.A.C., that also involve or require the withdrawal, reservations, and other uses of water in accordance with the applicable District rules. Some activities requiring a water use or consumptive use permit cannot be issued until the applicable permit under Part IV of Chapter 373, F.S., is complete and receives staff recommendation for approval.

Additional discussion on water use and consumptive uses of water is available at https://floridadep.gov/water-policy, and at the website of each of the Districts.

1.3.5 Mine Reclamation

Chapter 378, F.S., requires the reclamation of lands disturbed by mining operations, including lands disturbed by the operation of a borrow pit where the extracted materials will be used offsite for commercial, industrial or construction use. Under the Operating Agreements between DEP and the Districts, a District will process the ERP application for certain mines. However, the Districts do not have delegated authority to process the reclamation authorization. Applicants for mining activities are advised to contact DEP's Mining and Mitigation Program concerning the reclamation requirements. Mine operators are required to provide to DEP either a Conceptual Reclamation Plan or a Notice of Intent to Mine or Mining Other Resources unless exempt by Section 378.804, F.S.

1.4 Statutes and Rules

1.4.1 Statutes

The ERP program is authorized under Part IV of Chapter 373 F.S. More specifically, Section 373.4131, F.S., authorizes implementation of the statewide ERP rules. Chapter 120, F.S. (Administrative Procedures Act) also governs licensing, rulemaking, and administrative procedures under the ERP program. Chapter 403, F.S. (Environmental Control) governs aspects of the ERP program related to water quality, program implementation, exemptions, and general permits. Copies of these statutes are available at: http://www.leg.state.fl.us/Statutes/index.cfm?Tab=statutes&submenu=1 and from any Agency office.

1.4.2 Rules

Chapter 62-330, F.A.C., establishes the types of activities that require a permit, activities that do not require a permit, the procedures for processing a permit, the conditions for issuance of a permit, general permit conditions, and the forms associated with applications, notices, and permits. It also provides for general permits, which are pre-issued for specified activities that have been determined by rule to have minimal individual and cumulative impact.

The following additional rules of the Florida Administrative Code are related to implementing Chapter 62-330, F.A.C. Copies of the current rules are available at: https://www.flrules.org/. Some of these rules have been repealed, but are still applicable to activities that are "grandfathered" (see section 3.1.2 of this Volume); text of the repealed rules is still available, from the websites of the applicable Agency, and from the office of that Agency. This list is not comprehensive; other state, federal and local rules and regulations also may be required for an activity.

- Chapters 28-103 through 28-108, F.A.C. (Uniform Rules of Procedure) — provide uniform rules of procedure for all state agencies regarding activities such as processing of variances, administrative hearings, mediation, and licensing. Many of these uniform procedures have been superseded by exceptions to the uniform rules of procedure in Chapter 62-110, F.A.C. (specific to DEP), and in the rules of the applicable Districts.
- Chapter 62-4 (Permits) —Rule 62-4.242, F.A.C., provides antidegradation requirements for activities located in Outstanding Florida Waters. Rule 62-4.244, F.A.C., provides criteria for mixing zones. Subsection 62-4.050(4)(h), F.A.C., provides the schedule of processing fees required for applications, notices, and petitions for ERP activities that are the responsibility of DEP and the NWFWMD.
- Chapter 62-25, F.A.C. (Regulation of Stormwater Discharge) — applies to stormwater treatment systems that qualify for grandfathering under Sections 373.414(11), (12), (13), (14), (15), (16), or 373.4145(6), F.S. Systems constructed under Chapter 62-25, F.A.C., are authorized to be operated in perpetuity, and maintenance may be conducted under such systems without a permit under

Chapter 62-330, F.A.C., in perpetuity, provided the terms and conditions of the permit, exemption, or other authorization under Chapter 62-25, F.A.C., continue to be met, and provided the work is conducted in a manner that does not cause violations of water quality standards. However, if the system is altered, modified, expanded, abandoned, or removed, it is subject to being regulated by Chapter 62-330, F.A.C.

- Chapter 62-40, F.A.C. (Water Resource Implementation Rule) — provides water resource implementation goals, objectives, and guidance relating to water resources. This includes guiding principles for stormwater and surface water management programs (including the basis for minimum design criteria for the stormwater management systems), flood protection, natural systems protection and management, minimum flows and levels, and protection measures for surface water resources (including the goals for implementation of erosion and sediment control measures).
- Chapter 62-302, F.A.C. (Surface Water Quality Standards) — provides the State's numeric and narrative water quality standards criteria for surface waters, lists the classes of waters in Florida, and lists waters that are designated as Outstanding Florida Waters. Also includes the state's anti-degradation requirements.
- Chapters 62-303 (Identification of Impaired Surface Waters), 62-304, (Total Maximum Daily Loads), and 62-306, F.A.C. (Water Quality Credit Trading) — provide for identification of waters that do not meet state water quality standards and that are subject to pollution limits and recovery plans. Discharges of pollutants that cause or contribute to such impairment are subject to meeting net improvement requirements, as discussed in section 10.2.4.5 of this Volume and Volume II.
    - Sections 62-312.400 through 62-312.460, F.A.C. – establish special procedures and criteria for dredging and filling within the Outstanding Florida Waters in Monroe County that are used in combination with Chapter 62-330, F.A.C. The remainder of this chapter has been repealed, but can continue to be used as it existed prior to the repeal for dredging and filling in surface waters of the state (as defined in Rule 62-312.030, F.A.C.) for applicable activities "grandfathered" under Section 373.414(11), (12), (13), (14), (15), (16), 373.4131(4), or 373.4145(6), F.S. Grandfathered rule sections are retained on DEP website at https://floridadep.gov/water/water/content/water-resource-management-rules#erp.
- Chapter 62-340 (Delineation of the Landward Extent of Wetlands and Surface Waters) — provides the procedures and methodology used by all state and local government agencies in Florida to delineate the landward extent of wetlands and other surface waters.
- Chapter 62-341 (Noticed General Environmental Resource Permits) — All of this chapter was transferred to Chapter 62-330, F.A.C., on June 4, 2012. This chapter now applies only for those activities that can be constructed within the five years of the date notice was received by DEP of the intent to use the applicable noticed general permit, or within five years of the date DEP verified that the requested activities qualified for the noticed general permit, whichever is later. Such activities remain controlled under the rules that existed prior to Chapter 62-330, F.A.C. [10-1-13]. This grandfathered rule is retained on DEP website at https://floridadep.gov/water/water/content/water-resource-management-rules#erp.
- Chapter 62-342 (Mitigation Banks) – applies to projects proposed to be constructed and operated as a mitigation bank, and to persons seeking to purchase mitigation credits from such banks. The criteria of this chapter apply in addition to the permitting requirements of Chapter 62-330, F.A.C.
- Chapter 62-343 (Environmental Resource Permit Procedures) — contains the procedures used by DEP to review and take agency action on applications for ERPs under Part IV of Chapter 373, F.S., that are "grandfathered" under Chapter 62-330, F.A.C. More specifically, it is used in conjunction with the version of Chapter 62-330, F.A.C., in effect prior to October 1, 2013, which identifies the rules of the water management districts that are used when review and agency action

on the ERP is the responsibility of DEP), and Chapter 62-341, F.A.C. (Noticed General Environmental Resource Permits). Together, those rule chapters apply to activities that were permitted, exempt from permitting, or that were subject to an application that was complete prior to the effective date of the rules adopted under Section 373.4131, F.S. This grandfathered rule is retained on DEP website at https://floridadep.gov/water/water/content/water-resource-management-rules#erp.

- Chapter 62-344 (Delegation of the Environmental Resource Permit Program to Local Governments) — provides procedures for delegating all or a portion of the ERP program to qualified local governments.
- Chapter 62-345 (Uniform Mitigation Assessment Method) — in accordance with Section 373.414(18), F.S., this is the sole methodology to be used to determine the amount of mitigation required to offset otherwise unpermittable adverse impacts to wetlands and other surface waters, and the amount of mitigation that is provided by proposed mitigation. This rule does not assess whether the adverse impacts meet other criteria for issuance of a permit, or whether the mitigation is appropriate to offset adverse impacts.
- Chapter 62-346 (Environmental Resource Permitting in Northwest Florida) – applicable to activities within the geographical area of the NWFWMD that were permitted, constructed, exempt from permitting, legally in existence, or subject to an application under that chapter that was complete, including activities that qualified for a noticed general permit under Chapter 62-341, F.A.C., prior to the effective date of the rules adopted under Section 373.4131, F.A.C. This grandfathered rule is retained on DEP website at https://floridadep.gov/water/water/content/water-resource-management-rules#erp.
- Chapter 62-520 (Ground Water Classes, Standards, and Exemptions)
- Chapter 62-532 (Water Well Permitting and Construction Requirements)
- Chapter 62-550 (Drinking Water Standards, Monitoring, and Reporting)
- Chapter 62-555 (Permitting, Construction, Operation, and Maintenance of Public Water Systems)
- Chapter 62-621 Generic Permits) – sets forth procedures to obtain a type of general National Pollutant Discharge Elimination System (NPDES) permit issued under Section 403.0885, F.S., and 40 CFR 122.28, and a type of "Non-NPDES Generic Permit" issued under Section 403.087, F.S. These are alternatives to individual permits for certain wastewater facilities and other activities that: involve the same or substantially similar types of operations; discharge the same types of wastes or engage in the same types of residuals or industrial sludge use or disposal practices; require the same effluent limitations, operating conditions, or standards for residuals or industrial sludge use or disposal; require the same or similar monitoring.
- Chapters 40B-1, 40C-1, 40D-1, and 40E-1, F.A.C. – provide the fee schedules and certain administrative details associated with permitting of applications that are the responsibility of the SRWMD, SJRWMD, SWFWMD, and SFWMD, respectively.
- Chapters 40A-2, 40B-2, 40C-2, 40D-2, and 40E-2, F.A.C. — provide the regulatory requirements covering withdrawals, reservations, and other uses of water.
- Within the SRWMD, Chapter 40B-4, F.A.C., provides the permitting requirements for activities located within Works of the SRWMD. Chapters 40B-4, 40C-4, 40D-4, and 40E-4, F.A.C., also provide the standards and criteria, and general conditions for, issuance of an ERP within the SRWMD, SJRWMD, SWFWMD, and SFWMD, respectively, for an application that was complete or permitted prior to the effective date of the rules adopted under Section 373.4131, F.S., or that were legally in existence on that date. Portions of those rules remain in effect under the ERP program, the text of which is available at https://www.flrules.org/, but most of these rules have been repealed, and are applicable only for grandfathered activities. The text of these rules applicable to grandfathered activities remains available at the website of the respective Agency.
- Chapter 40A-6 (Works of the District) — provides the permitting requirements for activities that withdraw water from, discharge to, are located on, or otherwise use a Works of the NWFWMD,

primarily involving certain lands within Megginnis Creek-Megginnis Arm in Leon County. Chapters 40E-6, 40E-61, 40E-62, and 40E-63, F.A.C., provide the permitting requirements for activities are located on, or otherwise use a Works of the SFWMD, including activities within the Everglades and Lake Okeechobee.

- Chapters 40B-8, 40C-8, 40D-8, and 40E-8 — provide minimum water level and flow requirements for specified surface waters within each applicable District.
- Chapters 40C-40, 40D-40, and 40E-40, F.A.C. – provide the requirements for, conditions for issuance, and general conditions applicable to, standard general, general, and standard permits within the SJRWMD, SWFWMD, and SFWMD, respectively, that were in an application that was complete or permitted prior to the effective date of the rules adopted under Section 373.4131, F.S. The text of these rules applicable to grandfathered activities remains available at the website of the respective Agency.
- Chapters 40A-44 and 40C-44, F.A.C. — rules of the NWFWMD and SJRWMD that provide the permitting requirements for agriculture and, in the NWFWMD, silviculture activities that do not qualify for the exemptions in Section 373.406, F.S.
- Chapters 40B-400, 40C-400, 40D-400, and 40E-400, F.A.C. — rules of the Districts that adopted noticed general permits for activities under the ERP rules in effect prior to the effective date of the rules adopted under Section 373.4131, F.S., as well as the no-noticed general permit applicable within the South Florida Water Management District in Rule 40E-400.315, F.A.C. The text of these rules applicable to grandfathered activities remains available at the website of the respective Agency.

1.5 Administrative Criteria

1.5.1 Ownership and Control

(a) In accordance with Rule 62-330.060, F.A.C., and paragraph 62-330.301(1)(j), F.A.C., an applicant must provide reasonable assurance that permitted activities will be conducted by an entity with financial, legal, and administrative capability of ensuring that the activity will be undertaken in accordance with the terms and conditions of a permit, if issued, and to ensure staff of the Agencies have legal authority to access the land for inspections and monitoring, as discussed in **section 1.7, below**. Compliance with this requirement must be demonstrated through subsections 62-330.060(3) and (4), F.A.C., the certification required in the Application Form 62-330.060(1), Form 62-330.301(26), and **section 12.0 of this Handbook**.

(b) In addition to the above, persons proposing to conduct activities on state-owned submerged lands that are riparian to uplands must submit satisfactory evidence of sufficient upland interest in accordance with section 4.2.3(h) of this volume.

1.5.2 Phased Projects

Projects developed in phases will normally require the submission of a master plan showing the applicant's contiguous land holdings. The primary concerns of the Agency are to ensure continuity between phases, and satisfactory completion and operation of individual phases if the overall project is not completed as planned. Applicants desiring approval in concept of the master plan should consider submitting an application for a conceptual approval permit encompassing the total master plan. A conceptual approval permit also may be sought for phased construction as part of urban redevelopment or infill. An application to construct the first phase of the overall plan may be included as a part of the initial application for the conceptual approval permit. Procedures for

requesting a conceptual approval permit are in Rules 62-330.055 and 62-330.056, F.A.C., and **sections 3.4 through 3.4.6** of this Volume.

Applications to construct or alter phases of a project for which no conceptual permit has been obtained may be considered only when each phase can be constructed, operated, and maintained totally independent of the future phases, and, an overall plan for the full build out is submitted with the application, including an overall schedule for implementing the plan and identification of any future lands that may need to implement the future phases.

1.5.3 Land Use Considerations

The proposed land use to be served by an activity regulated under Chapter 62-330, F.A.C., does not have to be consistent with the local government's comprehensive plan or existing zoning for the site. However, it is strongly recommended that an applicant obtain the necessary land use approvals from the affected local government prior to or concurrent with the ERP application, since these approvals often contain conditions which impact the overall project design and, hence, the nature of the proposed activity. By obtaining these local government approvals first or concurrently, the applicant can reduce or eliminate the need for subsequent permit modifications which may be necessary as a result of conditions imposed by the local government.

When permits or authorizations issued or granted by other agencies materially affect the design or footprint of works authorized under Chapter 62-330, F.A.C., the permittee shall contact the Agency to determine if a modification of the permit is necessary under Rule 62-330.315, F.A.C., and sections 6.2 through 6.3.2.3 of this Handbook.

1.5.4 Water and Wastewater Service

As applicable, the applicant for an individual permit will be requested to provide information on how utilities, such as wells, sewage treatment or disposal (including septic tanks), lift station wet wells, and sewage force mains within the project area may affect any stormwater treatment and conveyance system, and whether activities to install or alter utility services may involve any work in wetlands or other surface waters, or any work that may affect surface water flows on or off-site, such as through the creation of temporary dikes and trenches during the installation of utility pipes and lines. This includes the status of any existing or proposed water use or consumptive use permit, if applicable. If wastewater disposal is accomplished on-site, additional information normally will be requested regarding separation of wastewater and stormwater systems.

1.5.5 Stormwater Management Areas

Areas reserved for stormwater management shall be shown on construction plans and legally reserved for that purpose by dedication on the plat or protected through deed restrictions, easements, or other binding covenants so that subsequent owners or others may not remove such areas from their permitted use. Stormwater management areas, including maintenance easements, shall be connected to a public road or other location from which operation and maintenance access is legally and physically available. Impervious areas designed for purposes such as roads, parking lots, sidewalks, or public access shall not be used as stormwater management areas if the level or duration of standing or flowing water on these areas is a risk to vehicular traffic or pedestrian use.

1.5.6 Legal Authorization for Offsite Areas

Applicants proposing to use offsite areas not under their control to satisfy the requirements for issuance in Rule 62-330.301, F.A.C., must obtain legal authorization to do so prior to permit issuance to use the area. For example, an applicant who proposes to locate the outfall pipe from a stormwater basin to the receiving water on an adjacent property owner's land must obtain a drainage easement or other appropriate legal authorization from the adjacent owner. A copy of the legal authorization shall be submitted with the permit application when required to do so under section 4.2.3(d) of this Volume. Authorization to use offsite mitigation areas is discussed in section 10.3.1.2.1 of this Volume. Authorization to use offsite stormwater compensation areas is discussed in **section 9.7.2** of this Volume.

1.6 Enforcement Authority

Parts I and IV of Chapter 373, F.S., provide for the enforcement of Agency rules by administrative and civil complaint. The Agency also has the authority to obtain the assistance of county and city officials in the enforcement of the rules (see Sections 373.603 and 373.609, F.S.). Any person who violates any provisions of Chapter 373 or 403, F.S., the rules adopted thereunder, or orders of the Agency, is subject to civil fines or criminal penalties as provided in Section 373.430, F.S.

1.7 Permission to Inspect, Monitor and Sample

Each application must include permission signed by the landowner, easement or lessee holder, or their legal designee that Agency staff may access the property where the proposed activity is located for purposes of inspecting, sampling, and monitoring the land subject to the application to determine whether the activity can meet (and if a permit is issued, is meeting) permitting criteria and permit conditions. If this is not possible, the applicant must supply the Agency with written authorization through other means (such as obtaining permission from leases and easement holders) for staff to enter onto, inspect, and conduct sampling of the site. This is necessary to prevent claims of trespass, and to ensure the applicant, and potential permittee, has approval from the entity that has sufficient real property interest over the land subject to the application to construct, alter, operate, and maintain, or remove, the project.

In the case of an easement, the easement must specifically provide for the right of governmental entities to be on the lands subject to the easement for such purposes as compliance, or such right must flow through necessity from the explicit grant of the easement.

Each permit is subject to the condition that Agency authorized staff, upon proper identification, will have permission to enter, inspect and observe, and collect samples of the activity to ensure compliance with the approved plans and specifications included in the permit. See Part 4 of Form 62-330.060(1) for additional information.

2.0 Definitions and Terms

(a) The definitions and terms below are used for purposes of Chapter 62-330, F.A.C., and this Volume I. **Section 2.1** of each District-specific Volume II contains additional definitions that apply to the design and performance standards and criteria for stormwater management systems, dams, impoundments, reservoirs, works, appurtenant works, and special basins as regulated in that District. Where a definition is in accordance with Florida Statutes, the statutory attribution is given as "[XX]."

1. "Abandon" or "Abandonment," means cessation of use and maintenance activities or responsibility for a system or part of a system in accordance with Section 373.426, F.S.

2. "Activity" or "Activities," means construction, alteration, operation, maintenance, abandonment, or removal of any stormwater management system, dam, impoundment, reservoir, works [including dredging or filling, as those terms are defined in Sections 373.403(13) and (14), F.S.], and appurtenant works.

3. "Agency" means the Department of Environmental Protection, the water management districts, and local governments delegated authority to implement the environmental resource permit program under Part IV of Chapter 373, F.S., in accordance with Section 373.441, F.S.

4. "Alter" means to extend a dam or works beyond maintenance in its original condition, including changes which may increase or diminish the flow or storage of surface water which may affect the safety of such dam or works [Section 373.403(7), F.S.]. Routine custodial maintenance and repairs shall not constitute alterations.

5. "Appurtenant works" means any artificial improvements to a dam which might affect the safety of such dam or, when employed, might affect the holding capacity of such dam or of the reservoir or impoundment created by such dam. [Section 373.403(2), F.S.]

6. "Aquatic plant" means a plant, including the roots, which typically floats on water or requires water for its entire structural support, or which will desiccate outside of water.

7. "Aquatic preserves" means those areas designated in Part II, Chapter 258, F.S.

8. "Aquifer" shall mean a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells, springs, or surface water.

9. "Aquitard" or "Confining Layer" means a layer of low permeability material, such as clay or rock, adjacent to an aquifer that functions to prevent the transmission of significant quantities of groundwater flow under normal hydraulic gradients.

10. "Artificial structure" means any object constructed or installed by man which has a water management effect, including, but without limitation thereof, dikes, levees, embankments, ditches, canals, conduits, channels, culverts, and pipes.

11. "Artificial waters," "artificial waterway," "artificially created waterway," or "artificial watercourse" means bodies of water that were totally excavated from uplands, do not overlap historic wetlands or other surface waters, and were not created as a part of a mitigation plan.

12. "As-Built drawings" or "record drawings" means plans certified by a registered professional that accurately represent the constructed condition of a project, including identifying any substantial deviations from the permitted design. See subparagraph 62-330.310(4)(a)1, F.A.C.

13. "Average annual nutrient load or loading" means the product of annual runoff volumes and land use appropriate event mean nutrient concentrations for total phosphorus (TP) and total nitrogen (TN).

14. "Best Management Practice (BMP) for sediment and erosion control" means a practice or combination of practices, based on research, field-testing, and expert review, to be the most effective and practicable, including economic and technological considerations, to prevent or reduce erosion processes and sediment transport downstream.

15. "Best Management Practice (BMP) for stormwater treatment" means a practice or combination of practices, based on research, field-testing, and expert review, to be the most effective and practicable, including economic and technological considerations, of improving water quality by reducing excess nutrients and other pollutant loads in water. Traditional BMPs for stormwater treatment are identified and described in Appendix O and the applicable AH Volume II, while provisions for proposing alternative BMPs are specified in section 9.5.2 of this Volume.

16. "Borrow pit" means a location where the soil or other natural deposits on or in the earth are removed from their location so as to make them suitable for use to build up land. No processing is involved, except for the use of a scalping screen to remove large rocks, wood, and other debris. The materials are used more for their bulk than their intrinsic qualities.

17. "Canal" means a man-made trench, the bottom of which is normally covered by water, with the upper edges of its two sides normally above water. [Section 403.803(2), F.S.]

18. "Canopy" means the plant stratum composed of all woody plants and palms with a trunk four inches or greater in diameter at breast height, except vines.

19. "Channel" means a trench, the bottom of which is normally covered entirely by water, with the upper edges of one or both of its sides normally below water. [Section 403.803(3), F.S.]

20. "Common plan of development or sale" or "larger plan of other commercial or residential development" means any activity that facilitates the advancement of land use (such as multiple residences, a residential subdivision, or phased site development) on the subject property, or that comprises a total land area divided into multiple lots, parcels, tracts, tiers, blocks, sites, or units, if such areas are under common ownership or control. This includes any activity on contiguous real property that comprises a total land area divided into parcels, tracts, tiers, blocks, sites, or units, and is served by a common road or road network or common stormwater management systems within that land area. Areas of land that are divided by public or private roads are considered contiguous if such areas are under common ownership or control.

21. "Completion of construction" means the time when all components of the project are installed and fully functional or when the infrastructure is used for its intended purpose, whichever occurs first. For a phased system, "completion of construction" means the time when all components for a phase of the project are installed and fully functional, or when the infrastructure for a phase is used for its intended purpose, whichever occurs first.

22. "Construction" means the creation, alteration, or abandonment of any project, including placement of fill, land clearing, earthwork, or the placement or removal of structures. Cutting of trees or removal of vegetation is not considered land clearing, except where it involves stump removal, root raking, or grubbing.

23. "Construction phase" means that period necessary to construct, alter, abandon, or remove a system in accordance with the terms and conditions of an individual permit.

24. "Conversion," for purposes of wetland mitigation, means a man-made change to a wetland [as defined in Section 373.019(27), F.S.], or surface water by draining, filling, or other means which results in the permanent change of the wetland or surface water to an upland.

25. "Coral" means living stony coral and soft coral.

26. "Creation" means the establishment of new wetlands or surface waters by conversion of other land forms.

27. "Dam" means any artificial or natural barrier, with appurtenant works, raised to obstruct or impound, or which does obstruct or impound, any of the surface waters of the state [Section 373.403(1), F.S.]

28. "Department" means the Florida Department of Environmental Protection.

29. "Detention" means the collection and temporary storage of stormwater with subsequent gradual release of the stormwater downstream.

30. "Detention with filtration" means the selective removal of pollutants from stormwater by the collection and temporary storage of stormwater and the subsequent gradual release of the stormwater downstream through an appropriately-sized engineered media or filter system.

31. "Diameter at Breast Height (DBH)" means the diameter of a plant's trunk or main stem at a height of 4.5 feet above the ground.

32. "Direct Hydrologic Connection" means a surface water connection which occurs on an average of 30 or more consecutive days per year. In the absence of reliable hydrologic records, a continuum of naturally occurring wetlands may be used to establish a direct hydrologic connection.

33. "Directly connected impervious area" or "DCIA" means the area covered by a building, impermeable pavement, and/or other impervious surfaces, which drains directly into a conveyance system without first flowing across sufficient permeable vegetated land area, as referenced in section 9.2 of this Volume, to allow for infiltration of runoff.

34. "Discharge" means to allow or cause water to flow.

35. "District" means a water management district created pursuant to Section 373.069, F.S.

36. "Dock" means a fixed or floating structure extending from land out over water, including access walkways, terminal platforms, catwalks, mooring pilings, lifts, davits, and other associated water-dependent structures, used for mooring and accessing vessels.

37. "Downstream Hazard Potential" means the category of a dam that indicates its potential adverse impact on the downstream areas should the dam or its appurtenant structures fail or be mis-operated. The Downstream Hazard Potential reflects probable loss of human life or adverse impacts on economic, environmental, or lifeline interests, or other concerns, such as water quality degradation. The Downstream Hazard may be one of three categories: High Hazard Potential, Significant Hazard Potential, and Low Hazard Potential. The categories and methodologies to evaluate each are described in Appendix L in this Volume.

38. "Drainage basin" means a subdivision of a watershed [Section 373.403(9), F.S.].

39. "Drainage ditch" or "irrigation ditch" means a man-made trench that is dug for the purpose of draining water from the land or for transporting water for use on the land and that is not built for navigational purposes. [Section 403.803(7), F.S.]

40. "Dredging" means excavation, by any means, in surface waters or wetlands, as delineated in Section 373.421(1), F.S. Dredging also means the excavation, or creation, of a water body which is, or is to be, connected to surface waters or wetlands, as delineated in Section 373.421(1), F.S., directly or via an excavated water body or series of water bodies [Section 373.403(13), F.S.]

41. "e-Permitting website" means the Agency's Internet address established to provide for submittal and viewing of applications and notices, responses to requests from the Agencies, reports, certifications, and other submittals.

42. "Ecological value" means the value of functions performed by uplands, wetlands and other surface waters to the abundance, diversity, and habitats of fish, wildlife, and listed species. These functions include, but are not limited to, providing cover and refuge; breeding, nesting, denning, and nursery areas; corridors for wildlife movement; food chain support; and natural water storage, natural flow attenuation, and water quality improvement, which enhances fish, wildlife and listed species utilization. [Section 373.403(18), F.S.]

43. "Embedded" means the placement of transmission or distribution lines, pipes or cables into the bottom of surface waters by minimal displacement of bottom material and without the creation of a trench, or trough, through the use of techniques such as plowing-in, weighing-in, or non-trenching jets.

44. "Emergency Action Plan" means a plan of action to be taken to reduce the potential for loss of human life and impacts to economic, environmental, and lifeline interests, and other concerns, such as water quality degradation, from failure or mis-operation of a dam or its appurtenant structures.

45. "Endangered or threatened species" means those animal species that are identified as endangered or threatened by the US Fish and Wildlife Service, the National Marine Fisheries Service, or the Florida Fish and Wildlife Conservation Commission, as well as those plant species identified as endangered or threatened when such plants are located in a wetland or other surface water.

46. "Enhancement" means improving the ecological value of wetlands, other surface waters, or uplands in comparison to their current condition.

47. "Entrenchment" means the placement of transmission or distribution lines, pipes or cables into the bottoms of waters of the state by the creation of a defined trench, or trough, through the use of such devices as clamshells, dredges, trenching jets, or other devices that produce similar results.

48. "Estuary" means a semi-enclosed, naturally existing coastal body of water which has a free connection with the open sea and within which seawater is measurably diluted with fresh water derived from riverine systems. [Section 373.403(15), F.S.]

49. "Existing nesting or denning" refers to an upland site that is currently being used for nesting or denning, or is expected, based on reasonable scientific judgment, to be used for such purposes based on past nesting or denning at the site.

50. "Exotic species" means a plant species introduced to Florida, purposefully or accidentally, from a natural range outside of Florida, including naturalized exotic species (an exotic plant that sustains itself outside cultivation) and invasive exotic species (an exotic plant that not only has naturalized, but is expanding on its own in Florida native plant communities). Additional information on Florida's exotic plant species is available at: http://www.fleppc.org/.

51. "Farm pond" means a pond located on agricultural lands as defined in Section 193.461, F.S, used for agricultural activities as described in Section 403.927, F.S.,

and constructed, altered, maintained, and operated using the agricultural best management practices as provided in Section 403.927, F.S.

52. "Filling" means the deposition, by any means, of materials in wetlands or other surface waters, as delineated in Section 373.421(1), F.S. [Section 373.403(14), F.S.]

53. "Floodplain" means land area subject to inundation by flood waters from a river, watercourse, or lake. Floodplains are delineated according to their estimated frequency of flooding.

54. "Forested wetlands," for purposes of how this term is used in the exemptions and general permits in Chapter 62-330, F.A.C., means those wetlands where the canopy coverage by trees with a diameter at breast height of greater than 4 inches is greater than 10 percent, as well as those areas required to be planted with tree species to establish or reestablish forested wetlands pursuant to a permit issued, or enforcement action taken, under rules adopted under Part IV of Chapter 373, F.S., or Sections 403.91 through 403.929, F.S. (1984 Supp.), as amended, and those areas where the canopy has been temporarily removed but are expected to revegetate to a forested wetland if use of the area would remain unchanged.

55. "Governing Board" means the governing board of a water management district created under Section 373.069, F.S.

56. "Groundwater" means water beneath the surface of the ground, whether or not flowing through known and definite channels [Section 373.019(9), F.S.]

57. "Herbaceous wetlands," for purposes of how this term is used in the general permits in Chapter 62-330, F.A.C., means those wetlands dominated by non-woody vegetation that have less than a 10 percent canopy coverage of tree species with a diameter at breast height of greater than 4 inches, and/or subcanopy or woody shrub species with a diameter at breast height of one inch to four inches.

58. "Hydrologic Unit Code" or "HUC" means the hydrologic cataloging unit assigned to a geographic area representing a surface watershed drainage basin. A complete list of Hydrologic Unit Codes, descriptions, names, and drainage areas, including subregions, can be found in the United State Geological Survey (USGS) Water-Supply Paper 2294, entitled "Hydrologic Unit Maps." A nationally consistent watershed dataset that is subdivided into six levels (12-digit HUCs or HUC 12) is available from the USGS and United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) National Cartographic and Geospatial Centers (NCGC) and linked on the Department's website: https://fdep.maps.arcgis.com/apps/mapviewer/index.html?webmap=ef1fbbf08fec46de8b1acaa8a8abcfae.

59. "Hydroperiod" means the duration and range of elevation of inundation in a wetland.

60. "Impaired water" means a water body or water body segment that does not meet its applicable water quality standards as set forth in Chapters 62-302 and 62-4, F.A.C., due in whole or in part to discharges of pollutants from point or nonpoint sources.

Impaired waters include those waters on the verified list of impaired waters pursuant to Part IV of Chapter 62-303, F.A.C.; waters with a Total Maximum Daily Load (TMDL) pursuant to Chapter 62-304, F.A.C.; waters with an alternative restoration plan pursuant to Chapter 62-303.600, F.A.C.; as well as waters with other evidence demonstrating that water quality standards are not being met. Pursuant to Rule 62-303.150, F.A.C., the inclusion of a water on the planning or study lists shall not be used as evidence of a waterbody failing to meet applicable water quality standards.

61. "Impervious" for purposes of applying permitting thresholds and exemption criteria, means surfaces that do not allow, or minimally allow, the penetration of water, including semi-impervious areas, but excluding wetlands or other surface waters. For other purposes, "impervious" means all artificial surfaces that that are not pervious. Included as examples are building roofs and normal concrete and asphalt pavements.

62. "Impoundment" means any lake, reservoir, pond, or other containment of surface water occupying a bed or depression in the earth's surface and having a discernible shoreline. [Sections 373.403(3) and 373.019(10), F.S.]

63. "Insect control impoundment dikes" means artificial structures, including earthen berms, constructed and used to impound waters for the purpose of insect control. [Section 403.803(10), F.S.]

64. "Isolated wetland" means any area that is determined to be a wetland in accordance with Chapter 62-340, F.A.C., but that does not have any connection to other wetlands or other surface waters via wetlands or other surface waters as determined using Rule 62-340.600, F.A.C.

65. "Lagoon" means a naturally existing coastal zone depression which is below mean high water and which has permanent or ephemeral communications with the sea, but which is protected from the sea by some type of naturally existing barrier. [Section 373.403(16), F.S.]

66. "Levee" means an embankment whose primary purpose is to furnish flood protection from seasonal high water and which is therefore subject to water loading for periods of only a few days or weeks a year. Levees may be classified as urban levees that provide protection from flooding in communities, including their industrial, commercial, and residential facilities, or as agricultural levees that provide protection from flooding in lands used for agricultural purposes. The primary purpose of a levee is to exclude flood waters from a portion of the floodplain, and may consist of embankments, floodwalls, pipes and associated drainage features, closures, pumping stations, floodways, and designed channels.

67. "Levee system" is composed of one or more levee segments and associated structures, and may include stormwater treatment areas, flow equalization basins that are less than four feet in water depth, and levees that bound water conservation and wildlife refuge areas. These are designed in accordance with USACE EM 1110-2-1913, Engineering and Design, Design and Construction of Levees, and constructed and operated in accordance with sound engineering practices.

68. "Lifeline" means systems that enable the continuous operation of critical business and government functions and is essential to human health and safety or economic security, e.g. evacuation roads, power stations, and drinking water treatment and supply facilities.

69. "Listed Species" means those species that are endangered or threatened species (as defined in definition 2.0(a)45., above), or species of special concern (as defined in definition 2.0(a)113., below).

70. "Littoral zone" means that portion of a stormwater management system that is designed to contain rooted emergent plants.

71. "Mail" shall mean when a document is properly addressed, stamped, and deposited in the United States mail, and the postmark date shall be the date of mailing. "Mail" also shall mean when the Agency electronically sends a document to the e-mail address provided to the Agency.

72. "Maintenance" or "Repair" means remedial work of a nature as may affect the safety of any dam, impoundment, reservoir, or appurtenant work or works, but excludes routine custodial maintenance. [Section 373.403(8), F.S.]

73. "Material," when used in the context of "filling," means matter of any kind, such as, sand, clay, silt, rock, dredged material, construction debris, solid waste, pilings or other structures, ash, and residue from industrial and domestic processes. The term does not include the temporary use and placement of lobster pots, crab traps, or similar devices or the placement of oyster cultch pursuant to Section 597.010, F.S.

74. "Mine" means an area of land that is related to the removal from its location of solid substances of commercial value found in natural deposits on or in the earth, so as to make the substances suitable for commercial, industrial, or construction use, but does not include excavation solely in aid of on-site farming or on-site construction, nor the process of prospecting. As used in Chapter 62-330, F.A.C., this does not include mining operations conducted in conjunction with land development that will result in residential, industrial, commercial, or land fill uses at the end of construction. Borrow pits that use extracted material in on-site locations are not mines. For the purposes of this definition, "on-site" means, "within the contiguous limits of an area of land under one ownership or control, and upon which agricultural or construction projects are taking place. Areas of land that are divided by public or private roads are considered contiguous if such areas are under one ownership or control."

75. "Mitigation" means an action or series of actions to offset the adverse impacts that would otherwise cause an activity regulated under Part IV of Chapter 373, F.S., to fail to meet the criteria set forth in Sections 10.1.1 through 10.2.8.2 of this Volume. Mitigation usually consists of restoration, enhancement, creation, preservation, or a combination thereof.

76. "Mitigation bank," "Mitigation bank permit," "Mitigation banker" or "banker," "Mitigation credit," and "Mitigation service area" shall have the same meanings as provided in Chapter 62-342, F.A.C.

77. “Natural systems” for the purpose of this rule means an ecological system supporting aquatic and wetland-dependent natural resources, including fish and aquatic and wetland-dependent wildlife habitat.

78. “Nuisance species” means any species of flora or fauna whose noxious characteristics or presence in sufficient number, biomass, or areal extent that prevents, or interferes with, uses or management of resources, and which are native or naturalized in the area where it occurs.

79. “Obstruction” means any fill, structure, work, appurtenant work, or system placed in waters, a floodway, or a work of the district which may impede the flow of water or otherwise result in increased water surface elevations.

80. “Offsite regional mitigation” means mitigation on land off of the site of an activity permitted under Part IV of Chapter 373, F.S., where an applicant proposes to mitigate the adverse impacts of only the applicant's specific activity as a requirement of the permit, which provides regional ecological value, and which is not a mitigation bank permitted under Section 373.4136, F.S. [Section 373.403(22), F.S.]

81. “Operate” or “operation” means to cause or to allow a project, or a completed independent phase thereof, to function.

82. “Ordinary high water line” or “OHWL,” for the regulatory purposes of Chapter 62-330, F.A.C., means that point on the slope or bank where the surface water from the water body ceases to exert a dominant influence on the character of the surrounding vegetation and soils. The OHWL frequently encompasses areas dominated by non-listed vegetation and non-hydric soils.

83. “Other surface waters” means surface waters as described and delineated pursuant to Rule 62-340.600, F.A.C., as ratified by Section 373.4211, F.S., other than wetlands.

84. “Other watercourse” means any canal, ditch, or other artificial watercourse in which water usually flows in a defined bed or channel. It is not essential that the flowing be uniform or uninterrupted. [Section 373.019(14), F.S.]

85. “Permanent pool” means that portion of a wet detention pond that normally holds water between the normal water level and the top of the anoxic zone or pond bottom, excluding any water volume claimed as wet detention treatment volume.

86. “Permit area” means the area where works occur as part of an activity requiring a permit under Part IV of Chapter 373, F.S., and any mitigation, buffer, and preservation areas, and all portions of the stormwater management system serving the project area.

87. “Pier” means a fixed or floating structure extending from land out over water, that is used primarily for fishing or swimming and not designed or used for mooring or accessing vessels.

88. "Pollution" is the presence in the outdoor atmosphere or waters of the state of any substances, contaminants, noise, or manmade or human-induced impairment of air or waters or alteration of the chemical, physical, biological, or radiological integrity of air or water in quantities or at levels which are or may be potentially harmful or injurious to human health or welfare, animal or plant life, or property or which unreasonably interfere with the enjoyment of life or property, including outdoor recreation unless authorized by applicable law. [Section 403.031(7), F.S.]

89. "Post-development condition" for nutrient loading determinations shall mean the average annual nutrient loading based on the proposed project area that would exist in accordance with the permitted project design.

90. "Predevelopment condition" for nutrient loading determinations shall mean the average annual nutrient loading based on the land use, land cover, and other site conditions that are legally in existence at the time of the application.

91. "Preservation" means the protection of wetlands, other surface waters or uplands from adverse impacts by placing a conservation easement as defined in and meeting the requirements of Section 704.06, F.S., over the property, or by donation of fee simple interest in the property to an entity having purposes as described in Section 704.06(3), F.S.

92. "Project" — see "system."

93. "Project area" means the area where works occur as part of an activity requiring a permit under part IV of Chapter 373, F.S., or Section 403.814, F.S.

94. "Prospecting" means activities considered normal and reasonably necessary to retrieve samples of subsurface geologic sediments for the specific purpose of locating, mapping, and determining the quality and quantity of sedimentary strata or natural deposits.

95. "Reclaimed water," except as specifically provided in Chapter 62-610, F.A.C., means water that has received at least secondary treatment and basic disinfection, and is reused after flowing out of a domestic wastewater treatment facility.

96. "Recreational path" means an improved lane, path, road, trail, or walkway, whether paved, cleared, or hardened with shell, clay, rock, or other materials, to provide a corridor for travel between destinations primarily by walking, biking, or use of non-internal combustion vehicles.

97. "Redevelopment" means the construction on sites having existing commercial, industrial, institutional, roadway, or residential land uses, excluding silviculture or agriculture, where the existing land use has not been previously permitted under Part IV of Chapter 373 F.S., where all or part of the existing impervious surface is removed and replaced with new impervious surface, which has the same or lesser area as the existing impervious surface, and the same or less intense land use, based on respective EMC values.

98. "Regional stormwater management system" means a system designed, constructed, operated, and maintained to collect convey, store, absorb, inhibit, treat, use or reuse stormwater to prevent or reduce flooding, overdrainage, environmental degradation and water pollution or otherwise affect the quantity and quality of discharges from multiple parcels and projects within the drainage area served by the regional system, where the term "drainage area" refers to the land or development that is served by or contributes stormwater to the regional system.

99. "Regional watershed" means a watershed as delineated in Rule 62-342.200, F.A.C.

100. "Registered Professional" means a professional registered or licensed by and in the State of Florida and practicing under Chapter 471, 472, 481, or 492, F.S.

101. "Remove" or "removal" means cessation of use and maintenance of a project, or part of a project, accompanied by elimination of all or part of the project.

102. "Reservoir" means any artificial or natural holding area that contains or will contain the water impounded by a dam. [Section 373.403(4), F.S.]

103. "Residential Canal System" means those canals whose uplands are occupied predominantly by residential single-family or multi-family dwelling units.

104. "Restoration" means converting back to a historic condition those wetlands, surface waters, or uplands that currently exist as a land form that differs from the historic condition. For phosphate mining and reclamation, "restoration" shall mean the recontouring and revegetation of the lands in a manner, consistent with the criteria and standards of Part II of Chapter 378, F.S., which will maintain or improve the water quality and functions of the biological systems present at the site prior to mining.

105. "Retention" means a system designed to prevent the discharge of a given volume of stormwater runoff into surface waters in the state by complete on-site storage. Examples are systems such as excavated or natural depression storage areas, pervious pavement with subgrade, or above ground storage areas.

106. "Reuse" means the deliberate application of reclaimed water, in compliance with Department and District rules, for a beneficial purpose.

107. "Riprap" means a sloping retaining structure or stabilization made to reduce the force of waves and to protect the shore from erosion, and consists of unconsolidated boulders, rocks, or clean concrete rubble with no exposed reinforcing rods or similar protrusions, and having a size large enough to be stable under normal hydrologic, tidal, and wave conditions unless a different specific size is specified by rule or permit.

108. "Routine custodial maintenance" means those activities described in **section 3.1.1** of this Volume.

109. "Seasonal High Water Level (SHWL)" means the elevation to which the ground and surface water can be expected to rise due to a normal wet season.

110. "Seawall" means a man-made wall or encroachment, except riprap, which is made to break the force of waves and to protect the shore from erosion. [Section 373.403(17), F.S.]

111. "Semi-impervious" means land surfaces that partially restrict the penetration of water, such as porous concrete and asphalt pavements, gravel, limerock, and certain compacted soils.

112. "Soil Survey" means a document prepared by the U.S. Natural Resources Conservation Service that provides soil maps and interpretations useful for guiding decisions about soil selection, use, and management.

113. "Species of special concern" means those species identified as such by the Florida Fish and Wildlife Conservation Commission.

114. "State-owned submerged lands" means those lands defined as "sovereignty submerged lands" in Rule 18-21.003, F.A.C., which are: "those lands including but not limited to, tidal lands, islands, sand bars, shallow banks, and lands waterward of the ordinary or mean high water line, beneath navigable fresh water or beneath tidally-influenced waters, to which the State of Florida acquired title on March 3, 1845, by virtue of statehood, and which have not been heretofore conveyed or alienated. For the purposes of [Chapter 18-21] sovereignty submerged lands shall include all submerged lands title to which is held by the Board."

115. "State water quality standards" means water quality standards adopted pursuant to Chapter 403, F.S. [Section 373.403(11), F.S.], including standards composed of designated most beneficial uses (classification of waters), the numerical and narrative criteria applied to the specific water use or classification, the Florida anti-degradation policy (Rules 62-4.242 and 62-302.300, F.A.C.), and the moderating provisions contained in Chapters 62-4, 62-302, 62-520, and 62-550, F.A.C.

116. "Stormwater" means the flow of water that results from, and that occurs immediately following, a rainfall event.

117. "Stormwater harvesting" means capturing stormwater for irrigation or other beneficial use.

118. "Stormwater management system" means a surface water management system that is designed and constructed or implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, over drainage, environmental degradation, and water pollution or otherwise affect the quantity and quality of discharges from the system. [Sections 373.403(10) and 403.031(16), F.S.]

119. "Stormwater Retrofit" means a project that adds treatment, attenuation, or flood control to an existing stormwater management system or systems but does not serve new development or redevelopment.

120. "Stormwater treatment system" means a component of stormwater management system specifically designed, constructed, or implemented to reduce the discharge of pollutants in stormwater by incorporating methods to collect, convey, store, absorb, treat, use, or harvest stormwater.

121. "Stormwater utility" means the entity through which funding for a stormwater management program is obtained by assessing the cost of the program to the beneficiaries based on their relative contribution to its need. It is operated as a typical utility that bills services regularly, similar to water and wastewater services.

122. "Stream" means any river, creek, slough, or natural watercourse in which water usually flows in a defined bed or channel. It is not essential that the flowing be uniform or uninterrupted. The fact that some part of the bed or channel shall have been dredged or improved does not prevent the watercourse from being a stream. [Section 373.019(20), F.S.]

123. "Structure" means anything constructed, installed, or portable, the use of which requires a location on a parcel of land. It includes a movable structure while it is located on the land which can be used for housing, business, commercial, agricultural, or office purposes either temporarily or permanently.

124. "Submerged grassbeds" means any native, herbaceous, submerged vascular plant community that is growing on the bottoms of surface waters waterward of the mean high water line or ordinary high water line.

125. "Surface water" means water upon the surface of the earth, whether contained in bounds created naturally or artificially or diffused. Water from natural springs shall be classified as surface water when it exits from the spring onto the earth's surface. [Section 373.019(21), F.S.]

126. "Swale" means a man-made trench that:

(a) Has a top width-to-depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or greater than three feet horizontal to one foot vertical;

(b) Contains contiguous areas of standing or flowing water only following a rainfall event;

(c) Is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake; and

(d) Is designed to take into account the soil erodibility, soil percolation, slope, slope length, and drainage area so as to prevent erosion and reduce pollutant concentration of any discharge. [Section 403.803(14), F.S.]

127. "System" or "surface water management system" means a stormwater management system, dam, impoundment, reservoir, appurtenant work, or works, or any combination thereof, including areas of dredging or filling, as those terms are defined in Sections 373.403(13) and (14), F.S. For purposes of Chapter 62-330, F.A.C., and this Handbook, the term "project" generally will be used in lieu of the term "system."

128. "Total land area" means land holdings under common ownership that are contiguous, or land holdings that are served by common surface water management facilities.

129. "Total maximum daily load," or TMDL, means the sum of the individual wasteload allocations for point sources and the load allocations for nonpoint sources and natural background as defined and applied in Chapter 62-303, F.A.C.

130. "Traversing work" means any artificial structure or construction that is placed in or across a stream or other watercourse, or an impoundment.

131. "Uplands" means areas that are not wetlands or other surface waters, as delineated pursuant to Rules 62-340.100 through 62-340.550, F.A.C., as ratified by Section 373.4211, F.S.

132. "Vertical seawall" is a seawall the waterward face of which is at a slope steeper than 75 degrees to the horizontal. A seawall with sloping riprap covering the waterward face to the mean high water line shall not be considered a vertical seawall.

133. "Vessel," is synonymous with "boat" as referenced in s. 1(b), Art. VII of the State Constitution, and includes every description of watercraft, barge, and airboat, other than a seaplane on the water, used or capable of being used as a means of transportation on water. [Section 327.02(43), F.S.]

134. "Water" or "waters in the state" means any and all water on or beneath the surface of the ground or in the atmosphere, including natural or artificial watercourses, lakes, ponds, or diffused surface water and water percolating, standing, or flowing beneath the surface of the ground, as well as all coastal waters within the jurisdiction of the state. [Section 373.019(22), F.S.]

135. "Water Management District" or "District" means a Water Management District created pursuant to Section 373.069, F.S.

136. "Water quality standards" or "State water quality standards" means those standards set forth in Chapters 62-4, 62-302, 62-520, and 62-550, F.A.C., including the antidegradation provisions of paragraphs 62-4.242(1)(a) and (b), F.A.C., subsections 62-4.242(2) and (3), F.A.C., and Rule 62-302.300, F.A.C.

137. "Waters of the state" shall be as defined in Section 403.031(13), F.S.

138. "Watershed" means the land area that contributes to the flow of water into a receiving body of water. [Sections 373.403(12) and 403.031(18), F.S.]

139. "Wet detention" means the collection and temporary storage of stormwater in a permanently wet impoundment in such a manner as to provide for treatment through physical, chemical, and biological processes with subsequent gradual release of the stormwater.

140. "Wetland Normal Pool Elevation" means the elevation of sustained water levels in a wetland during the wet season under normal conditions, as reflected by biological indicators. Normal pool elevation is lower than the SHWL.

141. "Wetlands," means those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto. [Section 373.019(27), F.S.] The landward extent of wetlands is delineated pursuant to Rules 62-340.100 through 62-340.550, F.A.C., as ratified by Section 373.4211, F.S.

142. "Work of the District" means those projects and works, including, but not limited to, structures, impoundments, wells, streams, and other watercourses, together with the appurtenant facilities and accompanying lands, which have been officially adopted by the governing board of the district as works of the district. [Section 373.019(28), F.S.]

143. "Works" means all artificial structures, including, but not limited to, ditches, canals, conduits, channels, culverts, pipes, and other construction that connects to, draws water from, drains water into, or is placed in or across the waters in the state [Section 373.403(5), F.S.] and includes all types of dredging and filling to create, remove, or locate structures in, on, or over wetlands or other surface waters.

144. "Zone of discharge" means a volume underlying or surrounding the site and extending to the base of a specifically designated aquifer or aquifers, within which an opportunity for the treatment, mixture or dispersion of wastes into receiving ground water is afforded.

(b) Definitions and terms that are not defined above shall be given their ordinary and customary meaning or usage of the trade or will be defined using published, generally accepted dictionaries, together with any rules and statutes of the Agencies that have additional authority over the regulated activities.

3.0 Regulated Activities

3.1 Permits Not Required

A permit is not required under Chapter 62-330, F.A.C., for activities listed in subsection 62-330.020(1), F.A.C. Components of those provisions are discussed below.

3.1.1 Routine Custodial Maintenance

The operation and routine custodial maintenance of projects legally in existence does not require a permit under paragraph 62-330.020(1)(a), F.A.C., provided they:

(a) Comply with the terms and conditions of any permit, exemption, or other authorization previously granted for the work being operated or maintained;

(b) Do not alter, modify, expand, abandon, or remove the existing work in a manner as to require a general permit under Rule 62-330.052, F.A.C., or an individual permit under Rule 62-330.054, F.A.C.

(c) Do not cause or contribute to violations of water quality standards in receiving waters.

(d) Are routine and custodial, having no more than a minimal adverse impact on the environment. To be considered routine custodial maintenance, the activity must occur on a frequent enough basis to ensure that the project continues to function as originally designed. The Agencies recognize that a partial loss of function will occur over a period of time prior to routine custodial maintenance. However, should the project be allowed to deteriorate over a period of time to the extent that it no longer functions as originally designed or proposed, then restoring the project to its original design is not exempt from the requirements to obtain a permit. Projects are considered to no longer function as designed when they no longer fulfill their originally intended purpose or the repairs needed to restore the project to original design are so extensive that they would cause more than a minimal adverse environmental impact. Some examples of originally intended purposes of projects are:

1. Stormwater systems;

2. Irrigation ditches – conveying water from a water source to a water use area;

3. Drainage ditches – draining lands to enable specific agricultural, residential, commercial or recreational land use;

4. Drainage ditches – draining lands to enable harvesting, site preparation, and regeneration of silvicultural lands during timber rotations;

5. Canals – conveying water for flood control or draining lands to enable specific land uses or navigational uses;

6. Channels – specific navigational uses; and

7. Dikes – preventing flooding to enable specific agricultural, urban or recreational land uses.

The only instance when repair of a non-functioning project would be routine custodial maintenance is when the project has lost functionality due to a sudden event such as a large storm. In such case, the repair must be conducted as soon as practical after the damage occurs, but in no case later than June 1 of the next calendar year after the damage occurred. This serves to ensure a continuity of function during the wet season, which generally occurs between June and October throughout the state. If this deadline would result in a substantial hardship or would violate principles of fairness, the maintenance entity may seek a variance or waiver from this requirement pursuant to Section 120.542, F.S.

The evaluation of environmental impacts will compare the environmental conditions prior to conducting the proposed maintenance activity with the expected environmental conditions that would result from the proposed maintenance. Environmental impacts that are considered to be more than minimal include: changing water levels in wetlands or other surface waters in a manner that adversely impacts fish and wildlife or their habitat as provided in paragraph 62-330.301(1)(d); changing water levels off-site in a manner that causes flooding or other adverse impacts as described in paragraph 62-330.301(1)(a), (b), or (c), F.A.C.; or causing a violation of state water quality standards in receiving waters, as described in paragraph 62-330.301(1)(e), F.A.C.

3.1.2 "Grandfathered Activities"

A permit is not required under Chapter 62-330, F.A.C., to conduct certain activities that are "grandfathered" in accordance with the statutory provisions listed in paragraph 62-330.020(1)(c), F.A.C. Such projects are authorized to remain in existence, to remain operating, or may be constructed under the stormwater, dredge and fill, and management and storage of surface waters (MSSW) statutes and rules that existed prior to certain dates as specified below, as long as the terms and conditions of any issued permit, exemption, or other authorization for such project continue to be met, unless the applicant elects review under Chapter 62-330, F.A.C.:

(a) The effective date of the ERP program (October 3, 1995) throughout Florida, except within the geographical area of the NWFWMD, for activities under Sections 373.414(11), (12)(a), (13), (14), (15), or (16), F.S. The text of these provisions must be followed very carefully. A copy of those provisions is included in the "References and Design Aids" for Volume I, available at https://floridadep.gov/water/water/content/water-resource-management-rules#erp. The following is just a brief overview, and should not be considered a complete guide to their implementation:

1. Activities approved under a valid stormwater permit under Chapters 17-25 or 62-25, F.A.C., a dredge and fill permit under Chapters 17-312 or 62-312, F.A.C., or an MSSW permit under the rules of the applicable District in effect prior to October 3, 1995. Most of these permits have now expired, but the operation and maintenance phase of those activities permitted under the stormwater and MSSW rules remains in effect in perpetuity.

2. Activities within a valid jurisdictional declaratory statement submitted prior to October 3, 1995.

3. Activities for which an application was pending on June 15, 1994, and complete prior to October 3, 1995, under Chapters 17-25 or 62-25, F.A.C., Chapters 17-312 or 62-312, F.A.C., or a management and storage of surface waters (MSSW) permit under the rules of the applicable District. Most of these applications have already been permitted, denied, or withdrawn.

4. Projects legally in existence, including those in operation and those that for which construction had commenced in accordance with an exemption under Part IV of Chapter 373, F.S., or Part V of Chapter 403, F.S., prior to October 3, 1995. Most of the exemptions continue to exist in Sections 373.406 and 403.813, F.S.; to the extent an activity meets the terms and conditions of an exemption, a permit under Chapter 62-330, F.A.C., is not required.

5. Activities associated with mining operations that are included in a conceptual reclamation plan or modification submitted prior to July 1, 1996, under Sections 378.201 through 378.212, and 378.701 through 378.703, F.S.

(b) The effective date of Phase I of the ERP program within the NWFWMD (October 1, 2007), was limited to certain stormwater management systems that were either legally in existence, permitted under Chapter 62-25, F.A.C., or did not require a permit under that chapter. The effective date of Phase II of the ERP program within the NWFWMD (November 1, 2010), was expanded to all systems, including dredging and filling in, on, or over wetlands and other surface waters, including isolated wetlands. In accordance with Section 373.4145(6), F.S., the following shall continue to be governed by Section 373.4145, F.S., as it was in effect in 1994. The text of these provisions must be followed very carefully — see: http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0373/Sections/0373.414.html; the following is just a brief overview, and should not be considered a complete guide to their implementation.

1. The operation and routine custodial maintenance of projects legally in existence as long as the terms and conditions of the permit, exemption, or other authorization for such projects continue to be met. Additional discussion on routine custodial maintenance is contained in **section 3.1.1, above.**

2. Activities approved in a permit issued pursuant to Section 373.4145, F.S. (1994).

3. Activities proposed in applications under Chapter 62-25, F.A.C., received and completed before November 1, 2010.

4. Any modification of the plans, terms, and conditions of a permit issued pursuant to Section 373.4145, F.S. (1994) that lessens the environmental impact, except that any such modification shall not extend the time limit for construction beyond two additional years.

These provisions shall not apply to any project that is altered or modified in a manner that: increases the water resource impact; increases the duration for construction beyond two additional years; or involves expansion, abandonment, or removal of a project after October 1, 2013.

(c) The following shall continue to be governed by the rules adopted by the Agencies under Part IV of Chapter 373, F.S., in effect before the effective date of Chapter 62-330, F.A.C.,

implementing Section 373.4131, F.S., unless the applicant elects review in accordance with Chapter 62-330, F.A.C., as it exists after that date:

1. Operation and maintenance of any project that was legally in existence before October 1, 2013, as long as the terms and conditions of the permit, exemption, or other authorization for such activity continue to be met.

2. Activities determined in writing by the Agency to be exempt from permitting under Part IV of Chapter 373, F.S., including self-certifications submitted to an Agency before October 1, 2013, as long as the terms and conditions of the exemption continue to be met.

3. Activities approved in a permit Part IV of Chapter 373, F.S., before October 1, 2013 and the review of activities proposed in a permit application that was complete before October 1, 2013. This includes any modification of such a permit, including new activities within the originally permitted project area that lessens or does not increase impacts. However, a permit modification under Chapter 62-330, F.A.C., October 1, 2013, is required if:

   a. The project will cause additional or substantially different water resource impacts, or

   b. The project does not qualify as a minor or "letter" modification under Rule 62-330.315, F.A.C.

(d) Appendix D of the NWFWMD Volume II contains guidance on the extent to which alteration of a system previously permitted under Rule 17-4.248, F.A.C. (in effect between March 1, 1979, and February 1, 1982), or Chapter 62-25, F.A.C. (Chapter 17-25, F.A.C., between February 1, 1982, and July 1994), is subject to the permitting requirements of Chapter 62-330, F.A.C.

(e) Stormwater criteria throughout Volume I and Volume II was updated effective [effective date]. The updated requirements are applicable to project applications as indicated in the respective updated sections, and as described below:

1. When public transportation projects have received an individual permit prior to [effective date], such activities will remain subject to the rules in effect at the time of issuance, including any associated modifications necessary to accommodate design changes solely for the purposes of public safety or design changes that do not increase the overall impervious surface area by more than 10 percent.

2. For permit modifications, submitted no later than five years from [effective date], for permitted public transportation projects which include stormwater ponds that were sized and permitted to collect stormwater from future public transportation projects, such projects shall be subject to the rules in existence at the time the stormwater management pond was permitted, so long as the treatment capacity for future public transportation projects was specified in the application materials submitted to the agency at the time of the original permit application.

3. For projects and activities not covered by subparagraphs 1. and 2. above, those projects and activities that were approved by an unexpired conceptual, general, or

individual Environmental Resource Permit, Management and Storage of Surface Waters Permit, or Surface Water Management Permit issued prior to [effective date] shall be exempt from the amendments to Chapter 62-330, F.A.C., and Volume I adopted on [effective date], and the corresponding amendments to the applicable Volume II. This exemption shall apply to any modification of such permit that is not a major modification or that does not cause substantially different water resource impacts, and to the subsequent permits to construct and operate the future phases consistent with an unexpired conceptual approval permit. This exemption shall also apply to transfers of such permits, or conversion of such permits to the operation phase, on or after [effective date]; however, such operation phase permits shall be subject to the Inspections and Reporting Requirements of sections 12.5 and 12.6 of this Volume. A modification of a permit qualifying for this exemption shall be reviewed under the rules in effect at the time the permit was originally issued, unless the applicant elects to have such modification reviewed under the rules adopted on [effective date]. Any modification of such permit for the construction of a new dam or major modification of an existing permit for a dam, as defined in paragraph 2.0(a)27 above, shall be subject to the criteria of sections 8.4.5 and Appendix L, if applicable to such permit modification.

4. Projects or activities that are the subject of a general or individual permit application that is deemed complete on or before [effective date + 12 months] shall be exempt from the amendments to Chapter 62-330, F.A.C., and Volume I adopted on [effective date], and the corresponding amendments to the applicable Volume II.

3.1.3 "10/2 General Permit"

Paragraph 62-330.020(1)(d), F.A.C., is a reference to activities in uplands having less than 10 acres of total project area and less than two acres of impervious surface that can qualify for the general permit in Section 403.814(12), F.S. (referred to as the "10/2" general permit). This is not a general permit under Chapter 62-330, F.A.C., and does not require submittal of the notice specified in subsection 62-330.402(1), F.A.C., but does require submittal of an electronic self-certification attesting to compliance with the general permit. DEP has a portal at http://www.fldepportal.com/go/ that enables persons to submit a variety of self-service authorizations for exempt and general permit activities online, including certifying qualification for the 10/2 general permit. DEP's portal can be used regardless of whether regulation of the activity in the absence of the general permit would be the responsibility of the DEP, a WMD, or a delegated local government under the Operating Agreements between the Agencies. **This Volume and Volume II** contain design and performance standards that are relevant to the design of activities that qualify for this general permit.

3.1.4. Permit Thresholds

Unless it is not regulated or is exempt under subsection 62-330.020(1), F.A.C. (as discussed above in sections **3.1 through 3.1.3**, above), a permit is required for any activity that, by itself or in combination with any other activity conducted after October 1, 2013, cumulatively exceeds any of the thresholds in paragraphs 62-330.020(2)(a) through (j), F.A.C. Some provisions of those thresholds are explained below:

(a) Examples of impervious or semi-impervious surface area subject to vehicular traffic, as provided in paragraph 62-330.020(2)(b), F.A.C., are roads, parking lots, driveways, and

loading zones. The terms "impervious" and "semi-impervious" are defined in paragraphs 2.0(a)51 and 92, respectively, of this Volume. The total impervious and semi-impervious surface areas in paragraph 62-330.020(2)(c), F.A.C., include those areas described in paragraph 62-330.020(2)(b), F.A.C.

(b) The term "project area," as used in paragraph 62-330.020(2)(d), F.A.C., is defined in paragraph 2.0(a)75 of this Volume, and generally is the area, including mitigation, where works (essentially movement of earth, or construction or alteration of structures) occur as part of an activity requiring a permit.

(c) As referenced in paragraph 62-330.020(2)(i), F.A.C., District-specific thresholds are in **section 1.2** of each Volume II.

(d) The term "common plan of development or sale" is defined in section **2.0(a)20.** of this Volume.

(e) Section 373.4132, F.S. provides additional information on dry storage facilities that are not subject to permitting under paragraph 62-330.020(2)(h), F.A.C.

(f) Activities that do not exceed the thresholds in paragraphs 62-330.020(2)(a) through (j) must not:

1. Cause adverse water quantity impacts to receiving waters and adjacent lands. Volume II applicable to the geographical location of the activity provides design and performance standards for meeting this criterion;

2. Cause adverse flooding to on-site or off-site property. Volume II applicable to the geographical location of the activity provides design and performance standards for meeting this criterion;

3. Cause adverse impacts to existing surface water storage and conveyance capabilities. Volume II applicable to the geographical location of the activity provides design and performance standards for meeting this criterion;

4. Cause or contribute to a violation of the water quality standards. Those standards are contained in Chapter 62-302, F.A.C., and Rule 62-4.242, F.A.C., for all surface waters, including the anti-degradation requirements for Outstanding Florida Waters, and Chapters 62-520 and 62-550, F.A.C., for ground waters; or

5. Cause adverse secondary or cumulative impacts to the water resources by itself, or in combination with existing activities. See Sections **10.2.7 and 10.2.8** for discussion of how the Agency evaluates the potential for secondary and cumulative impacts.

The above do not need to be evaluated by the Agencies prior to conducting activities that do not exceed the thresholds in subsection 62-330.020(2), F.A.C. However, persons are subject to potential enforcement if the construction or operation of such projects results in any of the adverse effects in (f)1 through 5, above, or the project is discovered to exceed the thresholds in subsection 62-330.020(2), F.A.C.

(g) A "Works of the District" permit pursuant to Chapter 40A-6, F.A.C. (within the NWFWMD), Chapter 40B-4, F.A.C. (within the SRWMD), and Chapter 40E-6, 40E-61, 40E-62, or 40E-63, F.A.C. (within the SFWMD), is required within those WMDs if the activity involves connection with, placement of structures in or across, or otherwise makes use of Works of the District.

3.2 Exemptions

A permit is not required for activities that are exempt under Section 373.406, 373.4145(3), or 403.813, F.S., Rule 62-330.051 or 62-330.0511, F.A.C., or Section 1.3 (District-specific exemptions) of the applicable Volume II (see Rule 62-330.020(1)(b), F.A.C.). Explanations of some of those exemptions are provided below.

Except where required by the terms of the exemption, an application or notice to the Agency is not required for activities that meet all the terms and conditions of an exemption. However, such exemptions do not provide the authorization that may be required from other local, state, regional, or federal agencies. For example, exempt activities that occur on state-owned submerged land may require a separate letter of consent, easement, or lease under Chapters 253 and 258, F.S., and Chapters 18-20 and 18-21, F.A.C., as applicable. Activities that are exempt from ERP permitting under Rules 62-330.051 or 62-330.0511, F.A.C., may require separate permitting from the USACE (see **sections 1.3.1 through 1.3.1.2, above**).

If a person desires verification that an activity qualifies for an exemption, and information on potential state-owned submerged lands authorization, the request must be submitted following Rule 62-330.050, F.A.C., and **sections 4.2.1 and 4.4 of this Volume**.

3.2.1 Agriculture and Forestry

(a) Section 373.406(2), F.S., states that "…[N]othing herein, or in any rule, regulation, or order adopted pursuant hereto, shall be construed to affect the right of any person engaged in the occupation of agriculture, silviculture, floriculture, or horticulture to alter the topography of any tract of land, including, but not limited to, activities that may impede or divert the flow of surface waters or adversely impact wetlands, for purposes consistent with the normal and customary practice of such occupation in the area. However, such alteration or activity may not be for the sole or predominant purpose of impeding or diverting the flow of surface waters or adversely impacting wetlands."

Within the Panhandle, the NWFWMD reviews agricultural and forestry activities that are not exempt using Chapter 40A-44, F.A.C.; they will not require a separate ERP under Chapter 62-330, F.A.C., for those activities. The other Districts regulate agriculture and silviculture activities that do not qualify for the exemption using Chapter 62-330, F.A.C., and the Applicant's Handbook. The SJRWMD also uses Chapter 40C-44, F.A.C., for such regulation.

(b) Section 373.406(3), F.S., provides that "Nothing herein, or in any rule, regulation or order adopted pursuant hereto, shall be construed to be applicable to construction, operation, or maintenance of any agricultural closed system." A "closed system" is defined in Section 373.403(6), F.S., and a surface water management permit is not required for such systems. This subsection shall not be construed to eliminate the need to meet generally accepted

engineering practices for the design, construction, operation, and maintenance of dams, dikes, or levees.

(c) The SWFWMD has a voluntary Agricultural Ground and Surface Water Management (AGSWM) program to assist the agriculture industry in implementing best management practices designed to minimize adverse impacts to water resources. See **section 1.3 of the SWFWMD Volume II** for additional information.

(d) DEP will regulate activities on agricultural or forestry lands that are non-agricultural in nature and that are otherwise the responsibility of DEP in accordance with the Operating Agreements between the Agencies, such as an individual single-family residence, duplex, triplex, or quadruplex that is incidental to an agriculture or forestry activity, or a concentrated animal feeding operation (CAFO) operating under an Industrial Waste Permit issued by DEP.

(e) Construction or alteration of systems such as roads for future development will not be considered agriculture or silviculture activities, and will be regulated under Chapter 62-330, F.A.C.

3.2.2 Individual Single-Family Residence, Duplex, Triplex, or Quadruplex

(a) Subsection 62-330.051(13), F.A.C., exempts from the noticing and permitting requirements of Chapter 62-330, F.A.C., the construction or private use of an individual, single-family dwelling unit, duplex, triplex, or quadruplex that:

1. Is not part of a larger common plan of development or sale;

2. Does not involve work in wetlands or other surface waters; and

3. Does not require a modification of a permit issued under part IV of Chapter 373, F.S.

This exemption does not apply within the Wekiva River Protection Area within Lake, Seminole, and Orange Counties (see **section 1.2 of the SJRWMD Volume II**).

(b) Section 403.813(1)(q), F.S., exempts the construction, operation, or maintenance of stormwater management facilities that are designed to serve single-family residential projects, including duplexes, triplexes, and quadruplexes, if they are less than 10 acres total land and have less than 2 acres of impervious surface and if the facilities:

1. Comply with all regulations or ordinances applicable to stormwater management and adopted by a city or county;
2. Are not part of a larger common plan of development or sale; and
3. Discharge into a stormwater discharge facility exempted or permitted by DEP under this chapter which has sufficient capacity and treatment capability as specified in this chapter and is owned, maintained, or operated by a city, county, special district with drainage responsibility, or water management district; however, this exemption does not authorize discharge to a facility without the facility owner's prior written consent.

Activities qualifying for the provisions in **paragraph (a) or (b), above,** are not required to comply with the provisions in the **Volume II**.

3.2.3 Maintenance Dredging and Maintenance of Insect Control Systems

Exemptions for certain maintenance activities are provided in Section 403.813(1)(f) and (g), F.S., and are described in detail below. The exemption in Section 403.813(1)(f), F.S., authorizes maintenance dredging of existing manmade canals and channels, including navigation basins and ship's berths; intake and discharge structures; and previously dredged portions of natural water bodies within recorded drainage rights-of-way or drainage easements. The exemption in Section 403.813(1)(g), F.S., addresses the maintenance of existing insect control structures, dikes, and irrigation and drainage ditches. A number of limitations and conditions apply to these exemptions, as summarized below.

(a) Original design specifications/configurations.

1. Section 403.813(1)(f), F.S., requires that no more dredging be performed than is necessary to restore the canals, channels, intake and discharge structures and previously dredged portions of natural water bodies, to original design specifications or configurations. Section 403.813(1)(g), F.S., requires that no more dredging be performed than is necessary to restore the dike or irrigation or drainage ditch to its original design specifications.

2. The entity claiming the maintenance exemption bears the burden of establishing that its activity qualifies for the exemption, including that the maintenance will not extend a system beyond its original design specifications or configuration. However, there is no requirement for the maintenance entity to provide advance notice to the Agency that they are planning on performing maintenance that qualifies for the exemptions in Sections 403.813(1)(f) or (g), F.S., except for the 30-day notice required for the maintenance dredging of previously dredged portions of natural water bodies within recorded drainage rights-of-way or drainage easements.

   Maintenance entities are encouraged to notify the Agency of proposed maintenance and to discuss its planned scope and extent with the Agency. Maintenance entities may also request confirmation from the Agency that they qualify for an exemption. In the event that the planned activity does not qualify for an exemption, such consultation should help to avoid enforcement action by the Agency.

3. Direct evidence of original design can include: plans; historical aerial photographs; surveyed cross sections; soil boring reports, if such borings can distinguish between the original soils and the sediment deposited in a system; and other historical documents. Where such documentation does not clearly establish the original design, eyewitness accounts can be submitted to provide further evidence of the original design specifications or configuration. In addition, indirect evidence can be used. Indirect evidence is evidence from which the original design specifications or configuration can be scientifically deduced. Examples of such indirect evidence include historic information of land uses enabled by the system, and the sizes and capacities of associated systems, such as culverts or weirs. If the maintenance entity cannot reasonably establish the original design of a system, the maintenance exemptions in Sections 403.813(1)(f) and (g), F.S., are not applicable.

(b) The following limitations, conditions, and definitions also apply to the exemption in Section 403.813(1)(f), F.S., for maintenance dredging of existing: canals and channels, including navigation basins and ship's berths; intake and discharge structures; and previously dredged portions of natural water bodies within recorded drainage rights-of-way or drainage easements:

1. Spoil material must be deposited in a self-contained, upland spoil disposal site that will prevent the escape of spoil material into the waters of the state. For the purposes of the exemptions in Sections 403.813(1)(f) and (g), F.S., a self-contained, upland disposal site is a disposal site located entirely in uplands which is designed to prevent the spoil material from reentering waters of the state as defined in Section 403.031(13), F.S. Some examples of self-contained upland spoil disposal sites are:

   a. An upland area separated from waters of the state by a berm, such that the spoil material cannot reenter waters of the state;

   b. In a system that has an outer berm or dike, placing the spoil on the inner banks of the dike where it could potentially reenter those interior canals which are not waters of the state, and where the spoil material is prevented from being discharged to waters of the state through the operation of a pump or other type of water control structure; and

   c. In a system involving a road with roadside ditches that are waters of the state, placing spoil in a "V" shaped notch in the center of the road such that it could not be discharged to waters of the state.

   Additionally, use of dredged materials to conduct exempt or permitted maintenance of a dike or road shall not be considered spoil disposal, so long as the dredged materials are only used to restore the dike or road to original design specifications and the dredged material is not deposited into wetlands or other surface waters outside of the original dike or road cross section.

2. Best management practices for erosion and sediment control must be used at the dredge site to prevent bank erosion and scouring and to prevent turbidity, dredged material, and toxic or deleterious substances from discharging into adjacent waters during maintenance dredging. This does not prevent the discharge of water during dredging or from the disposal site, as long as water quality standards are not violated in the receiving waters.

3. The maintenance dredging shall not cause significant impacts to previously undisturbed natural areas.

4. Maintenance work must be conducted in accordance with Section 379.2431(2)(d), F.S., which provides that, except as authorized by a permit issued under Section 379.2431(2)(c), F.S., or by the terms of a valid federal permit, the maintenance entity shall not at any time, by any means or in any manner intentionally or negligently:

   a. Annoy, molest, harass, or disturb or attempt to molest, harass, or disturb any manatee;

b. Injure or harm or attempt to injure or harm any manatee;

c. Capture or collect or attempt to capture or collect any manatee;

d. Pursue, hunt, wound, or kill or attempt to pursue, hunt, wound, or kill any manatee; or

e. Possess, literally or constructively, any manatee or any part of any manatee.

5. For canals and previously dredged portions of natural water bodies, the exemption only applies to such systems constructed prior to April 3, 1970, or constructed on or after April 3, 1970, pursuant to all necessary state permits.

6. The exemption does not apply to the removal of any natural or manmade barrier separating a canal or canal system from adjacent waters.

7. Maintenance dredging shall be limited to a depth of no more than five feet below mean low water for existing manmade canals or intake or discharge structures that have not been previously permitted for construction or maintenance dredging in accordance with necessary state permits or permits issued by the U.S. Army Corps of Engineers (USACE) between April 4, 1970, and October 26, 1975, or when such permits were required, by DEP, the WMD, or the USACE after October 26, 1975.

   For canals dredged prior to 1975, where evidence indicates that the canals were dredged to depths deeper than five feet, and no subsequent enforcement action was taken, the maintenance entity is encouraged to notify the Agency at least 30 days prior to dredging, and provide documentation of original design specifications or configurations where such exist so that the Agency can have an opportunity to verify that the exempt conditions apply.

8. For maintenance dredging of a previously dredged portion of a natural water body, the maintenance entity must notify DEP at least 30 days prior to dredging, and provide documentation of original design specifications or configurations where such exist.

9. The term “natural water bodies” as used in paragraph 403.813(1)(f), F.S., means those surface water bodies extending waterward from the boundary established pursuant to the methodology in Chapter 62-340, F.A.C., except for those waters that were created solely due to human activity, such as borrow pits, ditches, canals, and artificial impoundments located in areas that were uplands prior to construction. As stated above, the maintenance entity is required to notify the Agency at least 30 days prior to dredging and provide documentation of original design specifications or configurations where such exist for maintenance dredging of previously dredged portions of natural water bodies within recorded drainage rights-of-way or drainage easements. The terms “previously dredged” and “within recorded drainage rights-of-way” are interpreted to apply to dredging originally performed within a right-of-way recorded prior to when these provisions became effective (October 1, 1997, per Chapter 97-22, Laws of Florida).

(c) The following limitations or conditions also apply to the exemption in Section 403.813(1)(g), F.S., for the maintenance of existing insect control structures, dikes, and irrigation and drainage ditches:

1. Spoil material must be deposited on a self-contained, upland spoil site that will prevent the escape of spoil material into waters of the state (see **paragraph 3.2.3(b)1, above,** for further explanation of self-contained, upland spoil site);

2. For insect control structures, if the Department of Health determines that the cost of new spoil disposal is so excessive that it will inhibit proposed insect control, then existing spoil sites or dikes may be used upon notification to DEP. In such cases, turbidity control devices shall be used when the receiving water body is a potable water supply, is designated as shellfish harvesting waters, or functions as a habitat for commercially or recreationally important shellfish or finfish.

3.2.4 Seawall, Riprap, and other Shoreline Structure Restoration

Restoration and repair of a seawall, riprap revetment or other shoreline protection structure may be performed without a permit, under any of the following circumstances:

(a) The work qualifies as routine, custodial maintenance, as discussed in section 3.1.1, above.

(b) The work is authorized under a *de minimis* exemption, as explained in section 3.2.7, below.

(c) The work is authorized to be performed without a permit under an Emergency Order issued by the Governor and/or the Secretary of DEP or the Executive Director of a District following a large event, such as a hurricane.

(d) The work qualifies for an exemption under paragraph 62-330.051(12)(b), F.A.C., and Section 403.813(1)(e), F.S., which authorize restoration as long as no permit is required under Chapter 161, F.S., and the face of the restored structure is within 18 inches from the face of the old structure. Restoration under this exemption is limited to instances where the primary purpose of the project is restoration or replacement of an old or failing structure, and is not to expand or reclaim uplands. Generally, this exemption applies to situations in which:

1. The structure has been damaged or destroyed by a discrete event (such as a storm, accident, fire, or other unforeseen circumstance), typically of a localized nature within a period of no longer than one year of the event (which is normally a reasonable time to perform such restoration).

2. The restoration or repair is necessary due to degradation of materials over time, erosion (such as from currents or boat wakes), structural failures resulting from poor workmanship or design, or to upgrade materials or raise the height of the structure (such as to prevent overtopping by tides, waves, wakes, or flows). Restoration of structures that have deteriorated over long periods of time may require extensive work, such as backfilling, which may result in adverse individual or cumulative impact to the water resources. For this reason, the following factors will be considered in determining whether the repair or restoration work is exempt, or needs a permit:

a. Whether the mean (or ordinary) high water line has shifted landward or waterward of the structure along more than 50 percent of its length (which may or may not run the entire length of the shoreline of the property);

b. The structural failure has persisted long enough for wetland or other aquatic communities to become established behind more than 10 percent of the length of the structure (excluding such communities that exist solely due to periodic overtopping by tides, waves or floods);

c. The damage or deterioration consists of more than minor cracks or gaps, (such as large sections of the structure that are failing, leaning, or completely missing), and the structure is no longer effectively retaining or stabilizing land; or

d. An excessive period of time has elapsed between when the degradation or failure became apparent and the time the repairs are proposed. Consideration will be given when extended time is needed due solely to circumstances beyond the control of the property owner, such as unavailability of contractors.

Furthermore, for the restoration work to qualify for this exemption, the structure must also be (or have been) legally in existence by virtue of:

1. Having been built under an applicable exemption or permit under Part IV of Chapter 373, F.S., or Part V of Chapter 403, F.S.; and was granted any applicable state-owned submerged lands authorization under Chapters 253 and 258, F.S.; or

2. Qualifying as being "grandfathered" (see section 3.1.2, above), such as having been built prior to permitting requirements under the above statutes.

3.2.5 Swales

Section 403.813(1)(j), F.S., exempts the construction and maintenance of swales. A swale is defined in Section 403.803(14), F.S., as a manmade trench that:

(a) Has a top width to depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or greater than 3 feet horizontal to 1-foot vertical;

(b) Contains contiguous areas of standing or flowing water only following a rainfall event;

(c) Is planted with vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake; and

(d) Is designed to take into account the soil erodibility, soil percolation, slope, slope length, and drainage area so as to prevent erosion and reduce pollutant concentration of any discharge.

Applicants are advised that the construction of a swale system does not qualify for the exemption under Section 403.813(1)(j), F.S. A "swale system" is a stormwater management system that does not consist entirely of swales. An example is a subdivision served by swales as the primary stormwater management system, but that includes culverted driveway crossings and other pipe conveyance

features. Such stormwater management systems must be designed and evaluated to address such things as potential impoundments and flood conveyance restrictions imposed by the culvert crossings and other pipe conveyance features. The entire stormwater management system as a whole must be designed, implemented, operated, and maintained to meet the conditions for issuance of Rule 62-330.301, F.A.C., the applicable Volume II, and the operation and maintenance requirements in **section 6.1.4** and **Part V of this Volume**.

3.2.6 Docks and Piers

Subparagraph 62-330.051(5)(b)4, F.A.C., pertains to the exemption in Section 403.813(1)(b), F.S. Section 403.813(1)(b)5, F.S., provides that the installation must be, ". . .the sole dock constructed pursuant to this exemption as measured along the shoreline for a distance of 65 feet, unless the parcel of land or individual lot as platted is less than 65 feet in length along the shoreline, in which case there may be one exempt dock allowed per parcel or lot." This measurement begins where that portion of the structure (typically the access walkway or end of a marginal dock) connects to the shoreline (the landward extent of wetlands and other surface waters). From that point, there must be a minimum of 65 feet along the shoreline of the parcel or lot before reaching the point where the next access walkway or marginal dock connects to the shoreline of the same parcel or lot. The only exception is if the parcel of land or individual platted lot has less than 65 feet of shoreline. All waterward components of the dock (such as "T" ends, terminal platforms, walkways, finger piers, and boat shelters) must be separated from the waterward components of any other docks on the parcel or lot such that the docks cannot be reasonably be considered one structure. That test is met if there is enough separation between the docks that a person cannot access the next dock through more than extraordinary means (such as having to take a "running leap" or having to place temporary or permanent planks between the docks).

Applicants are advised that in addition to compliance with the regulatory exemption criteria, docks and piers located on state-owned submerged lands (SSL) are subject to the need to obtain a separate authorization, which will include consideration of such things as proximity and setbacks to riparian rights lines, the size of terminal platforms in aquatic preserves, whether the dock or pier includes any non-water dependent uses or activities, the total amount of preemption of state-owned submerged lands, the number of boat slips, the sufficient upland interest of the riparian upland owners, and any income-producing, revenue-generating uses of the dock or pier and associated uplands. See Chapters 18-18, 18-20, and 18-21, F.A.C., for additional information.

3.2.7 Other Exemptions

(a) Section 403.813(1), F.S., provides that no permit shall be required for certain activities under Chapters 373 and 403, F.S. These exemptions are listed in Rule 62-330.051, F.A.C.

(b) DEP has established additional exemptions by rule for minor activities that have been determined to have no more than minimal individual and cumulative impacts. They are contained in Rule 62-330.051, F.A.C.

(c) Section 373.406(6), F.S., provides that "Any district or the department may exempt from regulation under this part those activities that the district or department determines will have only minimal or insignificant individual or cumulative adverse impacts on the water resources of the district." The Agencies are authorized to determine, on a case-by-case basis, whether a specific activity comes within this exemption. Requests to qualify for this exemption shall be submitted in writing to the applicable Agency, and such activities shall not commence without

a written determination from the Agency confirming qualification for the exemption. These are known as "*de minimis*" exemptions.

Applicants and permittees are advised that dewatering during construction may require a separate consumptive use permit from the applicable District, and potentially an NPDES permit.

3.3 Permits Required

Rule 62-330.020, F.A.C., describes activities that require a permit. The types of permits available are general permits, individual permits (which include mitigation bank permits), and conceptual approval permits. These are described below.

3.3.1 General Permits

General permits authorize activities specified in Rules 62-330.410 through 62-330.635, F.A.C.

To qualify, a person must submit notice to the Agency of intent to use a general permit following Rule 62-330.402, F.A.C., and **section 4.2.2 of this Volume**. Activities that comply with all the general conditions of Rule 62-330.405, F.A.C., and the specific limitations and conditions for the particular general permit may be initiated 30 days after the Agency receives the notice, unless:

(a) The Agency responds within 30 days after receiving the notice that the activity does not qualify for the general permit, or that additional information is needed to determine if the activity qualifies for the general permit; or

(b) The conditions of the general permit require written verification from the Agency prior to initiating the activities.

Notices to use a general permit are not circulated to other parties for comment.

As discussed in **section 3.1.3**, above, the "10/2" general permit in Section 403.814(12), F.S., is not a general permit under Chapter 62-330, F.A.C.

3.3.2 Individual Permits

Except where a conceptual approval permit is sought, an individual permit under Rules 62-330.020 and 62-330.054, F.A.C., is required prior to the construction, alteration, operation, maintenance (excluding routine custodial maintenance), abandonment, or removal of projects that:

(a) Are not exempt in accordance with Rule 62-330.051 or 62-330.0511, F.A.C.;

(b) Exceed the permitting thresholds in subsection 62-330.020(2), F.A.C.;

(c) Do not qualify for a general permit under Rules 62-330.410 through 62-330.635, F.A.C.; and

(d) Do not qualify for the general permit in Section 403.814(12), F.S.

A mitigation bank permit is processed and evaluated as a type of individual permit, but also is processed and evaluated under the Mitigation Bank Permit rule, Chapter 62-342, F.A.C.

A conceptual approval permit is not a type of individual permit, but is processed in the same manner as an individual permit. It is evaluated under Rule 62-330.055 or 62-330.056, F.A.C., as applicable, the conditions for issuance in Rules 62-330.301 and 62-330.302, F.A.C., and the Applicant's Handbook Additional information on conceptual approval permits is contained in **section 3.4**, below.

Applications for individual permits undergo detailed site review and consideration of comments received during processing. Except as provided in Rule 62-330.054(4), F.A.C., an application for an individual permit shall be prepared and submitted following Rule 62-330.060, F.A.C., and **sections 4.2.3 and 4.4 below**, and processed following Rule 62-330.090, F.A.C., and **section 5.5, below.**

3.3.2.1 Dry Storage Facilities

An individual permit is required for the construction, alteration, operation, maintenance, abandonment, or removal of any dry storage facility for 10 or more vessels that is functionally associated with a boat launching area, including when the dry storage facility does not involve any work within the landward extent of wetlands and other surface waters (see Section 373.4132, F.S.). Such activities do not qualify for the "10/2" general permit in Section 403.814(12), F.S.

3.3.2.2 Alteration, Maintenance, and Operation

A permit is required prior to the alteration, maintenance (other than routine custodial maintenance), or operation of an existing project, including those previously constructed in conformance with an exemption or prior to the existence of state or federal permitting programs, if the alteration or maintenance does not qualify for an exemption under Rule 62-330.051 or 62-330.0511, F.A.C., a general permit under Section 403.814(12), F.S., or the grandfathering provisions summarized in **section 3.1.2**, above.

"Alter" means "to extend a dam or works beyond maintenance in its original condition, including changes that may increase or diminish the flow or storage of surface water which may affect the safety of such dam or works" (see Section 373.403(7), F.S., and **paragraph 2.0(a)3**., above). Alterations that are subject to requiring a permit under Chapter 62-330, F.A.C., include:

(a) Addition to an existing system;

(b) Change of any part of an existing activity to capacities or locations different from those originally constructed; or

(c) Addition of, or changes to an existing project that will result in changes in the rate, volume, or timing of discharges; the point or points of discharge; increased pollutant loading; or that intrude into or otherwise adversely affect wetlands or other surface waters by activities such as rim ditching, draining, filling, or excavation.

"Maintenance," as defined in Section 373.403(8), F.S., and **paragraph** 2.0(a)72., above, includes repairs that exceed routine custodial maintenance, and is subject to the permitting requirements of Chapter 62-330, F.A.C. Routine custodial maintenance is exempt from permitting as discussed in **section 3.1.1, above**.

Except as provided in Chapter 62-330, F.A.C., or in a permit issued thereunder, the construction phase of an individual permit must be converted to an operation phase that extends in perpetuity

after construction has been completed in conformance with the terms and conditions of the permit. The terms "operate" and "operation" are defined in **paragraph** 2.0(a)81., above. An application to construct or alter a project also constitutes a request for authorization to operate and maintain the project. General permits under Rules 62-330.410 through 62-330.635, F.A.C, automatically convert to the operation and maintenance phase upon completion of construction performed in compliance with the general permit. Additional information on operation and maintenance of projects is in Rule 62-330.310, F.A.C., and **Part V of this Volume.**

3.4 Conceptual Approval Permits

A conceptual approval permit is available, but not required, for activities occurring in phases or over a large land area. Conceptual approval permits are available under Rule 62-330.056, F.A.C., for any type of long-term build out other than for redevelopment or infill, and for redevelopment or infill under Rule 62-330.055, F.A.C. A conceptual approval permit does not authorize construction, alteration, maintenance, removal, or alteration (a separate individual permit is required for those activities). However, the first phase of construction can be authorized at the same time the conceptual approval permit is issued, as discussed below and in Rule 62-330.056, F.A.C. Construction of redevelopment or infill projects consistent with a conceptual approval permit issued under Rule 62-330.055, F.A.C., can be authorized through the general permit in Rule 62-330.450, F.A.C.

3.4.1 Issuance of a conceptual approval permit is a determination that conceptual plans are, within the extent of detail provided in the application, consistent with applicable rules at the time of issuance. A conceptual approval permit provides the permit holder with a rebuttable presumption that, during the duration of the conceptual approval permit, the design and environmental concepts upon which the conceptual approval permit is based (within the detail provided in the application) will meet applicable rule criteria for issuance of permits for subsequent phases of the project. This presumption is rebuttable at the time of receipt of a complete application to construct or operate future phases, dependent on the factors in subsection 62-330.056(7), F.A.C.

3.4.2 An application for a conceptual approval permit will be reviewed pursuant to the standards, criteria, and procedures for processing individual permits, together with the provisions of Rule 62-330.055 or 62-330.056, as applicable. The permit, if issued, will contain specific conditions necessary to ensure that future applications for permits to construct, alter, operate, maintain, remove, or abandon projects can be issued only if such applications remain consistent with the conceptual approval permit.

3.4.3 Conceptual Approval for Urban Infill and Redevelopment

(a) A county or municipality may request a conceptual approval permit under Rule 62-330.055, F.A.C., for redevelopment within an urban redevelopment and infill area or a community redevelopment area created under Chapter 163, F.S. Projects in compliance with the redevelopment conceptual approval permit can be constructed, operated, and maintained under the terms and conditions of the general permit in Rule 62-330.450, F.A.C.

(b) An application for redevelopment conceptual approval permit must contain a stormwater master plan developed in coordination with, and approved by, the Agency. The master plan must demonstrate that the urban redevelopment or infill project, as a whole, will provide a net improvement of the quality of stormwater discharge, as determined through a calculated reduction of annual loading of pollutants of concern as determined during the permit

application review discharged after development, as compared to the predevelopment condition existing on the date of application for the conceptual permit. For areas that were demolished prior to the application, the predevelopment condition is considered to be the land use five years prior to submittal of the application for the conceptual approval permit.

(c) If issued, the urban redevelopment or infill conceptual approval permit will include a ledger that indicates the target annual loading of the pollutants of concern (mass per acre) for each drainage basin within the area covered.

(d) A person wishing to construct or alter a project within the urban infill or redevelopment area may use the general permit in Rule 62-330.450, F.A.C., when the design meets the terms and conditions of that general permit. The general permit is available to all qualifying activities within the urban infill or redevelopment conceptual approval permit area. Construction under the general permit must occur within five years of the date qualification for its use is verified by the Agency for the specific activity subject to the general permit.

(e) Activities qualifying for the general permits will result in a debit to the master plan ledger of target pollutant loading within the drainage area affected. Once the entire pollutant load target is reached for the receiving waters, no more general permits under Rule 62-330.450, F.A.C., will be available for use under the terms of the issued urban infill or redevelopment conceptual approval permit. However, this does not preclude issuance of subsequent urban infill or redevelopment conceptual approval permits for which the general permit would be available.

3.4.4 The duration of a conceptual approval permit is discussed in **section 6.1.5**, below.

3.4.5 Modifications of conceptual approval permits and subsequently issued permits for construction, alteration, operation, maintenance, removal, or abandonment shall be in accordance with Rule 62-330.315, F.A.C.

3.4.6 Requests to extend the duration of a conceptual approval permit will be reviewed as provided in Rule 62-330.320, F.A.C.

4.0 Preparation and Submittal of Applications and Notices

4.1 Pre-application Conference

Applicants are encouraged to have a pre-application phone call, meeting (on-site or in the office), or other conference with the applicable Agency staff prior to submitting an application or notice. This should minimize processing steps and potential time delays by assisting the applicant to understand such things as:

(a) The need for a permit or potential qualification for an exemption or general permit;

(b) Which agency will be responsible for the review of the application or notice;

(c) How to prepare the application or notice, including availability of on-line tools that may assist in completing it;

(d) Information required by the Agency to evaluate an application or notice, including such things as wetland delineations, resources that may be affected, surface water data (such as for water quality, flooding, mean high water, and other surface water elevations), and other hydrologic, environmental, or water quality data;

(e) Application processing and evaluation procedures;

(f) The need for a pre-application on-site meeting;

(g) Adverse impacts that may prevent the proposed activity from meeting applicable permitting or review standards and criteria; and

(h) Measures that can be taken to reduce or eliminate adverse impacts, and the appropriateness of mitigation to offset remaining adverse impacts.

See **Appendix A of this Volume** for Agency contact information.

4.2 Forms and Submittal Instructions

Where available, applicants are encouraged to use the e-Permitting and electronic portals of the Agencies to submit most applications and notices as discussed below. **Appendix A** of this Volume contains the Internet addresses of the Agencies.

4.2.1 Requesting an Exemption Determination

Except as noted below, notice to the Agency is **not required** to conduct an activity that qualifies for an exemption. The following are exceptions where prior notice to the Agency is required before conducting an exempt activity:

(a) Work proposed under Section 373.406(6), F.S., often called the "*de minimis"* exemption; this exemption is used for activities that are expected to have no more than minimal individual and cumulative impact, but are not authorized under a specific exemption or general permit adopted by rule. These activities must be reviewed on a case-by-case basis to determine qualification for the statutory exemption.

(b) Maintenance dredging within previously dredged portions of natural water bodies within drainage rights-of-way or drainage easements which have been recorded in the public records of the county, in accordance with Section 403.813(1)(f), F.S.

(c) The repair, stabilization, paving, or repaving of existing county- or municipally-maintained roads and the repair or replacement of bridges that are part of the roadway under Section 403.813(1)(t), F.S., as superseded by the exemption in paragraph 62-330.051(4)(e), F.A.C.

(d) Removal by an individual, residential property owner of organic detrital material from freshwater rivers or lakes that have a natural sand or rocky substrate and that are not located in an Aquatic Preserve, in accordance with Section 403.813(1)(u), F.S.

(e) The construction, operation, maintenance, alteration, abandonment, or removal of minor silvicultural surface water management systems under Rule 62-330.0511, F.A.C. The notice required by this exemption [Form 62-330.0511(1)] must be received by the Agency, but does not require verification of qualification by the Agency prior to commencement of the authorized activities.

A request for a written determination of qualification for an exemption shall follow Rule 62-330.050, F.A.C. Additional information on submitting a notice or letter requesting verification of an exemption is in **section 5.2**, below.

Many exempt activities involving certain categories of in-water work qualify for the USACE SPGP discussed in **section 1.3.1.2**, above. If the activity does not qualify for the SPGP, a separate USACE permit may be required. Applicants must apply separately to USACE using the appropriate federal application form. More information about USACE permitting can be found online in the Jacksonville District Regulatory Division Sourcebook.

4.2.2 Preparing a Notice of Intent to Use a General Permit

Available general permits, including the specific limitations and conditions that apply to each are in Rules 62-330.410 through 62-330.635, F.A.C. General conditions applying to all general permits are in Rule 62-330.405, F.A.C.

Rule 62-330.402, F.A.C., contains the procedures to submit a notice of intent to use a general permit, and how it will be reviewed by the Agencies. Persons wishing to use a GP must complete Form 62-330.402(1), "Notice of Intent to Use an Environmental Resource and/or State 404 Program General Permit." This form will provide the Agency with information needed to determine if the requested activity is on state-owned submerged lands and if the activity qualifies for the SPGP (see **section 1.3.1.2**, above). The notice must include:

(a) A location map(s) of sufficient detail to allow someone who is unfamiliar with the site to travel to and locate the specific site of the activity;

(b) Documentation of the person's real property interest, as described in section 4.2.3(d) below, over the land upon which the activities subject to the notice will be conducted;

(c) One set of construction plans, drawings, other supporting documents that depict and describe that the proposed activities qualify for the GP requested; and

(d) The fee required by Rule 62-330.071, F.A.C.

The notice may be submitted electronically or mailed to the Agency as provided in Rule 62-330.010, F.A.C. See **Appendix A** of this Volume for information on who to contact if you have any questions about whether the proposed activity may qualify for a GP, and **section 4.4**, below, for additional information on submitting notices.

Effective July 1, 2012, and amended April 6, 2016, the Florida Legislature established a general permit in Section 403.814(12), F.S., authorizing certain activities located entirely in uplands having a total project area of less than 10 acres and less than two acres of impervious surface. This is not a general permit under Chapter 62-330, F.A.C., and is not subject to the noticing and review provisions of that chapter. Additional information on that general permit is in **section 3.1.3**, above.

4.2.3 Preparing an Application for an Individual or Conceptual Approval Permit

Except as provided in Rule 62-330.054(4), F.A.C., applications for individual and conceptual approval permits must be made on Form 62-330.060(1), "Application for Individual and Conceptual Approval Environmental Resource Permit, State 404 Program Permit, and Authorization to Use State-Owned Submerged Lands," available at: https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/content/forms-environmental-resource or from the Internet site or office of any of the Agencies (see **Appendix A of this Volume**). It is designed so an applicant will need to complete only those sections applicable to the type of activity proposed. The form requests site and design information needed:

- To distribute, process, and evaluate whether the application meets the standards and criteria for issuance;

- To determine if the requested activity is on state-owned submerged lands, and whether it qualifies for any applicable authorization to use and occupy those lands; and

- To determine whether the activity qualifies for the SPGP (see **section 1.3.1.2, above**).

The submitted application must contain one original mailed or an electronic submittal of the materials requested in the applicable sections of the form, and such other information as is necessary to provide reasonable assurance that the activities proposed in the application meet the conditions for issuance under Rule 62-330.301, F.A.C., the additional conditions for issuance under Rule 62-330.302, F.A.C., and the applicable provisions of the Applicant's Handbook. Those materials include:

(a) Location maps of detail to allow someone who is unfamiliar with the site to travel to and locate the specific site of the activity;

(b) Construction plans, drawings, calculations, and other supporting documents that depict and describe the proposed activities;

(c) The applicable processing fee in accordance with Rule 62-330.071, F.A.C.;

(d) Documentation of the applicant's real property interest over the land upon which the activities subject to the application will be conducted. Interests in real property typically are evidenced by:

1. The applicant being the record title holder.

2. The applicant being the holder of a recorded easement conveying the right to utilize the property for a purpose consistent with the authorization requested in the permit application.

3. An entity having the right to exercise the power of eminent domain and condemnation authority, in which case the permit shall contain a provision that work cannot begin until proof of ownership is provided to the Agency.

4. An entity having a contract to purchase the real property included in the application, in which case the permit shall contain a provision that work cannot begin until proof of ownership is provided to the Agency. The contract to purchase shall be provided to the Agency (financial terms can be redacted). If the contract to purchase does not authorize the Agency to access, inspect, and sample the property, then the applicant shall provide written authorization from the record title holder to enable staff of the Agency to legally access, inspect, and sample the property in accordance with section 4.2.3(f) below.

5. An entity that has either obtained or has an application to obtain a permit or other legal authorization from the Florida Department of Transportation, a Water Management District, or local government authorizing construction, operation, and maintenance of parts of the proposed system that will be located on right of way property.

6. A lessee of the property included in the application, provided at least one of the following exists:

    a. The record title owner is a co-applicant on the application.

    b. The applicant provides a copy of a written agreement with a governmental entity that states that the governmental entity agrees to accept the transfer of the permit if the lease is revoked, terminated or expires and that the governmental entity will accept the operation and maintenance phase of the permit. Documentation must be provided that the governmental entity has a recorded right of entry agreement or access easement to enter upon the property for these purposes.

    c. The applicant provides a recorded restrictive covenant or other recorded instrument demonstrating that the record title holder agrees to be responsible for the permanent operation and maintenance of the system upon revocation, termination or expiration of the lease.

    d. Where the lease is on lands owned by a water management district, the government of the State of Florida or the United States, the lessee shall:

        1] Provide a bond made payable to the Agency in an amount sufficient to construct the stormwater management system, or provide other measures suitable for ensuring that the stormwater management system can be completed, removed, or abandoned in

the event the lessee, at any time, fails to or cannot complete construction of the system;

2] Provide an agreement from a person in accordance with Part V of this Volume who agrees to be responsible for operation and maintenance of the system in the event the lessee, at any time, fails to or can no longer operate and maintain the system; or

3] Provide an easement or other legally-binding document from the landowner or other person with sufficient real property interest in the lands subject to the application giving the Agency and other persons who require it, a right of entry for purposes of inspecting for compliance, monitoring, operating and maintaining, and completing construction as needed to comply with the permit, if issued.

7. Alternatives such as a recorded option agreement, a judgment of the court, or a certificate of title issued by a clerk of the court, that show that the person or entity has sufficient interest in, or control over, the property to construct, alter, operate, and maintain the project in accordance with Chapter 62-330, F.A.C. Except when it cannot reasonably be provided (such as when there is a court determination, or an inability to locate the record title holder), the recorded documentation shall indicate that the record title holder agrees to accept responsibility for the permit, is agreeable to accept the transfer of the permit, and that the Agency has third party enforcement rights to enforce the terms and conditions of the permit on the property.

8. Additional persons may be included as co-applicants, provided that one of the persons listed in 1. through 6., above is included as an applicant.

(e) Applications must be signed by an entity having sufficient real property interest over the land upon which the activities subject to the application will be conducted as described in section 4.2.3(d), above. The applicant may designate an agent to provide materials in support of the application on its behalf. If the applicant is a non-individual entity required by statute or rule to register with the State of Florida Secretary of State, it must be registered, and the person signing the application must have the legal authority to bind the entity with the terms, conditions, and liabilities associated with such application and subsequent permit, if issued. Further, any such entity must maintain their registration with the State of Florida Secretary of State for the duration of the permitted activities.

(f) Written authorization from the owner, lessee, or easement holder for staff of the Agency to enter onto, inspect, and conduct sampling or monitoring of the site that is subject to the application. If this is not possible, the applicant shall secure other means for staff to access the site in a manner that prevents trespass, and to demonstrate how the applicant will obtain approval from the entity having sufficient real property interest over the land subject to the application to perform the activities proposed prior to undertaking the work.

(g) Where an operating entity described in **section 12.3.1** of this Volume will be different from the permittee, written confirmation is required from the operating entity that they agree to accept responsibility for operation and maintenance of the activity as set forth in the permit, as further set forth in **section 12.3** of this Volume. Written confirmation is not required if

the operation and maintenance entity is approved upon issuance of the permit for the construction phase, or in a permit modification.

(h) Persons requesting to conduct activities on state-owned submerged land must submit satisfactory evidence of sufficient upland interest in accordance with paragraph 18-21.004(3)(b), F.A.C. (March 2, 2012), and are advised that necessary consent, lease, easement, or other form of authorization as required under the authority of Chapter 253 and, as applicable, Chapter 258, F.S., and the rules adopted thereunder, is required prior to initiating such work. In addition to demonstrating ownership or control in the land as described above, the applicant also must demonstrate that they have the riparian rights to the state-owned submerged lands necessary to conduct the proposed activity under paragraph 18-21.004(3)(b), F.A.C.

For construction of docks and piers when satisfactory evidence of sufficient upland interest is not fee simple title, the applicant's interest must cover the entire shoreline of the adjacent upland fee simple parcel or 65 feet, whichever is less, except as otherwise provided in paragraph 18-21.004(1)(d), F.A.C.

(i) A separate mangrove alteration or trimming permit under Sections 403.9321 through 403.9333, F.S., is not required when the mangrove trimming or alteration is authorized and conducted as part of and in conformance with a general or individual environmental resource permit, or when necessary to construct projects in conformance with an exemption or general permit under Chapter 62-330, F.A.C.

Submittal of the application is discussed in **section 4.4, below**.

4.2.3.1 Conceptual Approval Permits

An application for a conceptual approval permit shall be prepared and submitted in the same manner, and using the same form as an individual permit, as discussed in **section 4.2.3.**, above, except that the application shall be supplemented with the materials discussed in either Rule 62-330.055 or 62-330.056, F.A.C., as applicable.

4.2.3.2 Mitigation Bank Permits

An application for a mitigation bank permit shall be prepared and submitted in the same manner, and using the same form as an individual permit, as discussed in Section 4.2.3., above, except that the application shall be supplemented with the materials required in Chapter 62-342, F.A.C.

4.3 Processing Fees

Processing fees are required for the Agency to process each permit application, permit modification, petition, and submittal of requests to determine qualification for a general permit or exemption under Chapter 62-330, F.A.C. These fees must be submitted as prescribed by Rule 62-330.071, F.A.C. Additional information on the fees of the Agencies is in **Appendix D of this Volume**.

Processing fees are non-refundable except for the amount of any fees paid that exceed the amount specified for the application or notice under review, as specified above.

An application or notice submitted without the fee will not be considered complete; an Agency shall not be compelled to issue the requested permit, verify qualification for a general permit or

exemption, or issue the requested petition until the complete processing fee is paid.

Additional information on processing fees associated with applications and notices is in sections 5.3.2, 5.3.3, 5.3.4, 5.5.3.1, 5.5.3.3, 5.5.3.4, 5.5.3.5 and 5.5.3.7, below.

4.4 Submittal of Applications, Notices, and Petitions

All applications, notices, and petitions shall be submitted by mail or via e-permitting (where available) to the correct office of the applicable Agency (see **Appendix A of this Volume),** in accordance with the Operating Agreement or Delegation Agreement between the Agencies [see subsection 62-330.010(5), F.A.C.], except that:

(a) Submittal of an application or notice for a activity, a portion of which extends beyond the boundary of more than one District, is subject to Section 373.046(6), F.S. It provides that the responsible Agency will be determined based on factors such as the amount and geography of the activity's land area, the location of the activity's discharge or discharges, the type of activity, prior agency history, and the terms and conditions of the Operating Agreement in effect between the Agencies. In the case of activities that are the responsibility of DEP, the Director of the district office or Administrator of the Program processing the application shall have the authority to take the final agency action on the entire application.

(b) Applications, notices, and requests for activities that are within the geographic limits of a local government delegated responsibility for the ERP program under Chapter 62-344, F.A.C., shall be submitted to that local government or to the Agency in accordance with the terms of the Delegation Agreement with that local government incorporated by reference in Chapter 62-113, F.A.C. The text of those agreements may be viewed at https://floridadep.gov/ogc/ogc/content/operating-agreements.

Paper and electronic copies of applications and notices must be filed during normal business hours with the Agency. Paper and electronic copies of applications or notices received after 5:00 PM (local time) of the office to which the submittal is made shall be deemed as filed as of 8:00 AM on the next regular business day. Electronic applications or notices to the NWFWMD are received at the District headquarters, which is in the Eastern time zone.

5.0 Processing of, and Agency Action on, Applications and Notices

5.1 General Procedures

The Agencies are required to follow procedural statutes and rules to review and act on applications and notices, and to provide rights to the public to object to Agency decisions: Chapter 120, F.S. (Florida Administrative Procedures Act), Chapters 28-101 through 28-110, F.A.C. (Uniform Rules of Procedure), and each Agency's adopted Exceptions to the Uniform Rules of Procedure. Additional specific provisions for processing applications and notices under Chapter 62-330, F.A.C., are summarized below.

Except as provided in subsection 62-330.054(4), F.A.C., individual and conceptual approval permits are processed using Rule 62-330.090, F.A.C., and **sections 5.5 through 5.5.5.6, below,** Those sections also address how components of an application that qualify for an exemption or general permit will be processed when they are included in an application for an individual permit.

5.2 Review of an Exemption Determination Request

Rule 62-330.050, F.A.C., and **section 4.2.1** above, describe how the Agencies evaluate whether an activity qualifies for an exemption. Persons are reminded that, except as noted in **section 4.2.1**, above, activities that qualify for an exemption may be conducted without formal review or action by the Agency.

5.3 Review of Request to Use a General Permit

5.3.1 General permits are granted by rule to authorize construction, operation, maintenance, alteration, abandonment, or removal of certain minor projects that have been determined to produce no more than minimal individual and cumulative impacts, provided:

(a) The activity is designed and implemented to meet the specific limits and conditions in the applicable general permit in Rules 62-330.410 through 62-330.635, F.A.C.

(b) The activity complies with all the general conditions in Rule 62-330.405, F.A.C.; and

(c) The person wishing to use a general permit submits to the Agency a completed Form 62-330.402(1), "Notice of Intent to Use an Environmental Resource General Permit", and as discussed in **section 4.2.2, above.**

5.3.2 Upon receipt, Agency staff will review the notice form to determine if it provides the information needed to demonstrate qualification for the general permit, including the processing fee required in Rule 62-330.071, F.A.C. If it does not qualify or contain all the required information, the Agency will mail a notification to the person within 30 days of receiving the notice form that the notice contains errors or omissions, or does not qualify for the requested general permit. If the Agency does not mail such notification within 30 days of receipt of the original or an amended notice to use the general permit, the person is authorized to conduct the activity authorized by the general permit, except where the general permit specifically requires Agency acknowledgement of qualification prior to proceeding with construction (see the general permits in Rules 62-330.410, 62-330.412, 62-330.417, 62-330.450, 62-330.475, and 62-330.630, F.A.C.)

5.3.3 The person submitting the notice form will have 60 days from the date of the Agency notification of non-qualification to correct the errors or deficiencies. An additional notice fee will not be required if the correct fee was originally submitted and information demonstrating qualification for the general permit is submitted to the Agency within the 60-day time limit.

5.3.4 If the person decides not to pursue the general permit and instead submits an application for an individual permit for the activity within 60 days of the Agency's notification of non-qualification for the general permit, the Agency will apply the fee submitted for the general permit to the application fee for the individual permit.

5.3.5 Within three business days of receipt of a general permit notice for general permits under Rule 62-330.474, 62-330.475, or 62-330.600, F.A.C., the Agency will send a copy of the notice form to the FWC.

5.3.6 Activities conducted under a general permit are certified to comply with applicable state water quality standards in Section 401, Public Law 92-500 and 33 USC Section 1341, and constitute a finding of consistency concurrence with the state's coastal zone management program

5.4 Publishing Notices of Exemptions and General Permits

The Agency will not publish in the newspaper, or require the person requesting qualification for an exemption or general permit to publish notice of receipt of, or Agency action on, the request. The Agency shall provide notice of receipt of permit applications, including notices of intent to use general permits, to persons who have requested to receive such notice within a geographic area in accordance with Section 373.413(3), F.S. Such notice may be provided by e-mail or regular mail. An Agency may require the use of an existing online notification system to request and receive such notices, except where the requestor demonstrates a technical or financial hardship. Such notice will not be directly provided for notice of receipt or Agency action on exemption verifications unless they are part of an application for a permit. Any person who requests to inspect public records will be furnished information in accordance with Section 119.07, F.S.

Persons qualifying for an exemption or general permit are advised that interested parties who become aware of Agency action verifying or denying use of the exemption or general permit may have the rights, under Chapter 120, F.S., to petition for an administrative hearing until their point of entry closes. For this reason, it may be in the best interest of the person proposing the activity to publish, at its expense, a one-time "Notice of Qualification for an Exemption" or "Notice of Qualification to Use a General Permit" in a newspaper of general circulation (under Section 50.031, F.S.) in the county where the activity is located.

5.5 Processing Individual and Conceptual Approval Permit Applications

5.5.1 Initial Receipt

Processing of an individual permit application, including an application for a conceptual approval or mitigation bank permit, commences upon receipt of the application (see **section 4.2.3**, above), submitted as described in Rule 62-330.060, F.A.C., and **section 4.4, above.**

5.5.2 Distribution of Applications and Notices to the Public Prior to Agency Action

Receipt of the application form 62-330.060(1) by the Agency serves to initiate the application process for four separate authorizations:

(a) Application for an environmental resource permit. This will include distribution of all or parts of the application to interested parties and state agencies who have requested receipt of such application, or notice of its receipt;

(b) Application for a State 404 Program permit, if the activities will occur within state-assumed waters regulated under Chapter 62-331, F.A.C. This will include distribution of a public notice to interested parties, adjacent property owners, the general public, and applicable state and federal agencies as provided in Chapter 62-331, F.A.C.;

(c) Application for a State Programmatic General Permit (SPGP), if applicable; and

(d) Application to use state-owned submerged lands, when the activities appear to be located on, or have the potential to be located on, such lands.

5.5.2.1 Distribution to the USACE

As of October 1, 2017, copies of the application form are not forwarded to the USACE. A separate USACE permit may be required for the activity. If a USACE permit is required and the project does not qualify for the SPGP, applicants should send a separate application form to the USACE on the appropriate federal application form. Additional information about federal permitting can be found online in the Jacksonville District Regulatory Division Sourcebook.

5.5.2.2 Distribution to Other Agencies

The applicable sections of the application will be distributed to certain state agencies with statutory authority under Florida's approved Coastal Zone Management Program within five working days of receipt of the application, including the Florida Fish and Wildlife Conservation Commission (FWC) and the Department of State, Division of Historical Resources. Those agencies may comment on the application as it is being processed, and may request additional information be provided to them so that they may fully evaluate the application. The Agencies shall consider comments that are timely received in the course of processing the application. As provided by Section 373.428, F.S., these agencies also may object to issuance of the project under the Coastal Zone Management Act. The applicant is not responsible for distributing the application to the above commenting agencies, but may be requested to supply information to them; the applicant is requested to always copy the processing Agency with any materials supplied to those other agencies in response to information related to the application.

5.5.2.3 Publishing Notice of Receipt of an Application for an Individual Permit

(a) Upon receipt by the District of an application for an individual permit to construct or alter a dam, impoundment, reservoir, or appurtenant work, it shall, cause a notice of receipt of the application to be published in a newspaper having general circulation (meeting the requirements of Section 50.031, F.S.) within the affected area in accordance with Sections 373.116, F.S., 373.118(3), 373.146, and 373.413(3), F.S. In addition, the District may also publish such notice on its website.

(b) When DEP processes the application, it may publish notice on its website if DEP determines that the activities are reasonably expected to result in a heightened public concern or likelihood of request for administrative proceedings. DEP will base that determination on the size, potential effect on the environment or the public, potential controversial nature, and the location of the activities.

(c) For applications processed by any Agency, the Agency will provide a notice of receipt of an application to any person who has filed a written request for notification of any pending applications affecting a designated area. Such notice will contain the name and address of the applicant; a brief description of the proposed activity, including any mitigation; the location of the proposed activity, including whether it is located within an Outstanding Florida Water or aquatic preserve; a map identifying the location of the proposed activity; a depiction of the proposed activity; a name or number identifying the application and the office where the application can be inspected; and any other information required by rule. Such persons have certain rights to comment on or object to applications as they are being processed. Again, applicants are not responsible for performing this distribution.

Persons who wish to have their names placed on that mailing list may do so by contacting the local office of the Agency. An Agency may require the use of an existing online notification system to request and receive such notices, except where the requestor demonstrates a technical or financial hardship. Pending applications and their current status also may be viewed at https://floridadep.gov/sec/sec/content/permits-applications-under-review (for DEP), or at the Internet site of the applicable District.

(d) When noticing is required under Section 253.115, F.S., for activities requiring a lease or easement in, on, or over state-owned submerged lands, the Agency, as staff to the Board of Trustees of the Internal Improvement Trust Fund, is required to provide notice of all property owners within a 500-foot radius of the proposed lease or easement boundary. In such a case, the applicant will be required to forward to the Agency a list of names and addresses from the latest county tax assessment roll in mailing label format. In lieu of the Agency providing notice of application for lease or easement, an applicant may elect to send the notice, provided the notice is sent by certified mail, with the return-receipt card addressed to DEP or District, as applicable.

5.5.3 Request for Additional Information

5.5.3.1 Within 30 days of receipt of the application (see **section 4.2.3., above**) for an individual or conceptual approval permit, and within 30 days of receipt of any additional information provided by the applicant in response to the Agency's timely request for information, the Agency will determine if it contains:

(a) The applicable information requested in Rule 62-330.060, F.A.C., and Sections A through H, as applicable, of the application;

(b) The fee required in Rule 62-330.071, F.A.C.;

(c) Information or exhibits needed to clearly and legibly depict and describe the proposed activity, and its location; and

(d) Any other additional information to provide the reasonable assurances needed by the Agency to determine if the proposed activity meets the conditions for issuance of a permit in accordance with Rules 62-330.301 and 62-330.302, F.A.C., and the Applicant's Handbook, as well as the information that may be required to concurrently process applications located on state-owned submerged lands in accordance with Rule 62-330.075, F.A.C. Applications for a conceptual approval permit also will be evaluated for the information required in either Rule 62-330.055 or 62-330.056, F.A.C., as applicable. Applications for a mitigation bank permit also will be evaluated for information required in Chapter 62-342, F.A.C.

The Agency may request only that information needed to clarify the additional information, or to answer new questions directly related to the additional information. The request will include citation to the rule that authorizes the Agency to request information on each item pursuant to Section 373.417, F.S.

The applicant may voluntarily submit a written waiver of the above 30-day time clock requirement to allow the Agency additional time to determine if additional information is required; the Agency is not obligated to accept the waiver or to delay sending the request for additional information.

5.5.3.2 An application will be considered incomplete if it does not include all the above items, or if it appears to contain conflicts or errors. If an agent completed the application on behalf of the applicant, the Agency will request any needed information from the agent, and will provide a copy of the request to the applicant. For purposes of the discussion that follows, the term "applicant" will also refer to the agent working on behalf of the applicant as identified in the application.

5.5.3.3 The Agency will inform the applicant within 30 days of receipt of the application, or within 30 days of receipt of additionally received information, whether the proposed activities are exempt from permitting or qualify for a general permit. Any processing fees received in excess of those required under Rule 62-330.071, F.A.C., will be refunded.

5.5.3.4 If a project contains a mixture of activities, one or more of which require an individual permit, and one or more of which are exempt from permitting or qualify for a general permit, all of the proposed activities will be considered together to be part of the application for an individual permit, and will be reviewed by the Agency as a whole, unless the applicant specifically requests in writing, prior to or in conjunction with the submittal of the application for an individual permit, that the Agency determine which components of the entire application qualify for an exemption or general permit. In such a case, the applicant must separately pay the processing fee required under Rule 62-330.071, F.A.C., for the Agency to determine qualification for an exemption, a general permit, or both. If the application contains more than one type of activity qualifying for an exemption, only one exemption verification processing fee will be charged in addition to the required permit application fee, as provided in subsection 62-330.050(6), F.A.C. If the application contains more than one type of activity qualifying for a general permit, a processing fee shall be charged for each general permit verification under subsection 62-330.402(2), F.A.C., in addition to the individual permit application fee.

5.5.3.5 The applicant shall have 90 days from the date the Agency makes a timely request for additional information to submit that information to the Agency. If an applicant requires more than 90 days to respond, it must notify the Agency in writing of the circumstances, at which time the application shall remain in active status for one additional period of up to 90 days. Additional extensions shall be granted for good cause shown by the applicant. A showing that the applicant is making a diligent effort to obtain the requested additional information, and that the additional time period is both reasonable and necessary to supply the information, shall constitute good cause. In such case, a specified amount of additional time shall be granted at the mutual consent of the Agency and the applicant. If the applicant chooses not to, or is unable to, respond to the request for additional information within the above time frames, the application shall be administratively denied without prejudice. Such denial is not a determination of the merit of an application and does not preclude the applicant from reapplying at a later time. However, the applicant will not receive a refund of processing fees submitted, and the Agency will not apply those processing fees to a subsequently submitted permit application or notice. An applicant who cannot provide requested information within the above time frames is encouraged to withdraw their application before the Agency takes action to deny it.

5.5.3.6 The applicant may submit a written request for an application be deemed complete at any time. Upon receipt of such request, the Agency will begin processing the application and will take Agency action to issue or deny the application within 60 days of that date, or within such additional time as may be provided if the applicant voluntarily waives that time clock.

5.5.3.7 An applicant may voluntarily request the application be withdrawn prior to Agency action if the applicant does not or cannot provide the requested information or required processing fees within the above time frames. The applicant will not receive a refund of processing fees, but the Agency will apply processing fees submitted for such withdrawn application to the processing fee required for a new application or notice received from the same applicant, for an activity on all or a part of the same parcel, within 365 days of the date the Agency received the request to withdraw the previous application.

5.5.4 Staff Evaluation and Agency Action

5.5.4.1 Agency staff will commence the technical review when the application for an individual permit is complete. Criteria used in the evaluation will include Rules 62-330.075 (if the activity is located on state-owned submerged lands), 62-330.301 and 62-330.302, F.A.C., **Parts II through V of this Volume,** and **Volume II**, as applicable**.**

The decision to issue or deny a permit will be based on a determination of whether the reasonable assurances required in the above rules and the Handbook have been provided, including the provisions for elimination or reduction of adverse impacts to wetlands and other surface waters, and a determination of whether mitigation is appropriate to offset those adverse impacts.

5.5.4.2 A permit shall be approved, denied, or subject to a notice of proposed agency action within 60 days after receipt of the original application, the last item of timely requested additional material, or the applicant's written request to begin processing the permit application. By the 60-day deadline, or prior to the expiration of a timely filed waiver, the Agency will either issue a permit (or a Notice of Intent to Issue) if the activity meets the criteria in **section 5.5.4.1, above,** or it will issue a Notice of Denial (or Notice of Intent to Deny) if the activity does not meet the permitting criteria.

5.5.4.3 If the Agency determines that the applicant has not provided reasonable assurance that the proposed activity qualifies for issuance of an individual permit, the notice of denial (or notice of intended denial) will explain the basis for the denial, and what changes, in general terms, if any, would address the reasons for denial.

5.5.5 Notice of Agency Action

5.5.5.1 A person may request notice of the intended agency action for a specific application.

5.5.5.2 Interested persons, including objectors, may submit information about a proposed activity for Agency review. For Agency staff to properly evaluate the information, those persons are advised to contact the Agency within 14 days of notification of the Agency's receipt of the application if they have questions, objections, comments, or information regarding the proposed activity. Persons may also request public records in accordance with Section 119.07, F.S.

5.5.5.3 For applications processed by DEP, it will provide notice of agency action to any person who has filed a written request to be notified of DEP's decision to issue or deny the permit, and to persons who have filed written objections or concerns about the activity. In addition, applicants will be required to publish, at their expense, a one-time notice of the agency decision in a newspaper of general

circulation (meeting the requirements of Section 50.031, F.S.) in the county where the activity is located if DEP determines the proposed activities are reasonably expected to result in a heightened public concern or likelihood of request for administrative proceedings. DEP will base that determination on the size, potential effect on the environment or the public, controversial nature, or location of the activities. DEP will furnish the applicant with the notice that is to be published. Notwithstanding DEP's intended agency action, such application shall be denied if the applicant either fails to publish notice, or fails to provide proof of publication within 30 days of DEP's issuance of intended agency action, or within 21 days of the date of publication, whichever occurs sooner. In addition, DEP may also publish such notice on its website.

5.5.5.4 For applications processed by a District, the District shall provide notice of agency action or intended agency action to the applicant and to any persons who have requested to receive such notice. The District shall inform the applicant of the right to publish the Agency decision. The District may also publish such notice on its website.

5.5.5.5 The Notice of Agency Action, or the permit if there is no prior Notice of Agency Action, will include a notice of rights under Chapter 120, F.S., explaining the time limit for a person to file a petition for a formal administrative hearing.

5.5.5.6 Persons who have not been provided with notice of the Agency decision may have the right to petition for an administrative hearing on the activity under Chapter 120, F.S., until their point of entry closes. Therefore, even if not required to publish notice of the Agency's decision, it may be in the applicant's best interest to publish, at its own expense, a one-time notice of the Agency's decision (or intended decision) in a newspaper of general circulation in the county in which the activity is located.

5.6 Activities on State-owned Submerged Lands

Permit applications (as well as notices requesting qualification for an exemption or general permit) for activities on, or having the potential to be located on, state-owned submerged lands are subject to review by DEP's Division of State Lands for a title determination. Applicants are not responsible for obtaining that determination. If a determination is made that the activity is located on state-owned submerged lands, a separate submerged lands authorization will be required in addition to any required environmental resource permit. The Agency will determine the form of authorization required, and whether such authorization can be approved, as part of the review of the application in accordance with Chapter 253, F.S., and 258, F.S., Chapters 18-18 or 18-20, F.A.C., as applicable, and Chapter 18-21, F.A.C. Processing of individual permit applications for activities on state-owned submerged lands are concurrently processed with the applicable state-owned submerged lands authorization, as described in **section 1.3.3 above**, Rule 62-330.075, F.A.C., and Section 373.427, F.S. For exemptions and general permits, the Agency will attempt to provide the state-owned submerged lands authorization at the same time as the decision to issue, deny, or verify the permit or notice under Chapter 62-330, F.A.C. If the state-owned submerged lands authorizations require execution of a document, such as a lease or easement, construction, alteration, maintenance, or removal of the project should not commence until that document is executed.

6.0 Duration, Operation, Modification, and Transfer of Permit

6.1 Duration of Permits

6.1.1 General

General, individual, and conceptual approval permits are issued with a specified construction phase, as provided in Rule 62-330.320, F.A.C. Upon completion of the construction that is compliant with the terms and conditions of the permit, the permit is then converted to a perpetual operation and maintenance phase. Conversion is either automatic or requires formal action by the Agency; the procedures for the conversion are described below and in Rule 62-330.310, F.A.C. A conceptual approval permit does not authorize construction or operation, but does have an expiration date that is tied to the issuance of subsequent permits for construction or alteration of the activities that are consistent with the conceptual approval permit, as discussed in Rule 62-330.055 and 62-330.056, F.A.C.

6.1.2 Construction Phase Duration

6.1.2.1 General Permits — The construction phase of a general permit is five years and cannot be extended. If construction activities have not been completed within that five year period, a new notice of intent to use the applicable general permit must be submitted, as provided in Rule 62-330.402, F.A.C., and **sections 5.3 through 5.3.6**, above.

6.1.2.2 Individual Permits — The construction phase of an individual permit typically is five years, but for good cause, may be authorized for a longer duration at the time of issuance of the permit, as described below and in subsection 62-330.320(2), F.A.C. An extension may be requested as a modification to the permit as described in Rule 62-330.315, F.A.C., and **sections 6.1.3 and 6.2**, below.

The construction phase of a permit expires on the date indicated in the permit unless an application is received for an extension of the construction phase prior to expiration of the permit.

If a construction phase is requested for a duration of more than five years, as part of either the initial application or any subsequent modification, the applicant, in each instance, will be required to provide reasonable assurance that:

(a) The project cannot reasonably be expected to be completed within five years after commencement of construction; and

(b) The impacts of the activity, considering its nature, size, and any required mitigation, can be accurately assessed and offset where appropriate, and the terms of the permit can be met for the duration of the permit requested.

A mine is an example of a type of project where a construction phase of more than five years is typically requested; in many cases, mine resources are extracted over a period that may exceed 50 years.

6.1.2.3 A construction phase may include some incidental operation of constructed activities prior to formal conversion to an operation phase. For example, during construction of a stormwater management system, rainfall events may occur that will discharge stormwater runoff into the

system under construction. At such times, the system may be temporarily operated prior to formal conversion to the operation phase, provided such temporary operation does not violate the conditions for issuance of a permit in Rule 62-330.301 and 63-330.302, F.A.C. However, such constructed projects cannot be used for their intended use (such as occupation of a residence, commencement of business transactions for a business, public use of a road, or occupation of parking spaces by the general public within a parking lot) until the project, or the portions of the project that can be operated independently of other portions of the project have been completed and the Permittee has submitted Form 62-330.310(1) "As-Built Certification and Request for Conversion to Operation Phase," in accordance with subparagraph 62-330.350(1)(f)2., F.A.C., certifying as to such completion.

6.1.3 Request to Extend the Duration of the Construction Phase after Issuance

After issuance of an individual or conceptual approval permit, *but before the expiration date*, a permittee may request the duration of the permit be extended by sending a permit modification request (electronically or by mail) to the Agency that issued the permit in accordance with Rule 62-330.315, F.A.C., and section **6.2**, below.

If a timely and complete request is received to extend the construction phase of an individual permit, or the duration of a conceptual approval permit, the existing permit shall remain in full force and effect until the Agency takes action on the request for extension. If the request is denied, the permit shall not expire until the last day for requesting review of the Agency order.

6.1.4 Operation and Maintenance Phase

The procedures and requirements for converting a permit from the construction phase to the operation and maintenance phase are provided in Rule 62-330.310, F.A.C., the general and special limiting condition in paragraph 62-330.350(1)(g), F.A.C., and **sections 12.1 through 12.2 of this Volume.**

The operation and maintenance phase of all ERPs lasts in perpetuity.

6.1.5 Conceptual Approval Permits

The duration of conceptual approval permits is:

The maximum duration of a conceptual approval permit, other than for urban infill and redevelopment, is 20 years, or as otherwise provided in subsection 62-330.056(9), F.A.C., provided authorized construction commences within five years of issuance (see subsection 62-330.056(10), F.A.C.).

The phrases "authorized construction or alteration has begun" in subsection 62-330.056(9), F.A.C., and "construction commenced" in subsection 62-330.056(10), F.A.C., mean that substantive work has been initiated in accordance with a general or individual permit authorizing construction of the project in conformance with the terms and conditions of the conceptual approval permit. Minor clearing, dredging, or filling with an apparent purpose of keeping the permit active will not be considered to meet this requirement.

For urban infill and redevelopment — 20 years, as specified in subsection 62-330.055(7), F.A.C.

6.2 Modification of Permits

The permittee may request a modification to an existing, currently valid individual or conceptual approval permit in accordance with Rule 62-330.315, F.A.C., and as summarized below. Changes to activities authorized by a general permit require submittal of a new notice (if the changes result in the project still qualifying for a general permit), or submittal of a new application for an individual permit if the changes cause the activity to exceed the limitations and conditions of the general permit.

6.2.1 Applications for modifications are processed as either minor or major in accordance with Rule 62-330.315, F.A.C., and the following.

(a) Applications for minor modifications, as described in Rule 62-330.315, F.A.C., other than to modify the permit to reflect a change in ownership or control of the land subject to the permit as provided in subsection 62-330.340(1), F.A.C., and section 6.3.2.1(a)**, below**, may be requested electronically or by letter sent to the Agency that processed the permit. The request must include:

1. Reference to the permittee name and permit number;

2. Contact information for the requestor;

3. A clear statement explaining the nature of the proposed modification

4. Fully dimensioned or scaled drawings reflecting the proposed modification, if applicable.

(b) A request to transfer a permit or to add co-permittees to a permit is considered a minor modification, and shall be made in accordance with Rule 62-330.340, F.A.C., and through use of the "Request to Transfer Environmental Resource Permit and/or State 404 Program" Form 62-330.340(1).

(c) A request that does not qualify as a minor modification is processed as a major modification in accordance with subsection 62-330.315(3), F.A.C.

(d) Factors that will be considered in determining whether a modification will cause more than minor changes under subsection 62-330.315(2), F.A.C., are whether the proposed activity will:

1. Increase the project area by more than 10 percent or 1 acre, whichever is less, unless the activities were permitted with stormwater treatment and flood attenuation capability sufficient to meet the permitting requirements for the proposed modification, or unless the increase in project area is to a mitigation bank, in which case any increase in the project area is considered a major modification;

2. Increase proposed impervious and semi-impervious surfaces by more than 10 percent or 0.5 acres, whichever is less, unless the activities were permitted with stormwater treatment and flood attenuation capability sufficient to meet the permitting requirements for the proposed modification;

3. Reduce the stormwater treatment or flood attenuation capability of the system, unless the activities were permitted with stormwater treatment and flood

attenuation capability sufficient to meet the permitting requirements for the proposed modification;

4. Result in additional net loss of regulated floodplain storage;

5. Result in additional unmitigated impacts to wetlands or other surface waters, unless mitigation is not required pursuant to **section 10.2.2.1 or 10.2.2.2**, below;

6. Result in more than 10 percent or 0.5 acre, whichever is less, of total additional mitigated impacts to wetlands and other surface waters;

7. Result in any additional impacts within a designated riparian habitat protection zone;

8. Cause or contribute to water quality violations that were not anticipated in the issued permit;

9. Reduce the permitted financial responsibility mechanisms, except in accordance with specific permit conditions that provide for a reduction in such financial responsibility mechanisms;

10. Result in a net reduction in the area of conservation easement or mitigation within the area which was previously permitted;

11. Extend the duration of a permit beyond five years from the current permit expiration date except as otherwise provided in Rule 62-330.320(2), F.A.C.;

12. Require a new site inspection that will require more than minimal staff time to conduct;

13. Lead to substantially different impacts to the water resources or overall objectives of the District or Department, unless they lessen the impacts of the original permit; or

14. Otherwise substantially alter the design of the activities or the permit conditions.

(e) An application for a permit or a request to construct a phase of a project pursuant to Rule 62-330.056, F.A.C., is not a minor modification of the conceptual approval permit.

(f) Requests to use or release mitigation bank credits shall be reviewed as a minor modification of the relevant mitigation bank permit.

(g) All modification requests must include payment of the processing fee under Rule 62-330.071, F.A.C.

6.3 Transfers of Permits and Changes in Ownership

6.3.1 General permits

Projects constructed in accordance with the terms and conditions of a general permit are automatically authorized to be operated and maintained by the permittee and subsequent owners in

accordance with subsection 62-330.340(1), F.A.C., and do not require a modification request to the Agency upon change in ownership.

6.3.2 Individual and Conceptual Approval Permits

6.3.2.1 A modification to an individual or conceptual approval permit is required to reflect any sale, conveyance, or other transfer of ownership or control of the real property, project, or activity covered by the permit, except for transfer to the operation and maintenance entity approved in the permit. Ownership must be demonstrated in accordance with **sections 4.2.3(d) and (e), above**. One of two procedures below is to be used, depending on whether the permit is in the construction phase or the operation and maintenance phase and the timing of the request:

(a) Upon transfer of ownership or control of the entire real property, project, or activity covered by a permit that is in the operation and maintenance phase, transfer of the permit to the new owner or person in control is automatic if the permittee provides the agency with written notice within 30 days of the change in ownership or control, except as otherwise provided in subsection 62-330.340(1), F.A.C.

(b) In all other situations a permit modification must be processed under subsections 62-330.340(2) through (4), F.A.C.

A request to transfer a portion of a permitted project shall also include a demonstration that either that portion of the project is capable of functioning independently in compliance with all conditions for permit issuance, or that the transferee has sufficient legal and ownership interest (such as drainage easements, cross drainage agreements or other agreements) to allow the transferee to operate and maintain all other portions of the project when necessary.

6.4 Removal and Abandonment

An owner of any stormwater management system, dam, impoundment, reservoir, appurtenant work, or works wishing to abandon or remove such project is subject to the provisions of Section 373.426, F.S.

7.0 Determinations of the Landward Extent of Wetlands and Other Surface Waters

7.1 Methodology

Determinations of the landward extent of wetlands and other surface waters shall be performed using Chapter 62-340, F.A.C., as ratified under Section 373.4211, F.S.

Three types of determinations are available:

(a) A formal determination, based on a certified survey, an approximate delineation, or a combination thereof, as discussed in **sections 7.2 through 7.2.9**, below;

(b) An informal determination, as discussed in **section 7.3**, below; and

(c) A delineation, identification, or verification as part of a request for verification of an exemption, notice of intent to use a general permit, or application for an individual or conceptual approval permit.

7.1.1 Data Form

Agency staff shall use Form 62-330.201(1), F.A.C., "Chapter 62-340, F.A.C. Data Form, (December 22, 2020), incorporated by reference in Rule 62-330.201(1), F.A.C., to document verification of determinations of the landward extent of wetlands and other surface water for notices and applications for ERP permits and formal or informal determinations of the landward extent of wetlands and other surface waters. The "Chapter 62-340, F.A.C. Data Form Guide" in Appendix J, the "62-340, F.A.C. Data Form Instructions", in Appendix K, and the "Florida Wetland Delineation Manual", which is available for download on the Department website, may be used to assist staff and other environmental professionals in completing the form and performing delineations.

Any time a regulatory agency concludes or determines that an area is a non-wetland surface water, wetland, or upland at least one data point should be documented, *i.e.*, once a conclusion informally or formally has been made by the regulatory agency at least one complete data form supporting that conclusion is required.

The number of data forms required will depend on the size and variability of the site inspection area. There is no size threshold or maximum number of data forms required for an inspection site. Reasonable scientific judgement should be used to determine the number of required data forms on a case by case basis.

(a) For the delineation of the landward extent of wetlands and other surface waters, at least one delineation data point along the boundary shall be verified and documented by the regulatory agency during the visual site inspection pursuant to Chapter 62-340.100(1), F.A.C. Documentation of a delineation data point shall include two data forms; one representative of the waterward area adjacent to the data point, the other representative of the landward or upland area adjacent to the data point. The two complete data forms at a delineation data point will document failure or satisfaction of all methodology criteria pursuant to Chapter 62-340, F.A.C., and changes in evidence used to determine the boundary delineation at that point.

A delineation data point will be documented for each homogeneous boundary within the site inspection area. If all delineation boundaries on site are homogenous in character, one data point is sufficient for documentation. One delineation data point representative of homogeneous boundaries found in other locations throughout the site is sufficient for documentation.

For purposes of the delineation data point, "homogeneous boundary" means all or part of a site delineation that is sufficiently similar in current condition to be delineated determine the landward extent of wetlands and other surface waters with a particular "test(s)" or interpretation of evidence as contemplated in Chapter 62-340, F.A.C. Characteristics that distinguish homogeneous boundaries may include, but are not limited to:

1. plant community type,
2. surface water type,
3. hydrologic indicators,
4. soils,
5. alterations to plants, hydrology, or soils,
6. hydrologic isolation or connection to waters of the State, or
7. other current condition expression which separate it from other boundaries on site.

(b) For identification or conclusions regarding the absence or presence of a non-wetland surface water, wetland, or upland classification by the regulatory agency within the site inspection area, at least one data form within homogeneous areas of classification shall be verified and documented by the regulatory agency during the visual site inspection pursuant to Chapter 62-340.100(1), F.A.C. Documentation of an identification data point shall include one data form representative of the area of classification. The data form at an identification data point will document failure or satisfaction of all methodology criteria pursuant to Chapter 62-340, F.A.C. and evidence used to determine the upland, wetland, or non-wetland surface water classification.

An identification data point will be documented for each homogeneous area within the site inspection area. If all areas on site are homogenous in character, one data point is sufficient for documentation. One data point representative of homogeneous areas found in other locations throughout the site is sufficient for documentation.

For purposes of the identification data point, "homogeneous area" means all or part of a site inspection area that is sufficiently similar in current condition to classify with a particular "test(s)" or interpretation of evidence as contemplated in Chapter 62-340, F.A.C. Characteristics that distinguish a homogeneous area may include, but are not limited to:

1. upland classification,
2. wetland classification,
3. non-wetland surface water classification,
4. hydrologic isolation or connection to waters of the State,
5. plant community type,
6. surface water type,
7. hydrologic indicators,
8. soils,
9. alterations to plants, hydrology, or soils, or
10. other current condition expression which separate it from other areas on site.

7.2 Formal Determinations

Petitions for formal determinations shall be prepared following the requirements below**,** and submitted to the applicable Agency in accordance with the Operating Agreements incorporated by reference in subsection 62-330.010(5), F.A.C.

7.2.1 Preparation and Submittal of the Petition

The petition shall contain:

(a) One copy of completed Form 62-330.201(2), "Petition for a Formal Determination of the Landward Extent of Wetlands and Other Surface Waters," including copies of all items required by that form; and

(b) The processing fee required in Rule 62-330.071, F.A.C.

(c) The petition shall be submitted to the Agency office that will have permitting responsibility for the types of activities proposed for the lands subject to the Determination, in accordance with the Operating Agreements incorporated by reference in Chapter 62-113, F.A.C.

7.2.2 Processing the Petition

(a) Within 30 days of receipt of a petition for a formal determination of the landward extent of wetlands and other surface waters, and within 30 days of receipt of any additional information submitted by the petitioner in accordance with this subsection, the Agency shall notify the petitioner of any additional information which may be necessary to complete the review of the petition. The applicant may voluntarily submit a written waiver of the above 30-day time clock requirement to allow the Agency additional time to determine if additional information is required. The Agency is not obligated to accept the waiver or to delay sending the request for additional information.

The petitioner shall have 90 days from the date the Agency mails a timely request for additional information to submit that information to the Agency. If a petitioner requires more than 90 days in which to respond to a request for additional information, the petitioner may notify the Agency in writing of the circumstances, at which time the petition shall be held in active status for one additional period of up to 90 days, if approved by the Agency. Additional extensions shall be granted by the reviewing Agency for good cause shown by the petitioner. A showing that the petitioner is making a diligent effort to obtain the requested additional information shall constitute good cause. Failure of a petitioner to provide the timely requested information by the applicable deadline shall result in administrative denial of the petition without prejudice to re-apply.

1. For petitions processed by DEP, it will complete the determination and issue a notice of intended agency action within 60 days after the petition is deemed complete. The petitioner shall publish, at its own expense, the notice of proposed agency action in a newspaper of general circulation in the affected area. The petitioner shall provide a copy of the proof of publication of the notice of intended agency action to DEP using the format prescribed in subsection 62-110.106(5), F.A.C. The Agency shall send the property owner a copy of the Agency determination if the owner is not the petitioner.

2. For petitions processed by a District, the District shall complete the determination and shall issue a notice of intended agency action within 60 days after the petition is deemed complete. The petitioner may publish, at its own expense, the notice of proposed agency action in a newspaper of general circulation in the affected area. If published, the petitioner shall provide a copy of the proof of publication of the notice of intended agency action to the District. The District shall send the property owner a copy of the Agency determination if the owner is not the petitioner.

(b) The petition shall be denied if the Agency determines that the materials submitted to the reviewing agency do not contain all the applicable information required in this subsection, including if the petitioner does not correctly delineate the landward extent of wetlands and other surface waters in accordance with Chapter 62-340, F.A.C. The Agency shall complete the determination and shall issue a notice of intended agency action within 60 days after the petition is deemed complete unless the petitioner provides the reviewing agency with a written waiver of this time limit. A person requesting a formal determination may withdraw the petition without prejudice at any point before final agency action.

(c) Sections 120.569 or 120.57, F.S., apply to formal determination decisions made by the Agency.

(d) Prior to the Agency's inspection of real property, the petitioner or its agent shall initially delineate the boundaries of wetlands and other surface waters on the site by flagging the field locations of wetland and other surface water boundaries (for a certified survey or a global positioning system [GPS] approximate delineation), or by depicting the extent of wetlands and other surface waters on the most recent aerials (for an approximate delineation). Limits of the area to be delineated, whether contained within a single property or consisting of multiple properties, shall be clearly marked and easily discernable in the field. This inspection boundary shall be depicted on all aerials and maps clearly identifying the limits of the inspection for the formal determination. An Agency representative will then verify the location of the wetland and other surface water boundaries within the inspection boundary and indicate any necessary adjustments of the petitioner's initial determination to reflect an accurate delineation. When the real property is less than 10 acres, the petitioner may elect to not pre-flag for verification, in which case the reviewing Agency will flag the wetland and other surface water boundaries during its inspection of the site. Verification and documentation of the wetland and other surface water boundaries by the Agency representative shall be conducted in accordance with Chapter 62-340, F.A.C., and section 7.1.1(a), above.

(e) A petitioner may request a formal determination in the form of a certified survey, an approximate delineation, or combinations thereof, as described below.

1. When a certified surveyed delineation of the extent of wetlands and other surface waters is used, the survey shall be prepared and certified by a Professional Surveyor and Mapper registered in the State of Florida. The surveyor or the surveyor's representative shall accompany the Agency representative on the delineation verification described in section **7.2.2(f)**, below, and shall have the surveyor survey the verified boundaries of wetlands and other surface waters. The certified survey shall include a legal description of, and acreage contained within, and depict the boundaries of the property for which the determination is sought. The boundaries of wetlands and other surface waters must be witnessed to the property boundaries, and shall be capable of being mathematically reproduced

from the survey. The petitioner must submit to the Agency one electronic copy or three paper copies of the certified survey, along with one copy of the survey depicted on aerial photographs to complete the petition.

2. When an approximate delineation is used, it shall consist of a depiction of the approximate boundary of wetlands and other surface waters produced by using a GPS, or the boundary of wetlands and other surface waters drawn on rectified aerial photographs, or a combination thereof. The approximate delineation shall be subject to the following:

   a. A range of variability shall be determined for all depictions of approximate wetland and other surface water boundaries by comparing a number of field located flagged points of the delineated wetland and other surface water points field delineated by GPS, to field located and surveyed boundary points. The Agency shall determine the number and location of comparison points using the total linear feet of approximately delineated wetland and other surface water boundaries such that the total number of comparison points reflects at least one specific surveyed comparison point for every 1,000 feet of approximately depicted wetland and other surface water boundary. No fewer than three comparison points shall be performed for each approximate delineation. The applicant may request that artificial waterbodies that were constructed entirely in uplands be excluded from the linear feet calculation when determining the number of required comparison points. This exclusion is limited to artificial waterbodies for which the Agency has confirmed a delineation in accordance with 62-340.600(2)(d), F.A.C., and that meet the definition in paragraph 2.0(a)10 of this Volume, except when the exclusion would result in an approximate delineation with less than three comparison points. For GPS approximate delineations, the petitioner shall provide a survey prepared and certified by a Professional Surveyor and Mapper registered in the State of Florida, to show the relationship of surveyed comparison points to the GPS depicted wetland and other surface water boundaries. The range of variability shall be the greatest deviation measured at the surveyed comparison points. An approximate GPS depiction of wetland and other surface water boundaries cannot be used if the range of variability is equal to or greater than 25 feet.

   b. A range of variability shall be determined for all approximate wetland and other surface water boundaries hand drawn on aerial photographs by comparing a number of specific wetland and other surface water boundary points indicated on the rectified aerial photograph, to field located and surveyed boundary points. The Agency shall determine the number and location of comparison points using the total linear feet of approximately delineated wetland and other surface water boundary such that the total number of comparison points reflects at least one specific surveyed comparison point for every 1,000 feet of approximately delineated wetland and other surface water boundary. No fewer than three comparison points shall be performed for each approximate delineation. The applicant may request that artificial waterbodies that were constructed entirely in uplands be excluded from the linear feet calculation when determining the number of required comparison points. This exclusion is limited to artificial

waterbodies for which the Agency has confirmed a delineation in accordance with 62-340.600(2)(d), F.A.C., and that meet the definition in paragraph 2.0(a)10 of this Volume, except when the exclusion would result in an approximate delineation with less than three comparison points. For approximate wetland and other surface water boundaries hand drawn on an aerial photograph, the petitioner shall provide a specific purpose survey prepared and certified by a Professional Surveyor and Mapper registered in the State of Florida, to show the relationship of surveyed comparison wetland and other surface water boundary points to the aerial photo-interpreted wetland and other surface water boundary points. The range of variability shall be the greatest deviation measured at the surveyed comparison points. An approximate hand-drawn aerial photograph delineation method cannot be used if the range of variability is equal to or greater than 25 feet.

c. A rectified aerial photograph shall serve as the basis for an approximate delineation hand-drawn on aerial photographs only when the boundaries of wetlands and other surface waters are accurately depicted on the aerial photograph by the clear expression of vegetative or physical signatures of the vegetative communities as verified by ground-truthing. If a submitted rectified aerial photograph does not provide a clear expression of vegetative or physical signatures of the vegetative communities or other surface water features on the property, or cannot be accurately depicted, then the landward extent of wetlands and other surface waters shall be delineated by flagging the boundary, and the formal determination shall be produced using the procedure for a certified survey described above in section 7.2.2(e)1; or by depiction of the approximate wetland and other surface water boundaries field delineated by GPS as described above in section 7.2.2(e)2.a., or a combination thereof.

d. After any verification and adjustment as required in section **7.2.2(f)**, below, the petitioner shall submit one copy of the following to complete the petition: the hand-drawn wetland and other surface water boundaries on a rectified aerial photograph; or a depiction of the approximate wetlands and other surface waters field-delineated by GPS on a rectified aerial photograph, along with one electronic copy or three paper copies of a survey prepared and certified by a Professional Surveyor and Mapper registered in the State of Florida, to show the relationship of field located surveyed comparison points to the approximate field GPS boundary points or the wetlands and other surface waters boundary drawn on a rectified aerial photograph.

e. As a condition of an approximate formal determination, when a subsequent permit application includes regulated activities within 200 feet of the landward extent of the approximate delineation, the applicant shall field-establish and flag or stake the exact wetlands and other surface waters boundaries pursuant to Chapter 62-340, F.A.C., at that location for verification by the reviewing Agency. The purpose of the flagging or staking is to identify the line to minimize the potential for unintentional disturbance of the wetlands or other surface waters. If the regulated activities are in such proximity to the field-established line that it is

necessary for the Agency to require the field-established line to be documented as part of the permit application or formal determination, or if required as part of accepting a site-protection instrument proposed by the applicant, the line as field-verified by the reviewing Agency shall be located by a surveyor or mapper registered in the State of Florida. The field-established line does not need to be documented when any of the following exist:

(1) The project will involve dredging or filling of an entire wetland or other surface water encompassed by the approximate delineation, and the impact meets the requirements of section 10.2.1 of Volume I. If only a portion of the wetlands or other surface waters at that location is proposed for dredging or filling, the need to stake or flag the field-established line or the proposed limits of dredging or filling will be determined by the Agency during processing of the permit application based on factors such as those in (2) through (3) below.

(2) The precise location of the wetland or other surface water boundary is not needed to demonstrate compliance with section 10.2.7 of Volume I.

(3) Flagging or staking of the field-established line will not materially affect whether the project impacts can be determined by relying on the approximate delineation.

(f) Prior to the Agency's inspection of the site the petitioner or their agent shall submit to the reviewing agency a depiction of the delineation of wetlands and other surface waters that have been flagged (for a certified survey or a global positioning system [GPS] approximate delineation) or photointerpreted (for an aerial approximate delineation) on the most recent aerial photographs that depict the property. Verification and documentation of the wetland and other surface water boundaries by the Agency representative shall be conducted in accordance with Chapter 62-340, F.A.C., and section 7.1.1(a), above.

(g) Pursuant to Section 373.421, F.S., an issued formal determination of the landward extent of wetlands and other surface waters is binding only for the limits of wetlands and other surface waters as defined and delineated under Chapter 62-340, F.A.C.

7.2.3 Duration.
A formal determination shall be binding for five years provided physical conditions on the property do not change, other than changes that have been authorized by a permit issued under Part IV, Chapter 373, F.S., so as to alter the boundaries of delineated wetlands or other surface waters during that period.

7.2.4 Renewal of Determination. A petition for a new formal determination for a property for which a formal determination issued pursuant to this rule already exists shall qualify for a renewal for an additional five years, pursuant to Section 373.421, F.S., at a reduced processing fee under Rule 62-330.071, F.A.C., provided:

(a) Physical conditions on the property have not altered the boundaries of wetlands or other surface waters during the period of the existing determination, other than changes that have

been authorized by a permit issued under Part IV of Chapter 373, F.S. Site conditions shall be documented in accordance with section 7.1.1(a), above;

(b) The petition is submitted within 60 days prior to the expiration of the existing determination; and

(c) The methodology in Chapter 62-340, F.A.C., has not been amended since the previous formal determination.

7.2.5 Re-issuance of Determination. A petition for a new formal determination for a property for which a formal determination was previously issued pursuant to this rule but has since expired shall qualify for a re-issuance for an additional five years at a reduced processing fee under Rule 62-330.071, F.A.C., provided:

(a) Physical conditions on the property have not altered the boundaries of wetlands or other surface waters during the period of the former determination, other than changes that have been authorized by a permit issued under Part IV of Chapter 373, F.S. (Site conditions shall be documented in accordance with section 7.1.1(a), above);

(b) The petition is submitted within two years of the expiration of the former determination; and

(c) The methodology in Chapter 62-340, F.A.C., has not been amended since the previous formal determination.

7.2.6 Revocation of Determination. The Agency shall revoke a formal determination upon finding that the petitioner has submitted inaccurate information to the Agency such that a substantially different delineation of the boundaries of wetlands or other surface waters would have resulted if the correct information had been submitted (see Section 373.421(4), F.S.).

7.2.7 A formal determination issued to a real property owner or other person who has a legal or equitable interest in real property may be transferred to a successor in interest to the party who originally petitioned for the determination. The transfer shall be subject to the existing terms and conditions of the original determination.

7.2.8 A copy of the issued formal determination, along with the certified survey depicting the approved wetlands and other surface waters boundaries, shall be sent to the appropriate USACE office and to DEP or the District, as appropriate.

7.2.9 Where a petition for a formal determination is requested for lands subject to a violation of Part IV of Chapter 373, F.S., the extent of wetlands and other surface waters will be evaluated as if the violation or non-compliance issue had not occurred.

7.3 Informal Determinations.

(a) The Agency may issue informal, non-binding pre-application determinations of wetlands and other surface waters. Such determinations will be performed only as Agency staff time and resources allow. Applicants are strongly advised to contact Agency staff prior to requesting an informal determination, as staff resources to perform these determinations are very limited.

Informal determinations are provided as a public service, and are available only to the property owner, an entity that has the power of eminent domain, or any other person who has a legal or equitable interest in the parcel of property.

(b) A request for an informal determination by the Agency requires payment of the fee in Rule 62-330.071, F.A.C., but:

1. Will be limited to one of the following:

(a) Presence or absence identification of wetlands, non-wetland surface waters, or uplands. Verification and documentation shall be conducted in accordance with Chapter 62-340, F.A.C., and section 7.1.1(b), above.

(b) Verification of the landward extent of wetlands and other surface waters established using Chapter 62-340, F.A.C., and marked in the field prior to the Agency inspection. Verification and documentation shall be conducted in accordance with Chapter 62-340, F.A.C., and section 7.1.1(a), above.

2. Is not an application for a permit.

3. Is not subject to the processing review timeframes in Chapter 120 or 373, F.S.

(c) An informal determination by the Agency, if issued:

1. Does not constitute final agency action;

2. Is subject to change, and does not bind the Agency, nor does it convey any legal rights, expressed or implied. Persons obtaining an informal pre-application determination are not entitled to rely upon it for purposes of compliance with law or Agency rules.

(d) An inability of the Agency to perform an informal determination also does not constitute a default of agency action.

PART II -- CRITERIA FOR EVALUATION

8.0 Criteria for Evaluation

8.1 Purpose

The criteria explained in this part are those that have been adopted by the Agency in evaluating applications for individual and conceptual approval permits, with the exception of those individual permits described in subsection 62-330.054(4), F.A.C. The staff recommendation to approve any individual or conceptual approval permit application will be based upon a determination of whether reasonable assurance has been provided that the activity meets the criteria for evaluation, and whether the applicable permit fee has been submitted. In addition, the staff recommendation to resolve any violation under Chapter 62-330, F.A.C., also will be based upon a determination of whether reasonable assurance has been provided that the activity meets the criteria for evaluation in this part.

General permits are pre-issued, and already contain the limitations and criteria that must be met to qualify to use the specific general permit. Upon receipt of a notice to use a general permit, the Agency's review is limited to determining whether the notice complies with the terms and conditions of the pre-issued permit, in accordance with Chapter 62-330, F.A.C., and whether the applicable permit fee has been submitted.

8.2 Criteria for Evaluation

8.2.1 To obtain an individual or conceptual approval permit, an applicant must provide reasonable assurance in accordance with rule 62-330.060, F.A.C., and reasonable assurance that the following standards contained in Sections 373.042, .413, .414, .416, .426, .429, .4595, F.S., are met:

(a) The construction or alteration of any stormwater management system, dam, impoundment, reservoir, appurtenant work or works will not be harmful to the water resources of the District or Department;

(b) The operation or maintenance of any stormwater management system, dam, impoundment, reservoir, appurtenant work or works will not be inconsistent with the overall objectives of the District or Department and will not be harmful to the water resources of the District or Department;

(c) The abandonment or removal of any stormwater management system, dam, impoundment, reservoir, appurtenant work, or works will not be inconsistent with the overall objectives of the District or Department; and

(d) Compliance with applicable additional basin criteria will not be inconsistent with the overall objectives of the District or Department.

8.2.2 All Individual and Conceptual Approval Permits

Generally, to obtain an individual or conceptual approval permit, an applicant must provide reasonable assurance that the construction, alteration, operation, maintenance, removal, or abandonment of a project will meet the Conditions for Issuance in Rule 62-330.301, F.A.C., the applicable Additional Conditions for Issuance in Rule 62-330.302, F.A.C., and the requirements of this Volume, and the applicable parts of Volume II.

However, when an activity requires an individual permit solely pursuant to **section 1.2.3** of Volume II for the SJRWMD, the permit application for such activity shall be reviewed and acted upon in accordance with that section.

8.2.3 Activities Discharging into Waters That Do Not Meet Standards

In instances where an applicant is unable to meet water quality standards because existing ambient water quality does not meet standards, and the proposed activity will cause or contribute to this existing condition, mitigation for water quality impacts can consist of water quality enhancement that achieves a net improvement. In these cases, the applicant must propose and agree to implement mitigation measures that will cause net improvement of the water quality in the receiving waters for those contributed parameters that do not meet water quality standards. In addition to meeting the required performance standards in **Section 8.3**, the applicant shall also demonstrate that the proposed activity will provide the said net improvement whereby the pollutant loads discharged from the post-development condition for the proposed project shall be demonstrated to be less than those discharged based on the project's pre-development condition. Such demonstration shall be provided whenever:

(a) a proposed activity is located within a HUC 12 subwatershed containing an impaired water and the project is located upstream of that impaired waterbody, and

(b) an adjacent HUC 12 subwatershed containing an impaired water that is hydrologically downstream, either under routine or tidally induced flow conditions, from the proposed activity's HUC 12 subwatershed, unless the applicant can demonstrate that the proposed activity cannot reasonably cause or contribute to the existing downstream HUC 12 subwatershed impairment.

8.3 Stormwater Quality Nutrient Permitting Requirements

Exemptions from these requirements are as set out below and in **section 3.1.2(e) of this volume.** For a major permit modification requested for an existing stormwater management system, permitted before [effective date], where the purpose of the modification is solely to bring the system into compliance with applicable design and performance criteria that were applicable at the time of the current permit's issuance, such modification shall not require the system to comply with the performance criteria listed in **sections 8.3.2 through 8.3.5** of this volume.

The requirements in **section 8.3** shall not apply to public transportation projects which have completed a PD&E Study prior to [effective date plus two years], or which are in the design or construction phases, as defined in FDOT's Project Development and Environment (PD&E) Manual[1] as of [effective date]. For public transportation projects that have completed a PD&E Study or are in the design or construction phases, stormwater design and performance criteria in effect prior to [effective date] shall apply. The requirements of **section 8.3** shall apply to public transportation projects commencing the PD&E study phase, as described in PD&E Manual, after [effective date].

8.3.1 Performance Standard Requirements

Each applicant shall demonstrate, through modeling or calculations, that their proposed stormwater management system is designed to discharge to the required treatment level based on the Performance

[1] The Florida Department of Transportation Project Development and Environment (PD&E) Manual (Parts 1 and 2, Topic No. 650-000-001, effective July 1, 2020), serves as the Florida Department of Transportation's (FDOT's) standard policies and procedures for complying with the National Environmental Policy Act (NEPA) of 1969, Title 42 United States Code (U.S.C.) § 4321, et seq., and associated federal and state laws and regulations. Local governments also implement this manual for transportation projects, either alone or with FDOT.

Standards described in **sections 8.3.2 through 8.3.5** below. For the purposes of this section, annual loading from the proposed project refers to post-development loads before treatment, as calculated in **section 9** of this Volume. Stormwater treatment systems shall be designed to achieve at least an 80% reduction of the average annual post-development total suspended solids (TSS) load, or 95% of the average annual post-development TSS load for those proposed projects located within a HUC 12 subwatershed containing an Outstanding Florida Water (OFW) and located upstream of that OFW. There is a rebuttable presumption that this standard is met when structural stormwater best management practices (BMPs) are designed to meet the applicable design standards in **sections 8.3.2 through 8.3.5** below.

8.3.2 Minimum Stormwater Treatment Performance Standards for All Sites

Except as described in sections **8.3.4 through 8.3.6** below, all stormwater treatment systems shall provide a level of treatment sufficient to accomplish the greater of the following nutrient load reduction criteria:

(a) an 80 percent reduction of the average annual loading of total phosphorus (TP) and a 55 percent reduction in the average annual loading of total nitrogen (TN) from the proposed project; or

(b) a reduction such that the post-development condition average annual loading of nutrients does not exceed the predevelopment condition nutrient loading.

8.3.3 Minimum Performance Standards for Outstanding Florida Waters (OFWs)

Stormwater treatment systems located within a HUC 12 subwatershed containing an OFW and located upstream of that OFW, shall provide a level of treatment sufficient to accomplish the greater of the following nutrient load reduction criteria:

(a) a 90 percent reduction of the average annual loading of TP and 80 percent reduction in the average annual loading of TN from the proposed project; or

(b) a reduction such that the post-development condition average annual loading of nutrients does not exceed the predevelopment condition nutrient loading.

8.3.4 Minimum Performance Standards for Impaired Waters

(a) Stormwater treatment systems located within a HUC 12 subwatershed which contains an impaired water, and located upstream of that impaired water, shall provide a level of treatment sufficient to accomplish:

1. an 80 percent reduction of average annual loading of TP and TN from the proposed project, or a 95 percent reduction of average annual loading of TP and TN from the proposed project where located within such a HUC 12 subwatershed containing an OFW and located upstream of that OFW; and
2. a reduction such that the post-development condition average annual loading of nutrients does not exceed the predevelopment condition nutrient loading; and
3. the post-development condition average annual loading of those pollutants not meeting water quality standards are less than that of the predevelopment condition.

(b) In lieu of the specific requirements of **section 8.3.4(a)** above, where the stormwater treatment system is located upstream of and within a HUC 12 subwatershed which contains an impaired water where basin-specific design and performance criteria for load reductions of nonpoint sources of stormwater were included in order to achieve an adopted Total Maximum Daily Load (TMDL), Basin Management Action Plan (BMAP), an approved alternative restoration

plan pursuant to Rule 62-303.600, F.A.C., or other watershed management plan, the applicant shall provide a level of treatment sufficient to accomplish:

1. the level of treatment for the basin-specific design and performance criteria prescribed in such TMDL, BMAP, approved alternative restoration plan, or other watershed management plan; and
2. the post-development condition average annual loading of those pollutants not meeting water quality standards are less than that of the predevelopment condition.

For purposes of this Section, the term "basin-specific design and performance criteria" must be specific to stormwater treatment systems as regulated hereunder and does not refer to general or categorical TMDL, BMAP, alternative restoration plan, or other watershed management plan loading allocations.

8.3.5 Alternative Performance Standards for Redevelopment

Stormwater treatment systems serving redevelopment activities shall meet the appropriate minimum level of treatment set forth above in **sections 8.3.2 through 8.3.4**. However, an applicant may propose a lower level of treatment if the redevelopment project does not fall within an area described in **section 8.3.4** above. The minimum level of treatment allowable for these sites shall be as follows:

(a) an 80 percent reduction of the post-development average annual loading of TP and a 45 percent reduction of the post-development average annual loading of TN from the project area; or

(b) for stormwater systems located within a HUC 12 subwatershed containing an OFW, a 90 percent reduction of the post-development average annual loading of TP and a 60 percent reduction of the post-development average annual loading of TN from the project area.

8.3.6 Exemption from Minimum Performance Standards for Redevelopment

Redevelopment sites that are under one acre may qualify for an exemption from permitting requirements as described in **section 3.2.7** of this handbook and section 373.406(6), F.S. These projects may qualify for this exemption if the site is not located within a HUC 12 subwatershed containing a nutrient-impaired water body or OFW and if the site is not upstream of that waterbody. This exemption only applies to redevelopment sites that also result in reduced impervious surface or reduced pollutant loading. Requests shall include supporting information that demonstrates the performance standards cannot be met (such as drainage basins, percolation rates, seasonal high water or mean high tide elevation for receiving waters, and site area limitations, etc.). Requests shall be submitted in writing to the applicable Agency and will be reviewed on a case-by-case basis, pursuant to section 373.406(6), F.S. Such activities shall not commence without a written determination from the Agency confirming qualification for the exemption.

8.4 Additional Criteria

8.4.1 Flood Damage

Activities shall not cause adverse flooding. Information on design and performance standards to avoid and minimize flood damage is contained in Volume II specific to the geographic area covered by each District.

8.4.2 Storage and Conveyance

Floodways and floodplains, and levels of flood flows or velocities of adjacent streams, impoundments or other water courses must not be altered so as to adversely impact the off-site storage and conveyance

capabilities of the water resource. Projects that alter existing conveyance systems (such as by rerouting an existing ditch) must not adversely affect existing conveyance capabilities. Also, the applicant shall provide reasonable assurance that proposed velocities are non-erosive or that erosion control measures (such as riprap and concrete lined channels) are sufficient to safely convey the flow. Information on design and performance standards to achieve storage and conveyance requirements are in Volume II specific to the geographic area covered by each District.

8.4.3 Low Flow and Base Flow Maintenance

Flows of adjacent streams, impoundments, or other watercourses must not be decreased so as to cause adverse impacts. Information on design and performance standards to achieve low flow and base flow maintenance requirements are contained in Volume II specific to the geographical area covered by each District.

8.4.4 Mine Stormwater Management Systems Permitted by DEP

Appendix I in this Volume contains additional criteria when a mine pit is to be used as part of a stormwater management system during mining and reclamation. That Appendix is applicable only for mines for which DEP has permitting, compliance, and enforcement responsibilities under the Agency Operating Agreements, but is not applicable to borrow pits. Specific evaluation criteria, including pre-treatment of stormwater runoff prior to stormwater entering the mine excavation area (mine pit) is needed to provide reasonable assurance that water quantity and quality requirements under Chapter 62-330, F.A.C., are met. The applicant for such a system is strongly encouraged to contact the Department's Mining and Mitigation staff to arrange a pre-application review meeting to discuss project design and monitoring requirements.

8.4.5 Dam Systems

Dam systems are a critical part of Florida's infrastructure for stormwater and surface water management. The design and operation standards specified in this Volume and in the Volume II for each District are critical to manage water quality and quantity effectively and safely. These standards are intended to reduce the risk of dam and appurtenant structure failure and improper operation, and consequences from flooding that would cause loss of human life or adverse impacts on economic, environmental, or lifeline interests, or other concerns, such as water quality degradation.

Appendix L, Additional Criteria for Dam Systems, in this Volume contains four permitting criteria that apply when the proposed activity is for construction of a new dam or alteration of an existing dam, as defined in paragraph **2.0(a)27.** in this Volume and meets the dam thresholds specified in the applicable Volume II. This appendix does not apply to a levee or levee system, as defined in paragraphs **2.0(a)66. and 67.**, respectively, in this Volume. These criteria are intended to reduce potential damage from floods, to reduce degradation of water resources from uncontrolled releases of stormwater, and to otherwise promote the safety of dams regulated under Chapter 62-330, F.A.C. The four criteria require the applicant to: 1) provide dam system information for collection in a repository maintained by the Department, 2) establish a Downstream Hazard Potential that indicates the potential adverse impact on the downstream areas should the dam or its appurtenant structures fail or be mis-operated, 3) develop an Emergency Action Plan for the owner of a High Hazard Potential or Significant Hazard Potential dam, and 4) provide a Condition Assessment Report for each existing High Hazard Potential or Significant Hazard Potential dam. These criteria and their requirements are described in detail in Appendix L.

8.4.6 Oil and Grease Control

Outlet structures from areas with greater than 50 percent impervious and semi-impervious area or from systems that receive runoff from directly connected impervious areas that are subject to vehicular traffic shall include a baffle, skimmer, grease trap or other mechanism suitable for preventing oil and grease from leaving the stormwater treatment system in concentrations that would cause a violation of applicable water quality standards for ground or surface waters of the state. Designs must ensure clearance is provided as needed, between the skimmer and outlet structure or pond bottom, to ensure that the hydraulic capacity of the structure is not affected.

8.4.7 Hazardous or Toxic Substances

Systems serving a land use or activity that produces or stores hazardous or toxic substances shall be designed to prevent exposure of such materials to rainfall and runoff to ensure that contact stormwater does not become contaminated by such materials. Stormwater treatment systems shall not result in violations of water quality standards for ground or surface waters of the state.

8.5 State Water Quality Standards

8.5.1 Surface Water Quality Standards

State surface water quality standards are set forth in Chapters 62-4 and 62-302, F.A.C., including the antidegradation provisions of paragraphs 62-4.242(1)(a) and (b), 62-4.242(2) and (3), F.A.C., and Rule 62-302.300, F.A.C., and the special standards for Outstanding Florida Waters and Outstanding National Resource Waters set forth in subsections 62-4.242(2) and (3), F.A.C.

8.5.2 Additional Permitting Requirements to Protect Ground Water

State water quality standards for ground water are set forth in Chapter 62-520, F.A.C. In addition to the minimum criteria, Class G-I and G-II ground water must meet primary and secondary drinking water quality standards for public water systems, which are established pursuant to the Florida Safe Drinking Water Act, Sections 403.850 through 403.864, F.S., and are listed in Rules 62-550.310 and 62-550.320, F.A.C.

Only the minimum criteria for ground water under rule 62-520.400, F.A.C., shall apply within an applicable zone of discharge, as determined in Chapter 62-520**,** F.A.C.

Pursuant to rule 62-555.312, F.A.C., stormwater retention and detention systems are classified as moderate sanitary hazards with respect to public and private drinking water wells. Stormwater treatment facilities shall not be sited or constructed within the setback distances for existing water supply wells as specified in accordance with Chapter 62-532, F.A.C.

To ensure protection of ground water quality, all stormwater treatment systems shall be designed and constructed to:

1. Ensure adequate treatment of stormwater so that a stormwater management system shall not result in a violation of ground water standards, outside an applicable Zone of Discharge, as determined in accordance with Chapter 62-520, F.A.C.; and

2. Avoid breaching an aquitard that would result in direct mixing of untreated water between surface water and an underground source of drinking water. Where an aquitard is not present,

the depth of the stormwater treatment system shall be limited to prevent any excavation within three (3) feet of an underlying limestone formation which is part of a underground source of drinking water, as defined in Chapter 62-528, F.A.C.

8.5.3 How Standards are Applied

The quality of waters discharged to receiving waters is presumed to meet the surface water quality standards in Chapter 62-302, F.A.C., and Rule 62-4.242 and 62-4.244, F.A.C., and the ground water standards in Chapter 62-520, F.A.C., if a project is permitted, constructed, operated, and maintained in accordance with Chapter 62-330, F.A.C., this Volume, and the applicable parts of Volume II.

9.0 Stormwater Quality Treatment Evaluations

9.1 Calculating Required Nutrient Load Reduction

Applicants are required to provide nutrient load reduction calculations in their application. To calculate the required stormwater nutrient load reduction for a project, the applicant should:

- Determine whether the site falls within the same HUC 12 subwatershed as, and is upstream of, an OFW or impaired water, and select the corresponding performance standard from **Section 8.3** of this Volume;
- Determine the pre-development average annual average mass loading of the project area for both total nitrogen (TN) and total phosphorus (TP) through modeling or as described in **Section 9.2**;
- Calculate the project area's post-development annual average mass loading before treatment for both TN and TP through modeling or as described in **Section 9.2**;
- Determine the percent TN and TP reduction needed as defined within **Sections 8.3 and 9.3** of this volume. The greater percent load reduction will be the requirement for the project; and
- Determine which BMPs will be used to meet the required TN and TP load reductions. Information on how to calculate nutrient load reduction for BMP Treatment Train is found in **Section 9.5** of this volume.

9.2 Calculating Nutrient Loading

Applicants shall determine the stormwater annual runoff volume for the corresponding predevelopment and post-development conditions for the project area, and determine the associated annual stormwater runoff mass loading for pollutants of interest. **Sections 9.2.1 and 9.2.2** below describe acceptable concentration-based loading calculations; however, the applicant may provide alternative calculations or modeling results, where those calculations or results provide an equivalent or greater degree of supporting information and reliability for estimating annual stormwater runoff mass loading. The annual stormwater mass loading shall be determined for the project area and any offsite contributing areas as denoted below in **Section 9.6**.

9.2.1 Calculating Predevelopment and Post-development Hydrology

The applicant shall determine the pre-development and post-development characteristics of the project area. If the project area encompasses multiple drainage basins or catchments, the applicant shall determine the predevelopment and post development characteristics for each within the project area. Calculations for a project's stormwater runoff and associated Stormwater Quality Nutrient Permitting Requirements under **Section 8.3**, and requirements for Activities Discharging into Water That Do Not Meet Standards under **Section 8.2.3**, shall address all areas within the project boundary and, if applicable, the off-site stormwater described in section 9.6 below. For the purposes of this analysis, estimates of annual runoff volumes shall be performed using the method described herein or another methodology based on modeling. If modeling is used to determine hydrology, at a minimum the applicant shall submit the program used, inputs, and outputs. The methodology to determine the hydrology of the site by hand is outlined in paragraphs a. through f. below.

a. This Handbook's methodology provides tabular solutions to a series of calculations for determining annual runoff volumes for each of the state's designated meteorological zones as outlined in Appendix M. Appendix M also lists the individual counties included in each

meteorological zone. Use this table to determine the project's meteorological zone first, and then continue to the determination of mean annual runoff associated with the project location.

b. The percent of Directly Connected Impervious Area (DCIA) should be calculated for each land use type in the project area. DCIA consists of those impervious areas that are directly connected to the stormwater conveyance system. Impervious areas also are considered to be DCIA if stormwater from the area occurs as concentrated shallow flow over a short pervious area such as grass. DCIA is calculated as a percentage of the total development, not as a percentage of the impervious areas. Non-Directly Connected Impervious Areas (Non-DCIA) include all pervious areas and portions of impervious areas that flow over at least 10 feet of undisturbed pervious areas with HSG A or B soils and over at least 20 feet of undisturbed pervious area for other soil types, unless the applicant demonstrates that a narrower width would provide sufficient infiltration to disconnect the impervious area by percolating the desired run-off volume from a 3-year 1-hour storm event.

c. Appendix N provides a summary of calculated mean annual runoff coefficients (ROC value) as a function of curve number and DCIA for each of the five designated meteorological zones. The values summarized in Appendix N reflect the average long-term ROC values for each of the five designated zones over a wide range of DCIA and curve number combinations. Determine the ROC value for each land use category in a catchment for the project area. Linear interpolation can be used to estimate annual runoff coefficients for combinations of DCIA and curve numbers that fall between the values in the Table. For "naturally occurring" undeveloped conditions, it should be assumed that the percent DCIA is equal to 0.0.

d. This method should be used for each catchment or subarea within the project area to provide the most accurate runoff volume(s) for treatment within the stormwater management system.

e. To calculate hydrology and pollutant loading from a catchment area in the proposed project area, applicants may develop a table similar to Table 9.1, or an equivalent accounting method, to summarize land use information for the project area.

Table 9.1 Example Land Use Categories Matrix to Calculate Loadings

Pre-development	Total watershed area	Non-DCIA CN	DCIA percentage	Calculated ROC Value
Low Density Residential				
Single Family				
Multi-Family				
Low Intensity Commercial				
High Intensity Commercial				
Light Industrial				
Highway				

Pre-development	Total watershed area	Non-DCIA CN	DCIA percentage	Calculated ROC Value
Natural Vegetated Community				

Post-development	Total watershed area	Non-DCIA CN	DCIA percentage	Calculated ROC Value
Low Density Residential				
Single Family				
Multi-Family				
Low Intensity Commercial				
High Intensity Commercial				
Light Industrial				
Highway				
Natural Vegetated Community				

f. Determine the annual runoff volume. The information contained in Table 9.1 and Appendix N is used to estimate the Annual Runoff Volume for a given catchment area under either predevelopment or post-development conditions. The Average Annual Rainfall should be obtained using the method described in **section 9.4**. To calculate the Annual Runoff Volume for the site; the area of the site, average annual rainfall, and the appropriate ROC value are multiplied. This is shown in equation 9-1:

Equation 9-1

$$Annual\ Runoff\ Volume\ (ac-ft.)\ = \\ Area\ (acres)\ x\ Average\ Annual\ Rainfall\ (inches)\ x\ ROC\ Value\ x\ (1ft/12in)$$

9.2.2 Calculating Predevelopment and Post-development Stormwater Nutrient Loading

a. To calculate the predevelopment and post development loadings before treatment of the annual mass loadings for TN and TP, multiply the predevelopment annual runoff volume (derived in Section 9.2.1) by the land use specific runoff characterization data (event mean concentrations or EMCs) for TN and TP. Applicants must use the most up-to-date verified EMC values, where available and incorporated by reference pursuant to rule 62.330.301(4), for their project region. Applicants also must comply with the applicable special basin or geographic area criteria in rule 62-330.301(1)(k), F.A.C., including any EMC values specified in the applicable Applicant's Handbook Volume II. EMC Values are listed in Table 9.2 for different types of land use categories. EMC values for the land uses must consider cover, soils, and topography and be representative of the latest assigned Florida Land Use and Cover Classification System (FLUCCS) code.

Table 9.2 Standardized Statewide Stormwater Nutrient EMC Values

Land Use Category	Total N (mg/l)	Total P (mg/l)
Low Density Residential	1.65	0.270
Single Family	1.77	0.327
Multi-Family	1.84	0.520
Low Intensity Commercial	0.93	0.19
High Intensity Commercial	2.40	0.345
Light Industrial	1.20	0.260
Highway	1.25	0.173
Dry Prairie	2.025	0.184
Marl Prairie	0.684	0.012
Mesic Flatwoods	1.087	0.043
Ruderal/Upland Pine	1.694	0.162
Scrubby Flatwoods	1.155	0.027
Upland Hardwood	1.042	0.346
Upland Mixed Forest	0.606	1.166
Wet Flatwoods	1.213	0.021
Wet Prairie	1.095	0.015
Xeric Scrub	1.596	0.156
Rangeland/parkland	1.150	0.055
General Agricultural	2.29	0.381
Pasture	3.03	0.593
Citrus	2.11	0.180
Row Crops	2.50	0.577

b. At the time of the application, an applicant may propose to use TN and TP EMC values accepted by the Agency which denote EMC values derived from regional or local government studies. Any study conducted must be submitted with the permit application for the Agency records. If EMC values from a study are to be used, data collected must follow quality assurance provisions outlined in chapter 62-160, F.A.C., and include:

- Data collected at a representative variety of rainfall depths;
- Minimum of 10 rainfall events;
- Minimum of one year of data with seasonal variation;
- Use of autosamplers to allow for runoff to be sampled for the duration of the rainfall event;
- Volume or time weighted composite samples;
- Sampling occurring at point of discharge upstream of all on-site stormwater treatment;
- Minimum of three or more sites with this land use category depending on the variability of the land use category;
- Sample locations must be representative of site conditions; and
- Data collected for all land use EMCs for the region.

Additionally, the contributing area to the sample site should represent a single land use type, and the results of the study should be reasonably consistent with other similar scientific studies and watershed plans. If this study is intended to be used for more than one site area, then this study will only be applicable for the region specified by the study area, not to exceed a HUC 8 area.

An applicant may choose to apply a more recent approved study, where adopted by the Department, to provide EMC values therein incorporated, for use in calculating predevelopment and post development loadings. In that case, the applicant must demonstrate within the application that the representative concentrations are applicable to the proposed project area.

c. Determine the average annual mass loading. The average annual mass loading calculation is provided in Equation 9-2 below.

Equation 9-2

$$Annual\ Average\ Mass\ Loading\ =\ Annual\ Runoff\ Volume\ x\ EMC$$

The components of Equation 9-2 are expressed in different units and require some conversion factors, as provided below.

$$Annual\ Mass\ Loading\ (lb./year)$$
$$=\ Annual\ Runoff\ Volume\ (ac-ft./year)\ *\ 43{,}560\ ft2$$

$$/ac\ *\ 7.48\ gal/ft3\ x\ 3.785\ liter/gal\ *\ EMC\ (mg/l)\ *\ 1\ lb./453{,}592\ mg$$

9.3 Determination of Required Treatment Efficiency

Predevelopment loadings and post-development loadings before treatment are calculated, and subsequently compared, based on the average annual loading of TN and TP discharged. Equation 9-3 calculates the treatment efficiency needed so that the post development average annual loading of nutrients equals the predevelopment nutrient loading:

Equation 9-3: Percent reduction calculation

$$\left(1-\left(\frac{Predevelopment\ loading}{Post\ development\ Loading\ before\ treatment}\right)\right)\times 100$$

Compare the result from equation 9-3 to the percent reduction required in the applicable paragraph of **Section 8.3**. The greater load reduction (the more protective) will be the requirement for the project. Once the load reduction has been determined, use Equation 9-4 to find the required treated loading rate for TN and TP for the project.

Equation 9-4: Post development maximum load to meet % treatment required

$$=(1-Load\ Reduction)\times Post\ development\ Loading\ Before\ Treatment$$

Another method to determine the loading rate required for the project is to use the percent reduction required in **Section 8.3** of this volume in Equation 9-4, where Load Reduction is the percent reduction expressed as a fraction, then compare the result to the predevelopment loading. If the resultant loading of Equation 9-4 is less than that of the predevelopment loading, then the percent reduction required in the applicable paragraph of **Section 8.3** must be used in the stormwater design. If the resultant loading is greater than that of the predevelopment loading, than the applicant must treat the site to a level that would result in a post development loading equal to or less than that of the predevelopment loading.

9.4 Rainfall Data

Calculations for the annual average mass loading will use the average annual rainfall data determined by National Centers for Environmental Information for the site area, as incorporated in Appendix M, which displays isopleths for the average annual rainfall data.

9.5 Best Management Practices (BMPs) for Stormwater Treatment

Once the pre-development and post-development loadings have been calculated and the required percent reduction of TN and TP have been established, the stormwater treatment system can be designed. Stormwater treatment can be achieved in a variety of ways. Best management Practices (BMPs) are an effective tool for achieving the treatment efficiencies required by **Section 8** of this Volume. The applicant must show that the stormwater treatment system complies with the hydraulic and hydrologic general design requirements in the applicable AH Volume II. If the applicant chooses to use a BMP that is not listed in the applicable AH Volume II, **Section 9.5.2** below describes the requirements for alternative designs. Methods to determine the treatment efficiencies of traditional BMPs for stormwater treatment are described in Appendix O.

If the post-development maximum load for TN and TP are met with a single BMP, the applicant shall complete the design of the stormwater treatment system. If the maximum load is not met, the applicant shall either modify the selected BMP or incorporate additional BMPs to achieve the required TN or TP load reductions.

9.5.1 Treatment Train Nutrient Reduction

BMPs can be implemented in combination or in conjunction with one another in a series called a best management practice treatment train. Where BMPs are used in series, the calculated overall efficiency of the treatment train must account for the reduced loading or concentrations that are available for removal by the subsequent downstream treatment device. This relationship is shown in Equation 9-5. This equation assumes each BMP acts independently of upstream BMPs, and that upstream BMPs do not impact performance of downstream BMPs. As stormwater pollutant concentrations are reduced in each BMP in the treatment train, the ability of a downstream BMP in the treatment train should not be arbitrarily reduced when used in Equation 9-5. The overall design removal calculations for a BMP treatment train should reflect any objective information where there is an identifiable causal relationship where a downstream unit treatment efficiency would be diminished in some manner by the operation of a specific upstream treatment unit. If such a causal relationship exists where the BMP acts in combination with the upstream BMP, the designer should consider the use of another methodology to accurately determine the resultant efficiency of the overall BMP treatment train.

Equation 9-5: Overall Treatment Train Efficiency for systems in series

$$Overall\ Treatment\ Train\ Efficiency = Eff1 + [(1 - Eff1)x\ Eff2] + [\{(1 - Eff1) - ((1 - Eff1)xEff2)\}\ x\ Eff3\ ]$$

$$or\ (in\ simplified\ form)$$

$$= 1 - [(1 - Eff1) \times (1 - Eff2) \times (1 - Eff3) \times \ldots \times (1 - Effn)]$$

Where:
Eff1 = efficiency (as a decimal) of initial treatment system
Eff2 = efficiency (as a decimal) of second treatment system
Eff3 = efficiency (as a decimal) of third treatment system
Effn = efficiency (as a decimal) of the nth treatment system

9.5.2 Alternative Designs

An applicant can propose alternative BMPs not listed in the applicable Volume II or Appendix O of Volume I. These will be considered by the Agency as alternative designs and evaluated based on engineering plans, quality assurance plans, representative monitoring data in Florida, and test results for the specific site conditions of the project. Applicants must provide reasonable assurance that their proposed alternative designs provide the level of treatment that they claim and that will achieve the required performance standards from **Section 8.3** of this Volume, either by the alternative design by themself or in conjunction with other BMPs. In determining whether the alternative design provides this reasonable assurance, the Agency will consider:

(a) Whether the alternative BMP has been tested and reviewed by scientific methods to substantiate its reported treatment efficiency; and
(b) Whether acceptable provisions have been made to ensure that the system will be effectively operated and maintained, as described in Section 12 of this volume.

9.5.3 Green Stormwater Infrastructure and Low Impact Design

The Agencies encourage the use of Low Impact Design (LID) approaches, such as Green Stormwater Infrastructure (GSI), which can be used to supplement or replace traditional stormwater infrastructure for managing the impacts of rain and stormwater runoff. GSI and LID reduce pollution and treat stormwater by detaining or retaining rainfall near its source and providing treatment processes that are similar to natural processes such as localized infiltration, evaporation, and opportunities for stormwater use, instead of conveying stormwater to a downstream conventional treatment and discharge system. When applied early in the design process, low impact design techniques can reduce stormwater runoff volume and pollutants generated from project areas. Thus, the use of GSI and LID may reduce traditional stormwater treatment BMP size requirements. GSI and LID, depending on the technology, can also treat stormwater in a manner similar to a traditional stormwater treatment BMP by treating TN and TP. Typical GSI and LID features are described in the Applicant's Handbook Volume II and Appendix O.

9.5.4 Airport Design

Airport projects that cannot use the General Permit for Construction, Operation, Maintenance, Alteration, Abandonment or Removal of Airport Airside Stormwater Management Systems, 62–330.449 FAC, including landside components of airports, may be planned, analyzed, designed, built, and maintained using the data and methodologies set forth in the *Statewide Airport Stormwater Best Management Practices Manual (April 27, 2016)* published by the Florida Department of Transportation - Aviation Office. The option to use this does not preclude using the data and methodologies set forth in other sections of this rule. Also, if this option is used, it shall comply with the nutrient loading criteria contained in **Section 8** of this volume and shall use the latest EMC values available as described in **section 9.2**.

9.6 Off-site Stormwater

The volume of runoff to be treated from a site shall be determined by the minimum level of treatment set forth in **Section 8** of this Volume; the type of treatment system (e.g., retention, wet detention, etc.); and the meteorological region (rainfall zone) where the project is proposed. If stormwater runoff from off-site areas is allowed to co-mingle with on-site runoff, then the effects of runoff from these off-site areas must be addressed in the load reduction calculations for the project area, unless the project is exempt from this provision under section 373.413(6), F.S.

9.7 Compensating Stormwater Treatment

The alternative methods below may be used as an alternative to, or in combination with on-site treatment to meet the required performance standards from **Section 8.3** of this Volume. Each of these methods are designed to furnish the same level of treatment as if the runoff from the entire project area was captured and treated in accordance with the provisions of this Volume.

The applicant is strongly encouraged to schedule a pre-application meeting with Agency staff to discuss the project if these alternatives are being considered. Applicants utilizing these compensating stormwater treatment methods are still required to meet the water quantity criteria described in the applicable Volume II, and must provide reasonable assurance through modeling, other evaluations, or a combination thereof, demonstrating that there will not be localized adverse impacts to the receiving waterbody or in downstream waters.

9.7.1 Overtreatment

Overtreatment may be used to treat the runoff from the project area that flows to a treatment system to a higher level than the rule requires to make up for the lack of sufficient treatment for a portion of the project area. The average treatment efficiency of the treated and untreated areas must meet the required performance standards from **Section 8.3** of this Volume.

9.7.2 Off-site Compensation

Off-site Compensating Stormwater Treatment may be used to provide additional treatment to meet the required performance standards from **Section 8.3** of this Volume. Off-site compensating stormwater treatment used to meet the requirements of section 8 is ineligible for any water quality credit in the trading provisions or programs in Chapter 62-306, F.A.C.

The following criteria must be met when using off-site treatment, unless off-site treatment is explicitly allowed by section 311.106, F.S.:

(a) The permittee must have legal authorization over the off-site treatment area in accordance with **sections 1.5.6. and 4.2.3(d)** of this volume;
(b) The proposed off-site area must be located within a HUC 12 subwatershed containing the proposed project, unless the applicant provides justification demonstrating that the proposed off-site area would provide the same degree of compensating treatment for a common downstream receiving waterbody without causing or contributing to any localized adverse impact to any downstream waters. The proposed off-site area must be hydrologically connected to the same or a downstream waterbody as the proposed project, unless otherwise noted by the applicable special basin criteria;

(c) The applicant shall use modeling techniques to provide reasonable assurance that the off-site treatment system provides an equivalent amount of pollutant reductions at the point of discharge for the project as if all of the treatment was performed on-site; and
(d) Where the operation and maintenance entity does not own the area proposed to be used for off-site treatment, legal authorization shall be granted to the operation and maintenance entity, as required in **Section 12.4** of this volume, for the area to allow for perpetual operation and maintenance access to the off-site treatment area.

9.7.3 Regional Stormwater Management Systems

Regional Stormwater Management Systems are designed, constructed, operated, and maintained to collect convey, store, absorb, inhibit, treat, or harvest stormwater to prevent or reduce flooding, overdrainage, environmental degradation and water pollution or otherwise affect the quantity and quality of discharges from multiple parcels and projects within the drainage area served by the regional system. The term "drainage area" refers to the land or development that is served by or contributes stormwater to the regional system. Regional systems must be maintained in accordance with the provisions outlined in **section 12** of this volume.

(a) Records of stormwater treatment allocations for parcels and projects must be reported, per **Section 12.6(d)** of this volume, and kept by the permit holder of the regional stormwater system in perpetuity.
(b) Allocations of load reduction due to stormwater treatment must be measured in pounds or kilograms of pollutant removal.
(c) The regional system shall not allocate more load reduction than its permitted design.

PART III – ENVIRONMENTAL

10.0 Environmental Considerations

10.1 Wetlands and other surface waters

Wetlands are important components of the water resources in the state because they often serve as spawning, nursery and feeding habitats for many species of fish and wildlife, and because they often provide important flood storage, nutrient cycling, detrital production, and recreational and water quality functions. Other surface waters, such as lakes, ponds, reservoirs, other impoundments, streams, rivers, and estuaries, also provide such functions and in addition may provide flood conveyance, navigation, recreation, and water supply functions to the public. Not all wetlands or other surface waters provide all of these functions, nor do they provide them to the same extent. A wide array of biological, physical and chemical factors affect the functioning of any wetland or other surface water community. Maintenance of water quality standards in applicable wetlands and other surface waters is critical to their ability to provide many of these functions. It is the intent of the Agency that the criteria in **sections 10.2 through 10.3.8, below,** be implemented in a manner that achieves a programmatic goal, and a project permitting goal, of no net loss in wetland or other surface water functions. This goal shall not include projects that are exempt by statute or rule, or that are authorized by a general permit. Unless exempted by statute or rule, permits are required for the construction, alteration, operation, maintenance, abandonment, and removal of projects so that the Agency can conserve the beneficial functions of these communities. The term "project" includes areas of dredging or filling, as those terms are defined in Sections 373.403(13) and 373.403(14), F.S.

10.1.1 Environmental Conditions for Issuance

The Agency addresses the conservation of these beneficial functions in the permitting process by requiring applicants to provide reasonable assurances that the following conditions for issuance of permits, set forth in Rules 62-330.301 (Conditions for Issuance) and 62-330.302 (Additional Conditions for Issuance), F.A.C., are met. Applicants must provide reasonable assurance that:

(a) A regulated activity will not adversely impact the value of functions provided to fish and wildlife and listed species by wetlands and other surface waters [paragraph 62-330.301(1)(d), F.A.C.];

(b) A regulated activity located in, on, or over wetlands or other surface waters will not be contrary to the public interest, or if such an activity significantly degrades or is within an Outstanding Florida Water, that the regulated activity will be clearly in the public interest [subsection 62-330.302(1), F.A.C.];

(c) A regulated activity will not adversely affect the quality of receiving waters such that the water quality standards set forth in Chapters 62-4, 62-302, 62-520, and 62-550, F.A.C., including any antidegradation provisions of paragraphs 62-4.242(1)(a) and (b), subsections 62-4.242(2) and (3), and Rule 62-302.300, F.A.C., and any special standards for Outstanding Florida Waters and Outstanding National Resource Waters set forth in subsections 62-4.242(2) and (3), F.A.C., will be violated [paragraph 62-330.301(1)(e), F.A.C.];

(d) A regulated activity located in, adjacent to or in close proximity to Class II waters or located in waters classified by the Department of Agriculture and Consumer Services as approved, restricted, conditionally approved, or conditionally restricted for shellfish harvesting will

comply with the additional criteria in **section 10.2.5, of this Volume** [paragraph 62-330.302(1)(c), F.A.C.];

(e) The construction of vertical seawalls in estuaries and lagoons will comply with the additional criteria in **section 10.2.6, of this Volume** [paragraph 62-330.302(1)(d), F.A.C.];

(f) A regulated activity will not cause adverse secondary impacts to the water resources [paragraph 62-330.301(1)(f), F.A.C.]; and

(g) A regulated activity will not cause unacceptable cumulative impacts upon wetlands and other surface waters [paragraph 62-330.302(1)(b), F.A.C.].

10.2 Environmental Criteria

Compliance with the conditions for issuance in **section 10.1.1, above,** will be determined through compliance with the criteria explained in **sections 10.2 through 10.3.8, below**.

10.2.1 Elimination or Reduction of Impacts

Protection of wetlands and other surface waters is preferred to destruction and mitigation due to the temporal loss of ecological value and uncertainty regarding the ability to recreate certain functions associated with these features. The following factors are considered in determining whether an application will be approved by the Agency: the degree of impact to wetland and other surface water functions caused by a proposed activity; whether the impact to these functions can be mitigated; and the practicability of design modifications for the site that could eliminate or reduce impacts to these functions, including alignment alternatives for a proposed linear system. Design modifications to reduce or eliminate adverse impacts must be explored, as described in **section 10.2.1.1, below**. Adverse impacts remaining after practicable design modifications have been made may be offset by mitigation as described in **sections 10.3 through 10.3.8, below**. An applicant may propose mitigation, or the Agency may suggest mitigation, to offset the adverse impacts caused by regulated activities as identified in **sections 10.2 through 10.2.8.2, below**. To receive Agency approval, an activity cannot cause a net adverse impact on wetland functions and other surface water functions that is not offset by mitigation.

10.2.1.1 Except as provided in **section 10.2.1.2, below**, if the proposed activity will result in adverse impacts to wetland functions and other surface water functions such that it does not meet the requirements of **sections 10.2.2 through 10.2.3.7, below**, then the Agency in determining whether to grant or deny a permit shall consider whether the applicant has implemented practicable design modifications to reduce or eliminate such adverse impacts.

The term "modification" shall not be construed as including the alternative of not implementing the activity in some form, nor shall it be construed as requiring a project that is significantly different in type or function. A proposed modification that is not technically capable of being completed, is not economically viable, or that adversely affects public safety through the endangerment of lives or property is not considered "practicable." A proposed modification need not remove all economic value of the property in order to be considered not "practicable." Conversely, a modification need not provide the highest and best use of the property to be "practicable." In determining whether a proposed modification is practicable, consideration shall also be given to the cost of the modification compared to the environmental benefit it achieves.

10.2.1.2 The Agency will not require the applicant to implement practicable design modifications to reduce or eliminate impacts when:

a. The ecological value of the functions provided by the area of wetland or other surface water to be adversely affected is low, based on a site specific analysis using the factors in **section 10.2.2.3, below**, and the proposed mitigation will provide greater long term ecological value than the area of wetland or other surface water to be adversely affected, or

b. The applicant proposes mitigation that implements all or part of a plan that provides regional ecological value and that provides greater long term ecological value than the area of wetland or other surface water to be adversely affected.

10.2.1.3 Should such mutual consideration of modification and mitigation not result in a permittable activity, the Agency must deny the application. Nothing herein shall imply that the Agency may not deny an application for a permit as submitted or modified, if it fails to meet the conditions for issuance, or that mitigation must be accepted by the Agency.

10.2.2 Fish, Wildlife, Listed Species and their Habitats

Pursuant to **section 10.1.1(a), above**, an applicant must provide reasonable assurances that a regulated activity will not impact the values of wetland and other surface water functions so as to cause adverse impacts to:

(a) The abundance and diversity of fish, wildlife, listed species, and the bald eagle (*Halieaeetus leucocephalus*), which is protected under the Bald and Golden Eagle Protection Act, 16 U.S.C. 668-668d (April 30, 2004); a copy of the Act is in Appendix F; and

(b) The habitat of fish, wildlife, and listed species.

In evaluating whether an applicant has provided reasonable assurances under these provisions, *de minimis* effects shall not be considered adverse for the purposes of this section.

As part of the assessment of the impacts of regulated activities upon fish and wildlife, the Agency will provide a copy of all notices of applications for individual (including conceptual approval) permits that propose regulated activities in, on, or over wetlands or other surface waters to the Florida Fish and Wildlife Conservation Commission (FWC) for review and comment, in accordance with Section 20.331(10), F.S. In addition, Agency staff may solicit comments from the FWC regarding other applications to assist in the assessment of potential impacts to fish and wildlife and their habitats, particularly with regard to listed species.

The need for a wildlife survey will depend upon the likelihood that the site is used by listed species and the bald eagle, considering site characteristics and the range and habitat needs of such species, and whether the proposed activity will impact that use such that the criteria in **sections 10.2.2 through 10.2.2.3 and section 10.2.7, below,** will not be met. Survey methodologies employed to inventory the site must provide reasonable assurances regarding the presence or absence of the subject listed species. Species-specific wildlife surveys are dependent on seasonality and day/night patterns of animals. Applicants are encouraged to discuss the proposed survey methodologies with the Agencies prior to conducting the survey.

In assessing the likelihood of use of a site by listed species, the sufficiency of proposed survey methodology, and any information provided as reasonable assurance under this section, the Agency will consider comments and recommendations received from the FWC, the U.S. Fish and Wildlife Service, comments from the applicant, and other water-resource related public comments. Scientific literature, and technical assistance documents such as the "*Florida Wildlife Conservation Guide*" at: myfwc.com/conservation/value/fwcg/ (2011), management plans, recovery plans, and habitat and conservation guidelines also will be considered.

10.2.2.1 Compliance with **sections 10.2.2 through 10.2.3.7 and 10.2.5 through 10.3.8, below,** will not be required for regulated activities in isolated wetlands less than one half acre in size, unless:

(a) The wetland is used by endangered or threatened species;

(b) The wetland is located in an area of critical state concern designated pursuant to Chapter 380, F.S.;

(c) The wetland is connected by standing or flowing surface water at seasonal high water level to one or more wetlands, and the combined wetland acreage so connected is greater than one half acre; or

(d) The Agency establishes that the wetland to be impacted is, or several such isolated wetlands to be impacted are cumulatively, of more than minimal value to fish and wildlife.

10.2.2.2 Alterations in wholly-owned ponds that were entirely constructed in uplands and that are less than one acre in area and alterations in drainage ditches that were constructed in uplands will not be required to comply with the provisions of **sections 10.2.2 through 10.2.2.3, 10.2.3 through 10.2.3.7, and 10.2.5 through 10.3.8 below**, unless those ponds or ditches provide significant habitat for endangered or threatened species. This means that, except in cases where those ponds or ditches provide significant habitat for endangered or threatened species, the only environmental criteria that will apply to those ponds or ditches are those included in **sections 10.2.2.4 and 10.2.4 through 10.2.4.5, below.** This provision shall only apply to those ponds and ditches that did not require a permit under Part IV, Chapter 373, F.S., or that were constructed for purposes other than mitigation pursuant to a permit under Part IV, Chapter 373, F.S. This provision does not apply to ditches constructed to divert natural stream flow.

10.2.2.3 The assessment of impacts expected as a result of proposed activities on the values of functions will be based on a review of scientific literature, ecologic and hydrologic information, and field inspection. When assessing the value of functions that any wetland or other surface water provides to fish, wildlife, and listed species, the factors that the Agency will consider are:

(a) Condition – this factor addresses whether the wetland or other surface water is in a high quality state or has been the subject of past alterations in hydrology, water quality, or vegetative composition. However, areas impacted by activities in violation of an Agency rule, order, or permit adopted or issued pursuant to Chapter 373, F.S., or Part VIII of Chapter 403, F.S. (1984 Supp.) as amended, will be evaluated as if the activity had not occurred;

(b) Hydrologic connection – this factor addresses the nature and degree of off-site connection, which may provide benefits to off-site water resources through detrital export, base flow maintenance, water quality enhancement or the provision of nursery habitat;

(c) Uniqueness – this factor addresses the relative rarity of the wetland or other surface water and its floral and faunal components in relation to the surrounding regional landscape;

(d) Location – this factor addresses the location of the wetland or other surface water in relation to its surroundings. In making this assessment, the Agency will consult reference materials such as the Florida Natural Areas Inventory, Comprehensive Plans, and maps created by governmental agencies identifying land with high ecological values; and

(e) Fish and wildlife utilization – this factor addresses use of the wetland or other surface water for resting, feeding, breeding, nesting or denning by fish and wildlife, particularly those that are listed species.

10.2.2.4 Water Quantity Impacts to Wetlands and Other Surface Waters

Pursuant to **section 10.1.1(a), above**, an applicant must provide reasonable assurance that the regulated activity will not change the hydroperiod of a wetland or other surface water, so as to adversely affect wetland functions or other surface water functions as follows:

(a) Whenever portions of a system, such as constructed basins, structures, stormwater ponds, canals, and ditches, could have the effect of reducing the depth, duration or frequency of inundation or saturation in a wetland or other surface water, the applicant must perform an analysis of the drawdown in water levels or diversion of water flows resulting from such activities and provide reasonable assurance that these drawdowns or diversions will not adversely impact the functions that wetlands and other surface waters provide to fish and wildlife and listed species;

(b) Increasing the depth, duration, or frequency of inundation through changing the rate or method of discharge of water to wetlands or other surface waters or by impounding water in wetlands or other surface waters must also be addressed to prevent adverse effects to functions that wetlands and other surface waters provide to fish and wildlife and listed species. Different types of wetlands respond differently to increased depth, duration, or frequency of inundation. Therefore, the applicant must provide reasonable assurance that activities that have the potential to increase discharge or water levels will not adversely affect the functioning of the specific wetland or other surface water subject to the increased discharge or water level; and

(c) Whenever portions of an activity could have the effect of altering water levels in wetlands or other surface waters, applicants shall be required to either: monitor the wetland or other surface waters to demonstrate that such alteration has not resulted in adverse impacts; or modify the activity to prevent adverse impacts. Monitoring parameters, methods, schedules, and reporting requirements shall be specified in permit conditions.

10.2.3 Public Interest Test

In determining whether a regulated activity located in, on, or over wetlands or other surface waters is not contrary to the public interest, or if such an activity significantly degrades or is within an Outstanding Florida Water, that the regulated activity is clearly in the public interest, the Agency shall consider and balance, and an applicant must address, the following criteria:

(a) Whether the regulated activity will adversely affect the public health, safety, or welfare or the property of others (subparagraph 62-330.302(1)(a)1, F.A.C.);

(b) Whether the regulated activity will adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats (subparagraph 62-330.302(1)(a)2, F.A.C.);

(c) Whether the regulated activity will adversely affect navigation or the flow of water or cause harmful erosion or shoaling (subparagraph 62-330.302(1)(a)3, F.A.C.);

(d) Whether the regulated activity will adversely affect the fishing or recreational values or marine productivity in the vicinity of the activity (subparagraph 62-330.302(1)(a)4, F.A.C.);

(e) Whether the regulated activity will be of a temporary or permanent nature (subparagraph 62-330.302(1)(a)5, F.A.C.);

(f) Whether the regulated activity will adversely affect or will enhance significant historical and archaeological resources under the provisions of Section 267.061, F.S. (subparagraph 62-330.302(1)(a)6, F.A.C.); and

(g) The current condition and relative value of functions being performed by areas affected by the proposed regulated activity (subparagraph 62-330.302(1)(a)7, F.A.C.).

10.2.3.1 Public Health, Safety, or Welfare or the Property of Others

In reviewing and balancing the criterion regarding public health, safety, welfare and the property of others in **section 10.2.3(a), above**, the Agency will evaluate whether the regulated activity located in, on, or over wetlands or other surface waters will cause:

(a) An environmental hazard to public health or safety or improvement to public health or safety with respect to environmental issues. Each applicant must identify potential environmental public health or safety issues resulting from their project. Examples of these issues include: mosquito control; proper disposal of solid, hazardous, domestic or industrial waste; aids to navigation; hurricane preparedness or cleanup; environmental remediation, enhancement or restoration; and similar environmentally related issues. For example, the installation of navigational aids may improve public safety and may reduce impacts to public resources;

(b) Impacts to areas classified by the Department of Agriculture and Consumer Services as approved, conditionally approved, restricted or conditionally restricted for shellfish harvesting. Activities that would cause closure or a more restrictive classification or management plan for a shellfish harvesting area would result in a negative factor in the public interest balance with respect to this criterion;

(c) Flooding or alleviate existing flooding on the property of others. There is at least a neutral factor in the public interest balance with respect to the potential for causing or alleviating flooding problems if the applicant meets the water quantity criteria in **Part III of Volume II**; and

(d) Environmental impacts to the property of others. For example, construction of a ditch that lowers the water table such that off-site wetlands or other surface waters would be partly or fully drained would be an environmental impact to the property of others. The Agency will not consider impacts to property values.

10.2.3.2 Fish and Wildlife and their Habitats

The Agency's public interest review of that portion of a proposed activity in, on, or over wetlands and other surface waters for impacts to "the conservation of fish and wildlife, including endangered or threatened species, or their habitats" is encompassed within the required review of the entire activity under **section 10.2.2, above**. An applicant must always provide the reasonable assurances required under **section 10.2.2, above**.

10.2.3.3 Navigation, Water Flow, Erosion and Shoaling

In reviewing and balancing the criterion on navigation, erosion and shoaling in **section 10.2.3(c), above**, the Agency will evaluate whether the regulated activity located in, on or over wetlands or other surface waters will:

(a) Significantly impede navigability or enhance navigability. The Agency will consider the current navigational uses of the surface waters and will not speculate on uses that may occur in the future. Applicants proposing to construct bridges or other traversing works must address adequate horizontal and vertical clearance for the type of watercraft currently navigating the surface waters. Applicants proposing to construct docks, piers and other works that extend into surface waters must address the continued navigability of these waters. An encroachment into a marked or customarily used navigation channel is an example of a significant impediment to navigability. Applicants proposing temporary activities in navigable surface waters, such as the mooring of construction barges, must address measures for clearly marking the work as a hazard to navigation, including nighttime lighting. The addition of navigational aids may be beneficial to navigation. If an applicant has a U.S. Coast Guard permit issued pursuant to 14 U.S.C. Section 81 or 33 C.F.R. Part 62 for a regulated activity in, on or over wetlands or other surface waters, submittal of this permit with the application may assist the applicant in addressing this criterion.

(b) Cause or alleviate harmful erosion or shoaling. Applicants proposing activities such as channel relocation, artificial reefs, construction of jetties, breakwaters, groins, bulkheads and beach nourishment must address existing and expected erosion or shoaling in the proposed design. Compliance with erosion control best management practices referenced in **Part IV of this Volume**, will be an important consideration in addressing this criterion. Each permit will have a general condition that requires applicants to utilize appropriate erosion control practices and to correct any adverse erosion or shoaling resulting from the regulated activities.

(c) Significantly impact or enhance water flow. Applicants must address significant obstructions to sheet flow by assessing the need for structures that minimize the obstruction such as culverts or spreader swales in fill areas. Compliance with the water quantity criteria found in **section 10.2.2.4, above,** shall be an important consideration in addressing this criterion.

10.2.3.4 Fisheries, Recreation, Marine Productivity

In reviewing and balancing the criterion regarding fishing or recreational values and marine productivity in **section 10.2.3(d), above**, the Agency will evaluate whether the regulated activity in, on, or over wetlands or other surface waters will cause:

(a) Adverse effects to sport or commercial fisheries or marine productivity. Examples of activities that may adversely affect fisheries or marine productivity are the elimination or degradation

of fish nursery habitat, change in ambient water temperature, change in normal salinity regime, reduction in detrital export, change in nutrient levels, or other adverse effects on populations of native aquatic organisms.

(b) Adverse effects or improvements to existing recreational uses of a wetland or other surface water. Wetlands and other surface waters may provide recreational uses such as boating, fishing, swimming, waterskiing, hunting, and birdwatching. An example of potential adverse effects to recreational uses is the construction of a traversing work, such as a road crossing a waterway, which could impact the current use of the waterway for boating.

10.2.3.5 Temporary or Permanent Nature

When evaluating the other criteria in **section 10.2.3, above**, the Agency will consider the frequency and duration of the impacts caused by the proposed activity. Temporary impacts will be considered less harmful than permanent impacts of the same nature and extent.

10.2.3.6 Historical and Archaeological Resources

In reviewing and balancing the criterion regarding historical and archaeological resources in **section 10.2.3(f), above**, the Agency will evaluate whether the regulated activity located in, on, or over wetlands or other surface waters will impact significant historical or archaeological resources. The applicant must map the location of and characterize the significance of any known historical or archaeological resources that may be affected by the regulated activity located in, on or over wetlands or other surface waters. The Agency will provide copies of all individual (including conceptual approval) permit applications to the Division of Historical Resources of the Department of State and solicit its comments regarding whether the regulated activity may adversely affect significant historical and archaeological resources. The applicant will be required to perform an archaeological survey and to develop and implement a plan as necessary to demarcate and protect the significant historical or archaeological resources, if such resources are reasonably expected to be impacted by the regulated activity.

10.2.3.7 Current Condition and Relative Value of Functions

When evaluating other criteria in **section 10.2.3, above**, the Agency will consider the current condition and relative value of the functions performed by wetlands and other surface waters affected by the proposed regulated activity. Wetlands and other surface waters that have had their hydrology, water quality, or vegetative composition permanently impacted due to past legal alterations or occurrences, such as infestation with exotic species, usually provide lower habitat value to fish and wildlife. However, if the wetland or other surface water is currently degraded, but is still providing some beneficial functions, consideration will be given to whether the regulated activity will further reduce or eliminate those functions. The Agency will also evaluate the predicted ability of the wetlands or other surface waters to maintain their current functions as part of the proposed activity once it is developed. Where previous impacts to a wetland or other surface water are temporary in nature, consideration will be given to the inherent functions of these areas relative to seasonal hydrologic changes, and expected vegetative regeneration and projected habitat functions if the use of the subject property were to remain unchanged. When evaluating impacts to mitigation sites that have not reached success pursuant to **section 10.3.6, below**, the Agency shall consider the functions that the mitigation site was intended to offset, and any additional delay or reduction in offsetting those functions that may be caused by impacting the mitigation site. Previous construction or alteration undertaken in violation of Chapter 373, F.S., or Agency rule, order or

permit will not be considered as having diminished the condition and relative value of a wetland or other surface water.

10.2.4 Water Quality

Pursuant to **section 10.1.1(c), above**, an applicant must provide reasonable assurance that the regulated activity will not cause or contribute to violations of water quality standards in areas where water quality standards apply.

Reasonable assurances regarding water quality must be provided both for the short term and the long term, addressing the proposed construction, alteration, operation, maintenance, removal and abandonment of the project. The following requirements are in addition to the water quality requirements found in **sections 8.2.3 and 8.3 through 8.5 above**.

10.2.4.1 Short Term Water Quality Considerations

The applicant must address the short term water quality impacts of a proposed activity, including:

(a) Providing and maintaining turbidity barriers or similar devices for the duration of dewatering and other construction activities in or adjacent to wetlands or other surface waters;

(b) Stabilizing newly created slopes or surfaces in or adjacent to wetlands and other surface waters to prevent erosion and turbidity;

(c) Providing proper construction access for barges, boats and equipment to ensure that propeller dredging and rutting from vehicular traffic does not occur;

(d) Maintaining construction equipment to ensure that oils, greases, gasoline, or other pollutants are not released into wetlands or other surface waters;

(e) Controlling the discharge from spoil disposal sites; and

(f) Preventing any other discharge or release of pollutants during construction or alteration that will cause or contribute to water quality standards being violated.

10.2.4.2 Long Term Water Quality Considerations

The applicant must address the long term water quality impacts of a proposed activity, including:

(a) The potential of a constructed or altered water body to cause or contribute to violations of water quality standards due to its depth or configuration. For example, the depth of water bodies must be designed to ensure proper mixing so that the water quality standard for dissolved oxygen will not be violated in the lower levels of the water body, but the depth should not be so shallow that the bottom sediments are frequently resuspended by boat activity. Water bodies must be configured to prevent the creation of debris traps or stagnant areas that could result in violations of water quality standards.

(b) Long term erosion, siltation or propeller dredging that will cause turbidity violations.

(c) Prevention of any discharge or release of pollutants from the activity that will cause water quality standards to be violated.

10.2.4.3 Additional Water Quality Considerations for Docking Facilities

Docking facilities, due to their nature, provide potential sources of pollutants to wetlands and other surface waters. If the proposed work has the potential to adversely affect water quality, an applicant proposing the construction, expansion or alteration of a docking facility must address the following factors to provide the required reasonable assurance that water quality standards will not be violated:

(a) Hydrographic information or studies shall be required for docking facilities of greater than ten boat slips, unless hydrographic information or studies previously conducted in the vicinity of the facility provide reasonable assurance that the conditions of the water body and the nature of the proposed activity do not warrant the need for new information or studies. Hydrographic information or studies also may be required for docking facilities of fewer than ten slips, dependent upon the site specific features described in **section 10.2.4.3(b), below**. In all cases, the design of the hydrographic study, and its complexity, will be dependent upon the specific project design and the specific features of the project site.

(b) The purpose of the hydrographic information or studies is to document the flushing time (the time required to reduce the concentration of a conservative pollutant to ten percent of its original concentration) of the water at the docking facility. This information is used to determine the likelihood that the facility will accumulate pollutants to the extent that water quality violations will occur. Generally, a flushing time of less than or equal to four days is the maximum that is desirable for docking facilities. However, the evaluation of the maximum desirable flushing time also takes into consideration the size (number of slips) and configuration of the proposed docking facility; the amplitude and periodicity of the tide; the geometry of the subject water body; the circulation and flushing of the water body; the quality of the waters at the project site; the type and nature of the docking facility; the services provided at the docking facility; and the number and type of other sources of water pollution in the area.

(c) The level and type of hydrographic information or studies that will be required for the proposed docking facility will be determined based upon an analysis of site specific characteristics. As compared to sites that flush in less than four days, sites where the flushing time is greater than four days generally will require additional, more complex levels of hydrographic studies or information to determine whether water quality standards can be expected to be violated by the facility. The degree and complexity of the hydrographic study will be dependent upon the types of considerations listed in **section 10.2.4.3(b), above**, including the potential for the facility, based on its design and location, to add pollutants to the receiving waters. Types of information that can be required include site-specific measurements of: waterway geometry, tidal amplitude, the periodicity of forces that drive water movement at the site, and water tracer studies that document specific circulation patterns.

(d) The applicant shall document, through hydrographic information or studies, that pollutants leaving the site of the docking facility will be adequately dispersed in the receiving water body so as to not cause or contribute to violations of water quality standards based on circulation patterns and flushing characteristics of the receiving water body.

(e) In all cases, the hydrographic studies shall be designed to document the hydrographic characteristics of the project site and surrounding waters. All hydrographic studies must be based on the factors described in **sections (a) through (d), above**. An applicant should consult with the Agency prior to conducting such a study.

(f) In accordance with Chapters 62-761 and 62-762, F.A.C., applicants are advised that fueling facilities must have secondary containment equipment and shall be located and operated so that the potential for spills or discharges to surface waters and wetlands is minimized.

(g) The disposal of domestic wastes from boat heads, particularly from liveaboard vessels, must be addressed to prevent improper disposal into wetlands or other surface waters. A liveaboard vessel shall be defined as a vessel docked at the facility that is inhabited by a person or persons for any five consecutive days or a total of ten days within a 30-day period.

(h) The disposal of solid waste, such as garbage and fish cleaning debris, must be addressed to prevent disposal into wetlands or other surface waters.

(i) Pollutant leaching characteristics of materials such as treated pilings and anti-fouling paints used on the hulls of vessels must be addressed to ensure that any pollutants that leach from the structures and vessels will not cause violations of water quality standards given the flushing at the site and the type, number and concentration of the likely sources of pollutants.

10.2.4.4 Mixing Zones

A temporary mixing zone for water quality during construction or alteration may be requested by the applicant. The Agency shall review such requests pursuant to Rule 62-4.242 and subsection 62-4.244(5), F.A.C.

10.2.4.5 Where Ambient Water Quality Does Not Meet Standards

If the site of the proposed activity currently does not meet water quality standards, the applicant must demonstrate compliance with the water quality standards by meeting the provisions in **sections 10.2.4.1, 10.2.4.2, and 10.2.4.3, above,** as applicable, and for the parameters that do not meet water quality standards, the applicant must demonstrate that the proposed activity will not contribute to the existing violation. If the proposed activity will contribute to the existing violation, mitigation may be proposed as described in **section 10.3.1.4, below**.

10.2.5 Class II Waters; Waters Approved for Shellfish Harvesting

The special value and importance of shellfish harvesting waters to Florida's economy as existing or potential sites of commercial and recreational shellfish harvesting and as a nursery area for fish and shellfish is recognized by the Agencies. In accordance with **section 10.1.1(d), above**, the Agency shall deny a permit for a regulated activity located:

(a) In Class II or Class III waters, as designated in Chapter 62-302, F.A.C., that are classified by the Department of Agriculture and Consumer Services (DACS) as "approved," "restricted," "conditionally approved," or "conditionally restricted" for shellfish harvesting. However, the Agency may issue permits or certifications in such waters for: environmental restoration or enhancement; maintenance dredging of navigational channels; the construction of shoreline protection structures; the installation of transmission and distribution lines for carrying potable

water, electricity or communication cables in rights-of-way previously used for such lines; or clam and oyster culture. This provision also shall not apply to docking facilities that meet all of the following criteria:

1. No more than two vessels shall be moored, and no more than two slips constructed in total at a private residential single-family dock, or no more than ten vessels moored and no more than ten slips constructed in total at a private residential multi-family, commercial, or governmental dock at any time;

2. No overboard discharges of trash, human or animal waste, or fuel shall occur at the dock. For all commercial, governmental, or private residential multi-family docks that will moor vessels that contain, or have the capability of containing, a permanent marine sanitation device, the applicant must provide reasonable assurance that there will not be a discharge of domestic wastes from such vessels at the dock;

3. Any enclosed, non-water dependent structures shall be located on the uplands;

4. Prior to the mooring of any vessel at the dock, there shall be existing structures with toilet facilities located on the uplands;

5. Any proposed boat shelter shall not be enclosed with screens, walls, doors, or windows;

6. A minimum of one foot clearance must be maintained between the deepest draft of any vessel (including the vessel propulsion unit) moored in the water at the dock and the top of any submerged resources (which includes rooted aquatic macrophyte communities, attached macro-marine algae communities, sponge beds, coral communities, and oyster communities) in the mooring location, as measured at mean low water. The height of rooted aquatic macrophyte communities, attached macro-marine algae communities shall be measured as they exist during the growing season (April through September);

7. Any structures located over grassbeds shall be designed so as to allow for the maximum practicable amount of light penetration; and

8. There shall be no overnight occupancy at any time on the dock or on any vessels moored to the dock.

Solely for purposes of this subsection, the term "vessel" shall include all sailboats and motorized boats of any type other than personal watercraft as defined in Section 327.02, F.S., whether moored in the water or stored on the dock, in a boat lift, or on a floating vessel platform.

(b) In any Class II waters that are not classified by DACS as "approved," "restricted," "conditionally approved," or "conditionally restricted" for shellfish harvesting, unless the applicant submits a plan or proposes a procedure to protect those waters and waters in the vicinity. The plan or procedure shall detail the measures to be taken to prevent significant damage to the immediate project area and the adjacent area, and shall provide reasonable assurance that the water quality standards for Class II waters will not be violated.

(c) In any class of waters where the location of the activity is adjacent or in close proximity to Class II waters, unless the applicant submits a plan or proposes a procedure that demonstrates that the regulated activity will not have a negative effect on the Class II waters and will not result in violations of water quality standards in the Class II waters.

10.2.6 Vertical Seawalls

(a) The construction of vertical seawalls in estuaries or lagoons is prohibited unless one of the following conditions exists:

1. The proposed construction is located within a port, as defined in Section 315.02 or 403.021, F.S.;

2. The proposed construction is necessary for the creation of a marina, the vertical seawalls are necessary to provide access to watercraft, or the proposed construction is necessary for public facilities;

3. The proposed construction is to be located within an existing manmade canal and the shoreline of such canal is currently occupied in whole or in part by vertical seawalls; or

4. The proposed construction is to be conducted by a public utility when such utility is acting in the performance of its obligation to provide service to the public.

5. The proposed construction is located within the coastal areas of Collier, Lee, Miami-Dade, and Monroe Counties, or Charlotte Harbor/Peace River in Charlotte County designated by the National Marine Fisheries Service as Critical Habitat for the smalltooth sawfish (*Pristis pectinata*) -- see http://www.nmfs.noaa.gov/pr/species/fish/smalltooth-sawfish.html.

(b) When considering an application for a permit to repair or replace an existing vertical seawall, the Agency shall require such seawall to be faced with riprap material, or to be replaced entirely with riprap material unless a condition specified in **paragraphs 1 through 5, above,** exists. However, nothing in this subsection shall be construed to hinder any activity previously exempt or permitted under Part IV of Chapter 373, F.S., or permitted under Chapter 161, F.S.

10.2.7 Secondary Impacts

Pursuant to **section 10.1.1(f), above**, an applicant must provide reasonable assurances that a regulated activity will not cause adverse secondary impacts to the water resource, as described in **sections (a) through (d), below**. Aquatic or wetland dependent fish and wildlife are an integral part of the water resources that the Agency is authorized to protect under Part IV, Chapter 373, F.S.

Aquatic or wetland dependent species that are listed species are particularly in need of protection, as are: the bald eagle (*Halieaeetus leucocephalus*), which is protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) and Rule 68A-16.002, F.A.C.

A proposed activity shall be reviewed under this criterion by evaluating the impacts to: wetland and surface water functions identified in **section 10.2.2, above**, water quality, upland habitat for bald eagles and aquatic or wetland dependent listed species, and historical and archaeological resources. *De*

minimis or remotely related secondary impacts will not be considered. Applicants may propose measures such as preservation to prevent secondary impacts. Such preservation shall comply with the land preservation provisions of **section 10.3.8, below**. If such secondary impacts cannot be prevented, the applicant may propose mitigation measures as provided for in **sections 10.3 through 10.3.8, below**.

This secondary impact criterion consists of the following four parts:

(a) An applicant shall provide reasonable assurance that the secondary impacts from construction, alteration, and intended or reasonably expected uses of a proposed activity will not cause or contribute to violations of water quality standards or adverse impacts to the functions of wetlands or other surface waters as described in **section 10.2.2, above**.

Impacts such as lights from development adjacent to marine turtle nesting beaches, boat traffic generated by a proposed dock, boat ramp or dry dock facility, which cause an increased threat of collision with manatees; impacts to wildlife from vehicles using proposed roads in wetlands or other surface waters; impacts to water quality associated with the use of onsite sewage treatment and disposal systems (e.g., septic tanks and drainfields) or propeller dredging by boats and wakes from boats; and impacts associated with docking facilities as described in **sections 10.2.4.3(f) through (i), above**, will be considered relative to the specific activities proposed and the potential for such impacts. Impacts of groundwater withdrawals upon wetlands and other surface waters that result from the use of wells permitted pursuant to the District consumptive use rules shall not be considered under the rules adopted pursuant to Part IV of Chapter 373, F.S.

Secondary impacts to the habitat functions of wetlands associated with adjacent upland activities will not be considered adverse if buffers, with a minimum width of 15 ft. and an average width of 25 ft., are provided abutting those wetlands that will remain under the permitted design, unless additional measures are needed for protection of wetlands used by bald eagles for nesting, or listed species for nesting, denning, or critically important feeding habitat. The mere fact that a species is listed does not imply that all of its feeding habitat is critically important. Buffers shall be maintained in an undisturbed vegetated condition, except when the permit requires removal of exotic and nuisance vegetation or the planting of appropriate native species to prevent adverse secondary impacts to the habitat functions of the wetlands. Drainage features such as spreader swales and discharge structures are acceptable within the buffer, provided the construction or use of these features does not adversely impact wetlands. Where an applicant elects not to use buffers of the above-described dimensions, buffers of different dimensions, or other measures, may be proposed to provide the required reasonable assurance. Wetlands or other surface waters shall not be filled to achieve this buffer requirement. For example, an undisturbed upland buffer would not be required to be established waterward of areas of wetlands or other surface waters that are authorized to be filled for other purposes, such as to construct a bulkhead, although this does not relieve the applicant from providing other reasonable assurance demonstrating that the construction, alteration, and intended or reasonably expected uses of a proposed activity will not result in adverse secondary impacts to wetlands and other surface waters. Buffers proposed to protect against secondary impacts shall be allowed to overlap with vegetated natural buffers, except where the Agency determines that such overlap would adversely affect the purposes each buffer is designed to address**.**

(b) An applicant shall provide reasonable assurance that the construction, alteration, and intended or reasonably expected uses of a proposed activity will not adversely impact the ecological

value of uplands for bald eagles, and aquatic or wetland dependent listed animal species for enabling existing nesting or denning by these species, but not including:

1. Areas needed for foraging; or

2. Wildlife corridors, except for those limited areas of uplands necessary for ingress and egress to the nest or den site from the wetland or other surface water.

A list of aquatic or wetland dependent listed species and species having special protection that use upland habitats for nesting and denning may be found at https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/documents/listed-wildlife-species-are.

In evaluating whether a proposed activity will adversely impact the ecological value of uplands to the bald eagle and aquatic or wetland dependent listed species, the Agencies shall consider comments received from the Florida Fish and Wildlife Conservation Commission (FWC), the U.S. Fish and Wildlife Service, the applicant, and the public (for comments related to this section). Permitting guidelines within management plans, recovery plans, habitat and conservation guidelines, scientific literature, and technical assistance documents such as the "*Florida Wildlife Conservation Guide*" (myfwc.com/conservation/value/fwcg/) also will be considered.

Compliance with the U.S. Fish and Wildlife Service (USFWS) *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (January 1990), available at: http://www.fws.gov/northflorida/WoodStorks/Documents/19900100_gd_Wood-stork-habitat-guidelines-1990.pdf, and reproduced in Appendix G, will provide reasonable assurance that the proposed activity will not adversely impact upland habitat functions described in **paragraph (b)** for the wood stork.

Secondary impacts to the functions of wetlands or uplands for nesting of bald eagles (*Haliaeetus leucocephalus)* will not be considered adverse if the applicant holds a valid authorization from the USFWS pursuant to paragraph 68A-16.002(1), F.A.C., for the same activities proposed by the applicant under Part IV of Chapter 373, F.S., or if the applicant demonstrates compliance with the USFWS *National Bald Eagle Management Guidelines* (May 2007) available at: https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf, and reproduced in Appendix H.

For those aquatic or wetland dependent listed animal species for which habitat management guidelines have not been developed, or in cases where an applicant does not propose to use USFWS or FWC habitat management guidelines, the applicant may propose measures to mitigate adverse impacts to upland habitat functions described in **paragraph (b)** provided to aquatic or wetland dependent listed animal species and species having special protection listed online at https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/documents/listed-wildlife-species-are. Such proposals will be evaluated by the Agency to determine if the measures provide reasonable assurance.

(c) In addition to evaluating the impacts in the area of any dredging and filling in, on, or over wetlands or other surface waters, and as part of the balancing review under **section 10.2.3,**

above, the Agency will consider any other associated activities that are very closely linked and causally related to any proposed dredging or filling that have the potential to cause impacts to significant historical and archaeological resources.

(d) An applicant shall provide reasonable assurance that the following future activities will not result in water quality violations or adverse impacts to the functions of wetlands or other surface waters as described in **section 10.2.2, above:**

1. Additional phases or expansion of the proposed activity for which plans have been submitted to the Agency or other governmental agencies; and

2. On-site and off-site activities regulated under Part IV, Chapter 373, F.S., or activities described in Section 403.813(1), F.S., that are very closely linked and causally related to the proposed activity.

As part of this review, the Agency will also consider the impacts of the intended or reasonably expected uses of the future activities on water quality and wetland and other surface water functions.

In conducting the analysis under **section (d)2, above**, the Agency will consider those future projects or activities that would not occur but for the proposed activity, including where the proposed activity would be considered a waste of resources should the future project or activities not be permitted.

Where practicable, proposed activities shall be designed in a fashion that does not necessitate future impacts to wetland and other surface water functions. Activity expansions and future activity phases will be considered in the secondary impact analysis. If the Agency determines that future phases of an activity involve impacts that do not appear to meet permitting criteria, the current application shall be denied unless the applicant can provide reasonable assurance that those future phases can comply with permitting criteria. One way for applicants to establish that future phases or system expansions do not have adverse secondary impacts is for the applicant to obtain a conceptual approval permit for the entire project.

10.2.8 Cumulative Impacts

Pursuant to **section 10.1.1(g), above**, an applicant must provide reasonable assurance that a regulated activity will not cause unacceptable cumulative impacts upon wetlands and other surface waters within the same drainage basin as the regulated activity for which a permit is sought. The impact on wetlands and other surface waters shall be reviewed by evaluating the impacts to water quality as set forth in **section 10.1.1(c), above,** and by evaluating the impacts to functions identified in **section 10.2.2, above**.

(a) If an applicant proposes to mitigate these adverse impacts within the same drainage basin as the impacts, and if the mitigation fully offsets these impacts, then the Agency will consider the regulated activity to have no unacceptable cumulative impacts upon wetlands and other surface waters, and consequently, the condition for issuance in **section 10.1.1(g)** will be satisfied. The drainage basins within each District are reproduced below in **Figures 10.2.8-1 through 10.2.8-5**.

(b) If an applicant proposes to mitigate adverse impacts through mitigation physically located outside of the drainage basin where the impacts are proposed, an applicant may demonstrate that such mitigation fully offsets the adverse impacts within the impacted drainage basin (as measured from

the impacted drainage basin), based on factors such as connectivity of waters, hydrology, habitat range of affected species, and water quality. If the mitigation fully offsets the impacts (as measured from the impacted drainage basin), then the Agency will consider the regulated activity to have no unacceptable cumulative impacts upon wetlands and other surface waters, and consequently, the condition for issuance in section 10.1.1(g), above, will be satisfied. In other words, if the functions provided by the proposed out-of-basin-mitigation will "spill over" into the impacted basin, and are sufficient to offset the impacts within the impacted basin, then the condition for issuance in section 10.1.1(g) will be satisfied.

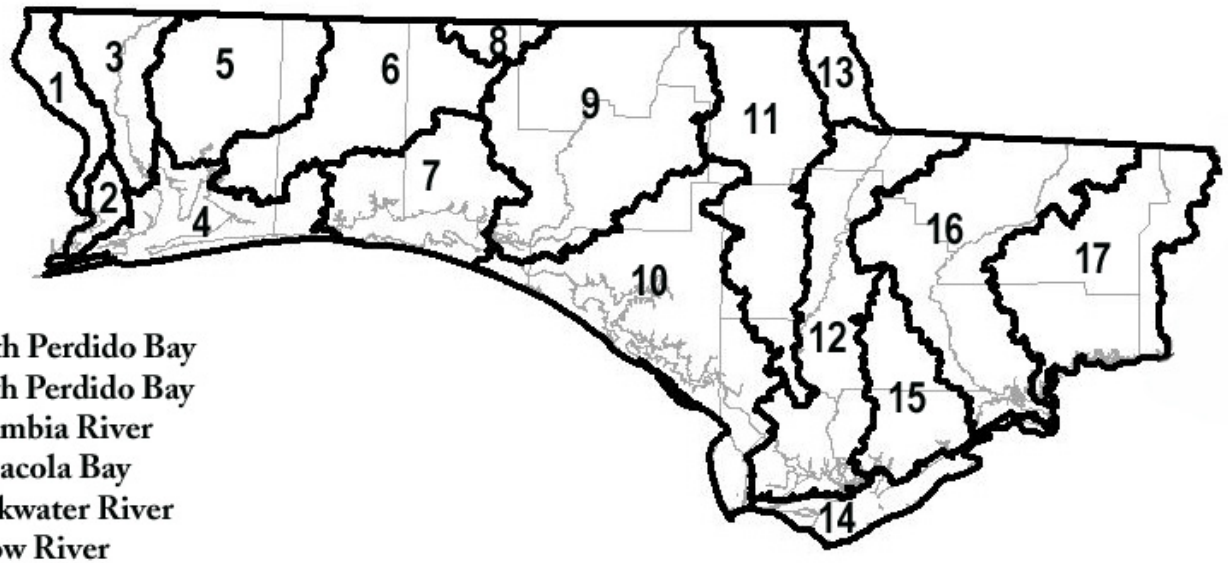
(c) When adverse impacts to water quality or adverse impacts to the functions of wetlands and other surface waters, as referenced in paragraphs (a) and (b) above, are not fully offset within the same drainage basin as the impacts, then an applicant must provide reasonable assurance that the proposed activity, when considered with the following activities, will not result in unacceptable cumulative impacts to water quality or the functions of wetlands and other surface waters, within the same drainage basin:

1. Projects that are existing or activities regulated under Part IV, Chapter 373, F.S., that are under construction or projects for which permits or determinations pursuant to Section 373.421, F.S., or Section 403.914, F.S. (1991), have been sought.

2. Activities that are under review, approved, or vested pursuant to Section 380.06, F.S., or other activities regulated under Part IV of Chapter 373, F.S., which may reasonably be expected to be located within wetlands or other surface waters, in the same drainage basin, based upon the comprehensive plans, adopted pursuant to Chapter 163, F.S., of the local governments having jurisdiction over the activities, or applicable land use restrictions and regulations.

Only those activities listed in **sections (c)1. and 2., above,** that have similar types of impacts (adverse effects) to those that will be caused by the proposed activity and for which those impacts are not fully offset within the drainage basin, as described in section (a) or (b), above, will be considered. Activities are considered to have similar impacts if they affect similar types of water resources and functions, regardless of whether the activities themselves are similar to one another.

The cumulative impact evaluation is conducted using an assumption that reasonably expected future applications with like impacts will be sought, thus necessitating equitable distribution of acceptable impacts among future applications.



1 North Perdido Bay
2 South Perdido Bay
3 Escambia River
4 Pensacola Bay
5 Blackwater River
6 Yellow River
7 Choctawhatchee Bay
8 Pea River
9 Choctawhatchee River
10 St. Andrews Bay
11 Chipola River
12 Apalachicola River
13 Chattahoochee River
14 Apalachicola Bay
15 New River
16 Ochlockonee River
17 St Marks River

Figure 10.2.8-1 Drainage Basins within the geographical territory of the Northwest Florida Water Management District (Source: USGS Hydrologic Unit Code (HUC) Basins, 1:24K, HPGN)

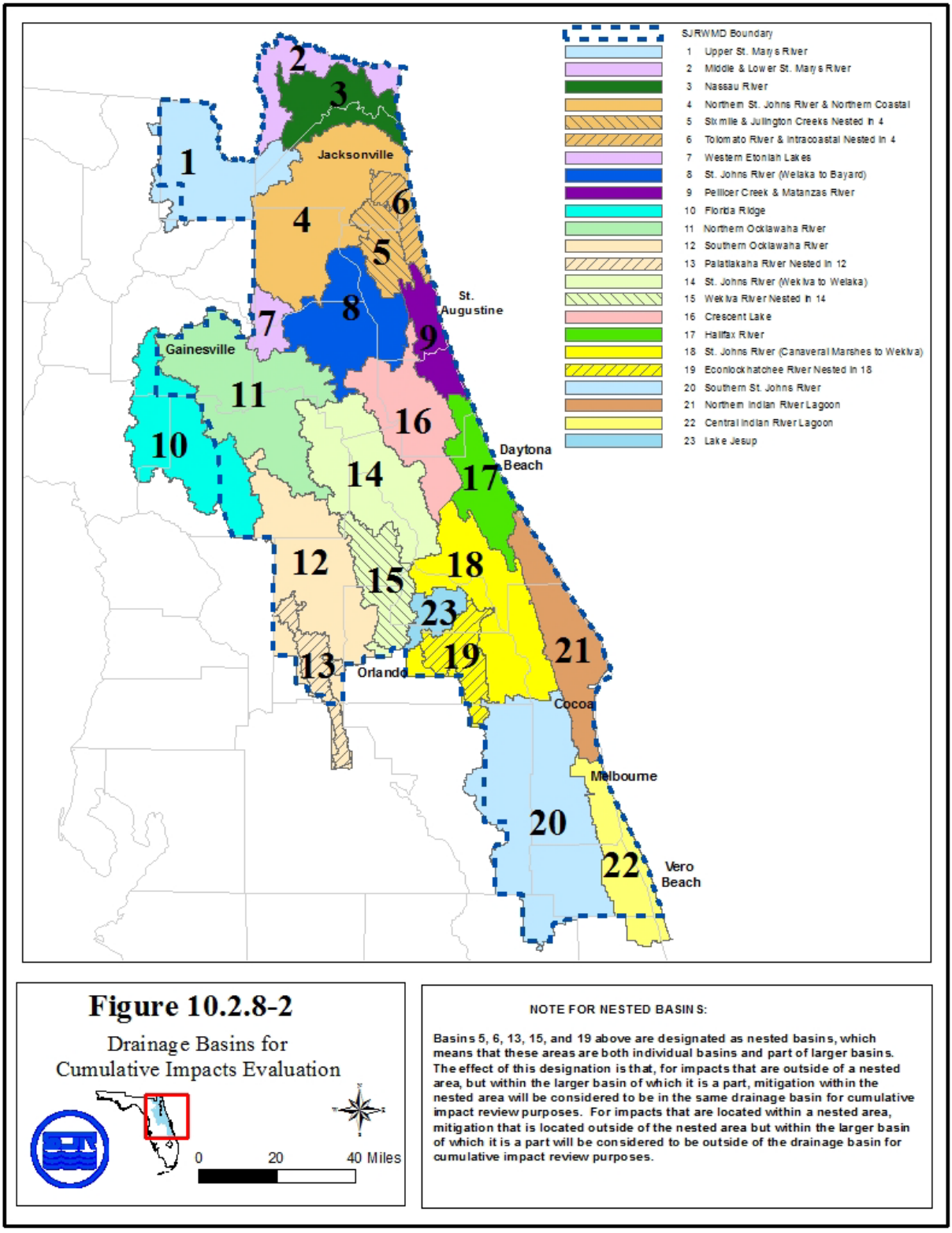


Figure 10.2.8-2

Drainage Basins for
Cumulative Impacts Evaluation

NOTE FOR NESTED BASINS:

Basins 5, 6, 13, 15, and 19 above are designated as nested basins, which means that these areas are both individual basins and part of larger basins. The effect of this designation is that, for impacts that are outside of a nested area, but within the larger basin of which it is a part, mitigation within the nested area will be considered to be in the same drainage basin for cumulative impact review purposes. For impacts that are located within a nested area, mitigation that is located outside of the nested area but within the larger basin of which it is a part will be considered to be outside of the drainage basin for cumulative impact review purposes.

Figure 10.2.8-3 Drainage Basins for Cumulative Impact Determinations within the Suwannee River Water Management District

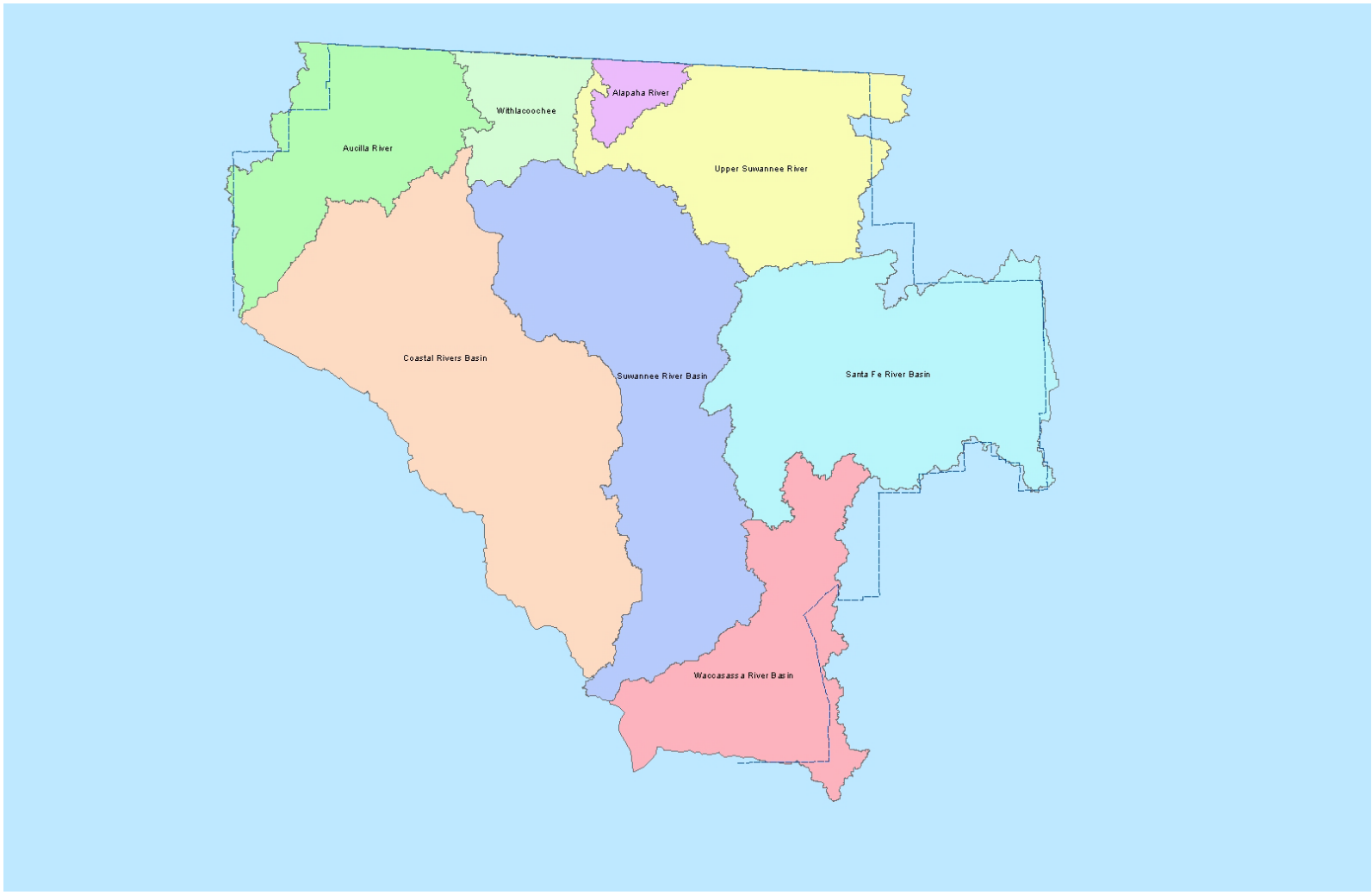


Figure 10.2.8-4

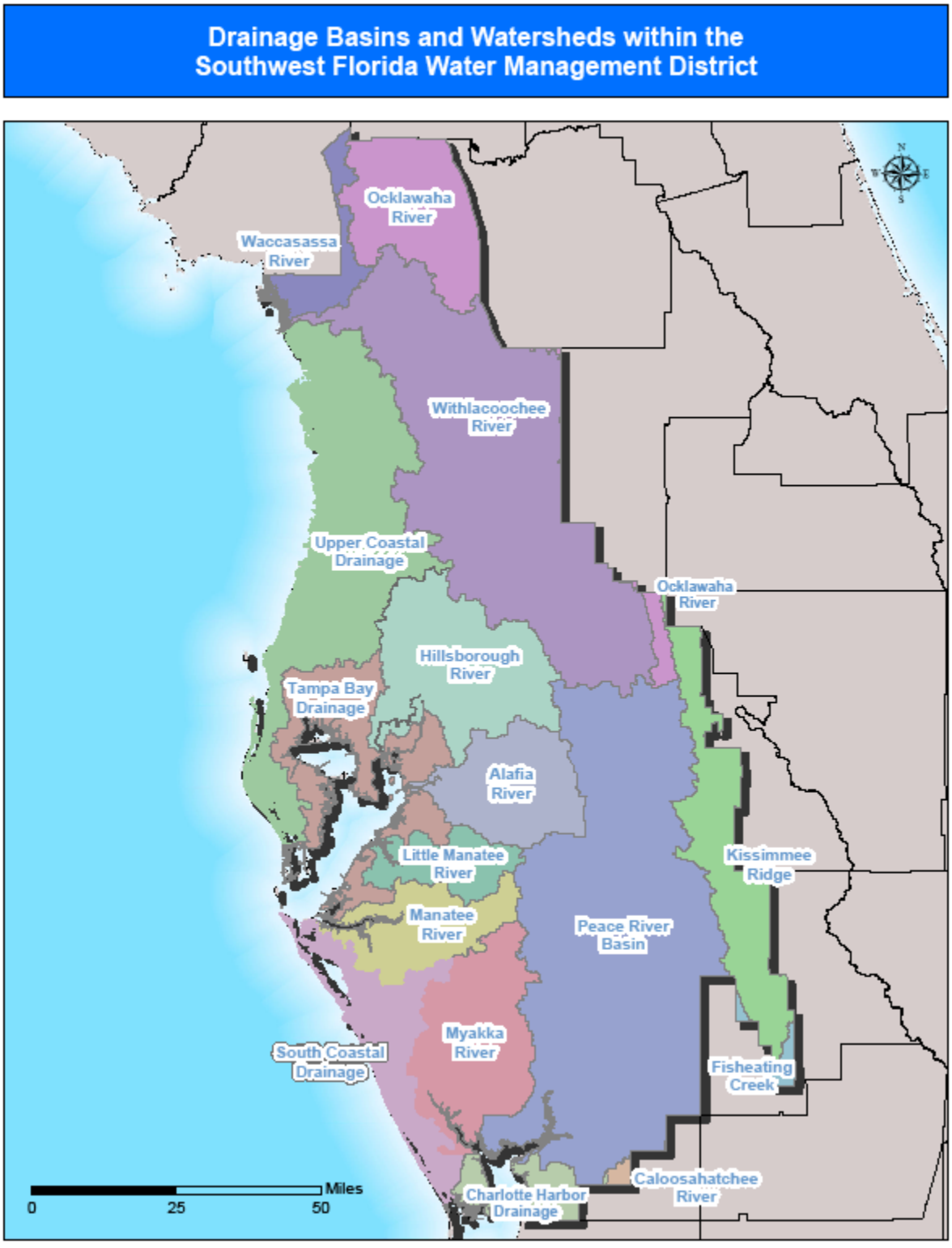
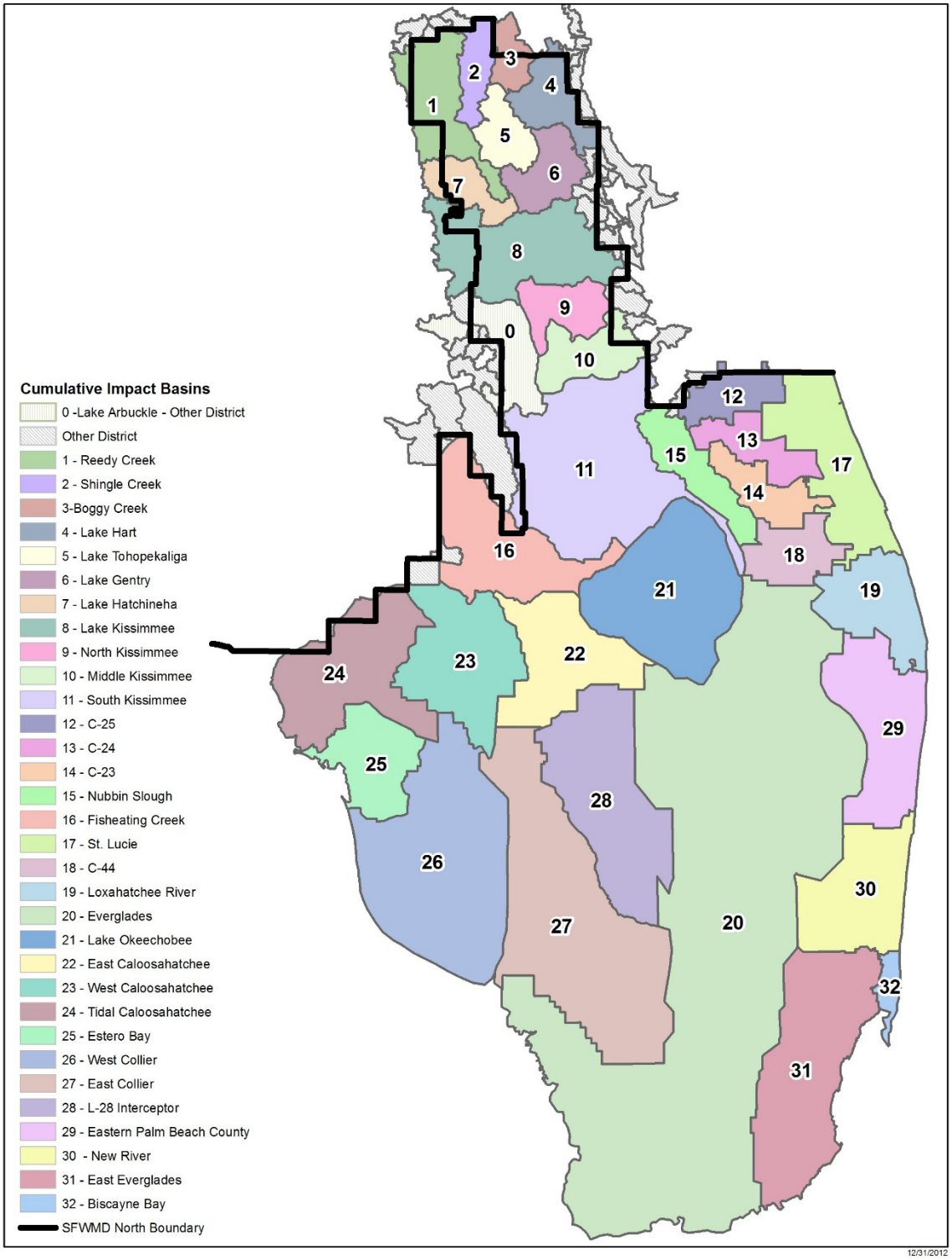


Figure 10.2.8-5 — Drainage Basins within the South Florida Water Management District



10.2.8.1 Cumulative impacts are considered unacceptable when the proposed activity, considered in conjunction with the past, present, and future activities as described in **section 10.2.8, above,** would then result in a violation of state water quality standards as set forth in **section 10.1.1(c)above**, or significant adverse impacts to functions of wetlands or other surface waters identified in **section 10.2.2**, **above**, within the same drainage basin when considering the basin as a whole. This analysis asks the question whether the proposed system, considered in conjunction with past, present, and future activities, would be the proverbial "straw that breaks the camel's back" regarding the above referenced water quality or wetland and other surface water functions in the basin.

10.2.8.2 Applicants may propose measures such as preservation to prevent cumulative impacts. Such preservation shall comply with the land preservation provisions in **section 10.3.8, below**. If unacceptable cumulative impacts are expected to occur, based on an evaluation conducted in accordance with **section 10.2.8, above**, the applicant may propose mitigation measures as provided for in **sections 10.3 through 10.3.8, below**.

10.3 Mitigation

Mitigation will be approved only after the applicant has complied with the requirements of **sections 10.2.1 through 10.2.1.3, above,** regarding practicable modifications to reduce or eliminate adverse impacts. However, any mitigation proposal submitted for review shall be reviewed concurrently with the analysis of any modification pursuant to **section 10.2, above**. This section establishes criteria to be followed in evaluating mitigation proposals in light of the programmatic and project permitting goal of no net loss of wetland and other surface waters functions.

Mitigation as described in **sections 10.3 through 10.3.8, below,** is required only to offset the adverse impacts to the functions identified in **sections 10.2 through 10.2.8.2, above,** caused by regulated activities. In certain cases, mitigation cannot offset impacts sufficiently to yield a permittable project. Such cases include activities that significantly degrade Outstanding Florida Waters, adversely impact habitat for listed species, or adversely impact those wetlands or other surface waters that are not likely to be successfully recreated.

Applicants are encouraged to consult with Agency staff in pre-application conferences or during the application process to identify appropriate mitigation options.

10.3.1 Types of Mitigation

Mitigation usually consists of restoration, enhancement, creation, or preservation of wetlands, other surface waters, or uplands. Uplands that function as a hydrologic contributing area to wetlands, and are necessary to maintain the ecological value of those wetlands, may be appropriate for mitigation of impacts to wetlands, as well as impacts to uplands that are used by bald eagles, and listed aquatic and wetland dependent species for nesting or denning. The evaluation of the appropriateness of incorporating uplands as part of a mitigation plan shall include consideration of the proximity of uplands to wetlands and the degree to which uplands support the functions of the associated wetlands. In some cases, a combination of mitigation types is the best approach to offset adverse impacts resulting from the regulated activity.

Restoration is usually preferred over creation as it often has a greater chance of success due to soil characteristics, hydrologic regime, landscape position, or other factors that favor re-establishment of wetland or other surface water communities. Preservation of important ecosystems can provide an improved level of protection over current regulatory programs when it ensures that the values of the preserved area are protected and maintained in the long term.

Areas proposed to be preserved to prevent secondary or cumulative impacts (**sections 10.2.7 and 10.2.8, above**) may also be considered part of a mitigation plan if those areas also serve to offset adverse impacts.

10.3.1.1 In general, mitigation is best accomplished through creation, restoration, enhancement, or preservation of ecological communities similar to those being impacted. However, when the area proposed to be impacted is degraded, compared to its historic ecological community and hydrologic condition, mitigation is best accomplished through creation, restoration, enhancement or preservation of the ecological community that was historically present. When impacts are proposed to wholly artificial systems, such as borrow pits, ditches, and canals, mitigation is best accomplished through creation, restoration, enhancement or preservation of the native ecological community to which it is most analogous in function. For wetlands or other surface waters that have been altered from their native community type, the historic community type at that location shall be used as a reference, unless the alteration has been of such a degree and extent that a different native community type is now present and self sustaining. Mitigation involving other ecological communities is acceptable if impacts are offset and the applicant demonstrates that greater improvement in ecological value will result.

10.3.1.2 Mitigation can be conducted on-site, off-site, or through the purchase of credits from a mitigation bank, or through a combination of approaches, as long as it offsets anticipated adverse impacts to wetlands and other surface waters and meets all other criteria for permit issuance. Off-site mitigation is preferred when:

(a) On-site mitigation opportunities are not expected to have comparable long-term viability due to such factors as unsuitable hydrologic conditions or ecologically incompatible existing adjacent land uses or future land uses identified in a local comprehensive plan adopted according to Chapter 163, F.S.; or

(b) Off-site mitigation will provide greater improvement in ecological value than on-site mitigation.

One example of a project expected to benefit from off-site mitigation is a linear project that cannot effectively implement on-site mitigation due to right-of-way constraints.

10.3.1.2.1 An applicant proposing offsite mitigation must provide reasonable assurance that the permitted mitigation will be conducted by an entity with the financial, legal, and administrative capability to implement the mitigation plan in accordance with the terms and conditions of the permit, if issued, pursuant to Rule 62-330.301(1)(j), F.A.C. Compliance with this requirement can be demonstrated when an entity has sufficient ownership interest or control in the land in accordance with **section 4.2.3(d)** of this Volume.

If the applicant demonstrates compliance with this requirement by providing the Agency with a purchase and sale agreement, the permit, if issued, shall be conditioned to prohibit all construction until ownership is transferred to the permittee. This provision does not apply if the applicant proposes to offset adverse impacts to wetlands or other surface waters through the purchase of credits from a mitigation bank, or participation in regional off-site mitigation pursuant to Section 373.4135, F.S., and does not apply to the Florida Department of Transportation when mitigation is accomplished pursuant to Section 373.4137, F.S.

10.3.1.3 Mitigation through participation in a mitigation bank shall be in accordance with Section 373.4136, F.S., and Chapter 62-342, F.A.C. (Mitigation Banks), except that, for purposes of the maps

applicable to regional watersheds, the SJRWMD, SWFWMD, and SFWMDs shall use the maps incorporated by reference in the applicable Volume II.

10.3.1.4 In instances where an applicant is unable to meet water quality standards because existing ambient water quality does not meet standards and the activity will contribute to this existing condition, mitigation for water quality impacts can consist of water quality enhancement. In these cases, the applicant must implement mitigation measures that will cause net improvement of the water quality in the receiving waters for those parameters that do not meet standards. (See Section 373.414(1)(b), F.S.)

10.3.1.5 To offset adverse secondary impacts from regulated activities to habitat functions that uplands provide to bald eagles and listed species evaluated as provided in **section 10.2.7(b), above**, mitigation can include the implementation of management plans, participation in a wildlife mitigation park established by the FWC, or other measures. Measures to offset adverse secondary impacts on wetlands and other surface waters resulting from use of a system can include the incorporation of culverts or bridged crossings designed to facilitate wildlife movement, fencing to limit access, reduced speed zones, or other measures designed to offset the secondary impact.

10.3.1.6 Mitigation for certain mining activities shall be in accordance with Section 373.414(6), F.S. Applicants also are advised that they may elect to use the provisions of Chapter 62-348, F.A.C. (Wetland Permitting and Mitigation for the Mining of Peat for the Horticultural Industry), to provide for alternative wetland mitigation associated with the mining of high-quality peat in accordance with Section 373.414(6)(e), F.S.

10.3.1.7 Except as provided in Section 373.414(6), F.S., mitigation or reclamation required or approved by other agencies for a specific project will be acceptable to the Agency to the extent that such mitigation or reclamation fulfills the requirements of **sections 10.3 through 10.3.8,** and offsets adverse impacts of the same project in accordance with the criteria in **sections 10.2 through 10.2.8.2, above**.

10.3.1.8 Innovative mitigation proposals that deviate from the standard practices described in **sections 10.3 through 10.3.6,** shall be considered on a case-by-case basis to determine whether they offset the adverse impacts. Any donation of money as mitigation shall be in accordance with Sections 373.4135(1)(b), F.S., and 373.414(1)(b), F.S.

10.3.2 Guidelines for the Amount of Mitigation

Chapter 62-345, F.A.C., Uniform Mitigation Assessment Method (UMAM), establishes a standardized procedure for assessing functions provided by wetlands and other surface waters, the amount those functions are reduced by proposed impact, and the amount of mitigation needed to offset that impact. The Agency will be responsible for verifying the information provided and applying this assessment method to determine the amount of mitigation necessary to offset the proposed impacts.

Chapter 62-345, F.A.C., also establishes the criteria to award and deduct mitigation bank or regional offsite mitigation area credits. The Agency will be responsible for verifying that information and applying this assessment method to determine the potential amount of mitigation to be provided by the bank or regional offsite mitigation area.

Paragraphs 62-345.100(3), (5), (6), (7), (8), and (9), F.A.C., provide exceptions from the application of UMAM to determine the amount of mitigation necessary to offset adverse impacts.

10.3.3 Mitigation Proposals

10.3.3.1 Applicants shall provide reasonable assurance that proposed mitigation will:

(a) Offset adverse impacts due to regulated activities; and

(b) Achieve mitigation success by providing viable and sustainable ecological and hydrological functions.

The use of credits from a mitigation bank permitted under Part IV of Chapter 373, F.S., or a Regional Offsite Mitigation Area under Section 373.4135, F.S., is not subject to **sections 10.3.3.2 through 10.3.8, below**.

10.3.3.2 Applicants shall submit detailed plans describing proposed construction, establishment, and management of mitigation areas. These plans shall include the following information, as appropriate for the type of mitigation proposed:

(a) A soils map of the mitigation area and other soils information pertinent to the specific mitigation actions proposed;

(b) A topographic map of the mitigation area and adjacent hydrologic contributing and receiving areas;

(c) A hydrologic features map of the mitigation area and adjacent hydrologic contributing and receiving areas;

(d) A description of current hydrologic conditions affecting the mitigation area;

(e) A map of vegetation communities in and around the mitigation area;

(f) Construction drawings detailing proposed topographic alterations and all structural components associated with proposed activities;

(g) Proposed construction activities, including a detailed schedule for implementation;

(h) A vegetation-planting scheme if planting is proposed, and schedule for implementation;

(i) Sources of plants and soils used in wetland creation or restoration;

(j) Measures to be implemented during and after construction to avoid adverse impacts related to proposed activities;

(k) A management plan comprising all aspects of operation and maintenance, including water management practices, vegetation establishment, exotic and nuisance species control, fire management, and control of access;

(l) A proposed monitoring plan to demonstrate mitigation success;

(m) A description of the activities proposed to control exotic and nuisance species should these become established in the mitigation area. The mitigation proposal must include reasonable

measures to assure that these species do not invade the mitigation area in such numbers as to affect the likelihood of success of the project;

(n) A description of anticipated site conditions in and around the mitigation area after the mitigation plan is successfully implemented;

(o) A comparison of current fish and wildlife habitat to expected habitat after the mitigation plan is successfully implemented;

(p) For mitigation plans with projected implementation costs in excess of $25,000, an itemized estimate of the cost of implementing mitigation as set forth in **section 10.3.7.7, below**;

(q) Evidence that the applicant has legal access to the mitigation area and authority to perform the mitigation, and documentation granting the Agency a reasonable right of legal access to the mitigation area and the authority to conduct the mitigation should the applicant fail to do so; and

(r) Any additional necessary supporting information required by Chapter 62-345, F.A.C.

10.3.4 Monitoring Requirements for Mitigation Areas

If applicable, applicants shall monitor the progress of mitigation areas until success can be demonstrated as provided in **section 10.3.6, below**. Monitoring parameters, methods, schedules, and reporting requirements will be specified in permit conditions.

10.3.5 Protection of Mitigation Areas

Applicants shall propose and be responsible for implementing methods that assure that mitigation areas will not be adversely impacted by incidental encroachment or secondary activities that might compromise mitigation success or long-term viability.

10.3.6 Mitigation Success

Mitigation success will be measured in terms of whether the objectives of the mitigation are expected to be realized. The success criteria to be included in permit conditions will specify the minimum requirements necessary to attain a determination of success. The mitigation shall be deemed successful by the Agency when all applicable water quality standards are met, the mitigation area has achieved viable and sustainable ecological and hydrological functions and the specific success criteria contained in the permit are met. If success is not achieved within the time frame specified within the permit, remedial measures shall be required. Monitoring requirements shall remain in effect until success is achieved as specified in the permit. Maintenance requirements shall remain in effect as specified in the permit.

10.3.7 Financial Responsibility for Mitigation.

As part of compliance with paragraph 62-330.301(1)(j), F.A.C., where an applicant proposes mitigation, the applicant shall provide proof of financial responsibility to:

(a) Conduct the mitigation activities;

(b) Conduct any necessary management of the mitigation site;

(c) Conduct monitoring of the mitigation;

(d) Prepare and submit monitoring reports to the Agency; and

(e) Conduct any necessary corrective action indicated by the monitoring.

10.3.7.1 Applicants not subject to financial responsibility requirements.

The following applicants shall not be subject to the financial responsibility requirements in **sections 10.3.7 through 10.3.7.9**:

(a) Applicants whose mitigation is deemed successful pursuant to **section 10.3.6, above,** prior to undertaking the construction activities authorized under the permit issued pursuant to Part IV, Chapter 373, F.S.

(b) Applicants whose mitigation is estimated to cost less than $25,000.

(c) Federal, state, county and municipal governments; state political subdivisions; investor-owned utilities regulated by the Florida Public Service Commission; and rural electric cooperative.

(d) Mitigation banks that comply with the financial responsibility provisions of Rule 62-342.700, F.A.C.

10.3.7.2 Amount of financial responsibility.

The amount of financial responsibility provided by the applicant shall be in an amount equal to 110 percent of the cost estimate determined pursuant to **section 10.3.7.7, below**, for each phase of the mitigation plan submitted under the requirements of **sections 10.3 through 10.3.8**, and under the requirements of Section 373.414(19)(a), F.S., when mitigation is required for the extraction of limestone and phosphate.

10.3.7.3 Documentation.

The permit applicant shall provide draft documentation of the required financial responsibility mechanism described below with the permit application, and shall submit to the Agency the executed or finalized documentation within the time frames specified in the permit.

10.3.7.4 General Terms for Financial Responsibility Mechanisms.

In addition to the specific provisions regarding financial responsibility mechanisms set forth in **section 10.3.7.6, below**, the following, as they relate to the specific mechanism proposed, shall be complied with:

(a) The form and content of all financial responsibility mechanisms shall be approved by the Agency. Forms that have been developed for this purpose are incorporated by reference in subsection 62-330.301(5), F.A.C. The applicant must provide the applicable form or one that is in substantial conformance with that form; any changes must be noted on the face of the form and identified to the Agency for review and approval.

(b) The financial mechanisms shall name the Agency as sole beneficiary or shall be payable solely to the Agency. If the financial mechanism is of a type that is retained by the beneficiary according to industry standards, the original financial responsibility mechanism shall be retained by the Agency.

(c) The financial responsibility mechanisms shall be established with a regulated state or national bank, savings and loan association, or other financial institution, licensed or regulated by a federal or state agency and authorized to issue such instruments in the State of Florida. In the case of letters of credit, the letter of credit must be issued by an entity that has authority to issue letters of credit and whose letter of credit operations are regulated and examined by a federal or state agency. In the case of a surety bond, the surety bond must be issued by a surety company registered with the state of Florida.

(d) The financial responsibility mechanisms shall be effective on or prior to the date that the activity authorized by the permit commences and shall continue to be effective through the date of notification of final release by the Agency in accordance with **section 10.3.7.7.2 below**.

(e) The financial responsibility mechanisms shall provide that they cannot be revoked, terminated, or cancelled without first providing an alternative financial responsibility mechanism that meets the requirements of **sections 10.3.7 through 10.3.7.9**. Financial mechanisms shall provide that they cannot be revoked, terminated, or cancelled without a 120-day notice to the Agency. Within 90 days of receipt by the permittee of actual or constructive notice of revocation, termination, or cancellation of a financial responsibility mechanism or other actual or constructive notice of cancellation, the permittee shall provide such an alternate financial responsibility mechanism.

(f) When mitigation is required for the extraction of limestone and phosphate, the financial responsibility mechanism must meet the criteria of Section 373.414(19)(a), F.S.

10.3.7.5 If the permittee fails to comply with the terms and conditions of the permit, including any mitigation requirement, such failure shall be deemed a violation of Chapter 62-330, F.A.C., and the permit issued thereunder. In addition to any other remedies for such violation available to it, the Agency may make demand upon the financial mechanism. Notice of intent to make demand shall be as provided in the mechanism or, if none, upon reasonable notice.

10.3.7.6 Financial Responsibility Mechanisms.

Financial responsibility for the mitigation, monitoring, and corrective action for each phase of the project may be established by any of the following methods, at the discretion of the applicant:

(a) Performance bond; when issued in favor of DEP, the applicant shall also establish a standby trust fund agreement;

(b) Irrevocable letter of credit; when issued in favor of DEP, the applicant shall also establish a standby trust fund agreement;

(c) Trust fund agreement;

(d) Deposit of cash or cash equivalent into an escrow account at a regulated financial institution or at the Florida Department of Financial Services; and

(e) Guarantee bond.

10.3.7.7 Cost estimates.

For the purposes of determining the amount of financial responsibility that is required by this subsection, the applicant shall submit a detailed written estimate, in current dollars, of the total cost of conducting the mitigation, including any maintenance and monitoring activities, and the applicant shall comply with the following:

(a) The cost estimate for conducting the mitigation and monitoring shall include all associated costs for each phase thereof, including earthmoving, planting, structure installation, maintaining and operating any structures, controlling nuisance or exotic species, fire management, consultant fees, monitoring activities, and reports.

(b) The applicant shall submit the estimates, together with verifiable documentation, to the Agency along with the draft of the financial responsibility mechanism.

(c) The costs shall be estimated based on a third party performing the work and supplying materials at the fair market value of the services and materials. The source of any cost estimates shall be indicated.

10.3.7.7.1 Partial Releases.

The permittee may request the Agency to release portions of the financial responsibility mechanism as parts of the mitigation plan, such as earth moving, construction, or other activities for which cost estimates were submitted in accordance with **section 10.3.7.7**, are successfully completed. The request shall be in writing and include documentation that the activities have been completed and have been paid for or will be paid for upon release of the applicable portion of the financial responsibility mechanism and a revised cost estimate for the completion of the mitigation activities. The Agency shall authorize the release, or shall request the applicable financial institution release, of the portion requested upon verification that the activities have been completed in accordance with the mitigation plans.

10.3.7.7.2 Final Release.

Within thirty (30) days of the Agency determining that the mitigation is successful in accordance with **section 10.3.6, above**, the Agency shall so notify the permittee and shall authorize the return and release of all funds held or give written authorization to the appropriate third party for the cancellation or termination of the financial responsibility mechanism.

10.3.7.8 Financial Responsibility Conditions.

For applicants subject to the financial responsibility of **sections 10.3.7 through 10.3.7.9,** the Agency will include the following conditions in the permit:

(a) A permittee must notify the Agency by certified mail of the commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming the permittee as debtor within 10 business days after the commencement of the proceeding.

(b) A permittee who fulfills the requirements of **sections 10.3.7 through 10.3.7.9,** by obtaining a letter of credit or performance bond will be deemed to be without the required

financial assurance in the event of bankruptcy, insolvency, or suspension or revocation of the license or charter of the issuing institution. The permittee must reestablish in accordance with **sections 10.3.7 through 10.3.7.9,** a financial responsibility mechanism within 60 days after such event.

(c) When transferring a permit, the new owner or person with legal control shall submit documentation to satisfy the financial responsibility requirements of **sections 10.3.7 through 10.3.7.9**. The prior owner or person with legal control of the project shall continue the financial responsibility mechanism until the Agency has approved the permit transfer and substitute financial responsibility mechanism.

10.3.7.9 Financial Responsibility Mechanisms for Multiple Projects.

An applicant may use a mechanism specified in **section 10.3.7.6, above** to meet the financial responsibility requirement for multiple projects. The financial responsibility mechanism must include a list of projects, the amount of funds assured for each project, and limit the amount of funds available for each project. The mechanism must be no less than the sum of the funds that would be necessary in accordance with **section 10.3.7.2, above**, as if separate mechanisms had been established for each project. As additional permits are issued that require mitigation, the amount of the financial responsibility mechanism may be increased in accordance with **section 10.3.7.2, above,** and the project added to the list.

10.3.8 Real property conveyances.

(a) All conservation easements, deed restrictions, and restrictive covenants accepted for mitigation purposes shall be granted in perpetuity without encumbrances, unless such encumbrances do not adversely affect the ecological viability of the mitigation. All liens and mortgages shall be released or subordinated to the conservation easement. All conservation easements shall be consistent with Section 704.06, F.S., and shall contain restrictions that ensure the ecological viability of the site.

(b) All real property conveyances shall be in fee simple and by statutory warranty deed, special warranty deed, or other deed, without encumbrances that adversely affect the integrity of the preservation. The Agency shall also accept a quit claim deed if necessary to aid in clearing minor title defects or otherwise resolving boundary questions.

(c) The use of the applicable Form 62-330.301(8) through 62-330.301(17) shall constitute consistency with Section 704.06, F.S. **Where the applicant demonstrates that project specific conditions necessitate deviation from language of the accepted forms, alternative language shall be accepted** provided that it meets the provisions of Section 704.06, F.S. and **section 10. 3. 8** of this Volume. Each of these forms are in **Appendix C** of this Volume, and a copy of the form may be obtained from the Agency, as described in subsection 62-330.010(5), F.A.C.

PART IV -- EROSION AND SEDIMENT CONTROL

11.0 Erosion and Sediment Control

11.1 Overview

Uncontrolled erosion and sediment from land development activities can result in costly damage to aquatic areas and to both private and public lands. Excessive sediment blocks stormwater conveyance systems, fills navigable channels, impairs fish spawning, clogs the gills of fish and invertebrates, and suppresses aquatic life.

A plan for minimizing erosion and controlling sediment through the implementation of best management practices (BMPs) must be included with the application for a permit. In addition to the "erosion and sediment control plan" required by **section 11.2**, all projects that disturb one or more acres of land or disturb less than one acre but are part of a larger common plan of development or sale and discharge to waters of the state or to a permitted Municipal Separate Stormwater Sewer System (MS4) also will need to develop and implement a Stormwater Pollution Prevention Plan (SWPPP) to obtain coverage under Florida's National Pollution Discharge Elimination System (NPDES) Stormwater Construction Generic Permit (CGP).

An effective sediment and erosion control plan is essential for controlling stormwater pollution during construction. An erosion and sediment control plan is a site-specific plan that specifies the location, installation, and maintenance of best management practices to prevent and control erosion and sediment loss at a construction site. The plan is submitted as part of the permit application and must be clearly shown on the construction plans for the development. Erosion and sediment control plans range from very simple for small, single-phase developments to complex for large, multiple phased projects. If, the proposed erosion and sedimentation controls no longer provide reasonable assurance that water quality standards will not be violated, due to unforeseen circumstances such as extreme rainfall events or construction delays, additional erosion and sediment control measures shall be required that must be implemented to prevent violations of water quality standards.

11.2 Development of an Erosion and Sediment Control Plan

An Erosion and Sediment Control (E&SC) Plan must be submitted as part of the application as a way of providing reasonable assurance that water quality standards will not be violated during the construction phase of a project. The plan must identify the location, relative timing, and specifications for all erosion and sediment control and stabilization measures that will be implemented as part of the project's construction. The plan must provide for compliance with the terms and schedule of implementing the proposed project, beginning with the initiation of construction activities. The plan may be submitted as a separate document or may be contained as part of the plans and specifications of the construction documents.

BMPs for erosion and sediment control are intended to prevent unauthorized off-site and on-site discharges of sediments and turbid waters. The BMPs for erosion and sediment control described in the permit are minimum requirements and may require revision, upgrading, relocating, strengthening, or other modifications to serve their intended function while responding quickly to unanticipated changes in conditions onsite. Therefore, a permit modification is not required in order to modify the BMPs for erosion and sediment control used during construction and development, which serve to increase protection against unauthorized discharges, replace or repair components, or respond to emergency conditions.

11.2.1 Erosion and Sediment Control Principles

Factors that influence erosion potential include soil characteristics, vegetative cover, topography, climatic conditions, timing of construction, and the areal extent of land clearing activities. The following principles must be considered in planning and undertaking construction and alteration of systems:

(a) Plan the development to fit topography, soils, drainage patterns, and vegetation;

(b) Minimize both the extent of area exposed at one time and the duration of exposure;

(c) Schedule activities during the dry season or during dry periods whenever possible to reduce the erosion potential;

(d) Apply erosion control practices to minimize erosion from disturbed areas;

(e) Apply perimeter controls to protect disturbed areas from off-site runoff and to trap eroded material on-site to prevent sedimentation in downstream areas;

(f) Reduce runoff velocities and retain runoff on-site;

(g) Stabilize disturbed areas immediately after final grade has been attained or during interim periods of inactivity resulting from construction delays; and

(h) Implement a thorough maintenance and follow-up program.

These principles are usually integrated into a system of vegetative and structural measures, along with other management techniques, that are included in an erosion and sediment control plan to minimize erosion and control movement of sediment. In most cases, a combination of limited clearing and grading, limited time of exposure, and a judicious selection of erosion control practices and sediment trapping systems will prove to be the most practical method of controlling erosion and the associated production and transport of sediment. Permit applicants, system designers, and contractors can refer to *State of Florida Erosion and Sediment Control Designer and Reviewer Manual* (Florida Department of Transportation and Florida Department of Environmental Protection, July 2013 the *Florida Stormwater, Erosion, and Sedimentation Control Inspector's Manual Tier I* (Florida Department of Environmental Protection, Division of Environmental Assessment and Restoration, Tallahassee, Florida, October 2018*)*, and the *Florida Stormwater Erosion and Sedimentation Control Inspector's Manual Tier II* (Florida Department of Environmental Protection, Division of Environmental Assessment and Restoration, Tallahassee, Florida, October 2018), for further information on erosion and sediment control. These manuals provide guidance for the planning, design, construction, and maintenance of erosion and sediment control practices. These manuals are incorporated by reference in subparagraph 62-330.050(9)(b)(5)., F.A.C.

11.2.2 Erosion and Sediment Control Requirements

BMPs for erosion and sediment control shall be used during construction to **retain sediment on-site and guard against causing or contributing to a violation of state water quality standards**. These BMPs must be designed according to specific site conditions and must be shown or clearly referenced on the construction plans for the site. At a minimum, the erosion and sediment control requirements described in this section shall be followed during construction of the project. When necessary, measures are required to protect wetlands or prevent off-site flooding. All appropriate

contractors must be furnished with the information pertaining to the implementation, operation, and maintenance of the erosion and sediment control plan. In addition, sediment accumulation in the stormwater system from construction activities must be removed prior to final certification of the system to ensure that the designed and permitted storage volume is available.

11.3 Development of a Stormwater Pollution Prevention Plan (SWPPP) for NPDES

Construction activities which result in greater than one acre of soil disturbance, or which disturb less than one acre of soil but are part of a larger common plan of development or sale, and which discharge to waters of the state or a permitted MS4 must also apply for and receive coverage from DEP under Florida's NPDES Generic Permit for Stormwater Discharge from Large and Small Construction Activities (CGP) before disturbing the soil. The applicant must adhere to the regulations and requirements of the CGP. The requirement to develop and submit a SWPPP under a NPDES permit is not a requirement for a permit under Chapter 62-330, F.A.C., however applicants are advised that preparation and adherence to a SWPPP is required where the permitted activity also requires an NPDES construction permit pursuant to subsection 62-621.300(4), F.A.C. Both the SWPPP and E&SC plans must retain sediment on site and guard against causing or contributing to a violation of state water quality standards. Changes to erosion and sedimentation controls can be documented as part of a permittee's requirements under the NPDES CGP SWPPP, should one be required.

11.4 Sediment Sump Design Example

Example calculations for designing a sediment sump are provided in Section 3 of the "References and Design Aids" for Volume I, available at https://floridadep.gov/water/water/content/water-resource-management-rules#erp.

PART V – OPERATION AND MAINTENANCE-SPECIFIC REQUIREMENTS

12.0 Operation and Maintenance Requirements

12.1 Responsibilities

(a) In accordance with Rule 62-330.310, F.A.C., and except as provided in section 12.1.1, below, upon completion of a project constructed in conformance with an individual permit issued under Part IV of Chapter 373, F.S., the permit must be converted from the construction phase to an operation and maintenance phase.

(b) Responsibility for operation and maintenance of a regulated activity shall be an obligation in perpetuity as provided in Rule 62-330.310, F.A.C.

(c) Operation and maintenance entities must demonstrate that they have the financial, legal, and administrative capability to perform operation and maintenance in accordance with Agency rules and permit conditions. Legal and financial capability requirements for operation and maintenance entities are specified further in section 12.3 below.

(d) Conversion of a permit from the construction to the operation and maintenance phase shall follow the procedures in Rule 62-330.310, F.A.C., and **section 12.2, below**.

12.1.1 Exceptions

The operation phase of mining projects subject to the land reclamation requirements of Chapter 378, F.S., and that are used solely for and by the mine during its life shall be allowed to terminate, without the need to apply for abandonment of the permit, after the mine, or its subunits, has met the requirements described in the applicable paragraph 62-330.310(7)(a) or (b), F.A.C.

12.2 Procedures for Requesting Conversion from the Construction Phase to the Operation and Maintenance Phase

(a) Automatic Conversion —

1. In accordance with subsection 62-330.310(5), F.A.C., projects authorized in a General Permit shall automatically convert to an operation and maintenance phase upon completion of the permitted activities in conformance with all the terms and conditions of the permit.

2. For projects that serve an individual, private single family dwelling unit, duplex, triplex, or quadruplex that are not part of a larger plan of common development proposed by an applicant, the construction phase of the permit shall automatically convert to the operation and maintenance phase upon receipt of a completed Form 62-330.310(3), "Construction Completion and Inspection Certification for Activities Associated with a Private Single-Family Dwelling Unit."

3. If at any time the Agency determines that such activities as referenced in subparagraphs (a) 1. and (a) 2. above were not built in conformance with the terms and conditions of the permit, the permittee shall be subject to enforcement action by the Agency and for all measures required to bring the activity into compliance with the permit.

(b) For projects other than those specified in **sections 12.1.1** and **12.2(a), above** — The permittee shall submit Form 62-330.310(1) "As-Built Certification and Request for Conversion to Operation Phase," in accordance with subparagraph 62-330.350(1)(f)2., F.A.C., to notify the Agency that the project, or independent portion of the project, is completed (other than long-term monitoring and any mitigation that will require additional time after construction or alteration to achieve the success criteria specified in the permit) and ready for inspection by the Agency.

1. Projects not requiring certification by a registered professional shall be certified by the permittee or their authorized agent. Projects designed by a registered professional shall be certified by a registered professional, unless exempted by law.

2. The permittee shall submit as-built drawings with Form 62-330.310(1). The person completing Form 62-330.310(1) shall inform the Agency if there are substantial deviations from the plans approved as part of the permit.

   The plans must be clearly labeled as "as-built" or "record" drawings and shall consist of the permitted drawings that clearly highlight (such as through "red lines" or "clouds") any substantial deviations made during construction. The permittee shall be responsible for correcting the deviations [as verified by a new certification using Form 62-330.310(1)]. Non-substantial deviations do not require a permit modification. Substantial deviations shall be processed as a minor or major modification as described in section 6.2 of this handbook and under Rule 62-330.315, F.A.C. Such modification must be issued by the Agency prior to the Agency approving the request to convert the permit from the construction to the operation and maintenance phase.

3. The person certifying compliance with the permit shall submit documentation that demonstrates satisfaction of all permit conditions, other than long term monitoring and inspection requirements, along with Form 62-330.310(1).

(c) When projects authorized by a permit under this chapter are constructed in phases, each phase or independent portion of the permitted project must be completed prior to the use of that phase or independent portion. The permittee must submit Form 62-330.310(1) "As-Built Certification and Request for Conversion to Operation Phase," in accordance with subparagraph 62-330.350(1)(f)2., F.A.C., certifying as to such completion prior to the use of that phase or independent portion of the project. The request for conversion to the operating phase for any phase or independent portion of the permitted project shall occur before construction of any future work that may rely on that infrastructure for conveyance and water quality treatment and attenuation. Phased construction can include a partial certification.

(d) Within 60 days of receiving Form 62-330.310(1), the Agency shall approve the request or notify the permittee of any deficiencies that must be corrected prior to conversion to the operation and maintenance phase. If the Agency fails to take action on the request to convert the permit or notify the permittee of deficiencies, the conversion to operation and maintenance shall be deemed approved.

(e) If the Agency notifies the permittee of deficiencies that must be corrected, and if the permittee fails to correct those deficiencies in a timely manner, the project will be considered to be not operating in accordance with a permit issued under Chapter 62-330,

F.A.C., and the permittee will be subject to enforcement action by the Agency. In such cases, the permittee will be responsible for any necessary permit modifications, alterations, or maintenance to bring the project into compliance, and for submitting any new certifications and requests to convert the permit to the operation and maintenance phase as provided in this section.

(f) The requirements for submittal of an "as-built certification" contained in a permit issued under Part IV of Chapter 373, F.S., prior to October 1, 2013, the effective date of Chapter 62-330, F.A.C., shall continue to be followed in accordance with the existing permit unless the permittee obtains a modification using the procedures in Rule 62-330.315, F.A.C., to comply with the "as-built certification" requirements of Rules 62-330.310 and 62-330.350, F.A.C., and this section of Volume I.

12.2.1 Transfer to the Perpetual Operation and Maintenance Entity

(a) If the permittee is also the operation and maintenance entity, once the activity has been converted to the operation phase as described in **section 12.2, above,** no other action is required under this section.

(b) In accordance with subparagraph 62-330.350(1)(g)2., F.A.C., if the permittee is not the operation and maintenance entity, a completed Form 62-330.310(2), "Request for Transfer of Environmental Resource Permit to the Perpetual Operation Entity" must be submitted to transfer the permit to the operation and maintenance entity. If the transfer is to the entity identified in the permit, the submittal of the form does not require a processing fee, and the review shall not require processing as a permit modification under Rule 62-330.315, F.A.C. The form must be signed by a person authorized to represent the operation and maintenance entity, and shall be submitted along with the following, as applicable:

1. A copy of the recorded transfer of title to the operation and maintenance entity for the common areas on which the stormwater management system, or other permitted works are located (unless dedicated by plat);

2. A copy of all recorded plats;

3. Copies of recorded declaration of covenants and restrictions, amendments, and associated exhibits;

4. A copy of the filed articles of incorporation and documentation of the operation and maintenance entity's active corporate status with the Department of State, Division of Corporations, if the entity is a corporation;

5. A copy of the operation and maintenance plan, revised as necessary to be applicable to the stormwater management system as designed and permitted;

6. A copy of the cost estimate in accordance with section 12.3.5 below; and

7. Documentation demonstrating financial capability in accordance with section 12.3 below.

(c) The permittee shall ensure that all documents that require recordation in the public records

are recorded in the county where the project is located prior to any lot or unit sales within the project served by the system or work, or upon completion of construction of the system or work, whichever occurs first.

(d) Within 60 days of receiving a complete request to transfer the permit to the operation and maintenance entity, the Agency shall approve the request, or will notify the permittee that the documentation is insufficient to demonstrate compliance with **Section 12.3, below,** and permit conditions. The permittee shall remain liable until the permit is transferred to the operation and maintenance entity by the Agency. If the Agency fails to take action or notify the permittee of the insufficiencies within 60 days of the request, the transfer shall be deemed approved if the permit has already been certified and converted to the operation phase.

(e) If a permit modification is required to allow for a new entity or multiple entities to operate and maintain the project, the 60-day time period for Agency action shall not commence until the permit modification is issued.

12.3 Operation and Maintenance Entities

12.3.1 An acceptable operation and maintenance entity shall have the financial, administrative, and legal capability to access, monitor, operate, and maintain the permitted project. Typically, this is accomplished through ownership or control of all property on which the permitted project is located by one of the entities listed below. However, alternative methods of achieving the legal requirements necessary for operation and maintenance will be considered by the Agency. Drainage easements, cross drainage agreements, or similar documents may be required for connected systems or systems with common infrastructure to be operated by different entities.

The following entities are acceptable for ensuring that an activity will be operated and maintained in compliance with the requirements of Section 373.416(2), F.A.C., and Chapter 62-330, F.A.C.

(a) Local government units, including counties and municipalities, Municipal Service Taxing Units, or special taxing units;

(b) Water control districts created pursuant to Chapter 298, F.S., drainage districts created by special act, special districts defined in Chapter 189, F.S., Community Development Districts created pursuant to Chapter 190, F.S., Special Assessment Districts created pursuant to Chapter 170, F.S., or water management districts created pursuant to Chapter 373, F.S.;

(c) State or federal agencies;

(d) Duly constituted communication, water, sewer, stormwater, electrical, or other public utilities;

(e) Construction permittees, subject to the restrictions below; or

(f) Non-profit corporations, including homeowners' associations, property owners' associations, condominium owners' or master associations, subject to the restrictions below.

12.3.2 If the proposed operation and maintenance entity falls within paragraph (a), (b), (c), or (d) above, a preliminary letter of intent or statement from such entity must be submitted to the Agency with

the permit application, or in a permit modification request, indicating the entity's intention to accept responsibility for operation and maintenance of the permitted system. The letter of intent or statement must clearly indicate what portions of the system will be operated and maintained by the entity, and whether any portions of the system are to be operated and maintained by another entity. If portions of the system are to be operated and maintained by another entity, similar letters of intent or statements must be received from those entities. Upon approval by the Agency, all such identified entities will be responsible for operation and maintenance of the system.

12.3.3 A construction permittee is an acceptable operation and maintenance entity, provided the property on which all of the permitted project is located will continue to be owned or controlled by the construction permittee. When a construction permittee intends to convey the property to a third party, the permittee will be an approved operation and maintenance entity from the time construction begins until the system is transferred to the established legal entity approved by the Agency. If a permittee intends to convey or transfer any portion of the property on which the permitted project is located, the permittee may continue to be the long-term operation and maintenance entity only if appropriate drainage easements, cross drainage agreements or similar documents that provide the entity with the legal capability and authority to operate and maintain the permitted project is approved as part of the permit application, are recorded in the official records of the applicable county, and are in effect prior to any conveyance or transfer of the property or conversion of the permit to the operation and maintenance phase, whichever occurs first. Where the property is leased or rented to a third party, the property owner shall continue to be the responsible operation and maintenance entity, unless the Lessor is the permittee.

12.3.4 Homeowners' associations, property owners' associations, and condominium owners' or master associations (collectively, "Associations") are acceptable operation and maintenance entities only if they have the financial, legal, and administrative capability to provide for the perpetual operation and maintenance of the project. Accordingly, the applicant must:

(a) Submit draft Articles of Incorporation, Declaration, Restrictive Covenants, Deed Restrictions or other organizational and operation documents, or draft amendments thereto, that affirmatively assign responsibility to the Association for the operation or maintenance of the project. Model language for Declaration and Restrictive Covenants is included in section 7 of the "References and Design Aids" for Volume I. The Association documents must comply with Chapters 617, 718, 719, and 720, F.S., as applicable.

(b) Submit documentation that the Association will have sufficient powers (reflected in governing documents where applicable)~~,~~ to:

1. Own and convey property;

2. Operate and perform maintenance of the permitted project on common property as exempted or permitted by the Agency;

3. Establish rules and regulations governing membership or take any other actions necessary for the purposes for which the corporation or association was organized;

4. Assess members for the cost of operating and maintaining the common property, including the stormwater management system, and enforce the collection of such assessments;

5. Sue and be sued;

6. Contract for services to provide for operation and maintenance (if the association contemplates employing a maintenance company);

7. Require all owners of real property or units to be members of the corporation or association; and

8. Demonstrate that the land on which the system is located is owned or otherwise controlled by the corporation or association to the extent necessary to operate and maintain the system or convey operation and maintenance to another entity.

(c) Submit documentation that the following covenants and restrictions, will be or have been set forth in the Declaration of Restrictive Covenants, Deed Restrictions, Declaration of Condominium, or other recorded document setting forth the Association's rules and regulations:

1. That it is the responsibility of the Association to operate and maintain the system;

2. The system is owned by the Association or described therein as common property;

3. That there is a method of assessing and collecting the assessment for operation and maintenance of the system;

4. That assessments are such that they would cover, at minimum, the annual costs of operation and maintenance for the permitted stormwater systems, outlined in the cost estimate as described in section 12.3.5, and that those assessments are intended to be allocated sufficiently within the annual budget to cover projected operating expenses, including any operation and maintenance costs for the permitted stormwater systems for periodically required capital expenditures or deferred maintenance, that would be in addition to annual operating expenses pursuant to Chapter 720, F.S.;

5. That any proposed amendment to the Association's documents affecting the system (including environmental conservation areas and the water management portions of the common areas) must be submitted to the Agency for a determination of whether the amendment necessitates a modification of the environmental resource permit. If a modification is necessary, the Agency will so advise the permittee. The amendment affecting the system may not be finalized until any necessary permit modification is approved by the Agency or the Association is advised that a modification is not necessary;

6. That the governing provisions of the Association must be in effect for at least 20 years with automatic renewal periods thereafter, and must state that the Association shall maintain governing provisions as needed to maintain compliance with any applicable local, state, or federal regulations for perpetual operation and maintenance of the permitted stormwater system;

7. That the Association shall exist in perpetuity. However, should the Association dissolve, the operational documents shall provide that the system shall be transferred to and maintained by one of the entities identified in **sections 12.3.1(a) through (f), above**, who has the powers listed in **section 12.3.4(b)1. through 8., above**, the

covenants and restrictions required in **section 12.3.4(c)1. through 9., herein**, and the ability to accept responsibility for the operation and maintenance of the system described in **section 12.3.4(d)1. or 2., below**;

8. If wetland mitigation monitoring is required by the permit and the operational entity will be responsible to carry out this obligation, the rules and regulations of the Association shall state that it will be the Association's responsibility to complete the task successfully, including meeting all conditions associated with mitigation maintenance and monitoring;

9. The Agency has the right to take enforcement action, including a civil action for an injunction and penalties, against the Association to compel it to correct any outstanding problems with the system facilities or in mitigation or conservation areas under the responsibility or control of the Association; and

10. A "Recorded Notice of Environmental Resource Permit," Form No. 62-330.090(1), shall be recorded in the public records of the County(s) where the project is located. The Registered Agent for the Association shall maintain copies of all permitting actions for the benefit of the Association.

(d) Submit documentation that the Association will:

1. Have the ability to accept responsibility for the operation and maintenance of the system for future phases of the project, if the operation and maintenance entity is proposed for a project that will be constructed in phases, and subsequent phases will utilize the same system as the initial phase or phases;

2. Have, either separately or collectively, the responsibility and authority to operate and perform maintenance of the system for the entire project area, if the development scheme contemplates independent operation and maintenance entities for different phases, and the system is integrated throughout the project. That authority must include cross easements for surface water management and the ability to enter and maintain the various portions of the system, should any sub-entity fail to maintain a portion of the system within the project area; and

3. Have ownership or control of the reserve fund(s), if established by the construction permittee or a prior operation and maintenance entity, or provide other reasonable assurance that the financial obligations of the system will be met.

12.3.5 All operation and maintenance entities shall provide a cost estimate for the perpetual operation and maintenance of the stormwater management system through the submission of the documents described in this section.

(a) Cost estimates:

1. Cost estimates are required for all stormwater management systems, except those using a self-certification in accordance with the 10/2 general permit authorization under section 403.814(12), F.S.

2. The cost estimate shall be computed in current year dollars to determine the annual operating expenses, including inspection costs, and maintenance costs for the estimated remaining useful life of the system, accounting for replacement costs or deferred maintenance expenses for non-annual expenditures, for all components of the stormwater management system, including for each BMP in the stormwater management system.

3. The operation and maintenance entity may adjust replacement reserve assessments annually to take into account any changes in estimates of cost or useful life of a reserve item.

4. The applicant shall submit written cost estimates with supporting documentation for the estimates to the Agency along with the financial capability certification required under (b) below. At the time of request for transfer, the permittee shall submit an updated written cost estimate, or indicate in writing that the cost estimate is the same as a referenced prior submittal. The source of any cost estimates shall be indicated.

5. If more than one financial mechanism is proposed for perpetual operation and maintenance, the cost estimate shall specify the appropriate mechanism for each itemized cost.

(b) Demonstration of Financial Capability for Operation and Maintenance:
At the time of permit application, applicants for the operation and maintenance phase must submit Form 62-330.301(26), "Certification of Financial Capability for Perpetual Operations and Maintenance Entities."

(c) Associations which are subject to reporting and budgeting requirements under Chapter 720, F.S., shall provide the summary information reported on Form 62-330.301(26) to conform with the financial reporting and budget requirements of Chapter 720, F.S. Such certification shall provide reasonable assurance that the Association has the financial capability to operate and maintain the permitted system as designed and permitted. An Association may submit draft documentation, including information regarding a reserve account, to the Agency with the permit application. If it is a part of the Association's demonstration of financial capability as approved by a permit, the reserve account must be executed and funded prior to the transfer to the operation and maintenance phase, unless another time frame is specified in the permit.

1. If the budget for an Association includes a reserve account for capital expenditures and deferred maintenance, the required funds for such shall be computed by a means consistent with the requirements of section **12.3.5(a)** above.

2. The operation and maintenance entity may adjust replacement reserve assessments annually to take into account any changes in estimates of cost or useful life of a reserve item.

3. Reserve funds originally proposed to support operation and maintenance activities for a stormwater management system shall remain in the reserve account(s) and shall be used only for authorized operation and maintenance expenditures, unless their use for other purposes is approved in advance by the Association in accordance with the requirements of Chapter 720, F.S.

12.4 Minimum Operation and Maintenance Standards

(a) In accordance with Section 373.416(2), F.S., unless revoked or abandoned, all stormwater management systems, dams, impoundments, reservoirs, appurtenant works, or works permitted under Part IV of Chapter 373, F.S., must be operated and maintained in perpetuity. The operation and maintenance shall be in accordance with the designs, plans, calculations, and other specifications that are submitted with an application, approved by the Agency, and incorporated as a condition into any permit issued.

(b) Operation and Maintenance Access

An operation and maintenance entity shall provide documentation of legal authorization, such as access easements, deed restrictions, or other legal instruments, for the operation and maintenance entity to have and maintain sufficient access for operation and maintenance of the stormwater treatment system, except where the operation and maintenance entity has provided separate documentation of having ownership or control of the related stormwater management system property. The following requirements shall apply to operation and maintenance access easements:

1. Access easements must cover at least the primary and high-maintenance components of the system (i.e., inlets, outlets, littoral zones, filters, pumps, etc.), including provisions for equipment to enter and perform the necessary maintenance on the system. Applicants may propose site-specific easements that meet this requirement.

2. Easements for stormwater management systems must:

   a. Include the area of the water surface measured at the control elevation;
   b. Extend a minimum of 20 feet from the top of the bank and include side slopes or an allowance for side slopes calculated at no steeper than 4H:1V (horizontal to vertical), or an alternate allowance for installation and maintenance of a fence or other public access restriction, whichever is greater; and
   c. Be traversable by operation and maintenance equipment and personnel.

3. Easements for piped stormwater conveyances must be a minimum of the width of the pipe plus 4 times the depth of the pipe invert below finished grade.

4. Easements must provide a minimum access width of 20 feet, unless the applicant demonstrates that smaller widths will provide sufficient access for equipment and personnel to enter and perform the necessary maintenance for the system. The easement(s) shall extend from a public road, public right-of-way, or other location from which operation and maintenance access is legally and physically available. The easement(s) shall extend far enough to provide access, as needed, for operation and maintenance for each stormwater management system component.

   As an alternative, the applicant may propose other forms of legal authorization for operation and maintenance access, provided the applicant affirmatively demonstrates that equipment and operators can enter and perform the required operation and maintenance activities on the stormwater management system.

12.4.1 Stormwater Management System Operation and Maintenance Plan

An applicant for construction, alteration, operation of a stormwater management system shall provide a written operation and maintenance plan (O&M Plan) at time of application. A qualified registered professional shall prepare and certify the application, which shall specifically identify the O&M Plan activities required to ensure the stormwater management system's perpetual performance. The O&M Plan shall describe the overall inspection and maintenance requirements, including applicable operations and maintenance requirements as specified herein, and shall identify future capital and maintenance expenditures that are required to ensure that the stormwater management system continues to function as designed and permitted.

Applicants for systems where the operation and maintenance entity is or will be a Municipal Separate Storm Sewer System permittee subject to Chapter 62-624, F.A.C. (MS4 Entity) are not required to submit a separate O&M plan under this section. Those applicants shall instead conduct operation and maintenance of the ERP-permitted stormwater management systems in accordance with their MS4 permit requirements and any associated stormwater management program requirements. MS4 Entities shall nonetheless ensure that operation and maintenance activities are sufficient to perpetually maintain the performance of the ERP stormwater management system so that it functions as designed and permitted.

(a) The written O&M Plan for all operation and maintenance entities, other than MS4 Entities, shall, at a minimum, include:

1. A list and details of all stormwater system components, including their location, type, and other pertinent information, such as normal pool elevation, volume, recovery time, and how the systems connect;

2. A list and description of each of the identified maintenance and inspection tasks for each of the system's components and for the overall system (refer to Appendix O for procedures for BMPs);

3. All regular inspection and maintenance schedules;

4. Inspection checklists;

5. Copies of or references to the pertinent sections of all covenants, conditions, restrictions, and other association documents, permits, approvals, and agreements that govern the operation and maintenance of the stormwater management system; and

6. Permitted or as-built plans of the stormwater water management system.

(b) When a project enters the operation and maintenance phase, the permittee must include as-built plans in the O&M Plan upon completion of each phase of construction. The O&M Plan must also include or reference other pertinent facility information, such as design limitations and replacement schedules, for any components of the stormwater management system that are needed to maintain performance as originally designed and permitted, including those components where maintenance or replacement frequencies are less frequent than once per year. The O&M Plan should also include a list of after-hours telephone numbers of key maintenance personnel in case of emergencies and information necessary for reviewing copies of maintenance and inspection records.

(c) The operation and maintenance entity shall maintain a copy of the O&M Plan as submitted and approved in accordance with Chapter 62-330, F.A.C. If a third-party entity performs operation and maintenance on behalf of the owner or permittee, the permittee shall remain responsible for all operation and maintenance requirements.

(d) The operation and maintenance entity shall periodically review the O&M plan, and at least at the time of inspections required under section **12.5** below, to identify any new or additional required operation and maintenance activities. The operation and maintenance entity shall ensure that the plan is updated as needed with applicable contact information and any new operation and maintenance requirements to ensure that the stormwater system continues to function as designed and permitted. If any document is updated, the updated document(s) shall be available for inspection upon request by the permitting Agency.

12.5 Inspections

(a) All operation and maintenance entities, other than MS4 Entities, shall conduct and report inspections in accordance with this section. An operation and maintenance entity for a stormwater management system shall conduct inspections as needed to ensure that the stormwater management system, and each component thereof, continues to function as designed and permitted. Minimum inspection frequencies are specified in table 12.1, or as proposed by the applicant pursuant to subsection (h) below. If a system is found to be out of compliance, then the inspection frequency may be increased to be greater than that which was originally permitted, per rule 62-330.311 F.A.C. The operation and maintenance entity shall employ a qualified registered professional, or a qualified inspector as described in subsection (c) below, to inspect the stormwater treatment system. The inspector shall submit a report to the Agency describing and certifying the results within 30 days of the inspection. The inspector shall certify in the report that the stormwater treatment system is operating as designed and permitted. The results of required inspections shall be filed with the Agency using Form 62-330.311(1), "Operation and Maintenance Inspection Certification."

(b) An MS4 Entity shall conduct and report inspections of ERP-permitted stormwater management systems owned or operated by the MS4 Entity in accordance with their MS4 permit requirements and any associated Standard Operating Procedures (SOPs) required pursuant to Chapter 62-624, F.A.C.

(c) For stormwater management system inspections conducted on or after [effective date + 1 year], a qualified inspector for conducting, certifying, and submitting inspection reports must, at a minimum, either: (i) be a registered professional, (ii) include documentation that the inspector conducted the inspection under the supervision of a registered professional, or (iii) have completed training, and be able to provide documentation of completion, no more than five years prior to the date of the inspection that covers the following topics:

1. The ability to read construction drawings, plans, specifications and modeling of recovery timeframes;
2. Principles of traditional BMPs, as listed in Form 62-330.311(3), for stormwater treatment, including functions that convey and remove pollutants from stormwater;
3. For traditional BMPs, the potential causes of failure or malfunction, replacement needs, and reduction in treatment efficiency;

4. Understanding of the purpose, design, and function of manufactured devices or non-traditional BMPs and the ability to ensure the device meets manufacturers' specifications and maintenance requirements; and
5. Performance of inspections, including field inspection experience and the completion of required reports and documentation, consistent with the requirements of section 12 of this Volume, any relevant requirements of the applicable Volume II, and all other applicable rules and regulations.

(d) Upon completion of the permitted stormwater management systems, dams, reservoirs, impoundments, appurtenant work, or works, the Agency may conduct periodic inspections to ensure the project was constructed and is being operated in compliance with the terms and conditions of the permit, and in a manner that protects the public health and safety and the natural resources of the state.

(e) Inspections may be performed by Agency staff during and after construction and as needed to ensure a project is being operated and maintained in perpetuity in compliance with permit conditions.

(f) Some projects **that do not consist of or include a stormwater management system, dam, impoundment, reservoir, or appurtenant work,** whether designed by a registered professional or not, also may be required in the permit to be regularly inspected and monitored to ensure continued compliance with permit conditions and the functioning of the project. This may include individual permits issued for activities at a private residential single-family residence. For example, a residential fill pad may have been permitted with specific requirements for slope drainage or runoff. A dock located in waters with sensitive resources may have been permitted with conditions prohibiting mooring in certain locations, limiting the number or size of boats to be moored at the dock, or with requirements for handrailing or other associated structures. The permit will specify the periodic inspections that will be required, and how the results of the inspections are to be either retained by the permittee or reported to the Agency.

The following are examples of activities as discussed above that are subject to an initial inspection prior to conversion to the operation phase, and then subject to routine inspections during the operation and maintenance phase. The inspection frequency during the operation and maintenance phase will be determined in the permit:

- Single-family dock (to verify that: handrails are constructed and are maintained to prevent mooring of vessels in shallow waters);
- Multi-slip docking facility (to verify maintenance of manatee protection signs, sewage pumpout facilities, or over-water fueling operation);
- Single-family lot fill (to verify lawn grading and sloping is maintained to reduce discharges of nutrients from lawn runoff entering sensitive waters);
- Seawalls or rip rap (to verify integrity of system or shoreline plantings);
- Lands within a conservation easement (for encroachments, alterations, or exotic/nuisance vegetation removal) in accordance with a permit under this chapter;
- Mitigation sites (to determine compliance with success criteria, including the status of exotic species removals); and
- Other dredging or filling (for example, dredged material sites and dams to ensure functioning and stability of dikes and control structures).

(g) Types of BMPs in the system. Table 12-1 lists common BMPs and their default inspection frequencies. For stormwater systems with multiple BMPs in series, the BMP with the most frequent inspection rate will govern the inspection rate for the entire system. These frequencies can be altered by the permitting Agency based on the considerations in subsection (h), below, and in accordance with this section.

Table 12-1: Inspection Frequencies for common BMPs

TYPE OF SYSTEM	**INSPECTION FREQUENCY**
Dry Retention basins	Once every 3 years
Exfiltration trenches	Once every 2 Years
Underground retention	Once every Year
Sand or Media Filters	Once every Year
Underdrain System	Once every 2 Years
Underground vault/chambers	Once every Year
Pump Systems	Twice every Year
Swales (treatment)	Once every 3 years
Wet Detention systems	Once every 3 years
Wet Detention systems with littoral zones	Once every 2 years
Vegetated Natural Buffers	Once every 5 years
Manufactured Devices	As manufacturer recommends in specifications, minimum once every year
Dam Systems	Once every Year
All other	Once every Year

(h) For an operation and maintenance entity other than an MS4 Entity, the applicant or permittee may propose a project-specific minimum inspection frequency for a stormwater management system, with a maximum frequency of five years, at the time of application. The permitting Agency shall allow a minimum inspection frequency, recommended by a registered professional, that provides reasonable assurance that the proposed inspection schedule will ensure that the system is being operated and maintained as designed and permitted. Where an applicant's proposed minimum inspection frequency does not provide reasonable assurance that the minimum inspection frequency will ensure that the stormwater management system will continue to function perpetually as designed and permitted, the Agency shall require frequencies as listed in table 12-1. A proposed minimum inspection frequency for a stormwater management system shall provide historical information on the operation and maintenance of any existing stormwater management system, as well as the specific operational and maintenance requirements of the site, which includes the following:

1. The type, nature, and design of the design and performance standards proposed, including any alternative designs such as pervious pavement, green roofs, cisterns, managed aquatic plant systems, stormwater harvesting, wetland treatment trains, low impact designs, alum or polymer injection systems;

2. The proximity of receiving waters classified as Outstanding Florida Waters in Rule 62-302.700, F.A.C., or impaired for constituents likely to be contained in discharges from the project;
3. The nature of the site, such as whether it is part of a port or landfill, whether it will

impound more than 40 acre-feet of water, or will include above ground impoundments;

4. The topography, rainfall patterns, and adjacent development surrounding the activity site, including any special basin designations within the District in which the activity is located, as identified in paragraph 62-330.301(1)(k), F.A.C.;

5. The nature of the underlying soils, geology, groundwater, and hydrology;

6. The potential during construction and operation of the project to cause harm to public health, safety, or welfare, or harm to water resources, water quality standards, or water quality; and

7. Prior compliance history with the proposed design and performance type, including whether the activity characteristics are likely to pose more than a minimal risk for harm.

12.5.1 Inspection Requirements

Operation and maintenance entities must ensure that inspections are being conducted to ensure that stormwater management systems are being maintained as designed and permitted. The efficiency of stormwater management systems, dams, impoundments, and most other projects normally decreases over time without periodic maintenance. For example, a significant reduction in the flow capacity of a stormwater management system often can be attributed to partial blockages of its conveyance system. Once flow capacity is compromised, flooding may result. Therefore, operation and maintenance entities must perform periodic inspections to identify whether there are any deficiencies in structural integrity, degradation due to insufficient maintenance, or improper operation of projects that may endanger public health, safety, or welfare, or water resources. If deficiencies are found, the operation and maintenance entity will be responsible for correcting the deficiencies so that the project is returned to the operational functions required in the permit and contemplated by the design of the project as permitted. The corrections must be done a timely manner to prevent flooding and protect water quality.

(a) Special attention shall be made during inspections to ensure that:

1. All erosion is controlled, and soil is appropriately stabilized to prevent sediment discharge to waters in the state;

2. The system is kept free of debris, trash, garbage, oils and greases, floatables, and other refuse;

3. Stormwater management systems that include oil and grease separators, skimmers, or collection devices are working properly and do not allow the discharge of oils or greases. Oils and greases or other materials removed from such a device during routine maintenance shall be disposed of at a sanitary landfill or by other lawful means;

4. All structures within stormwater management systems have not become clogged or choked with vegetative or aquatic growth to such an extent as to render them inoperable;

5. System components have been maintained to remove sediments, debris, and other deleterious materials to ensure that the systems continue to perform as designed and permitted, and that their original permitted dimensions have not been altered substantially; and

6. All system components associated with nutrient or other pollutant removal are in good working order. Maintenance logs and records are reviewed to ensure devices are functioning properly and are being replaced at the intervals recommended in the operation and maintenance plan.

(b) Form 62-330.311(3) "Inspection Checklists" shall be used for reporting and supplemented with additional information as denoted within the form. Inspection checklists shall be used for the permitted inspections after the project has been transferred to the operation and maintenance phase, to ensure that all system components are functioning as originally permitted and constructed. A permittee may submit the information required on the checklist in another format, as long as all required information is present.

(c) Unless otherwise specified in the permit, the operation and maintenance entity must maintain a record of each inspection, including the date of inspection, the name and contact information of the inspector, whether the system was functioning as designed and permitted, and make such record available upon request of the Agency, in accordance with **section 12.6, below**.

12.6 Reporting

(a) All forms required for reporting can be submitted to the respective Agency Internet site. If the permittee does not use the electronic forms provided on that site, they shall be responsible for retaining records of the inspections and for delivering such records within 30 days of request to the requesting Agency, unless a more rapid delivery is requested for such reasons as the potential for the activity harm to water quality, water resources, public health, or public safety.

(b) Operation and maintenance entities, other than an MS4 Entity, responsible for a stormwater management system shall submit an inspection report to the agency describing and certifying the results of the inspection within 30 days of the date of the inspection. A qualified inspector shall certify the results of all such inspections. The permittee shall submit inspection reports with the Agency using Form 62-330.311(1), "Operation and Maintenance Inspection Certification." Reports shall also include, as applicable:

1. Form 62-330.311(3) "Inspection Checklists;"
2. Any updated operation and maintenance cost estimates as described in section **12.3.5** of this Volume;
3. A summary of updates to the operation and maintenance plan described in section **12.4.1** of this Volume; and
4. Any monitoring reports as may be required by a specific permit condition.

(c) Within 30 days of any failure of a stormwater management system or deviation from the permit, a report shall be submitted electronically or in writing to the Agency using Form 62-330.311(1), "Operation and Maintenance Inspection Certification," describing the remedial actions taken to resolve the failure or deviation.

(d) The operation and maintenance entity of a regional stormwater management system must notify the Agency on an annual basis, using Form 62-330.311(2), "Regional Stormwater Management System Annual Report," of all new systems and their associated stormwater volumes that have been allowed to discharge stormwater into the regional system, and confirming that the maximum allowable treatment volume of stormwater authorized to be accepted by the regional stormwater management system has not been exceeded.

(e) The inspection and reporting requirements contained in a permit issued under Part IV of Chapter 373, F.S., prior to [effective date] shall continue to be followed in accordance with the existing permit unless the permittee obtains a modification using the procedures in Rule 62-330.315, F.A.C., to comply with the inspection and reporting requirements of Rule 62-330.311, F.A.C., and this section.

(f) A listing of all the forms that are incorporated by reference in Chapter 62-330, F.A.C., is contained in Appendix C of this Volume; copies of which may be obtained from the Agency, as described in Appendix A of this Volume and subsection 62-330.010(5), F.A.C.

12.7 Recording of Operation and Maintenance Documents and Notice of Permit

(a) Operation and maintenance documents required by **sections 12.3.5 and 12.4 above**, must be submitted to the Agency for approval prior to recording. Such documents must be recorded in public records of the county where the project is located prior to any lot or unit sales within the project served by the system, or upon completion of construction of the system, whichever occurs first. Final operation and maintenance documents must be received by the Agency when maintenance and operation of the system is accepted by the operation and maintenance entity. Failure to submit the appropriate final documents will result in the permittee remaining liable for carrying out maintenance and operation of the permitted system.

(b) Permittees are advised that the Agency shall cause a "Recorded Notice of Environmental Resource Permit," Form No. 62-330.090(1), to be recorded in the public records of the county where the property is located in accordance with subsection 62-330.090(7), F.A.C., upon issuance of a permit, except for certain types of activities identified in that subsection.

12.8 Subsequent Transfers

Transfers of the permitted activity or the real property on which the permitted activity is located once a permit is in the operation and maintenance phase are governed by the procedures described in Rule 62-330.340, F.A.C., and **section 6.3** of this Volume**.**

APPENDIX A

CONTACT INFORMATION AND MAPS FOR AGENCIES IMPLEMENTING THE ERP PROGRAM

The Agencies have divided responsibilities for permitting, compliance, and enforcement in accordance with Operating and Delegation Agreements incorporated by reference in Chapter 62-113, F.A.C., and as referenced in subsection 62-330.010(3), F.A.C.

Applications and notices are to be submitted to the correct agency. However, some applications involve activities, a portion of which extends beyond the boundary of more than one water management district. In such a case, Section 373.046(6), F.S., provides that the responsible Agency will be determined based on factors such as the amount and geography of the activity's land area, the location of the activity's discharge or discharges, the type of activity, prior agency history, and the terms and conditions of the Operating Agreement in effect between the Agencies.

Electronic applications shall be filed through the applicable Agency e-permitting portal or website listed in subsection 62-330.010(7), F.A.C., or at http://flwaterpermits.com/, or at the following Internet site of the applicable District:

SWFWMD: http://www.swfwmd.state.fl.us/permits/

SJRWMD: http://www.sjrwmd.com/permitting/ or https://permitting.sjrwmd.com/epermitting/jsp/start.jsp

SRWMD: https://permitting.sjrwmd.com/srepermitting/jsp/start.jsp

NWFWMD: https://permitting.sjrwmd.com/nwepermitting/jsp/start.jsp

SFWMD: http://my.sfwmd.gov/ePermitting/MainPage.do

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DISTRICT AND BRANCH OFFICES

https://floridadep.gov/districts http://www.dep.state.fl.us/secretary/dist/default.htm

Northwest District:
Escambia, Holmes, Okaloosa, Santa Rosa, & Walton Counties
160 W. Governmental Street, Suite 308
Pensacola, FL 32502-5740
https://floridadep.gov/northwest/ http://www.dep.state.fl.us/northwest/

Northwest District Branch Office: Bay, Calhoun, Gulf, Jackson, & Washington Counties
2353 Jenks Avenue
Panama City, FL 32405

Northwest District Branch Office: Franklin, Gadsden, Jefferson, Leon, Liberty, & Wakulla Counties
2600 Blair Stone Road MS 55
Tallahassee, FL 32399-3000

Northeast District:
Alachua, Baker, Bradford, Clay, Columbia, Dixie, Duval, Flagler, Gilchrist, Hamilton, Lafayette, Levy, Madison, Nassau, Putnam, St. Johns, Suwannee, Taylor & Union Counties
8800 Baymeadows Way West, Suite 100
Jacksonville, FL 32256-7590
https://floridadep.gov/northeast/

Central District:
Brevard, Lake, Marion, Orange, Osceola, Seminole, Sumter & Volusia Counties
3319 Maguire Boulevard, Suite 232
Orlando, FL 32803-3767
https://floridadep.gov/central/ http://www.dep.state.fl.us/central/

Southwest District:
Citrus, Hardee, Hernando, Hillsborough, Manatee, Pasco, Pinellas & Polk Counties
13051 N. Telecom Parkway
Temple Terrace, FL 33637-0926
https://floridadep.gov/southwest/ http://www.dep.state.fl.us/southwest/

Southeast District:
Indian River, Okeechobee, St. Lucie, Martin, Palm Beach, Broward & Dade Counties
400 North Congress Avenue, Third Floor
West Palm Beach, FL 33401-2913
https://floridadep.gov/southeast/ http://www.dep.state.fl.us/southeast/

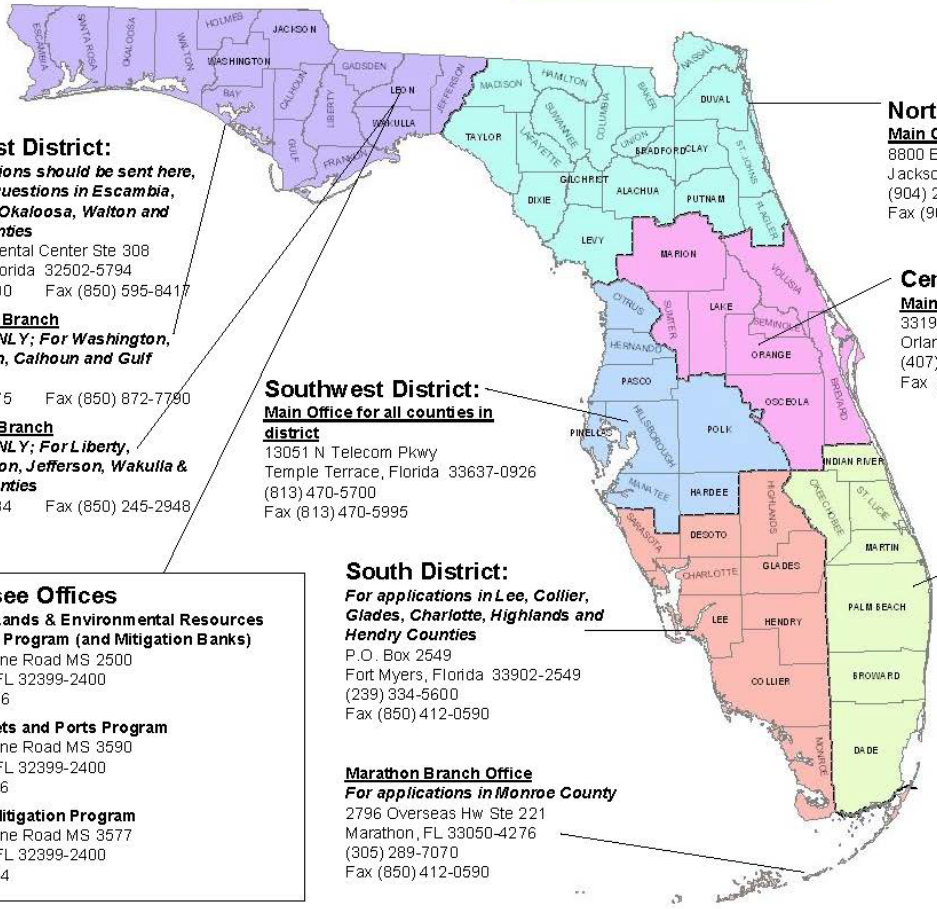
South District:
Charlotte, Collier, DeSoto, Highlands, Hendry, Glades, Lee & Sarasota Counties
2295 Victoria Avenue, Suite 364
Fort Myers, FL 33901-2549
https://floridadep.gov/south/

South District Marathon Branch Office: Monroe County
2796 Overseas Highway, Suite 221
Marathon, FL 33050-4276

Florida Department of Environmental Protection District Offices

SLER Programs Contacts

Directions: https://floridadep.gov/districts



Northwest District:
ALL applications should be sent here, and call for questions in Escambia, Santa Rosa, Okaloosa, Walton and Holmes Counties
160 Governmental Center Ste 308
Pensacola, Florida 32502-5794
(850) 595-8300 Fax (850) 595-8417

Panama City Branch
Questions ONLY; For Washington, Bay, Jackson, Calhoun and Gulf Counties
(850) 872-4375 Fax (850) 872-7790

Tallahassee Branch
Questions ONLY; For Liberty, Gadsden, Leon, Jefferson, Wakulla & Franklin Counties
(850) 245-2984 Fax (850) 245-2948

Northeast District:
Main Office for all counties in district
8800 Baymeadows Way West, Suite 100
Jacksonville, FL 32256-7590
(904) 256-1700
Fax (904) 256-1590

Central District:
Main Office for all counties in district
3319 Maguire Blvd., Suite 232
Orlando, FL 32803-3767
(407) 897-4100
Fax (850) 245-0467

Southwest District:
Main Office for all counties in district
13051 N Telecom Pkwy
Temple Terrace, Florida 33637-0926
(813) 470-5700
Fax (813) 470-5995

Southeast District:
Main Office for all counties in district
3301 Gun Club Road, MSC 7210-1
West Palm Beach, FL 33406-3007
(561) 681-6600
Fax (561) 681-6755

Tallahassee Offices

Submerged Lands & Environmental Resources Coordination Program (and Mitigation Banks)
2600 Blair Stone Road MS 2500
Tallahassee, FL 32399-2400
(850) 245-8486

Beaches, Inlets and Ports Program
2600 Blair Stone Road MS 3590
Tallahassee, FL 32399-2400
(850) 245-8336

Mining and Mitigation Program
2600 Blair Stone Road MS 3577
Tallahassee, FL 32399-2400
(850) 245-7554

South District:
For applications in Lee, Collier, Glades, Charlotte, Highlands and Hendry Counties
P.O. Box 2549
Fort Myers, Florida 33902-2549
(239) 334-5600
Fax (850) 412-0590

Marathon Branch Office
For applications in Monroe County
2796 Overseas Hw Ste 221
Marathon, FL 33050-4276
(305) 289-7070
Fax (850) 412-0590

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Figure 1A

WATER MANAGEMENT DISTRICTS

Water management districts: contact information is available at the Department's site https://floridadep.gov/water-policy/water-policy/content/water-management-districts at the permitting portal http://flwaterpermits.com/ and at individual water management district web sites.

Northwest Florida Water Management District:

Contact the nearest Field Office

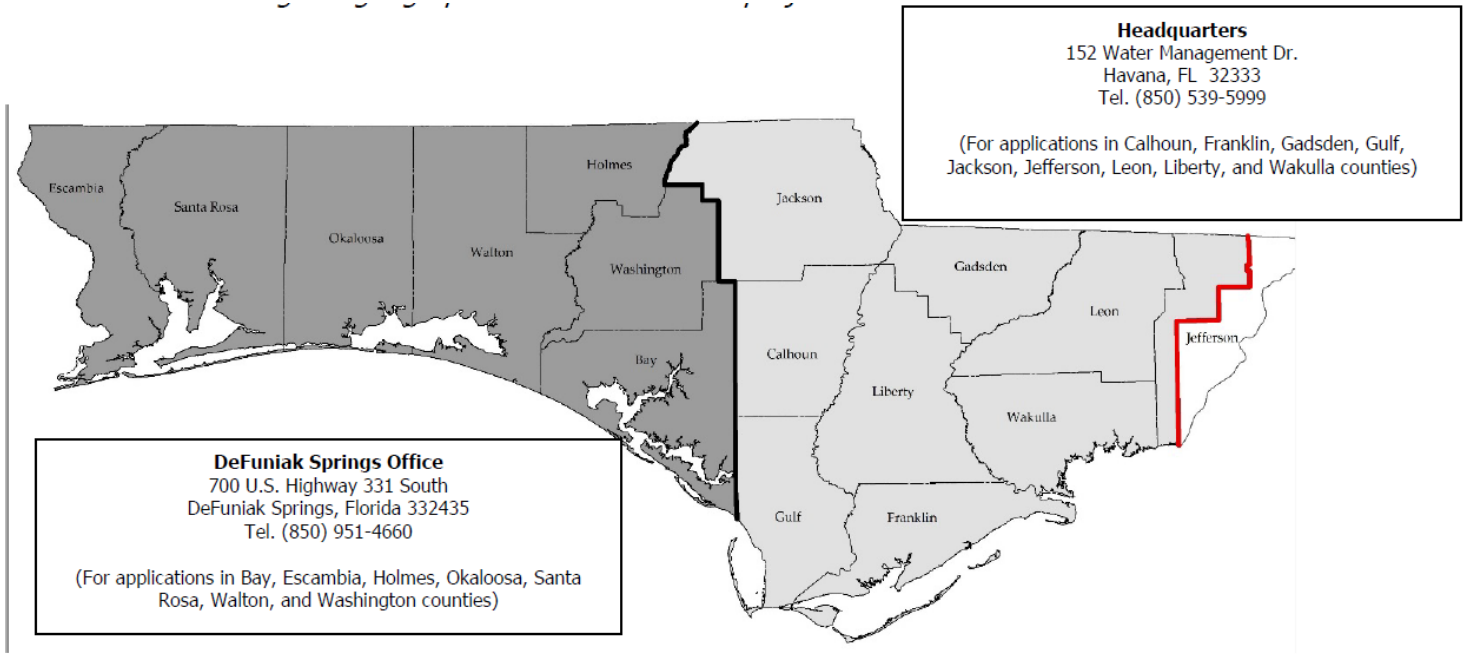
http://www.nwfwater.com/contact-us/locations/
http://www.nwfwater.com/permits/environmental-resource-permits/

Headquarters (ERP)
152 Water Management Dr.
Havana, FL 32333
Tel. (850) 951-4660

DeFuniak Springs Office
700 U.S. Highway 331 South
DeFuniak Springs, Florida 32435

Figure 1B:
Northwest Florida Water Management District Geographic Limits and Office Responsibilities

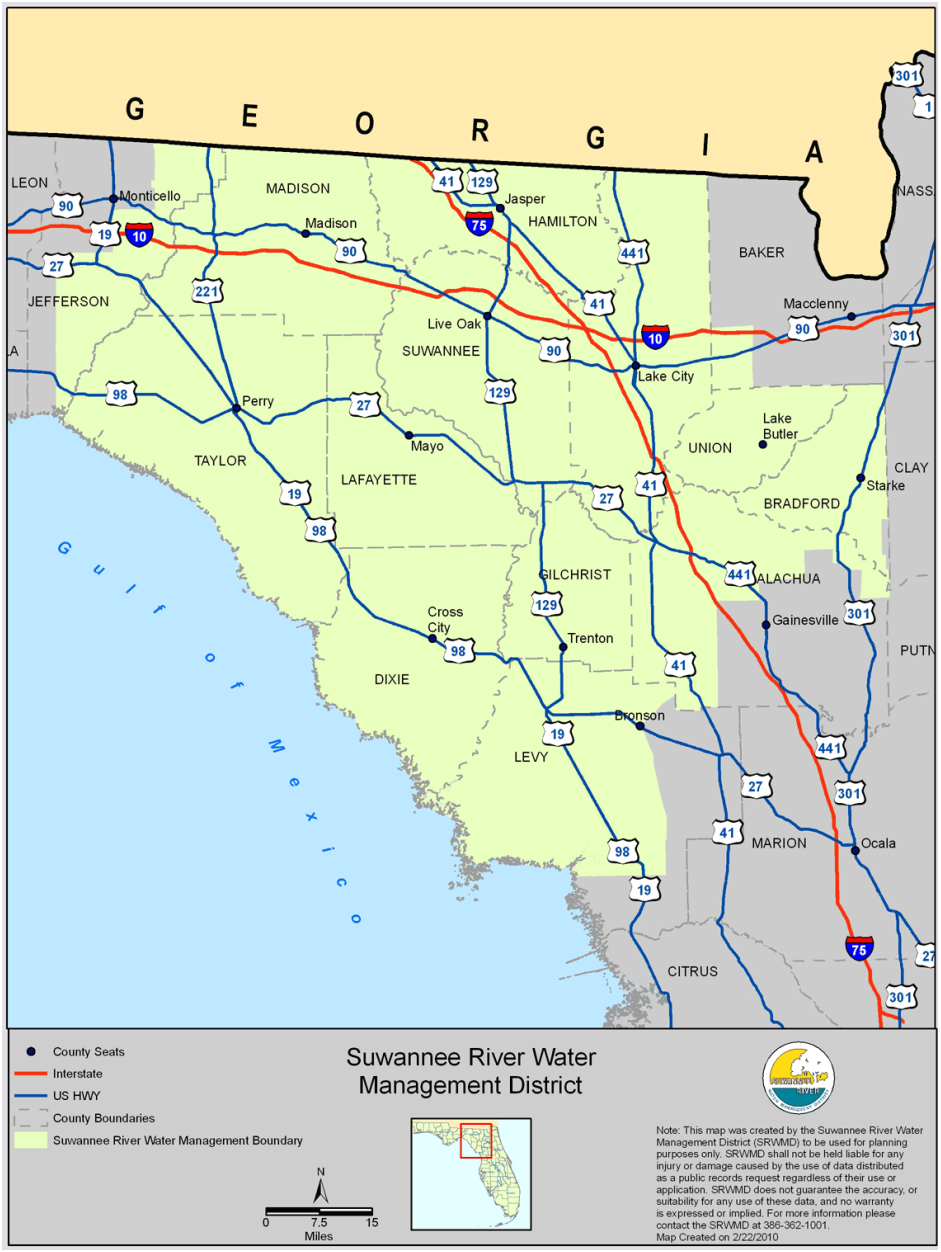
Note: Electronic applications can be submitted to the NWFWMD via the web. Paper applications can be submitted to the office covering the geographic area in which the project is located.



SUWANNEE RIVER WATER MANAGEMENT DISTRICT

Contact the Resource Management Division
https://www.mysuwanneeriver.com/
http://webapub.sjrwmd.com/agws10/fpperp1/

Resource Management Division
9225 CR 49
Live Oak, FL 32060
resourcemanagement@srwmd.org
386.362.1001

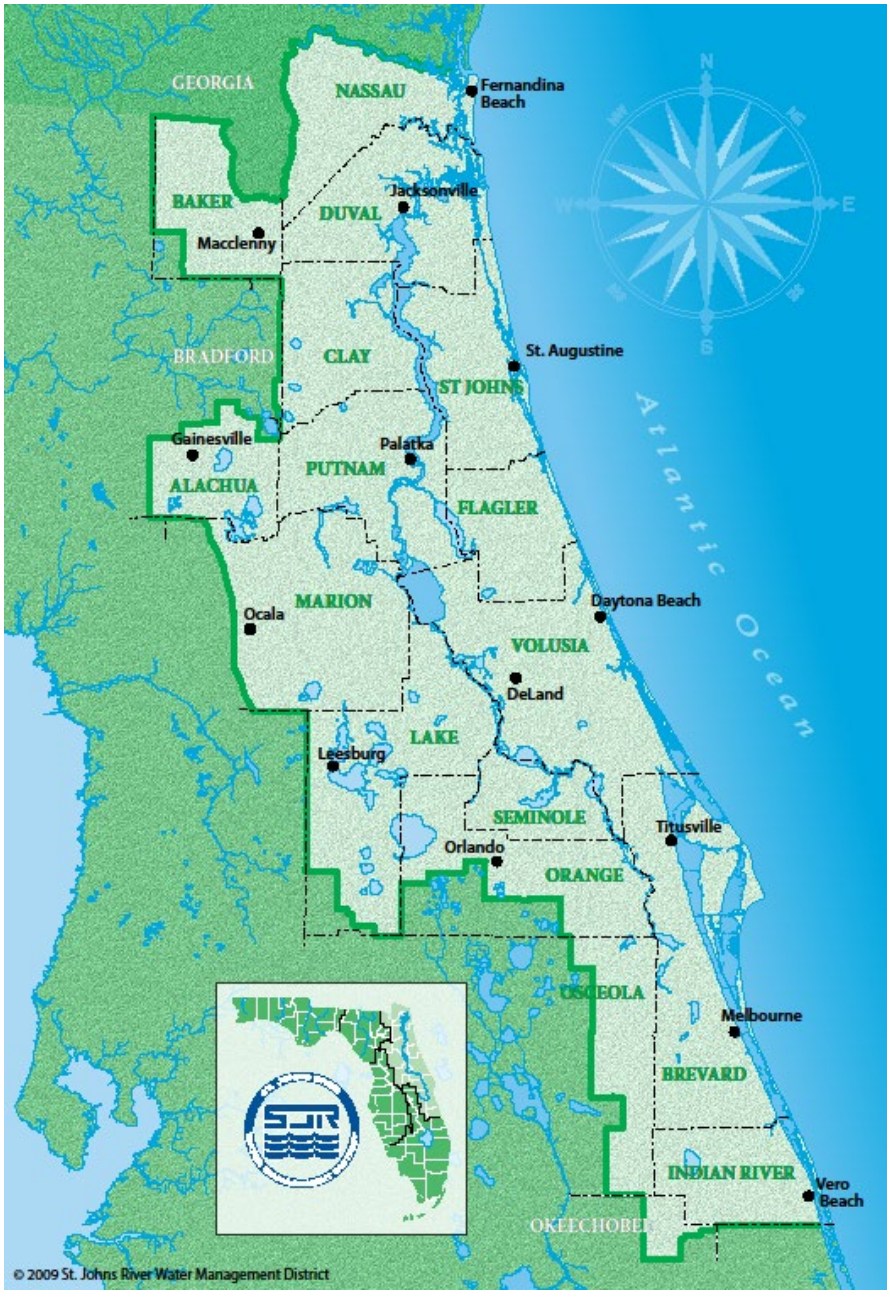


ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

Contact the District Headquarters
http://www.flwaterpermits.com/home/stjohns_inside.jsp
http://www.SJRWMD.com
ePermitting: http://floridaswater.com/permitting/

District Headquarters, Division of Permit Data Services
4049 Reid Street
Palatka, Florida 32177-2529

P.O. Box 1429
Palatka, FL 32178-1429



Southwest Florida Water Management District

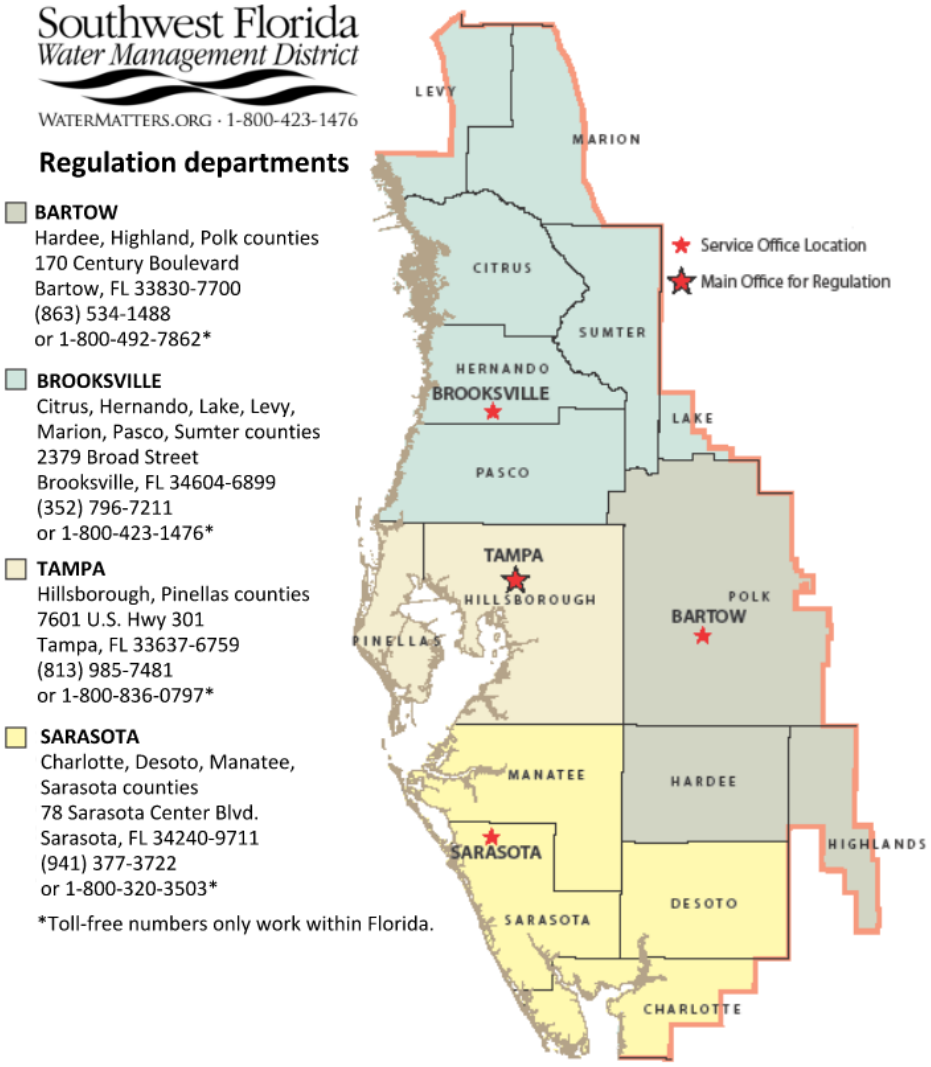
Contact the nearest Tampa Service Center or the nearest
Regulation Department office as depicted below:

http://www.flwaterpermits.com/home/swfwmd_inside.jsp

http://www.WaterMatters.org
ePermitting:

http://www.swfwmd.state.fl.us/permits/

Tampa Service Office
7601 US Hwy. 301
Tampa, FL 33637-6759



South Florida Water Management District

Contact the nearest Service Center or the Regulation Reception Desk

http://www.flwaterpermits.com/home/sfwmd_inside.jsp

http://www.sfwmd.gov/ePermitting

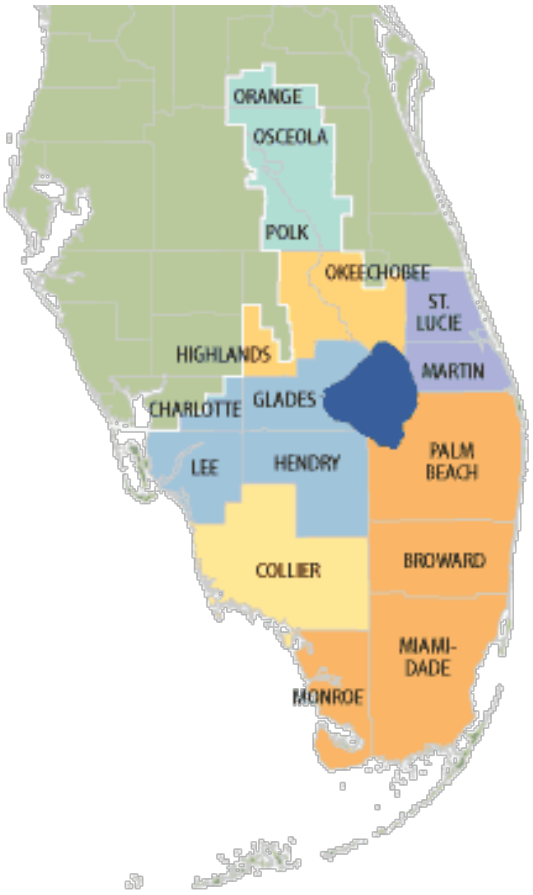
http://my.sfwmd.gov/portal/page/portal/levelthree/permits, or at any of the District's Service Centers online at http://my.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/motormap.pdf

- **Broward, Miami-Dade, Monroe and Palm Beach counties**
  SFWMD Headquarters
  Building B-1
  3301 Gun Club Road
  West Palm Beach, FL 33406
  Phone: (561) 682-6736

- **Charlotte, Collier, Hendry and Lee counties**
  Fort Myers Service Center
  2301 McGregor Blvd.
  Fort Myers, FL 33901
  Phone: (239) 338-2929

- **Glades, Highlands, Martin, Okeechobee and St. Lucie counties**
  Okeechobee Service Center
  3800 NW 16th Blvd., Suite A
  Okeechobee, FL 34972
  Phone: (863) 462-5260

- **Orange, Osceola and Polk counties**
  Orlando Service Center
  1707 Orlando Central Parkway
  Orlando, FL 32809
  Phone: (407) 858-6100



Local Governments with Delegated Authority

1. Broward County:
   Agreement dated 7/19/2001: https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/content/erp-local-program-delegation
   http://www.dep.state.fl.us/water/wetlands/docs/erp/BrowardCoDeleg.pdf
   http://www.broward.org/permittingandlicensing/Pages/Default.aspx

   Broward County Environmental Protection and Growth Management Department,
   Environmental Licensing and Building Permitting Division
   1 North University Drive, Suite 201
   Plantation, FL 33324, (954)519-1483

2. Environmental Protection Commission of Hillsborough County:
   Agreement dated 2/9/2012:
   https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/content/erp-local-program-delegation
   http://fl-hillsboroughcountyepc.civicplus.com/

   Executive Director
   Environmental Protection Commission
   3629 Queen Palm Dr.
   Tampa, FL 33619

APPENDIX B

OPERATING AND DELEGATION AGREEMENTS BETWEEN THE DEPARTMENT, WATER MANAGEMENT DISTRICTS, and DELEGATED LOCAL GOVERNMENTS

The following Operating Agreements have been executed between the Department and the Districts to implement the divisions of responsibilities for implementing the environmental resource permitting program under Part IV of Chapter 373, F.S. These Agreements are cited in subsection 62-330.010(3), F.A.C., and are incorporated by reference in Chapter 62-113, F.A.C.:

#10-1 Operating Agreement Concerning Regulation Under Part IV, Chapter 373, F.S., Between Northwest Florida Water Management District and Department of Environmental Protection, effective October 1, 2013, incorporated by reference in paragraph 62-113.100(3)(aa), F.A.C. (October 1, 2013).

#07-2: Operating Agreement Concerning Regulation Under Part IV, Chapter 373, F.S., between Suwannee River Water Management District and Department of Environmental Protection, dated July 1, 2007, incorporated by reference in paragraph 62-113.100(3)(m), F.A.C., and subsection 40B-400.091(2), F.A.C. (June 7, 2010).

#07-4: Operating Agreement Concerning Regulation Under Part IV, Chapter 373, F.S., between St. Johns River Water Management District and Department of Environmental Protection, dated July 1, 2007, incorporated by reference in paragraph 62-113.100(3)(x), F.A.C., and subsection 40C-4.091(1)(b), F.A.C. (May 27, 2012).

#07-3: Operating Agreement Concerning Regulation Under Part IV, Chapter 373, F.S., Between the Southwest Florida Water Management and Department of Environmental Protection, dated July 1, 2007, incorporated by reference in paragraph 62-113.100(3)(s), F.A.C., and subsection 40D-4.091(2), F.A.C. (August 1, 2012).

#07-1: Operating Agreement Concerning Regulation Under Part IV, Chapter 373, F.S., between South Florida Water Management District and Department of Environmental Protection, dated July 1, 2007, incorporated by reference in paragraph 62-113.100(3)(f), F.A.C., and subsection 40E-4.091(1)(c), F.A.C., May 27, 2012

The following Delegation Agreements have been executed between the Department and Local Governments to delegate responsibilities of the Agencies for implementing the environmental resource permitting program under Part IV of Chapter 373, F.S. These Agreements are in subsection 62-330.010(5), F.A.C., and are incorporated by reference in Chapter 62-113, F.A.C:

#01-1: Delegation Agreement Between the Florida Department of Environmental Protection, the South Florida Water Management District, and Broward County Regarding Implementation of Environmental Resource Permitting, Compliance, and Enforcement, under Part IV, Chapter 373, F.S., dated May 22, 2001, incorporated by reference in paragraph 62-113.100(2)(o), F.A.C.

#11-1: Delegation Agreement Between the Florida Department of Environmental Protection and the Environmental Protection Commission, Hillsborough County, Regarding Implementation of Environmental Resource Permitting, Compliance, and Enforcement, under Part IV, Chapter 373, F.S., effective date December 13, 2011, incorporated by reference in paragraph 62-113.100(2)(p), F.A.C., dated May 22, 2001.

Additional Operating Agreements, Memoranda of Understandings, and Delegation Agreements may be accessed at:
https://floridadep.gov/ogc/ogc/content/operating-agreements

APPENDIX C
FORMS

The following forms incorporated for use in Chapter 62-330, F.A.C., (as identified by the Form number) are listed below.

Form No.	Title
Form 62-330.050(1)	"Request for Verification of an Exemption" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02468]
Form 62-330.0511(1)	"Notice of Intent to Construct a Minor Silvicultural System" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02510]
Form 62-330.060(1)	Section A "Application for Individual and Conceptual Approval Environmental Resource Permit, State 404 Program Permit, and Authorization to Use State-Owned Submerged Lands" [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Section B: For Single-Family Projects [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Section C: Supplemental Information for Works or Other Activities In, On, Over Wetlands and/or Other Surface Waters [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Section D: Supplemental Information For Works or Other Activities Within Surface Waters [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Section E: Supplemental Information Required for Works or Other Activities Involving a Stormwater Management System (Other Than a Single-Family Project [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Section F: Application For Authorization to Use State-Owned Submerged Lands [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Section G: Supplemental Information Required for Mitigation Banks [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Section H: Supplemental Information for Stormwater Management Systems for Mines [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Section I: Supplemental Information for State 404 Program Permits [https://www.flrules.org/Gateway/reference.asp?No=Ref-12036]
	Attachments 1-3: Application Form Instructions, Agency Contacts, and Application Fees [http://www.dep.state.fl.us/water/wetlands/erp/forms.htm]
Form 62-330.090(1)	"Recorded Notice of Environmental Resource Permit" [http://www.flrules.org/Gateway/reference.asp?No=Ref-09362]
Form 62-330.201(1)	"Chapter 62-340, F.A.C., Data Form" [https://www.flrules.org/Gateway/reference.asp?No=Ref-12037]
Form 62-330.201(2)	"Petition for a Formal Determination of the Landward Extent of Wetlands and Other Surface Waters" [https://www.flrules.org/Gateway/reference.asp?No=Ref-12038]
Form 62-330.301(1)	"Performance Bond To Demonstrate Financial Assurance for Mitigation" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02472]
Form 62-330.301(2)	"Irrevocable Letter of Credit to Demonstrate Financial Assurance for Mitigation" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02473]

Form 62-330.301(3)	"Standby Trust Fund Agreement to Demonstrate Financial Assurance for Mitigation" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02474]
Form 62-330.301(4)	"Trust Fund Agreement to Demonstrate Financial Assurance for Mitigation" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02477]
Form 62-330.301(5)	"Escrow Agreement" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02476]
Form 62-330.301(6)	"Guarantee Bond To Demonstrate Financial Assurance for Mitigation" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02488]
Form 62-330.301(8)	"Deed of Conservation Easement, Standard" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02489]
Form 62-330.301(9)	"Deed of Conservation Easement, Standard, With Third Party Beneficiary Rights" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02490]
Form 62-330.301(10)	"Deed of Conservation Easement – Passive Recreational Uses" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02491]
Form 62-330.301(11)	"Deed of Conservation Easement – Riparian Uses" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02492]
Form 62-330.301(12)	"Deed of Conservation Easement for Local Governments" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02493]
Form 62-330.301(13)	"Deed of Conservation Easement with Third Party Beneficiary Rights to the U.S. Army Corps of Engineers" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02494]
Form 62-330.301(14)	"Declaration of Restrictive Covenants" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02495]
Form 62-330.301(15)	"Declaration of Restrictive Covenants –Insert" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02496]
Form 62-330.301(16)	"Temporary Easement for Construction Access" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02497]
Form 62-330.301(17)	"Permanent Access Easement" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02498]
Form 62-330.301(18)	"Joint Deed of Conservation Easement – Standard (within Broward County)," [http://www.flrules.org/Gateway/reference.asp?No=Ref-09377]
Form 62-330.301(19)	"Joint Deed of Conservation Easement — Third Party Beneficiary Rights (within Broward County)," [http://www.flrules.org/Gateway/reference.asp?No=Ref-09378]
Form 62-330.301(20)	"Joint Deed of Conservation Easement — Passive Recreational Uses (within Broward County)," [http://www.flrules.org/Gateway/reference.asp?No=Ref-09379]
Form 62-330.301(21)	"Joint Deed of Conservation Easement — Riparian Uses (within Broward County)," [http://www.flrules.org/Gateway/reference.asp?No=Ref-09380]
Form 62-330.301(22)	"Joint Deed of Conservation Easement — Local Governments (within Broward County)," [http://www.flrules.org/Gateway/reference.asp?No=Ref-09381]
Form 62-330.301(23)	"Joint Deed of Conservation Easement — Third Party Beneficiary Rights to the U.S. Army Corps of Engineers (within Broward County)," [http://www.flrules.org/Gateway/reference.asp?No=Ref-09382]
Form 62-330.301(24)	"Deed of Conservation Easement for Mitigation Banks – Third Party Beneficiary Rights to the U.S. Army Corps of Engineers," [http://www.flrules.org/Gateway/reference.asp?No=Ref-09383]

Form 62-330.301(25)	"Dam System Information" [http://www.flrules.org/Gateway/reference.asp?No=Ref-XXXXX]
Form 62-330.301(26)	"Certification of Financial Capability for Perpetual Operations and Maintenance Entities" [http://www.flrules.org/Gateway/reference.asp?No=Ref-XXXXX]
Form 62-330.310(1)	"As-Built Certification and Request for Conversion to Operation Phase" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02499]
Form 62-330.310(2)	"Request For Transfer of Environmental Resource Permit to the Perpetual Operation and Maintenance Entity" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02500]
Form 62-330.310(3)	"Construction Completion and Inspection Certification for Activities Associated With a Private Single-Family Dwelling Unit" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02501]
Form 62-330.311(1)	"Operation and Maintenance Inspection Certification" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02502]
Form 62-330.311(2)	"Regional Stormwater Management System Annual Report" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02503]
Form 62-330.311(3)	"Inspection Checklists" [https://www.flrules.org/Gateway/reference.asp?No=Ref-XXXXX]
Form 62-330.311(4)	"Condition Assessment Report" [https://www.flrules.org/Gateway/reference.asp?No=Ref-XXXXX]
Form 62-330.340(1)	"Request to Transfer Environmental Resource Permit and/or State 404 Program Permit" [https://www.flrules.org/Gateway/reference.asp?No=Ref-12039]
Form 62-330.350(1)	"Construction Commencement Notice" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02505]
Form 62-330.360(1)	"Emergency Field Authorization" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02506]
Form 62-330.402(1)	"Notice of Intent to Use an Environmental Resource and/or State 404 Program General Permit" [https://www.flrules.org/Gateway/reference.asp?No=Ref-12040]
Form 62-330.417(1)	"Agreement to Maintain Public Access" [http://www.flrules.org/Gateway/reference.asp?No=Ref-02508]
Form 62-330.417(2)	"Agreement to Maintain Public Access and Operate Stormwater System" [https://www.flrules.org/Gateway/reference.asp?No=Ref-02509]

All forms are listed by rule number, which is also the form number, and with the subject title and effective date. Copies of forms may be obtained from the above Internet links, or from any local district or branch office of the Agencies (see subsection 62-330.010(5), F.A.C., and Appendix A).

APPENDIX D

PROCESSING FEES

PROCESSING FEES REQUIRED FOR APPLICATIONS, NOTICES, AND PETITIONS SUBMITTED TO THE AGENCIES ARE ACCESSIBLE AT:

- Submittals to the Department or the Northwest Florida Water Management District — Rule 62-4.050(4)(h) , F.A.C. [https://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-4]

- Submittals to the Suwannee River Water Management District — Rule 40B-1.706, F.A.C. [https://www.flrules.org/Gateway/reference.asp?No=Ref-02534]

- Submittals to the St. Johns River Water Management District — Rule 40C-1.603, F.A.C. [https://www.flrules.org/Gateway/reference.asp?No=Ref-02535]

- Submittals to the Southwest Florida Water Management District — Rule 40D-1.607, F.A.C. [https://www.flrules.org/Gateway/reference.asp?No=Ref-02536]

- Submittals to the South Florida Water Management District — Rule 40E-1.607, F.A.C. [https://www.flrules.org/Gateway/reference.asp?No=Ref-02537]

These rules are incorporated by reference in Rule 62-330.071, F.A.C.

For applications, notices, or petitions that are the responsibility of a local government delegated to implement Chapter 62-330, F.A.C., in accordance with Section 373.441, F.S., the processing fee shall be submitted to the local government in accordance with the fee schedule of the local government as authorized in the Delegation Agreement between the Department and the local government incorporated by reference in Chapter 62-113, F.A.C.

- Broward County - http://www.broward.org//Environment/Engineering/Pages/Default.aspx

- Hillsborough County - http://www.epchc.org/

APPENDIX E

OPERATING AGREEMENT BETWEEN JACKSONVILLE DISTRICT USACE, DEP, AND ALL WMDS

[Appendices E, F, G, H, I, J, K, L, M, N, and O are located in a separate document because of size; title pages are included here because they are all part of Applicant's Handbook, Volume I]

APPENDIX F

Bald and Golden Eagle Protection Act

APPENDIX G

USFWS Habitat Management Guidelines for the Wood Stork in the Southeast Region

APPENDIX H

National Bald Eagle Management Guidelines

APPENDIX I

Mine Stormwater Management Systems

APPENDIX J

Chapter 62-340, F.A.C. Data Form Guide

APPENDIX K

Chapter 62-340, F.A.C. Data Form Instructions

APPENDIX L

Additional Criteria for Dam Systems

APPENDIX M

Rainfall Criteria

APPENDIX N

Mean Annual Runoff Coefficients (ROC Value) as a Function of DCIA Percentage and Non-DCIA Curve Number

APPENDIX O

Traditional BMP Treatment Efficiencies

OPERATING AGREEMENT BETWEEN THE JACKSONVILLE DISTRICT OF THE U.S. ARMY CORPS OF ENGINEERS, THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT, THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT, THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, AND THE SUWANNEE RIVER WATER MANAGEMENT DISTRICT CONCERNING REGULATORY PROGRAMS FOR ACTIVITIES IN WETLANDS AND OTHER SURFACE WATERS, INCLUDING WATERS OF THE UNITED STATES

I. PARTIES, PURPOSE AND GOALS

A. The Parties

The Parties to this Agreement are the Jacksonville District of the United States Army Corps of Engineers (Corps), Florida Department of Environmental Protection (Department), Northwest Florida Water Management District (NWFWMD), South Florida Water Management District (SFWMD), St. Johns River Water Management District (SJRWMD), Southwest Florida Water Management District (SWFWMD), and Suwannee River Water Management District (SRWMD) (collectively referred to as "Districts"). Where the Department or a District has delegated responsibilities to a local government in accordance with section 373.441, Florida Statutes (F.S.), this Agreement shall also apply to those local governments that have been delegated such authority as of the effective date of this Agreement.

B. Purpose

The purpose of this Agreement is to coordinate the permitting, compliance and enforcement programs of the Parties concerning regulation of activities that affect waters of the United States (WOUS) under the jurisdiction of the Corps, and wetlands and other surface waters under the jurisdiction of the Department or the Districts within the state of Florida. This Agreement shall apply to Department of the Army permits ("DA Permits") issued by the Corps pursuant to Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899 or Section 103 of the Marine Protection, Research and Sanctuaries Act and to permits issued by the Districts or the Department pursuant to part IV of chapter 373, F.S. ("State permits"). This Agreement describes the interaction between the Parties and is subject to the respective laws and implementing regulations and policies of the Parties.

This Agreement supersedes the Agreement entered on November 30, 1998, entitled "Operating Agreement Between the U.S. Army Corps of Engineers, the Florida Department of Environmental Protection, the South Florida Water Management District, the St. Johns River Water Management District, the Southwest Florida Water Management District, and the Suwannee River Water Management District Concerning Regulatory Programs for Activities in Wetlands

and Other Surface Waters."

C. Goals

It is a goal of the Parties to this Agreement to effectuate efficient, streamlined regulatory programs that govern activities affecting wetlands and other surface waters, including jurisdictional WOUS. Towards this goal, the Parties have established joint application forms and agree, where possible, to coordinate the distribution and review of information received during the permit application review process. Other streamlining measures to be explored and further developed by the Parties include joint field inspections and pre-application meetings, coordinated, complementary enforcement efforts, and the Corps's state programmatic and regional general permits. Additionally, in order to further streamline the permitting process, the agencies agree to continue to jointly review the wetland delineation methodologies of the state and the Corps to identify any differences and explore ways to further resolve or overcome these differences. Further, the Parties may explore methods to integrate the principles of ecosystem management within their existing legal authority in order to achieve more effective environmental protection.

II. WATER QUALITY CERTIFICATION

By letter dated January 15, 1998, to the Secretary of the Department of Environmental Protection, the Governor of the State of Florida, under the authority in 33 U.S.C., Sections 1341 and 1362 (the Clean Water Act), and 40 C.F.R. 121.1(e), designated the Department as the agency responsible for certifying compliance with applicable state water quality standards for federal licenses or permits issued by the Corps under Section 404 of the Clean Water Act, 33 U.S.C. 1344. That letter granted the Department the authority to issue, deny, or waive certification of compliance with water quality standards, the authority to identify categories of activities for which water quality certification is waived, and the authority to establish categories of State permits or other authorizations for which the issuance (or denial) of the permit or authorization constitutes a certification (or denial of certification) that the permitted or authorized activity complies with (or fails to comply with) applicable state water quality standards. By letter dated February 2, 1998, to the Administrator of the Environmental Protection Agency, the Secretary of the Department of Environmental Protection, as delegated by the Governor of the State of Florida, designated certain permits under part IV of chapter 373, F.S., and other authorizations as constituting state certification of compliance with state water quality standards unless the permit or other authorization specifically states otherwise, established categories of activities for which water quality certification is waived, and delegated concurrent authority to issue, deny or waive water quality certifications to a District created under section 373.069, F.S., or to the head of a county, municipality or local government local pollution control program where such county, municipality, or local government pollution control program has received delegation of the permitting authority from the Department or a District under section 373.441, F.S. In accordance with these letters, the Parties agree to the following regarding water quality certification.

A. Grants or Waivers of Water Quality Certification

1. Each of the following will constitute the granting of water quality certification by the Department or Districts, unless a State permit is issued pursuant to the net improvement provisions for water quality provided by section 373.414(1)(b), F.S., or unless otherwise specifically stated in the State permit or authorization.

   (a) Noticed general environmental resource permits and wetland resource general permits under part IV of chapter 373, F.S.

   (b) Standard, general, standard general, individual, or conceptual approval environmental resource permits, and individual wetland resource permits issued under part IV of chapter 373, F.S.

   (c) Management and storage of surface waters permits for agricultural activities or agricultural water management systems issued under part IV of chapter 373, F.S.

   (d) Joint coastal permits issued under section 161.055 and part IV of chapter 373, F.S.

   (e) Individual and conceptual mitigation bank permits issued under part IV of chapter 373, F.S.

   (f) A written final order granting “certification" under one of the following siting acts by the Governor and Cabinet as the Siting Board, the Florida Land and Water Adjudicatory Commission, or by the Department of Environmental Protection, as appropriate:

      (1) The Florida Electric Power Plant Siting Act, sections 403.501- .519, F.S. (2011), as amended;

      (2) The Florida Transmission Line Siting Act, sections 403.501 - .5365, F.S., together with sections 403.537-.539, F.S. (2011), as amended; or

      (3) The Natural Gas Transmission Pipeline Siting Act, sections 403.9401-.9425, F.S. (2011), as amended.

   (g) Consent decrees, orders, or agreements issued by the Department, a District, or a delegated local government under section 373.441, F.S. (hereinafter the term “Department or District’ shall also include local governments delegated in accordance with Section 373.441, F.S.), where such consent decree, order, or agreement authorizes activities which would otherwise require a permit under part IV of chapter 373, F.S.

2. Water quality certification will be considered waived for the following:

(a) Activities, other than agricultural activities or agricultural water management systems, exempt by rule or statute from the requirement to obtain an environmental resource permit and a wetland resource permit under part IV of chapter 373, F.S., including activities that fall below permitting thresholds;

(b) Agricultural activities or agricultural water management systems exempt by rule or statute from the requirement to obtain an environmental resource permit and a management and storage of surface waters permit under part IV of chapter 373, F.S., including activities that fall below permitting thresholds;

(c) Activities permitted or authorized, as described in Sections II. A. 1(a) through (g), when the permit or authorization is issued pursuant to the net improvement provisions for water quality provided by paragraph 373.414(1)(b), F.S.;

(d) Activities permitted or authorized in Sections II. A. 1(a) through (g) when the permit or authorization expressly waives water quality certification.

B. Denial of Water Quality Certification

Unless otherwise stated in the denial document, the denial of the State permit or authorization, listed in Section II.A.1. of this Agreement shall constitute denial of the state water quality certification. Where a final Department or District action on an application for a permit listed in Section II.A.1. of this Agreement cannot be made within the time frames specified in Section II.C. of this Agreement and the application otherwise does not meet the criteria for issuance of a permit, the Department or District may deny water quality certification for the activity described in the permit application in order to meet the time clock requirements in Section II.C.

C. Time Frames

Once the Department or the District determines that an application for a permit listed under Section II.A.1. of this Agreement is complete, the Department or District shall have 365 days to act on the certification, or the certification shall be considered waived.

D. Corps Nationwide Permits

For nationwide permits that have received water quality certification by the Department, or where water quality certification has been waived by the Department or District, no individual water quality certification is necessary. For those Corps nationwide permits that were conditioned upon individual review of the water quality certification by the Department or District, or that have been denied water quality certification by the Department or District, state water quality certification for an individual proposed activity shall be made in accordance with

Sections II. A - C.

III. COASTAL ZONE CONSISTENCY CONCURRENCE (CZCC)

In accordance with section 373.428, F.S., final agency action by the Department or District on a permit application submitted under part IV of chapter 373, F.S., that is subject to a consistency review under section 380.23, F.S., shall constitute the state's determination as to whether the activity is consistent with the federally approved Coastal Management Program. The Parties agree to the following procedures regarding coastal zone consistency determinations.

A. Determination of Concurrence

The following will constitute a finding of concurrence with the state's coastal zone management program for the activity authorized thereby:

1. Noticed general environmental resource permits and wetland resource general permits under part IV of chapter 373, F.S.;

2. Standard, general, standard general, individual, or conceptual approval environmental resource permits and individual wetland resource permits issued under part IV of chapter 373, F.S.;

3. Joint coastal permits issued under section 161.055 and part IV of chapter 373, F.S.;

4. Individual and conceptual mitigation bank permits issued under section 161.055 and part IV of chapter 373, F.S.; and

5. Management and storage of surface waters permits for agricultural activities or agricultural water management systems issued under part IV of chapter 373, F.S.

B. Determination of Inconsistency

The denial of a permit listed in Section III. A. of this Agreement shall constitute a finding that the activity is inconsistent with the state's coastal zone management program.

C. Time Frames

The time frame for a coastal zone concurrence begins upon a determination by the Department or the District that an application for a permit listed in Section III.A. of this Agreement is complete. The coastal zone consistency decision must be made within 180 days after the application is considered complete by the Department or District and in accordance with the procedures in 15 C.F.R. 930

Subpart D. At the end of 180 days, if a determination of coastal zone consistency has not been made, concurrence will be conclusively presumed, unless the applicant and the Department or District have agreed to waive the 180-day time clock pursuant to 15 C.F.R. 930.60(b).

D. Corps Nationwide Permits

For nationwide permits that have been determined to be consistent with the state's coastal zone management program, no individual coastal zone consistency concurrence determination is necessary. For those Corps nationwide permits where consistency with the state coastal zone management program is conditioned upon individual review of the coastal zone management consistency by the state of Florida, or has been denied by Florida, the final consistency concurrence determination for a proposed activity shall be made in accordance with Sections III A - C.

E. Exemptions

Pursuant to section 380.23(7), F.S., applications for federally permitted or licensed activities that qualify for an exemption under section 373.406 or 403.813(1), F.S., are not eligible to be reviewed for federal consistency with part IV of chapter 373, F.S. For purposes of this Agreement, the Corps or any designated Federal, State or local agency administering general permits on behalf of the Corps under 33 C.F.R. § 325.2(b)(2) may presume CZCC by operation of Section 380.23(7), F.S., for such exempt activities, provided the activity receives the applicable authorization to use and occupy state-owned submerged lands under chapter 253, F.S., and, as applicable, chapter 258, F.S., and the rules of the Florida Administrative Code adopted thereunder. For purposes of this agreement, the Corps or any designated Federal, State or local agency administering general permits on behalf of the Corps shall not be precluded from acting on the DA permit before the applicable authorization under chapter 253, F.S., and, as applicable, chapter 258, F.S., is obtained or granted, because it is understood such authorization must be obtained prior to persons using or occupying state-owned submerged lands.

IV. PERMIT APPLICATION COORDINATION

A. Joint Application Forms

The Parties have developed comprehensive, integrated joint permit application forms to initiate processing of permit applications required by each of the Parties. For activities that require a DA Permit and an environmental resource permit under part IV of chapter 373, F.S., the "Joint Application for Environmental Resource Permit/Authorization to Use State Lands/Federal Dredge and Fill Permit," the "Application for a Joint Coastal Permit," or the "Joint Application Forms and Instructions for Wetland Resource Alterations (Dredging & Filling) in the Waters of Florida" will be used. For activities that require a DA Permit and a wetland resource permit under the provisions of Section 373.4145(6) or

373.414(11) - (16), F.S., the "Joint Application For Works in the Waters of Florida" and the "Notice of Intent to Construct Works Pursuant to a Wetland Resource General Permit" will be used.

B. Processing of Applications

Except as provided below for E-permitting, for activities that do not qualify for processing as "green" under the State Programmatic General Permit, once a joint application, a request for permit modification, or a request for verification of exempt status is submitted by an applicant to the Department or District, the responsible agency (in accordance with the division of responsibilities in the Operating Agreements in effect between the Department and Districts) will, forward the following information to the Corps office with responsibility for processing the corresponding DA Permit application. All forwarded materials will include a Department or District application processing number

1. Forwarding Received Applications;

   Within five working days of receipt, the Department or District, as applicable, will forward to the Corps, either by mail or electronically via a mutually agreed upon protocol:

   (a) For WRP applications, a copy of the application, all submitted maps, drawings, and any other information accompanying the application or request;

   (b) For ERP applications, including mitigation banks, that have one or more of the following items provided or identified, one copy of the Notice of Receipt of the Application (Section C of the Joint Application) with its accompanying maps, drawings and any other information accompanying the application or request:

      (1) A completed Corps' Data Entry Sheet;

      (2) Any indication in the application that work is occurring, or appears to be occurring, in, on, or over wetlands and other surface waters.

      (3) A type of DA Permit or enforcement action is requested or is identified as pending, issued or denied at the location of the activity. The Corps number starts with an "SAJ" and the four digit year (prior to 1990 the number started with a two digit year); the number also may include staff initials.

      (4) An indication in the application that a member of the Corps has attended a pre-application meeting.

2. Forwarding of Applications and Material Received During Processing:

(a) For WRP and ERP applications, including mitigation banks, that meet the criteria of IV.B.1., the Department or District, as applicable, will, within five working days of sending to the applicant, forward one copy of all Requests for Additional Information (RAIs) to the Corps.

(b) For those applications not copied to the Corps in which either state or federal wetlands within the proposed activity or future phases are discovered during the evaluation, the Department or District, as applicable, will, within five working days of this discovery, forward the Corps one copy of the Notice of Receipt of the Application (Section C of the Joint Application) with its accompanying maps, drawings, and activity descriptions, together with a copy of any RAIs that have been generated.

(c) A copy of materials subsequently submitted. Individual Corps offices will coordinate with individual Department and District offices to identify the manner in which the Corps wants such documents forwarded to it.

3. Forwarding Modifications and Materials:

Within five working days of receipt of a modification request, the Department or District, as applicable, will forward to the Corps, either by mail or electronically via a mutually agreed upon protocol, a copy of the request with all attached maps, drawings, and any other information accompanying the request.

4. E-Permitting — For Department or District offices that electronically post applications, RAIs, modifications, and related materials to the Internet, an .ftp site, or another site accessible to the Corps, the Department or District shall first coordinate with the Corps to ensure the electronic posting procedure is compatible with the needs of the Corps. If the Department or the District's electronic posting procedure is not compatible with the Corps's requirements, the Department or District shall continue to mail materials to the Corps.

5. In those cases where the Corps receives a copy of the joint application, an application to modify a permit, a notice to use a noticed general permit, a request to verify qualification for an exemption, or a request to verify that an activity does not require a permit directly from an applicant, the Corps shall retain one copy of the application and all accompanying materials and send all other copies and materials to the appropriate office of the Department or District. The Corps shall include its processing number with this information.

6. The Department or District shall not be obligated to forward documents or materials to the Corps that are confidential under chapter 119, F.S. In such cases the Corps will request the applicant, permittee, or sponsor to provide such information directly to the Corps as needed.

7. In those cases where the Corps has made a "no permit required" (NPR) determination on an application that is under review by the Department or District,

the Corps will furnish a copy of the determination to the Department or District. The Corps will include the applicant's name, location, brief project name/description, and, if known, the Department or District application file number. The Department or District will no longer be required to provide information to the Corps subsequent to receiving this notification unless the project is modified to include additional impacts to wetlands or other surface waters.

C. Mitigation Bank and In-lieu Fee Review

1. Interagency Review Team

Interagency review of mitigation bank applications and establishment of in-lieu fee programs is required by 33 C.F.R. § 332.8(b) and serves to facilitate a more efficient and effective review of such applications. The Corps's District Engineer will establish an Interagency Review Team (IRT) to review documentation for the establishment and management of mitigation banks and in-lieu fee programs. He or his designated representative serves as Chair of the IRT. In cases where a mitigation bank or in-lieu fee program involves an activity that is proposed to satisfy state statutory requirements, it may be appropriate for either the Department or District to serve as Co-Chair of the IRT. For purposes of this Agreement, the "administering agency" is defined as a member of either the Department or the applicable District. The IRT may include representatives from tribal, state, and local regulatory and resource agencies when such agencies have authorities or mandates directly affecting, or affected by, the establishment, operation, or use of the mitigation bank or in-lieu fee program. The District Engineer will give full consideration to any comments and advice received within time limits specified at 33 C.F.R. § 332.8. The Department and the Districts will give full consideration to any comments and advice received within the time limits specified in chapter 120, F.S. The District Engineer retains final authority for the approval of the instruments and other documentation required by the Corps. The Department and the Districts retain final authority for the approval of state permits or other documentation required by the state.

2. Team Coordination

An application to the Department or Districts for a mitigation bank shall be coordinated with the Corps in accordance with the Permit Application Coordination section IV. B. of this Agreement. When the Corps receives a mitigation bank or in-lieu-fee prospectus or draft prospectus, copies shall be provided to the Department or applicable District, along with other IRT members. In addition, the IRT shall coordinate, review, and take action on the items required by 33 C.F.R. § 332.8.

D. Distribution of Agency Actions

For applications that meet the criteria of section IV.B.1, IV.B.2, or IV.B.3 above,

the Department or District, as applicable, will, within five working days of sending to the applicant/permittee, forward to the Corps a copy of all final permitting actions, including copies of permits, formal or major permit modifications, permit denials, application withdrawals, exemption verification letters, and the cover letter for formal determinations.

The Corps shall forward to the Department or Districts, as appropriate, copies of notices of intent to issue standard permits, final actions on standard permits, and "no permit required" determinations within five working days of taking such actions.

V. MITIGATION FINANCIAL ASSURANCE

A. When the type and amount of the financial assurance obtained or required by the Department or District for compensatory mitigation, including mitigation banks, as part of a permit issued under part IV of chapter 373, F.S., adequately addresses the financial assurance requirements of the Corps, the Corps may determine that additional financial assurance is not necessary for that compensatory mitigation project or mitigation bank.

B. The Corps's concurrence with the Department's or District's financial assurance mechanism shall be subject to the applicant, sponsor, or permittee agreeing to the following requirements:

1. The Corps shall notify the Department or District in all cases where the Corps is relying on the financial assurance mechanism accepted by the Department or District so that the Department or District can coordinate with the Corps prior to modification, amendment, partial release, termination, or revocation of the financial assurance instrument.

2. The financial assurance instrument shall be in place prior to commencement of the permitted activity.

3. Disbursements from these financial assurance instruments can only be made with direction and approval of the Department or District as applicable after prior notice has been given to the Corps in accordance with 4., below.

4. The Corps permit shall require that the permittee shall provide the Corps written notice at least 120 days in advance of any termination or revocation of any financial assurance instrument by the financial institution, and notice at least 30 days in advance of modifications, amendments, and partial releases.

C. If, at any time, the Corps determines that the type or amount of the financial assurance mechanism being proposed for a State permit under part IV of chapter 373, F.S., is not sufficient to meet the Corps' requirements for a DA Permit or a mitigation banking instrument or in-lieu fee instrument and those requirements are

within the scope of such state permit, the Corps may require the applicant, sponsor, or permittee for the DA Permit to request that the Department or District modify the permit under part IV of chapter 373, F.S., as applicable, to require an additional amount or alternative type of financial assurance mechanism to meet the Corps' requirements. In such a case:

1. The financial assurance instrument shall be in place prior to commencing the permitted activity;

2. Prior to any disbursements under the financial assurance instruments, the Department or District shall coordinate with the Corps at least 30 days prior to such disbursement being made, but the final decision on the disbursement shall be made by the Department or District;

3. Notification of such disbursements shall be provided to the Corps within 10 days after the disbursement;

4. The Corps permit shall require that the permittee shall provide the Corps written notice at least 120 days in advance of any termination or revocation of any financial assurance instrument by the financial institution, and notice at least 30 days in advance of modifications, amendments, and partial releases.

Notwithstanding the above, the Department or District is not obligated to accept financial assurance mechanisms that are not required to satisfy the permit requirements under part IV of chapter 373, F.S.

D. If the Corps requires an alternative type or an additional amount of financial assurance to meet Corps mitigation requirements outside of the scope of the State permit, the Department or District is not obligated to be a party to any instrument related to that assurance.

VI. MITIGATION SITE PROTECTION

Long-term protection of a mitigation site or preservation to prevent secondary impacts for a State permit, mitigation bank instrument, or as the result of an enforcement action under part IV of chapter 373, F.S., may be provided through the conveyance of a conservation easement or restrictive covenants in accordance with Section 704.06,
F. S., or by transfer of title to the Department or District (hereinafter all referred to as "site protection instrument").

In accordance with 33 C.F.R. § 332.7(a)(1), when such a site protection instrument meets the Corps' requirements for mitigation site protection for the corresponding DA Permit for the same activities, the Corps may agree that the site protection instrument granted to the Department or District provides sufficient site protection, and not require an applicant, sponsor, or permittee to provide an amended, additional, or duplicative mitigation site protection instrument. When the Department or District accepts a site protection instrument in the form of a restrictive covenant or deed

restriction, the Corps may determine that an applicant needs to execute a conservation easement.

A. When the Department or District agrees to hold or amend a site protection instrument which provides rights to the Corps, the Department and District agree to accept a site protection instrument containing, or that is amended to contain, the following language, unless alternative language is needed on a case-specific basis:

> "WHEREAS, the U.S. Army Corps of Engineers Permit No._____(Corps Permit) authorizes certain activities in the waters of the United States and requires this site protection instrument over the lands identified in Exhibit XX as mitigation for such activities;
>
> "Rights of the U.S. Army Corps of Engineers ("Corps"): The Corps, as a third party beneficiary, shall have the right to enforce the terms and conditions of the site protection instrument, including:
>
> "1. The right to take action to preserve and protect the environmental value of the Property;
>
> "2. The right to prevent any activity on the Property that is inconsistent with the purpose of this instrument, and to require the restoration of areas or features of the Property that may be damaged by any inconsistent activity;
>
> "3. The right to enter upon and inspect the Property in a reasonable manner and at reasonable times to determine if Grantor or its successors and assigns are complying with the covenants and prohibitions contained in this instrument;
>
> "4. The right to enforce this instrument by injunction or proceed at law or in equity to enforce the provisions of this instrument and the covenants set forth herein, to prevent the occurrence of any of the prohibited activities hereinafter set forth, and the right to require Grantor, or its successors and assigns, to restore such areas or features of the Property that may be damaged by unauthorized activities; and
>
> "5. The Grantor, including their successors or assigns, shall provide the Corps at least 60 days advance notice in writing before any action is taken to amend, alter, release, or revoke this instrument. The Grantee shall provide reasonable notice and an opportunity to comment or object to the release or amendment to the U.S. Army Corps of Engineers. The Grantee shall consider any comments or objections from the U.S. Army Corps of Engineers when making the final decision to release or amend such a conservation easement."

B. When the Corps requires additional protection or additional mitigation lands for an

activity that has a corresponding State permit, mitigation bank instrument, or enforcement instrument under part IV of chapter 373, F.S., and the Department or the District is willing to accept the additional or amended site protection instrument, the instrument shall include the following additional provision:

> "The Grantor, including their successors or assigns, shall provide the Corps at least 60 days advance notice in writing before any action is taken to amend, alter, release, or revoke this instrument. The Grantee shall provide reasonable notice and an opportunity to comment or object to the release or amendment to the U.S. Army Corps of Engineers. The Corps, as third party beneficiary, must approve any amendment, alteration, release or revocation of this instrument, and must approve any proposed structures, work, or activities on the Property that require approval by the Grantee."

C. When the Department or District does not agree or is unable to modify the permit, mitigation bank instrument, or enforcement instrument under part IV of chapter 373, F.S., or any existing site protection instrument to include the additional mitigation land needed to meet the Corps's requirements, the Department or District may agree to accept a separate mitigation site protection instrument over the additional land. If the Department or District agrees to accept a separate mitigation site protection instrument over the additional land, the Department or District agree that the instrument shall be accepted with the following additional provision:

> "The Grantor, including their successors or assigns, shall provide the Corps at least 60 days advance notice in writing before any action is taken to amend, alter, release, or revoke this instrument. The Grantee shall provide reasonable notice and an opportunity to comment or object to the release or amendment to the U.S. Army Corps of Engineers. The Corps, as third party beneficiary, must approve any amendment, alteration, release or revocation of this instrument, and must approve any proposed structures, work, or activities on the Property that require approval by the Grantee."

D. In any case where the Department or District agrees to hold or amend a site protection instrument which provides rights to the Corps, as described above, the Corps shall notify the applicable Department or District office within 10 days of any discovery of a violation of the terms and conditions of the site protection instrument, and shall coordinate with the applicable Department or District office prior to requiring restoration of areas or features of the Property that were damaged by unauthorized activities so that any restoration activities receive applicable authorization required under part IV of chapter 373, F.S.

E. In the event a site protection instrument has already been recorded on behalf of the Department or District for the same activity that will be authorized under a corresponding DA Permit or mitigation bank or in-lieu fee instrument that does not include the "Rights of the Corps" language in VILA., above, the Corps may require the applicant, permittee, or sponsor to request that the Department or District

modify their respective permit, mitigation bank instrument or enforcement instrument with its associated site protection instrument to include that language.

F. The Department and the District do not agree to accept a site protection instrument on behalf of the Corps when there is no corresponding permit under part IV of chapter 373, F.S., for the activity that is subject to a DA permit.

G. In all cases, the Corps shall not request an applicant, permittee, or sponsor to record any site protection instrument granted to the Department or District without first coordinating with and obtaining a letter of concurrence from the applicable office of the Department or District; however, final approval of this request may be required from the District Governing Board. Failure to obtain such written concurrence shall result in any such recorded site protection instrument being considered an invalid conveyance of the interest to the Department or District.

H. In any case when the Corps requires the applicant, permittee, or sponsor to obtain an additional site protection instrument, the Corps agrees to take responsibility for all negotiations with the applicant, permittee, or sponsor associated with processing and preparation of the site protection instrument required by the Corps, including review of the title work. The Corps also shall take responsibility for all steps required to have the site protection instrument recorded, including any subsequent amendments or releases of any site protection instrument previously recorded on behalf of the Department or District, and for sending an original copy of the recorded site protection instrument, and any modifications and releases thereto, to the applicable Department or District office that serves the area in which the site protection instrument is recorded. The Corps also agrees to monitor for compliance and pursue needed enforcement, including litigation, to enforce the terms and conditions of the site protection instrument obtained over any lands that were not required to be protected under the permit, mitigation bank instrument, or enforcement instrument under part IV of chapter 373, F.S.

I. The Parties agree to coordinate in the event compliance monitoring of the protected lands identifies the need for enforcement.

VII. COMPLIANCE AND ENFORCEMENT

Upon discovery of an unauthorized or non-compliant activity in WOUS, wetlands, or other surface waters, the Party discovering the activity will notify the appropriate Party to this Agreement regarding the unauthorized or non-compliant activity. The Parties may coordinate their enforcement activities when appropriate in order to maximize limited agency resources and encourage compliance. Regardless of any coordination that may occur, each Party will maintain independent enforcement authority and discretion.

VIII. INTERAGENCY MEETINGS

A. Permitting Meetings

Subject to fiscal or travel restrictions, each Party agrees to host interagency permitting meetings on a rotating basis. The time and place of all the meetings will be addressed at the beginning of each calendar year. Because interagency meetings between the Parties and other agencies can serve as a good forum to aid communication, exchange information, conduct pre-application meetings, or to resolve outstanding permitting issues, each Party will endeavor to have a representative attend all interagency meetings.

B. Enforcement Meetings

Subject to fiscal or travel restrictions, representatives of the Parties' enforcement staff shall endeavor to meet at least annually. If possible, the meeting should take place at Enforcement Workshops hosted by the Department or District, but local meetings in areas of operation are also appropriate and encouraged. The meeting should address issues related to implementation of section VII of this Agreement.

C. Cross Training

The Parties agree to provide opportunities, when possible, for cross-training. This may take the form of: providing spaces in formally scheduled training courses; providing training sessions at each others' training events; providing personnel and opportunities for cross-training through developmental assignments; sharing interpretations of agency rules and procedures; and performing joint formal and informal training on other subjects of mutual interest.

IX. ELECTRONIC COORDINATION

To the extent practicable, the Parties agree to use electronic media for the transfer of data to facilitate information exchange. The Parties agree to participate in future efforts to enhance electronic communication necessary to achieve their regulatory missions.

X. DELEGATED PROGRAMS

Where the Department or Districts delegate to a local government all or a portion of the permitting or enforcement authority under part IV of chapter 373, F.S., the delegation agreement shall include a provision that the local government shall be subject to all the terms and conditions of this Agreement, although the Corps, with the concurrence of the delegating agency, may allow deviations from these terms and conditions.

XI. EFFECTIVE DATE

This Agreement shall take effect upon execution by all the Parties. In witness whereof, the Parties hereto have caused this Agreement to be executed by their duly authorized representatives on the latest day and year provided below.

XII. TERMINATION

Any Party who wishes to terminate this Agreement with or without cause shall provide 60 days prior written notice to the other Parties. The notice submitted by the Corps shall be signed by the District Engineer of the Jacksonville District. The notice submitted by a District shall be signed by the Chair of the Governing Board. The notice submitted by the Department shall be signed by the Secretary. By mutual agreement of all Parties, the 60 day notice period may be reduced. Within 30 days of a notice of intent to terminate this Agreement, all Parties shall make good faith efforts to preserve the Agreement by attempting to resolve any basis for the termination. This Agreement also may be terminated by future agreements between the Parties that whi~~ch~~ expressly supersede this Agreement.

Herschel T. Vinyard Jr.
Secretary
Florida Department of
Environmental Protection

9/4/12
Date

Lad Daniels
Chair, Governing Board
St. Johns River Water
Management District

4/10/12
Date

Joe Collins
Chair, Governing Board
South Florida Water
Management District

4/12/2012
Date

Donald J. Quincey, Jr.
Chair, Governing Board
Suwannee River Water
Management District

8-14-12
Date

Hugh M. Gramling
Vice Chair, Governing Board
Southwest Florida Water
Management District

5/22/12
Date

Alan M. Dodd
Colonel, U. S. Army
District Commander

9-4-12
Date

George Roberts
Chair, Governing Board
Northwest Florida Water
Management District

4/30/12
Date

APPENDIX F

Bald and Golden Eagle Protection Act

16 USC 668-668d
Bald and Golden Eagle Protection Act

SUBCHAPTER II—PROTECTION OF BALD AND GOLDEN EAGLES

Release date: 2004-04-30

§ 668. Bald and golden eagles

(a) Prohibited acts; criminal penalties
Whoever, within the United States or any place subject to the jurisdiction thereof, without being permitted to do so as provided in this subchapter, shall knowingly, or with wanton disregard for the consequences of his act take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or in any manner any bald eagle commonly known as the American eagle or any golden eagle, alive or dead, or any part, nest, or egg thereof of the foregoing eagles, or whoever violates any permit or regulation issued pursuant to this subchapter, shall be fined not more than $5,000 or imprisoned not more than one year or both: Provided, That in the case of a second or subsequent conviction for a violation of this section committed after October 23, 1972, such person shall be fined not more than $10,000 or imprisoned not more than two years, or both: Provided further, That the commission of each taking or other act prohibited by this section with respect to a bald or golden eagle shall constitute a separate violation of this section: Provided further, That one-half of any such fine, but not to exceed $2,500, shall be paid to the person or persons giving information which leads to conviction: Provided further, That nothing herein shall be construed to prohibit possession or transportation of any bald eagle, alive or dead, or any part, nest, or egg thereof, lawfully taken prior to June 8, 1940, and that nothing herein shall be construed to prohibit possession or transportation of any golden eagle, alive or dead, or any part, nest, or egg thereof, lawfully taken prior to the addition to this subchapter of the provisions relating to preservation of the golden eagle.
(b) Civil penalties
Whoever, within the United States or any place subject to the jurisdiction thereof, without being permitted to do so as provided in this subchapter, shall take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or in any manner, any bald eagle, commonly known as the American eagle, or any golden eagle, alive or dead, or any part, nest, or egg thereof of the foregoing eagles, or whoever violates any permit or regulation issued pursuant to this subchapter, may be assessed a civil penalty by the Secretary of not more than $5,000 for each such violation. Each violation shall be a separate offense. No penalty shall be assessed unless such person is given notice and opportunity for a hearing with respect to such violation. In determining the amount of the penalty, the gravity of the violation, and the demonstrated good faith of the person charged shall be considered by the Secretary. For good cause shown, the Secretary may remit or mitigate any such penalty. Upon any failure to pay the penalty assessed under this section, the Secretary may request the Attorney General to institute a civil action in a district court of the United States for any district in which such person is found or resides or transacts business to collect the penalty and such court shall have jurisdiction to hear and decide any such action. In hearing any such action, the court must sustain the Secretary's action if supported by substantial evidence.
(c) Cancellation of grazing agreements
The head of any Federal agency who has issued a lease, license, permit, or other agreement authorizing the grazing of domestic livestock on Federal lands to any person who is convicted of a violation of this subchapter or of any permit or regulation issued hereunder may immediately cancel each such lease, license, permit, or other agreement. The United States shall not be liable for the payment of any compensation, reimbursement, or damages in connection with the cancellation of any lease, license, permit, or other agreement pursuant to

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this section.

§ 668a. Taking and using of the bald and golden eagle for scientific, exhibition, and religious purposes

Whenever, after investigation, the Secretary of the Interior shall determine that it is compatible with the preservation of the bald eagle or the golden eagle to permit the taking, possession, and transportation of specimens thereof for the scientific or exhibition purposes of public museums, scientific societies, and zoological parks, or for the religious purposes of Indian tribes, or that it is necessary to permit the taking of such eagles for the protection of wildlife or of agricultural or other interests in any particular locality, he may authorize the taking of such eagles pursuant to regulations which he is hereby authorized to prescribe: Provided, That on request of the Governor of any State, the Secretary of the Interior shall authorize the taking of golden eagles for the purpose of seasonally protecting domesticated flocks and herds in such State, in accordance with regulations established under the provisions of this section, in such part or parts of such State and for such periods as the Secretary determines to be necessary to protect such interests: Provided further, That bald eagles may not be taken for any purpose unless, prior to such taking, a permit to do so is procured from the Secretary of the Interior: Provided further, That the Secretary of the Interior, pursuant to such regulations as he may prescribe, may permit the taking, possession, and transportation of golden eagles for the purposes of falconry, except that only golden eagles which would be taken because of depredations on livestock or wildlife may be taken for purposes of falconry: Provided further, That the Secretary of the Interior, pursuant to such regulations as he may prescribe, may permit the taking of golden eagle nests which interfere with resource development or recovery operations.

§ 668b. Enforcement provisions

(a) Arrest; search; issuance and execution of warrants and process
Any employee of the Department of the Interior authorized by the Secretary of the Interior to enforce the provisions of this subchapter may, without warrant, arrest any person committing in his presence or view a violation of this subchapter or of any permit or regulations issued hereunder and take such person immediately for examination or trial before an officer or court of competent jurisdiction; may execute any warrant or other process issued by an officer or court of competent jurisdiction for the enforcement of the provisions of this subchapter; and may, with or without a warrant, as authorized by law, search any place. The Secretary of the Interior is authorized to enter into cooperative agreements with State fish and wildlife agencies or other appropriate State authorities to facilitate enforcement of this subchapter, and by said agreements to delegate such enforcement authority to State law enforcement personnel as he deems appropriate for effective enforcement of this subchapter. Any judge of any court established under the laws of the United States, and any United States magistrate judge may, within his respective jurisdiction, upon proper oath or affirmation showing probable cause, issue warrants in all such cases.
(b) Forfeiture
All bald or golden eagles, or parts, nests, or eggs thereof, taken, possessed, sold, purchased, bartered, offered for sale, purchase, or barter, transported, exported, or imported contrary to the provisions of this subchapter, or of any permit or regulation issued hereunder, and all guns, traps, nets, and other equipment, vessels, vehicles, aircraft, and other means of transportation used to aid in the taking, possessing, selling, purchasing, bartering, offering for sale, purchase, or barter, transporting, exporting, or importing of any bird, or part, nest, or egg thereof, in violation of this subchapter or of any permit or regulation issued hereunder shall be subject to forfeiture to the United States.
(c) Customs laws applied
All provisions of law relating to the seizure, forfeiture, and condemnation of a vessel for violation of the customs laws, the disposition of such vessel or the proceeds from the sale thereof, and the remission or mitigation of such forfeitures, shall apply to the seizures and forfeitures incurred, or alleged to have been incurred, under the provisions of this subchapter, insofar as such provisions of law are applicable and not

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inconsistent with the provisions of this subchapter: Provided, That all powers, rights, and duties conferred or imposed by the customs laws upon any officer or employee of the Treasury Department shall, for the purposes of this subchapter, be exercised or performed by the Secretary of the Interior or by such persons as he may designate.

§ 668c. Definitions

As used in this subchapter "whoever" includes also associations, partnerships, and corporations; "take" includes also pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb; "transport" includes also ship, convey, carry, or transport by any means whatever, and deliver or receive or cause to be delivered or received for such shipment, conveyance, carriage, or transportation.

§ 668d. Availability of appropriations for Migratory Bird Treaty Act

Moneys now or hereafter available to the Secretary of the Interior for the administration and enforcement of the Migratory Bird Treaty Act of July 3, 1918 [16 U.S.C. 703 et seq.], shall be equally available for the administration and enforcement of this subchapter.

APPENDIX G

USFWS Habitat Management Guidelines for the Wood Stork in the Southeast Region

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

B-1

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Prepared by

John C. Ogden
Acting Program Manager
Wildlife Research
Everglades National Park

for the

Southeast Region
U.S. Fish and Wildlife Service

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Cover design by
Florida Power & Light Company
Miami, Florida

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

A number of Federal and state laws and/or regulations prohibit, cumulatively, such acts as harrassing, disturbing, harming, molesting, pursuing, etc., wood storks, or destroying their nests (see Section VII). Although advisory in nature, these guidelines represent a biological interpretation of what would constitute violations of one or more of such prohibited acts. Their purpose is to mainain and/or improve the environmental conditions that are required for the survival and well-being of wood storks in the southeastern United States, and are designed essentially for application in wood stork/human activity conflicts (principally land development and human intrusion into stork use sites). The emphasis is to avoid or minimize detrimental human-related impacts on wood storks. These guidelines were prepared in consultations with state wildlife agencies and wood stork experts in the four southeastern states where the wood stork is listed as Endangered (Alabama, Florida, Georgia, South Carolina).

General

The wood stork is a gregarious species, which nests in colonies (rookeries), and roosts and feeds in flocks, often in association with other species of long-legged water birds. Storks that nest in the southeastern United States appear to represent a distinct population, separate from the nearest breeding population in Mexico. Storks in the southeastern U.S. population have recently (since 1980) nested in colonies scattered throughout Florida, and at several central-southern Georgia and coastal South Carolina sites. Banded and color-marked storks from central and southern Florida colonies have dispersed during non-breeding seasons as far north as southern Georgia, and the coastal counties in South Carolina and southeastern North Carolina, and as far west as central Alabama and northeastern Mississippi. Storks from a colony in south-central Georgia have wintered between southern Georgia and southern Florida. This U.S. nesting population of wood storks was listed as endangered by the U.S. Fish and Wildlife Service on February 28, 1984 (*Federal Register* 49(4):7332-7335).

Wood storks use freshwater and estuarine wetlands as feeding, nesting, and roosting sites. Although storks are not habitat specialists, their needs are exacting enough, and available habitat is limited enough, so that nesting success and the size of regional populations are closely regulated by year-to-year differences in the quality and quantity of suitable habitat. Storks are especially sensitive to environmental conditions at feeding sites; thus, birds may fly relatively long distances either daily or between regions annually, seeking adequate food resources.

All available evidence suggests that regional declines in wood stork numbers have been largely due to the loss or degradation of essential wetland habitat. An understanding of the qualities of good stork habitat should help to focus protection efforts on those sites

that are seasonally important to regional populations of wood storks. Characteristics of feeding, nesting, and roosting habitat, and management guidelines for each, are presented here by habitat type.

I. **Feeding habitat.**

A major reason for the wood stork decline has been the loss and degredation of feeding habitat. Storks are especially sensitive to any manipulation of a wetland site that results in either reduced amounts or changes in the timing of food availability.

Storks feed primarily (often almost exclusively) on small fish between 1 and 8 inches in length. Successful foraging sites are those where the water is between 2 and 15 inches deep. Good feeding conditions usually occur where water is relatively calm and uncluttered by dense thickets of aquatic vegetation. Often a dropping water level is necessary to concentrate fish at suitable densities. Conversely, a rise in water, especially when it occurs abruptly, disperses fish and reduces the value of a site as feeding habitat.

The types of wetland sites that provide good feeding conditions for storks include: drying marshes or stock ponds, shallow roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, and depressions in cypress heads or swamp sloughs. In fact, almost any shallow wetland depression where fish tend to become concentrated, either through local reproduction or the consequences of area drying, may be used by storks.

Nesting wood storks do most of their feeding in wetlands between 5 and 40 miles from the colony, and occasionally at distances as great as 75 miles. Within this colony foraging range and for the 110-150 day life of the colony, and depending on the size of the colony and the nature of the surrounding wetlands, anywhere from 50 to 200 different feeding sites may be used during the breeding season.

Non-breeding storks are free to travel much greater distances and remain in a region only for as long as sufficient food is available. Whether used by breeders or non-breeders, any single feeding site may at one time have small or large numbers of storks (1 to 100+), and be used for one to many days, depending on the quality and quantity of available food. Obviously, feeding sites used by relatively large numbers of storks, and/or frequently used areas, potentially are the more important sites necessary for the maintenance of a regional population of birds.

Differences between years in the seasonal distribution and amount of rainfall usually mean that storks will differ between years in where and when they feed. Successful nesting colonies are those that have a large number of feeding site options, including sites that may be suitable only in years of rainfall extremes. To maintain the wide range of feeding site options requires that many different wetlands, with both relatively short and long annual hydroperiods, be preserved. For example, protecting only the larger wetlands, or those with longer annual hydroperiods, will result in the eventual loss of smaller, seemingly less important wetlands. However, these small scale wetlands are crucial as the only available feeding sites during the wetter periods when the larger habitats are too deeply flooded to be used by storks.

II. Nesting habitat.

Wood storks nest in colonies, and will return to the same colony site for many years so long as that site and surrounding feeding habitat continue to supply the needs of the birds. Storks require between 110 and 150 days for the annual nesting cycle, from the period of courtship until the nestlings become independent. Nesting activity may begin as early as December or as late as March in southern Florida colonies, and between late February and April in colonies located between central Florida and South Carolina. Thus, full term colonies may be active until June-July in south Florida, and as late as July-August at more northern sites. Colony sites may also be used for roosting by storks during other times of the year.

Almost all recent nesting colonies in the southeastern U.S. have been located either in woody vegetation over standing water, or on islands surrounded by broad expanses of open water. The most dominant vegetation in swamp colonies has been cypress, although storks also nest in swamp hardwoods and willows. Nests in island colonies may be in more diverse vegetation, including mangroves (coastal), exotic species such as Australian pine (*Casuarina*) and Brazilian Pepper (*Schinus*), or in low thickets of cactus (*Opuntia*). Nests are usually located 15-75 feet above ground, but may be much lower, especially on island sites when vegetation is low.

Since at least the early 1970's, many colonies in the southeastern U.S. have been located in swamps where water has been impounded due to the construction of levees or roadways. Storks have also nested in dead and dying trees in flooded phosphate surface mines, or in low, woody vegetation on mounded, dredge islands. The use of these altered wetlands or completely "artificial" sites suggests that in some regions or years storks are unable to locate natural nesting habitat that is adequately flooded during the normal breeding season. The readiness with which storks will utilize water impoundments for nesting also suggests that colony sites could be intentionally created and maintained through long-term site management plans. Almost all impoundment sites used by storks become suitable for nesting only fortuitously, and therefore, these sites often do not remain available to storks for many years.

In addition to the irreversible impacts of drainage and destruction of nesting habitat, the greatest threats to colony sites are from human disturbance and predation. Nesting storks show some variation in the levels of human activity they will tolerate near a colony. In general, nesting storks are more tolerant of low levels of human activity near a colony when nests are high in trees than when they are low, and when nests contain partially or completely feathered young than during the period between nest construction and the early nestling period (adults still brooding). When adult storks are forced to leave their nests, eggs or downy young may die quickly (<20 minutes) when exposed to direct sun or rain.

Colonies located in flooded environments must remain flooded if they are to be successful. Often water is between 3 and 5 feet deep in successful colonies during the nesting season. Storks rarely form colonies, even in traditional nesting sites, when they are dry, and may abandon nests if sites become dry during the nesting period. Flooding in colonies may be most important as a defense against mammalian predators. Studies of stork colonies in Georgia and

Florida have shown high rates of raccoon predation when sites dried during the nesting period. A reasonably high water level in an active colony is also a deterrent against both human and domestic animal intrusions.

Although nesting wood storks usually do most feeding away from the colony site (>5 miles), considerable stork activity does occur close to the colony during two periods in the nesting cycle. Adult storks collect almost all nesting material in and near the colony, usually within 2500 feet. Newly fledged storks, near the end of the nesting cycle, spend from 1-4 weeks during the fledging process flying locally in the colony area, and perched in nearby trees or marshy spots on the ground. These birds return daily to their nests to be fed. It is essential that these fledging birds have little or no disturbance as far our as one-half mile within at least one or two quadrants from the colony. Both the adults, while collecting nesting material, and the inexperienced fledglings, do much low, flapping flight within this radius of the colony. At these times, storks potentially are much more likely to strike nearby towers or utility lines.

Colony sites are not necessarily used annually. Regional populations of storks shift nesting locations between years, in response to year-to-year differences in food resources. Thus, regional populations require a range of options for nesting sites, in order to successfully respond to food availability. Protection of colony sites should continue, therefore, for sites that are not used in a given year.

III. Roosting habitat.

Although wood storks tend to roost at sites that are similar to those used for nesting, they also use a wider range of site types for roosting than for nesting. Non-breeding storks, for example, may frequently change roosting sites in response to changing feeding locations, and in the process, are inclined to accept a broad range of relatively temporary roosting sites. Included in the list of frequently used roosting locations are cypress "heads" or swamps (not necessarily flooded if trees are tall), mangrove islands, expansive willow thickets or small, isolated willow "islands" in broad marshes, and on the ground either on levees or in open marshes.

Daily activity patterns at a roost vary depending on the status of the storks using the site. Non-breeding adults or immature birds may remain in roosts during major portions of some days. When storks are feeding close to a roost, they may remain on the feeding grounds until almost dark before making the short flight. Nesting storks traveling long distances (>40 miles) to feeding sites may roost at or near the latter, and return to the colony the next morning. Storks leaving roosts, especially when going long distances, tend to wait for mid-morning thermals to develop before departing.

IV. Management zones and guidelines for feeding sites.

To the maximum extent possible, feeding sites should be protected by adherence to the following protection zones and guidelines:

A. There should be no human intrusion into feeding sites when storks are present. Depending upon the amount of screening vegetation, human activity should be no closer than between 300 feet (where solid vegetation screens exist) and 750 feet (no vegetation screen).

B. Feeding sites should not be subjected to water management practices that alter traditional water levels or the seasonally normal drying patterns and rates. Sharp rises in water levels are especially disruptive to feeding storks.

C. The introduction of contaminants, fertilizers, or herbicides into wetlands that contain stork feeding sites should be avoided, especially those compounds that could adversely alter the diversity and numbers of native fishes, or that could substantially change the characteristics of aquatic vegetation. Increase in the density and height of emergent vegetation can degrade or destroy sites as feeding habitat.

D. Construction of tall towers (especially with guy wires) within three miles, or high power lines (especially across long stretches of open country) within one mile of major feeding sites should be avoided.

V. **Management zones and guidelines for nesting colonies.**

A. Primary zone: This is the most critical area, and must be managed according to recommended guidelines to insure that a colony site survives.

1. Size: The primary zone must extend between 1000 and 1500 feet in all directions from the actual colony boundaries when there are no visual or broad aquatic barriers, and never less than 500 feet even when there are strong visual or aquatic barriers. The exact width of the primary zone in each direction from the colony can vary within this range, depending on the amount of visual screen (tall trees) surrounding the colony, the amount of relatively deep, open water between the colony and the nearest human activity, and the nature of the nearest human activity. In general, storks forming new colonies are more tolerant of existing human activity, than they will be of new human activity that begins after the colony has formed.

2. Recommended Restrictions:

a. Any of the following activities within the primary zone, at any time of the year, are likely to be detrimental to the colony:

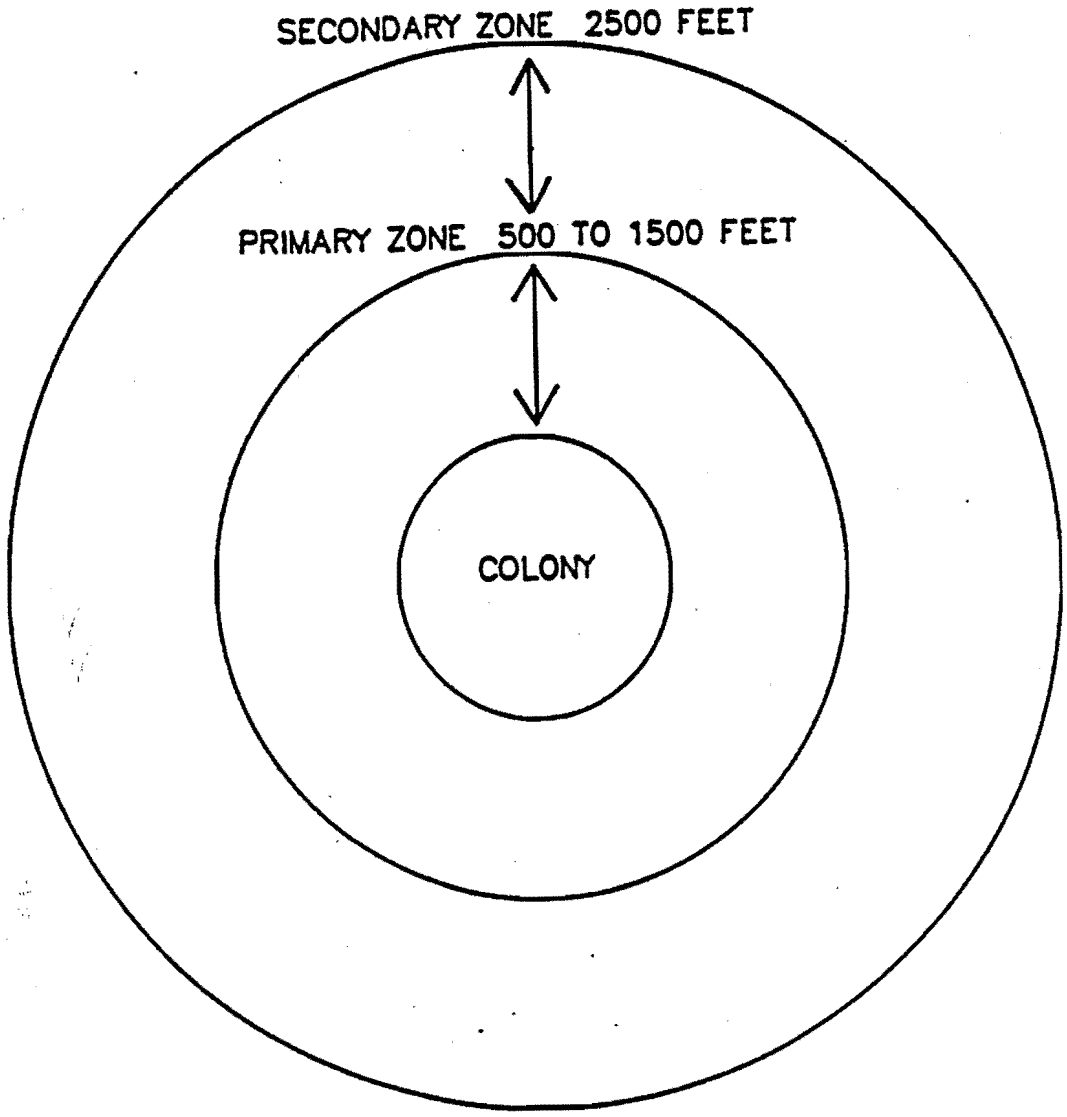
(1) Any lumbering or other removal of vegetation, and

(2) Any activity that reduces the area, depth, or length of flooding in wetlands under and surrounding the colony, except where periodic (less than annual) water control may be required to maintain the health of the aquatic, woody vegetation, and

(3) The construction of any building, roadway, tower, power line, canal, etc.

b. The following activities within the primary zone are likely to be detrimental to a colony if they occur when the colony is active:

(1) Any unauthorized human entry closer than 300 feet of the colony, and


SECONDARY ZONE 2500 FEET
PRIMARY ZONE 500 TO 1500 FEET
COLONY

(2) Any increase or irregular pattern in human activity anywhere in the primary zone, and

(3) Any increase or irregular pattern in activity by animals, including livestock or pets, in the colony, and

(4) Any aircraft operation closer than 500 feet of the colony.

B. Secondary Zone: Restrictions in this zone are needed to minimize disturbances that might impact the primary zone, and to protect essential areas outside of the primary zone. The secondary zone may be used by storks for collecting nesting material, for roosting, loafing, and feeding (especially important to newly fledged young), and may be important as a screen between the colony and areas of relatively intense human activities.

1. Size: The secondary zone should range outward from the primary zone 1000-2000 feet, or to a radius of 2500 feet of the outer edge of the colony.

2. Recommended Restrictions:

a. Activities in the secondary zone which may be detrimental to nesting wood storks include:

(1) Any increase in human activities above the level that existed in the year when the colony first formed, especially when visual screens are lacking, and

(2) Any alteration in the area's hydrology that might cause changes in the primary zone, and

(3) Any substantial (>20 percent) decrease in the area of wetlands and woods of potential value to storks for roosting and feeding.

b. In addition, the probability that low flying storks, or inexperienced, newly-fledged young will strike tall obstructions, requires that high-tension power lines be no closer than one mile (especially across open country or in wetlands) and tall trans-mission towers no closer than 3 miles from active colonies. Other activities, including busy highways and commercial and residential buildings may be present in limited portions of the secondary zone at the time that a new colony first forms. Although storks may tolerate existing levels of human activities, it is important that these human activities not expand substantially.

VI. Roosting site guidelines.

The general characteristics and temporary use-patterns of many stork roosting sites limit the number of specific management recommendations that are possible:

A. Avoid human activities within 500-1000 feet of roost sites during seasons of the year and times of the day when storks may be present. Nocturnal activities in active roosts may be especially disruptive.

B. Protect the vegetative and hydrological characteristics of the more important roosting sites--those used annually and/or used by flocks of 25 or more storks. Potentially, roosting sites may, some day, become nesting sites.

VII. Legal Considerations.

A. Federal Statutes

The U.S. breeding population of the wood stork is protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act). The population was listed as endangered on February 28, 1984 (49 Federal *Register* 7332); wood storks breeding in Alabama, Florida, Georgia, and South Carolina are protected by the Act.

Section 9 of the Endangered Species Act of 1973, as amended, states that it is unlawful for any person subject to the jurisdiction of the United States to take (defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.") any listed species anywhere within the United States.

The wood stork is also federally protected by its listing (50 CFR 10.13) under the Migratory Bird Treaty Act (167 U.S.C. 703-711), which prohibits the taking, killing or possession of migratory birds except as permitted.

B. State Statutes

1. State of Alabama

Section 9-11-232 of Alabama's Fish, Game, and Wildlife regulations curtails the possession, sale, and purchase of wild birds. "Any person, firm, association, or corporation who takes, catches, kills or has in possession at any time, living or dead, any protected wild bird not a game bird or who sells or offers for sale, buys, purchases or offers to buy or purchase any such bird or exchange same for anything of value or who shall sell or expose for sale or buy any part of the plumage, skin, or body of any bird protected by the laws of this state or who shall take or willfully destroy the nests of any wild bird or who shall have such nests or eggs of such birds in his possession, except as otherwise provided by law, shall be guilty of a misdemeanor...

Section 1 of the Alabama Nongame Species Regulation (Regulation 87-GF-7) includes the wood stork in the list of nongame species covered by paragraph (4). " It shall be unlawful to take, capture, kill, possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value, the following nongame wildlife species (or any parts or reproductive products of such species) without a scientific collection permit and written permission from the Commissioner, Department of Conservation and Natural Resources,..."

2. State of Florida

Rule 39-4.001 of the Florida Wildlife Code prohibits "taking, attempting to take; pursuing, hunting, molesting, capturing, or killing (collectively defined as "taking"), transporting, storing, serving, buying, selling,

APPENDIX H

National Bald Eagle Management Guidelines

NATIONAL BALD EAGLE MANAGEMENT GUIDELINES

U.S. Fish and Wildlife Service

May 2007

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INTRODUCTION

The bald eagle (*Haliaeetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The MBTA and the Eagle Act protect bald eagles from a variety of harmful actions and impacts. The U.S. Fish and Wildlife Service (Service) developed these National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. A variety of human activities can potentially interfere with bald eagles, affecting their ability to forage, nest, roost, breed, or raise young. The Guidelines are intended to help people minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the Eagle Act.

The Guidelines are intended to:

(1) Publicize the provisions of the Eagle Act that continue to protect bald eagles, in order to reduce the possibility that people will violate the law,

(2) Advise landowners, land managers and the general public of the potential for various human activities to disturb bald eagles, and

(3) Encourage additional nonbinding land management practices that benefit bald eagles (see Additional Recommendations section).

While the Guidelines include general recommendations for land management practices that will benefit bald eagles, the document is intended primarily as a tool for landowners and planners who seek information and recommendations regarding how to avoid disturbing bald eagles. Many States and some tribal entities have developed state-specific management plans, regulations, and/or guidance for landowners and land managers to protect and enhance bald eagle habitat, and we encourage the continued development and use of these planning tools to benefit bald eagles.

Adherence to the Guidelines herein will benefit individuals, agencies, organizations, and companies by helping them avoid violations of the law. However, the Guidelines themselves are not law. Rather, they are recommendations based on several decades of behavioral observations, science, and conservation measures to avoid or minimize adverse impacts to bald eagles.

The U.S. Fish and Wildlife Service strongly encourages adherence to these guidelines to ensure that bald and golden eagle populations will continue to be sustained. The Service realizes there may be impacts to some birds even if all reasonable measures are taken to avoid such impacts. Although it is not possible to absolve individuals and entities from liability under the Eagle Act or the MBTA, the Service exercises enforcement discretion to focus on those individuals, companies, or agencies that take migratory birds without regard for the consequences of their actions and the law, especially when conservation measures, such as these Guidelines, are available, but have not been implemented. The Service will prioritize its enforcement efforts to focus on those individuals or entities who take bald eagles or their parts, eggs, or nests without implementing appropriate measures recommended by the Guidelines.

The Service intends to pursue the development of regulations that would authorize, under limited circumstances, the use of permits if “take” of an eagle is anticipated but unavoidable. Additionally, if the bald eagle is delisted, the Service intends to provide a regulatory mechanism to honor existing (take) authorizations under the Endangered Species Act (ESA).

During the interim period until the Service completes a rulemaking for permits under the Eagle Act, the Service does not intend to refer for prosecution the incidental “*take*” of any bald eagle under the MBTA or Eagle Act, if such take is in full compliance with the terms and conditions of an incidental take statement issued to the action agency or applicant under the authority of section 7(b)(4) of the ESA or a permit issued under the authority of section 10(a)(1)(B) of the ESA.

The Guidelines are applicable throughout the United States, including Alaska. The primary purpose of these Guidelines is to provide information that will minimize or prevent violations only of *Federal* laws governing bald eagles. In addition to Federal laws, many states and some smaller jurisdictions and tribes have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines. If you are planning activities that may affect bald eagles, we therefore recommend that you contact both your nearest U.S. Fish and Wildlife Service Field Office (see the contact information on p.16) and your state wildlife agency for assistance.

LEGAL PROTECTIONS FOR THE BALD EAGLE

The Bald and Golden Eagle Protection Act

The Eagle Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.” The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” “Disturb’’ means:

> "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle=s return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

A violation of the Act can result in a criminal fine of $100,000 ($200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

The Migratory Bird Treaty Act
The MBTA (16 U.S.C. 703-712), prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors. Implementing regulations define "take" under the MBTA as "pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect."

Copies of the Eagle Act and the MBTA are available at: http://permits.fws.gov/ltr/ltr.shtml.

State laws and regulations
Most states have their own regulations and/or guidelines for bald eagle management. Some states may continue to list the bald eagle as endangered, threatened, or of special concern. If you plan activities that may affect bald eagles, we urge you to familiarize yourself with the regulations and/or guidelines that apply to bald eagles in your state. Your adherence to the Guidelines herein does not ensure that you are in compliance with state laws and regulations because state regulations can be more specific and/or restrictive than these Guidelines.

NATURAL HISTORY OF THE BALD EAGLE

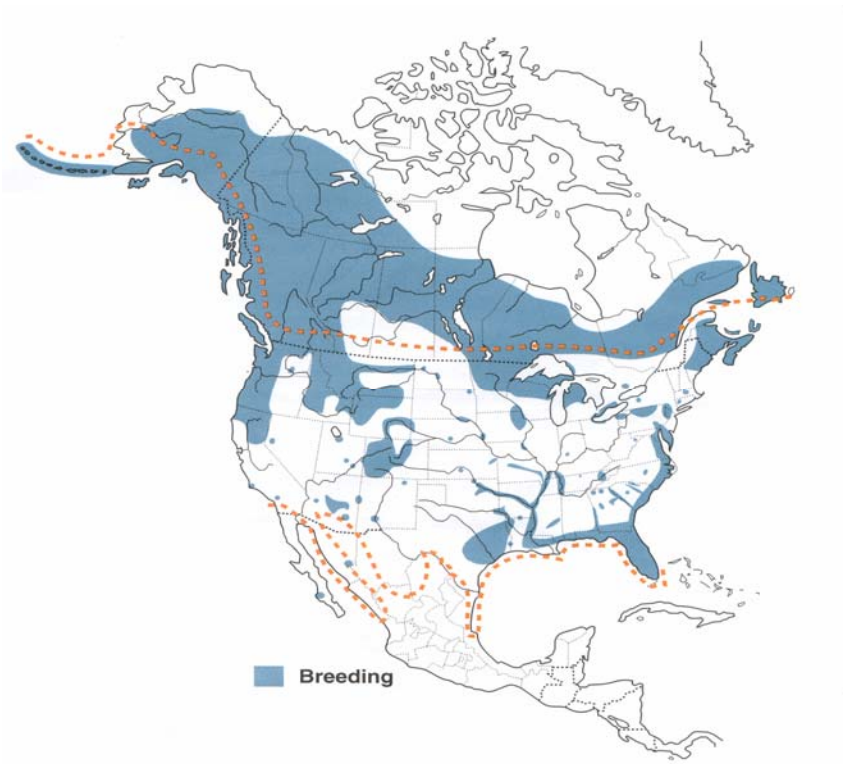
Bald eagles are a North American species that historically occurred throughout the contiguous United States and Alaska. After severely declining in the lower 48 States between the 1870s and the 1970s, bald eagles have rebounded and re-established breeding territories in each of the lower 48 states. The largest North American breeding populations are in Alaska and Canada, but there are also significant bald eagle populations in Florida, the Pacific Northwest, the Greater Yellowstone area, the Great Lakes states, and the Chesapeake Bay region. Bald eagle distribution varies seasonally. Bald eagles that nest in southern latitudes frequently move northward in late spring and early summer, often summering as far north as Canada. Most eagles that breed at northern latitudes migrate southward during winter, or to coastal areas where waters remain unfrozen. Migrants frequently concentrate in large numbers at sites where food is abundant and they often roost together communally. In some cases, concentration areas are used year-round: in summer by southern eagles and in winter by northern eagles.

Juvenile bald eagles have mottled brown and white plumage, gradually acquiring their dark brown body and distinctive white head and tail as they mature. Bald eagles generally attain adult plumage by 5 years of age. Most are capable of breeding at 4 or 5 years of age, but in healthy populations they may not start breeding until much older. Bald eagles may live 15 to 25 years in the wild. Adults weigh 8 to 14 pounds (occasionally reaching 16 pounds in Alaska) and have wingspans of 5 to 8 feet. Those in the northern range are larger than those in the south, and females are larger than males.

Where do bald eagles nest?

Breeding bald eagles occupy "territories," areas they will typically defend against intrusion by other eagles. In addition to the active nest, a territory may include one or more alternate nests (nests built or maintained by the eagles but not used for nesting in a given year). The Eagle Act prohibits removal or destruction of both active and alternate bald eagle nests. Bald eagles exhibit high nest site fidelity and nesting territories are often used year after year. Some territories are known to have been used continually for over half a century.

Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human-made structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags located in reservoirs provide the visibility and accessibility needed to locate aquatic prey. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4-6 feet in diameter and 3 feet deep, although larger nests exist.



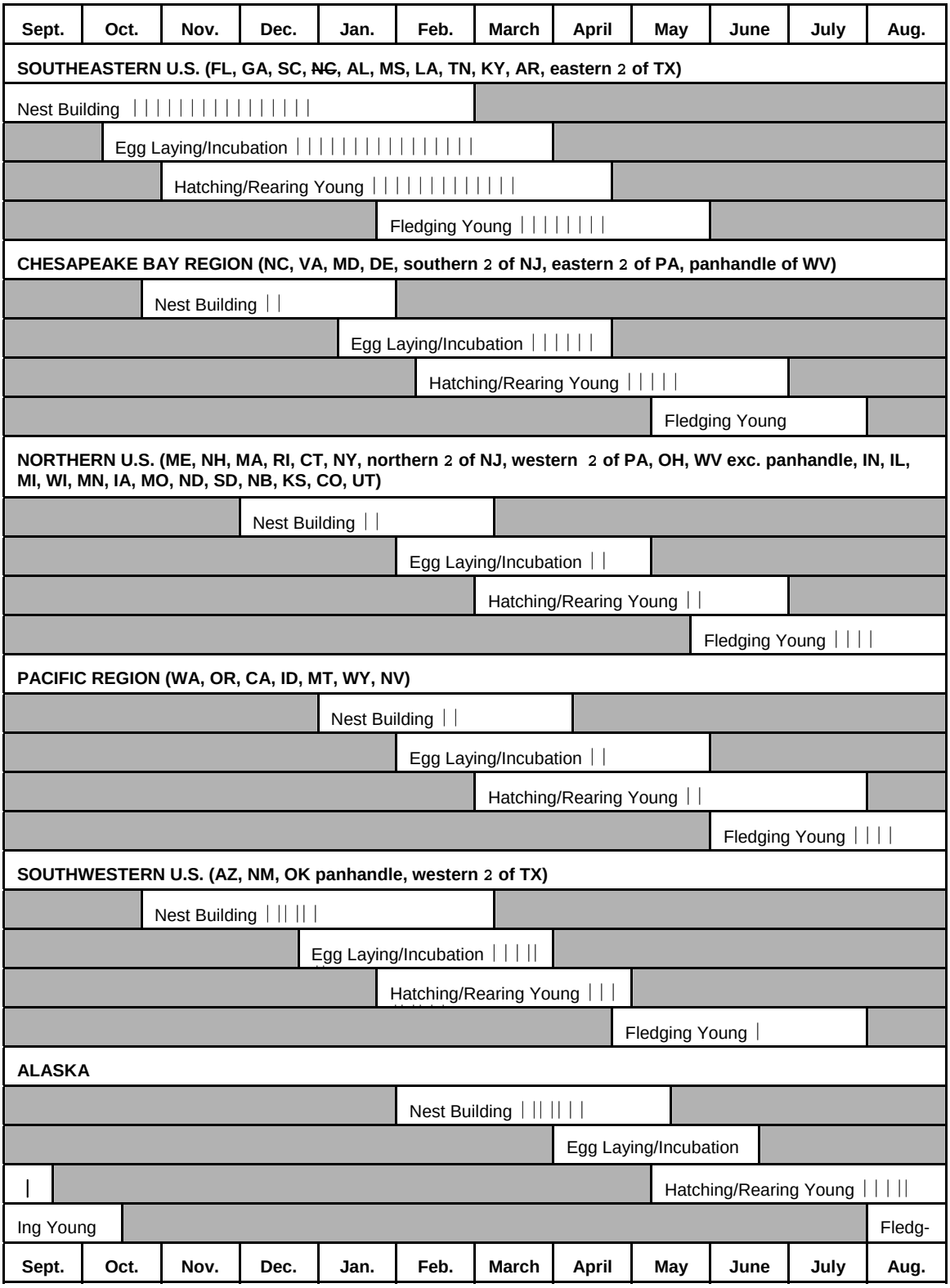
The range of breeding bald eagles in 2000 (shaded areas). This map shows only the larger concentrations of nests; eagles have continued to expand into additional nesting territories in many states. The dotted line represents the bald eagle's wintering range.

When do bald eagles nest?

Nesting activity begins several months before egg-laying. Egg-laying dates vary throughout the U.S., ranging from October in Florida, to late April or even early May in the northern United States. Incubation typically lasts 33-35 days, but can be as long as 40 days. Eaglets make their first unsteady flights about 10 to 12 weeks after hatching, and fledge (leave their nests) within a few days after that first flight. However, young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later.

The bald eagle breeding season tends to be longer in the southern U.S., and re-nesting following an unsuccessful first nesting attempt is more common there as well. The following table shows the timing of bald eagle breeding seasons in different regions of the country. The table represents the range of time within which the majority of nesting activities occur in each region and does not apply to any specific nesting pair. Because the timing of nesting activities may vary within a given region, you should contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16) and/or your state wildlife conservation agency for more specific information on nesting chronology in your area.

Chronology of typical reproductive activities of bald eagles in the United States.



How many chicks do bald eagles raise?
The number of eagle eggs laid will vary from 1-3, with 1-2 eggs being the most common. Only one eagle egg is laid per day, although not always on successive days. Hatching of young occurs on different days with the result that chicks in the same nest are sometimes of unequal size. The overall national fledging rate is approximately one chick per nest, annually, which results in a healthy expanding population.

What do bald eagles eat?
Bald eagles are opportunistic feeders. Fish comprise much of their diet, but they also eat waterfowl, shorebirds/colonial waterbirds, small mammals, turtles, and carrion. Because they are visual hunters, eagles typically locate their prey from a conspicuous perch, or soaring flight, then swoop down and strike. Wintering bald eagles often congregate in large numbers along streams to feed on spawning salmon or other fish species, and often gather in large numbers in areas below reservoirs, especially hydropower dams, where fish are abundant. Wintering eagles also take birds from rafts of ducks at reservoirs and rivers, and congregate on melting ice shelves to scavenge dead fish from the current or the soft melting ice. Bald eagles will also feed on carcasses along roads, in landfills, and at feedlots.

During the breeding season, adults carry prey to the nest to feed the young. Adults feed their chicks by tearing off pieces of food and holding them to the beaks of the eaglets. After fledging, immature eagles are slow to develop hunting skills, and must learn to locate reliable food sources and master feeding techniques. Young eagles will congregate together, often feeding upon easily acquired food such as carrion and fish found in abundance at the mouths of streams and shallow bays and at landfills.

The impact of human activity on nesting bald eagles
During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair. The relative sensitivity of bald eagles during various stages of the breeding season is outlined in the following table.

Nesting Bald Eagle Sensitivity to Human Activities

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to 4 weeks)	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, 4 to 8 weeks	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledging	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool too much and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves. Once fledged, juveniles range up to ¼ mile from the nest site, often to a site with minimal human activity. During this period, until about six weeks after departure from the nest, the juveniles still depend on the adults to feed them.

The impact of human activity on foraging and roosting bald eagles

Disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding, reducing chances of survival. Interference with feeding can also result in reduced productivity (number of young successfully fledged). Migrating and wintering bald eagles often congregate at specific sites for purposes of feeding and sheltering. Bald eagles rely on established roost sites because of their proximity to sufficient food sources. Roost sites are usually in mature trees where the eagles are somewhat sheltered from the wind and weather. Human activities near or within communal roost sites may prevent eagles

from feeding or taking shelter, especially if there are not other undisturbed and productive feeding and roosting sites available. Activities that permanently alter communal roost sites and important foraging areas can altogether eliminate the elements that are essential for feeding and sheltering eagles.

Where a human activity agitates or bothers roosting or foraging bald eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the activity constitutes a violation of the Eagle Act's prohibition against disturbing eagles. The circumstances that might result in such an outcome are difficult to predict without detailed site-specific information. If your activities may disturb roosting or foraging bald eagles, you should contact your local Fish and Wildlife Service Field Office (see page 16) for advice and recommendations for how to avoid such disturbance.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT NEST SITES

In developing these Guidelines, we relied on existing state and regional bald eagle guidelines, scientific literature on bald eagle disturbance, and recommendations of state and Federal biologists who monitor the impacts of human activity on eagles. Despite these resources, uncertainties remain regarding the effects of many activities on eagles and how eagles in different situations may or may not respond to certain human activities. The Service recognizes this uncertainty and views the collection of better biological data on the response of eagles to disturbance as a high priority. To the extent that resources allow, the Service will continue to collect data on responses of bald eagles to human activities conducted according to the recommendations within these Guidelines to ensure that adequate protection from disturbance is being afforded, and to identify circumstances where the Guidelines might be modified. These data will be used to make future adjustments to the Guidelines.

To avoid disturbing nesting bald eagles, we recommend (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees.

The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there are little or no forested or topographical buffers, such as in many western states, distance alone must serve as the buffer. Consequently, in open areas, the distance between the activity and the nest may need to be larger than the distances recommended under Categories A and B of these guidelines (pg. 12) if no landscape buffers are present. The height of the nest above the ground may also ameliorate effects of human activities; eagles at higher nests may be less prone to disturbance.

In addition to the physical features of the landscape and nest site, the appropriate size for the distance buffer may vary according to the historical tolerances of eagles to human activities in particular localities, and may also depend on the location of the nest in relation

to feeding and roosting areas used by the eagles. Increased competition for nest sites may lead bald eagles to nest closer to human activity (and other eagles).

Seasonal restrictions can prevent the potential impacts of many shorter-term, obtrusive activities that do not entail landscape alterations (e.g. fireworks, outdoor concerts). In proximity to the nest, these kinds of activities should be conducted only outside the breeding season. For activities that entail both short-term, obtrusive characteristics and more permanent impacts (e.g., building construction), we recommend a combination of both approaches: retaining a landscape buffer *and* observing seasonal restrictions.

For assistance in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of a bald eagle nest, we encourage you to contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16).

Existing Uses

Eagles are unlikely to be disturbed by routine use of roads, homes, and other facilities where such use pre-dates the eagles' successful nesting activity in a given area. Therefore, in most cases *ongoing* existing uses may proceed with the same intensity with little risk of disturbing bald eagles. However, some *intermittent, occasional, or irregular* uses that pre-date eagle nesting in an area may disturb bald eagles. For example: a pair of eagles may begin nesting in an area and subsequently be disturbed by activities associated with an annual outdoor flea market, even though the flea market has been held annually at the same location. In such situations, human activity should be adjusted or relocated to minimize potential impacts on the nesting pair.

ACTIVITY-SPECIFIC GUIDELINES

The following section provides the Service=s management recommendations for avoiding bald eagle disturbance as a result of new or intermittent activities proposed in the vicinity of bald eagle nests. Activities are separated into 8 categories (A – H) based on the nature and magnitude of impacts to bald eagles that usually result from the type of activity. Activities with similar or comparable impacts are grouped together.

In most cases, impacts will vary based on the visibility of the activity from the eagle nest and the degree to which similar activities are already occurring in proximity to the nest site. Visibility is a factor because, in general, eagles are more prone to disturbance when an activity occurs in full view. For this reason, we recommend that people locate activities farther from the nest structure in areas with open vistas, in contrast to areas where the view is shielded by rolling topography, trees, or other screening factors. The recommendations also take into account the existence of similar activities in the area because the continued presence of nesting bald eagles in the vicinity of the existing activities indicates that the eagles in that area can tolerate a greater degree of human activity than we can generally expect from eagles in areas that experience fewer human impacts. To illustrate how these factors affect the likelihood of disturbing eagles, we have incorporated the recommendations for some activities into a table (categories A and B).

First, determine which category your activity falls into (between categories A – H). If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity represented.

If your activity is under A or B, our recommendations are in table form. The vertical axis shows the degree of visibility of the activity from the nest. The horizontal axis (header row) represents the degree to which similar activities are ongoing in the vicinity of the nest. Locate the row that best describes how visible your activity will be from the eagle nest. Then, choose the column that best describes the degree to which similar activities are ongoing in the vicinity of the eagle nest. The box where the column and row come together contains our management recommendations for how far you should locate your activity from the nest to avoid disturbing the eagles. The numerical distances shown in the tables are the closest the activity should be conducted relative to the nest. In some cases we have included additional recommendations (other than recommended *distance* from the nest) you should follow to help ensure that your activity will not disturb the eagles.

Alternate nests

For activities that entail permanent landscape alterations that may result in bald eagle disturbance, these recommendations apply to both active and alternate bald eagle nests. Disturbance becomes an issue with regard to alternate nests if eagles return for breeding purposes and react to land use changes that occurred while the nest was inactive. The likelihood that an alternate nest will again become active decreases the longer it goes unused. If you plan activities in the vicinity of an alternate bald eagle nest and have information to show that the nest has not been active during the preceding 5 breeding seasons, the recommendations provided in these guidelines for avoiding disturbance around the nest site may no longer be warranted. The nest itself remains protected by other provisions of the Eagle Act, however, and may not be destroyed.

If special circumstances exist that make it unlikely an inactive nest will be reused before 5 years of disuse have passed, and you believe that the probability of reuse is low enough to warrant disregarding the recommendations for avoiding disturbance, you should be prepared to provide all the reasons for your conclusion, including information regarding past use of the nest site. Without sufficient documentation, you should continue to follow these guidelines when conducting activities around the nest site. If we are able to determine that it is unlikely the nest will be reused, we may advise you that the recommendations provided in these guidelines for avoiding disturbance are no longer necessary around that nest site.

This guidance is intended to minimize disturbance, as defined by Federal regulation. In addition to Federal laws, most states and some tribes and smaller jurisdictions have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines.

Temporary Impacts

For activities that have temporary impacts, such as the use of loud machinery, fireworks displays, or summer boating activities, we recommend seasonal restrictions. These types of activities can generally be carried out outside of the breeding season without causing disturbance. The recommended restrictions for these types of activities can be lifted for alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched (depending on the distance between the alternate nest and the active nest).

In general, activities should be kept as far away from nest trees as possible; loud and disruptive activities should be conducted when eagles are not nesting; and activity between the nest and the nearest foraging area should be minimized. If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity addressed, or contact your local U.S. Fish and Wildlife Service Field Office for additional guidance.

If you believe that special circumstances apply to your situation that increase or diminish the likelihood of bald eagle disturbance, or if it is not possible to adhere to the guidelines, you should contact your local Service Field Office for further guidance.

Category A:
Building construction, 1 or 2 story, with project footprint of ½ acre or less.
Construction of roads, trails, canals, power lines, and other linear utilities.
Agriculture and aquaculture – new or expanded operations.
Alteration of shorelines or wetlands.
Installation of docks or moorings.
Water impoundment.

Category B:
Building construction, 3 or more stories.
Building construction, 1 or 2 story, with project footprint of more than ½ acre.
Installation or expansion of marinas with a capacity of 6 or more boats.
Mining and associated activities.
Oil and natural gas drilling and refining and associated activities.

	If there is no similar activity within 1 mile of the nest	***If there is similar activity closer than 1 mile from the nest***
If the activity will be visible from the nest	660 feet. Landscape buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Landscape buffers are recommended.
If the activity will not be visible from the nest	Category A: 330 feet. Clearing, external construction, and landscaping between 330 feet and 660 feet should be done outside breeding season. Category B: 660 feet.	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping within 660 feet should be done outside breeding season.

The numerical distances shown in the table are the closest the activity should be conducted relative to the nest.

Category C. Timber Operations and Forestry Practices

- Avoid clear cutting or removal of overstory trees within 330 feet of the nest at any time.

- Avoid timber harvesting operations, including road construction and chain saw and yarding operations, during the breeding season within 660 feet of the nest. The distance may be decreased to 330 feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched.

- Selective thinning and other silviculture management practices designed to conserve or enhance habitat, including prescribed burning close to the nest tree, should be undertaken outside the breeding season. Precautions such as raking leaves and woody debris from around the nest tree should be taken to prevent crown fire or fire climbing the nest tree. If it is determined that a burn during the breeding season would be beneficial, then, to ensure that no take or disturbance will occur, these activities should be conducted only when neither adult eagles nor young are present at the nest tree (i.e., at the beginning of, or end of, the breeding season, either before the particular nest is active or after the young have fledged from that nest). Appropriate Federal and state biologists should be consulted before any prescribed burning is conducted during the breeding season.

- Avoid construction of log transfer facilities and in-water log storage areas within 330 feet of the nest.

Category D. Off-road vehicle use (including snowmobiles). No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 330 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet.

Category E. Motorized Watercraft use (including jet skis/personal watercraft). No buffer is necessary around nest sites outside the breeding season. During the breeding season, within 330 feet of the nest, (1) do not operate jet skis (personal watercraft), and (2) avoid concentrations of noisy vessels (e.g., commercial fishing boats and tour boats), except where eagles have demonstrated tolerance for such activity. Other motorized boat traffic passing within 330 feet of the nest should attempt to minimize trips and avoid stopping in the area where feasible, particularly where eagles are unaccustomed to boat traffic. Buffers for airboats should be larger than 330 feet due to the increased noise they generate, combined with their speed, maneuverability, and visibility.

Category F. Non-motorized recreation and human entry (e.g., hiking, camping, fishing, hunting, birdwatching, kayaking, canoeing). No buffer is necessary around nest sites outside the breeding season. If the activity will be visible or highly audible from the nest, maintain a 330-foot buffer during the breeding season, particularly where eagles are unaccustomed to such activity.

Category G. Helicopters and fixed-wing aircraft.
Except for authorized biologists trained in survey techniques, avoid operating aircraft within 1,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity.

Category H. Blasting and other loud, intermittent noises.
Avoid blasting and other activities that produce extremely loud noises within 1/2 mile of active nests, unless greater tolerance to the activity (or similar activity) has been demonstrated by the eagles in the nesting area. This recommendation applies to the use of fireworks classified by the Federal Department of Transportation as Class B explosives, which includes the larger fireworks that are intended for licensed public display.

RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT FORAGING AREAS AND COMMUNAL ROOST SITES

1. Minimize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sites and important foraging areas.

2. Locate long-term and permanent water-dependent facilities, such as boat ramps and marinas, away from important eagle foraging areas.

3. Avoid recreational and commercial boating and fishing near critical eagle foraging areas during peak feeding times (usually early to mid-morning and late afternoon), except where eagles have demonstrated tolerance to such activity.

4. Do not use explosives within ½ mile (or within 1 mile in open areas) of communal roosts when eagles are congregating, without prior coordination with the U.S. Fish and Wildlife Service and your state wildlife agency.

5. Locate aircraft corridors no closer than 1,000 feet vertical or horizontal distance from communal roost sites.

ADDITIONAL RECOMMENDATIONS TO BENEFIT BALD EAGLES

The following are additional management practices that landowners and planners can exercise for added benefit to bald eagles.

1. Protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within ½ mile from water.

2. Where nests are blown from trees during storms or are otherwise destroyed by the elements, continue to protect the site in the absence of the nest for up to three (3) complete breeding seasons. Many eagles will rebuild the nest and reoccupy the site.

3. To avoid collisions, site wind turbines, communication towers, and high voltage transmission power lines away from nests, foraging areas, and communal roost sites.

4. Employ industry-accepted best management practices to prevent birds from colliding with or being electrocuted by utility lines, towers, and poles. If possible, bury utility lines in important eagle areas.

5. Where bald eagles are likely to nest in human-made structures (e.g., cell phone towers) and such use could impede operation or maintenance of the structures or jeopardize the safety of the eagles, equip the structures with either (1) devices engineered to discourage bald eagles from building nests, or (2) nesting platforms that will safely accommodate bald eagle nests without interfering with structure performance.

6. Immediately cover carcasses of euthanized animals at landfills to protect eagles from being poisoned.

7. Do not intentionally feed bald eagles. Artificially feeding bald eagles can disrupt their essential behavioral patterns and put them at increased risk from power lines, collision with windows and cars, and other mortality factors.

8. Use pesticides, herbicides, fertilizers, and other chemicals only in accordance with Federal and state laws.

9. Monitor and minimize dispersal of contaminants associated with hazardous waste sites (legal or illegal), permitted releases, and runoff from agricultural areas, especially within watersheds where eagles have shown poor reproduction or where bioaccumulating contaminants have been documented. These factors present a risk of contamination to eagles and their food sources.

CONTACTS

The following U.S. Fish and Wildlife Service Field Offices provide technical assistance on bald eagle management:

Alabama	Daphne	(251) 441-5181
Alaska	Anchorage	(907) 271-2888
	Fairbanks	(907) 456-0203
	Juneau	(907) 780-1160
Arizona	Phoenix	(602) 242-0210
Arkansas	Conway	(501) 513-4470
California	Arcata	(707) 822-7201
	Barstow	(760) 255-8852
	Carlsbad	(760) 431-9440
	Red Bluff	(530) 527-3043
	Sacramento	(916) 414-6000
	Stockton	(209) 946-6400
	Ventura	(805) 644-1766
	Yreka	(530) 842-5763
Colorado	Lakewood	(303) 275-2370
	Grand Junction	(970) 243-2778
Connecticut	(See New Hampshire)	
Delaware	(See Maryland)	
Florida	Panama City	(850) 769-0552
	Vero Beach	(772) 562-3909
	Jacksonville	(904) 232-2580
Georgia	Athens	(706) 613-9493
	Brunswick	(912) 265-9336
	Columbus	(706) 544-6428
Idaho	Boise	(208) 378-5243
	Chubbuck	(208) 237-6975
Illinois/Iowa	Rock Island	(309) 757-5800
Indiana	Bloomington	(812) 334-4261
Kansas	Manhattan	(785) 539-3474
Kentucky	Frankfort	(502) 695-0468
Louisiana	Lafayette	(337) 291-3100
Maine	Old Town	(207) 827-5938
Maryland	Annapolis	(410) 573-4573
Massachusetts	(See New Hampshire)	
Michigan	East Lansing	(517) 351-2555
Minnesota	Bloomington	(612) 725-3548
Mississippi	Jackson	(601) 965-4900
Missouri	Columbia	(573) 234-2132
Montana	Helena	(405) 449-5225
Nebraska	Grand Island	(308) 382-6468
Nevada	Las Vegas	(702) 515-5230
	Reno	(775) 861-6300
New Hampshire	Concord	(603) 223-2541
New Jersey	Pleasantville	(609) 646-9310
New Mexico	Albuquerque	(505) 346-2525
New York	Cortland	(607) 753-9334
	Long Island	(631) 776-1401
North Carolina	Raleigh	(919) 856-4520
	Asheville	(828) 258-3939
North Dakota	Bismarck	(701) 250-4481
Ohio	Reynoldsburg	(614) 469-6923
Oklahoma	Tulsa	(918) 581-7458
Oregon	Bend	(541) 383-7146
	Klamath Falls	(541) 885-8481
	La Grande	(541) 962-8584
	Newport	(541) 867-4558
	Portland	(503) 231-6179
	Roseburg	(541) 957-3474
Pennsylvania	State College	(814) 234-4090
Rhode Island	(See New Hampshire)	
South Carolina	Charleston	(843) 727-4707
South Dakota	Pierre	(605) 224-8693
Tennessee	Cookeville	(931) 528-6481
Texas	Clear Lake	(281) 286-8282
Utah	West Valley City	(801) 975-3330
Vermont	(See New Hampshire)	
Virginia	Gloucester	(804) 693-6694
Washington	Lacey	(306) 753-9440
	Spokane	(509) 891-6839
	Wenatchee	(509) 665-3508
West Virginia	Elkins	(304) 636-6586
Wisconsin	New Franken	(920) 866-1725
Wyoming	Cheyenne	(307) 772-2374
	Cody	(307) 578-5939

National Office
U.S. Fish and Wildlife Service
Division of Migratory Bird Management
4401 North Fairfax Drive, MBSP-4107
Arlington, VA 22203-1610
(703) 358-1714
http://www.fws.gov/migratorybirds

State Agencies

To contact a state wildlife agency, visit the Association of Fish & Wildlife Agencies' website at http://www.fishwildlife.org/where_us.html

GLOSSARY

The definitions below apply to these National Bald Eagle Management Guidelines:

Communal roost sites – Areas where bald eagles gather and perch overnight – and sometimes during the day in the event of inclement weather. Communal roost sites are usually in large trees (live or dead) that are relatively sheltered from wind and are generally in close proximity to foraging areas. These roosts may also serve a social purpose for pair bond formation and communication among eagles. Many roost sites are used year after year.

Disturb – To agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle=s return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

Fledge – To leave the nest and begin flying. For bald eagles, this normally occurs at 10-12 weeks of age.

Fledgling – A juvenile bald eagle that has taken the first flight from the nest but is not yet independent.

Foraging area – An area where eagles feed, typically near open water such as rivers, lakes, reservoirs, and bays where fish and waterfowl are abundant, or in areas with little or no water (i.e., rangelands, barren land, tundra, suburban areas, etc.) where other prey species (e.g., rabbit, rodents) or carrion (such as at landfills) are abundant.

Landscape buffer – A natural or human-made landscape feature that screens eagles from human activity (e.g., strip of trees, hill, cliff, berm, sound wall).

Nest – A structure built, maintained, or used by bald eagles for the purpose of reproduction. An **active** nest is a nest that is attended (built, maintained or used) by a pair of bald eagles during a given breeding season, whether or not eggs are laid. An **alternate** nest is a nest that is not used for breeding by eagles during a given breeding season.

Nest abandonment – Nest abandonment occurs when adult eagles desert or stop attending a nest and do not subsequently return and successfully raise young in that nest for the duration of a breeding season. Nest abandonment can be caused by altering habitat near a nest, even if the alteration occurs prior to the breeding season. Whether the eagles migrate during the non-breeding season, or remain in the area throughout the non-breeding season, nest abandonment can occur at any point between the time the eagles return to the nesting site for the breeding season and the time when all progeny from the breeding season have

dispersed.

Project footprint – The area of land (and water) that will be permanently altered for a development project, including access roads.

Similar scope – In the vicinity of a bald eagle nest, an existing activity is of similar scope to a new activity where the types of impacts to bald eagles are similar in nature, and the impacts of the existing activity are of the same or greater magnitude than the impacts of the potential new activity. Examples: (1) An existing single-story home 200 feet from a nest is similar in scope to an additional single-story home 200 feet from the nest; (2) An existing multi-story, multi-family dwelling 150 feet from a nest has impacts of a greater magnitude than a potential new single-family home 200 feet from the nest; (3) One existing single-family home 200 feet from the nest has impacts of a lesser magnitude than three single-family homes 200 feet from the nest; (4) an existing single-family home 200 feet from a communal roost has impacts of a lesser magnitude than a single-family home 300 feet from the roost but 40 feet from the eagles' foraging area. The existing activities in examples (1) and (2) are of similar scope, while the existing activities in example (3) and (4) are not.

Vegetative buffer – An area surrounding a bald eagle nest that is wholly or largely covered by forest, vegetation, or other natural ecological characteristics, and separates the nest from human activities.

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APPENDIX I

Mine Stormwater Management Systems

APPENDIX I

Mine Stormwater Management Systems

1. Applicability

This Appendix is applicable only for mines for which the Department has permitting, compliance, and enforcement responsibilities under the interagency operating agreements adopted under Rule 62-113.100, F.A.C., but is not applicable to borrow pits. See paragraphs 2.0(a)12 and 61 of Volume I for more specific definitions of "borrow pits" and "mines," respectively.

Applicants are advised that future changes in land use or development of the project area, subsequent to mining operations and reclamation, may necessitate changes to the stormwater management system and associated operation, maintenance, and monitoring requirements.

2. Design Options and Considerations

1. A mine stormwater management system must be designed to accomplish the water quantity and quality objectives specified in Rule 62-330.301(1), F.A.C. These objectives may be addressed through the following two design options: 1) containment of a specified volume and/or 2) compliance with the stormwater treatment and attenuation criteria provided in the Applicant's Handbook Volume II of the water management district (WMD) where the mine will be located.

2. An industrial wastewater (IW) facility permit, issued in accordance with Chapter 62-620, F.A.C., constitutes authorization to discharge to waters of the state under the National Pollutant Discharge Elimination System (NPDES) Program in accordance with Section 403.0885, F.S. The water quantity and quality objectives of Rule 62-330.301(1), F.A.C., as described in this appendix, with the exception of water elevation (see Part 2.3.b. below) shall be presumed to be met within the physical boundary of an active IW management system that is permitted under Chapter 62-620, F.A.C., prior to commencement of construction on the basis that the IW permit establishes the following:

    1. The total areal extent of the NPDES system.
    2. The designated discharge outfalls and points within the NPDES system.
    3. Specific conditions regarding effluent limitations; standards and prohibitions at outfalls and discharge points; discharge sampling, reporting requirements, and corrective measures.
    4. Best management practices, pollution prevention procedures, and standard operating procedures for wastewater management.

3. Design considerations intended to meet the objectives of Rule 62-330.301(1), F.A.C., are presented below regarding containment, water elevations, stormwater runoff pretreatment, water and soil quality, and karstic subsurface.

    a. Containment

    Stormwater runoff that is directly or indirectly conveyed to a mine pit may be managed through containment measures to meet water quantity and quality objectives. An above-grade internal or perimeter berm is an acceptable design method to provide containment.

    Containment will be presumed if the mine pit and/or the above-grade berms have sufficient available storage capacity for a given volume and freeboard at all times throughout the life of the mine. The required storage capacity shall be calculated using the larger of two design storm events: 1) the 25-year 24-hour design storm event or 2) the required design storm event specified in the Applicant's Handbook Volume II of the WMD where the mine will be located. A minimum of three feet of freeboard is

recommended for mine pit lakes having fetch lengths of one mile or less. A wave run-up analysis is necessary to determine the appropriate freeboard for a mine pit lake having a fetch length greater than one mile. The freeboard must be measured from the final stage elevation of the applicable WMD's design storm event using the seasonal high water table as the initial stage elevation of the design storm event. The applicant shall demonstrate recovery of the storage capacity for back-to-back required design storm events if the freeboard will be less than three feet. Alternate reasonable assurance may be provided to demonstrate that overtopping will not occur below the required storage capacity.

In lieu of freeboard, stormwater runoff may be discharged through a permanent structure at an elevation above the final stage elevation of the applicable design storm event using the seasonal high water table as the initial stage elevation of the design storm. Discharge design criteria shall be as specified in the applicable WMD's Applicant's Handbook Volume II. The applicant shall demonstrate that offsite discharges shall not cause adverse water quantity impacts to receiving waters and adjacent lands, adverse flooding to onsite or offsite property, adverse impacts to existing surface water storage and conveyance capabilities, or adverse secondary or cumulative impacts to water resources, by itself or in combination with pre-existing activities.

b. Water Elevations

Dewatering and subsurface excavation have the potential to adversely affect surface water and groundwater elevations. The applicant shall provide reasonable assurance that such adverse effects will not occur by providing a water elevation drawdown or budget analysis or other engineering methodologies (such as recharge through a trench), to demonstrate that the project activity will not adversely affect wetland hydroperiods or cause adverse flooding and environmental impacts to the property of others as a result of changes to water elevations. To provide this assurance, the Department shall require the permittee to take certain measures, as necessary, such as installing piezometers and staff gauges, and monitoring them on a permitted interval. To the extent that an existing water use permit or consumptive use permit addresses the foregoing, such permit may provide reasonable assurance that the stormwater management system will meet these objectives.

c. Stormwater Runoff Pretreatment

If a mine pit is owned entirely by one person other than the state, surface water quality standards do not apply within that mine pit lake*, except with respect to potential discharges to offsite surface waters and groundwater. Except for activities permitted under 62-620, F.A.C., as provided in paragraph 2.2. above, "contact" runoff that may reasonably be expected to contain potentially-hazardous pollutants may require treatment prior to entering the mine pit or other stormwater management systems. Runoff from entrance roads, parking areas, processing areas, petroleum product storage areas, solid waste storage areas, and equipment maintenance or washdown areas may contain potentially-hazardous pollutants. However, areas associated with material processing, such as washing associated with grading and sorting of sand or limestone extracted from the site, are not considered potential sources of pollutants, provided that no chemicals, except Department-approved water conditioners or pH adjusters, are added to the process water used for transporting, washing, or processing the sand or limestone. Such sources of pollution may require separate management systems to prevent direct discharges to the mine pit, other stormwater management systems, offsite property, or any waters of the state. The applicant is also advised to contact the Department's Industrial Wastewater Program regarding the need and requirements for an IW permit.

d. Water and Soil Quality

Evaluation of the ambient surface water, if present, and groundwater quality is required. Typically, to evaluate the ambient groundwater quality, sampling will be required at 5-foot depth intervals to approximately five feet below the proposed depth of extraction. An alternative sampling interval will be considered, based on available lithologic data and mine depths, when requested by the applicant. Compliance water quality monitoring shall be required, as necessary, on a permitted interval to provide reasonable assurance based on the site-specific conditions and the proposed activities. Representative soil characterization shall be required, as necessary, for areas of the property that may be contaminated with potentially-hazardous substances. Such areas may include existing or historical agricultural areas where potentially-hazardous substances may have been used, fuel storage and fueling areas, and hazardous waste areas within the proposed project area. Existing soil characterization reports and agency determination letters may be submitted in support of an application. Sampling shall be conducted in accordance with the current version of DEP's Standard Operating Procedures (DEP-SOP-001/01), as incorporated by reference in Rule 62-160.800, F.A.C.

e. Karstic Subsurface

The breaching of confining layers or conduit features in karstic or other highly permeable materials, such as limestone, dolomitic limestone, or dolostone, presents a greater potential for direct discharge of untreated stormwater pollutants into groundwater. The applicant must provide reasonable assurance that groundwater quality standards will not be violated by mining activities that have the potential to penetrate confining layers or flow conduits in karst-sensitive areas. Runoff from entrance roads, parking areas, processing areas, petroleum product storage areas, solid waste storage areas, and equipment maintenance or washdown areas may contain potentially-hazardous pollutants. However, areas associated with material processing, such as washing associated with grading and sorting of sand or limestone extracted from the site, are not considered potential sources of pollutants, provided that no chemicals, except Department-approved water conditioners or pH adjusters, are added to the process water used for transporting, washing, or processing the sand or limestone. Stormwater that is treated by a stormwater management system designed, constructed, and operated in accordance with the applicable Volume II of this handbook, *prior to discharge to the mine excavation*, shall be presumed to not cause or contribute to a water quality violation. The applicant may propose alternative measures demonstrating that stormwater runoff entering the mine pit will not result in offsite exceedances in water quality standards.

* *Applicants are advised that a mine pit lake that is subject to federal jurisdiction as a water of the United States may require federal authorization, prior to use for stormwater treatment or other wastewater treatment purposes.*

3. Pre-Application Contact Information

Applicants are strongly advised to request a pre-application meeting with the Department's Mining & Mitigation Program to discuss sample locations, depths, parameters, and frequencies, prior to performing any sampling or installation of piezometers or monitoring wells. The Mining & Mitigation Program's contact information is as follows:

Department of Environmental Protection
Bob Martinez Center
2600 Blair Stone Road, Mail Station 3577
Tallahassee, Florida 32399-2400

APPENDIX I

Mine Stormwater Management Systems

MiningAndMitigation@dep.state.fl.us
Telephone: (850) 245-7554
Alternate telephone: (850) 245-8335 (Division of Water Resource Management) Fax Number: (850) 245-8356
Website: https://floridadep.gov/water/mining-mitigation

Chapter 62-340, F.A.C.
Data Form Guide

Wetland and Other Surface Water Delineation
Version: August 2018 ©

From the Staff of
Wetland Evaluation and Training
Submerged Lands and Environmental Resources Coordination

Table of Contents **Page**

The content of this guide was compiled by members of the Florida Department of Environmental Protection, Submerged Lands and Environmental Resources Coordination, Wetland Evaluation and Training Team. The express purpose of this document is to provide guidance to regulatory staff in order to maintain consistency in the applied field methodologies for wetland delineation pursuant to Chapter 62-340, F.A.C. The information contained in this guide was garnered from various sources pertinent to the field application of wetland delineation methodology outlined in Chapter 62-340, F.A.C. FDEP does

not warrant data provided by other sources for accuracy or for any particular use that may require accurate information. This guide is for information purposes only.

Appendix A: subsection 62-340.450(1), (2), (3), F.A.C.

Vegetative Index Plant List

Botanical Name/ Common Name/ Wetland Status

Abildgaardia ovata flat-spike rush FACW
Acacia auriculiformis ear-leaved acacia FAC
Acer negundo box-elder FACW
Acer rubrum red maple FACW
Acer saccharinum silver maple OBL
Acoelorraphe wrightii paurotis palm OBL
Acrostichum spp. leather fern OBL
Aeschynomene indica India joint-vetch FACW
Aeschynomene pratensis meadow joint-vetch OBL
Agalinis aphylla scale-leaf false-foxglove FACW
Agalinis linifolia flax-leaf false-foxglove OBL
Agalinis maritima saltmarsh false-foxglove OBL
Agalinis pinetorum (*A. pulchella*) false-foxglove FACW
Agalinis purpurea large purple false-foxglove FACW
Agarista populifolia hobble-bush FACW
Agrostis stolonifera redtop FACW
Aletris spp. colic-root FAC
Alisma subcordatum subcordate water-plantain OBL
Alnus serrulata hazel alder OBL
Alopecurus carolinianus tufted foxtail FAC
Alternanthera maritima beach alternanthera FACW - Keys only
Alternanthera paronychioides smooth chaff-flower FAC - Keys only
Alternanthera philoxeroides alligator-weed OBL
Alternanthera sessilis sessile alligator-weed OBL
Amaranthus australis southern amaranth OBL
Amaranthus cannabinus tidemarsh amaranth OBL
Amaranthus floridanus Florida amaranth OBL
Ammannia spp. toothcup OBL
Amorpha fruticosa indigo-bush FACW
Amphicarpum muhlenbergianum blue maidencane FACW
Amsonia rigida stiff slimpod FACW
Amsonia tabernaemontana eastern slimpod FACW
Anagallis pumila Florida pimpernel FAC
Andropogon arctatus (Campbell) savannah bluestem FAC
Andropogon brachystachys (Campbell) short-spike bluestem FAC
Andropogon gerardii (Campbell) big bluestem FAC
Andropogon glomeratus (Campbell) bushy bluestem FACW
Andropogon liebmanii var. ***pungensis*** (Campbell) (***A. mohrii***) Mohr's bluestem FACW
Andropogon perangustatus (Campbell) slim bluestem FAC
Andropogon virginicus (Campbell) broom-sedge FAC
Annona glabra pond apple OBL
Anthaenantia rufa purple silky-scale FACW
Apteria aphylla nodding nixie FACW
Ardisia spp. marlberry FAC
Arenaria godfreyi Godfrey's stitchwort FACW
Arisaema spp. jack-in-the-pulpit; green-dragon FACW

Aristida affinis long-leaf three-awn grass OBL
Aristida purpurascens (s.l.) wand-like three-awn grass FACW
Aristida rhizomophora rhizomatous three-awn grass FAC
Aristida spiciformis three-awn bottlebrush FAC
Aristida stricta pineland three-awn grass FAC
Armoracia aquatica lakecress OBL
Arnoglossum diversifolium variable-leaf indian-plantain FACW
Arnoglossum ovatum egg-leaf indian-plantain FACW
Arnoglossum sulcatum indian-plantain, Georgia OBL
Aronia arbutifolia red chokeberry FACW
Arundinaria gigantea giant cane FACW
Arundo donax giant reed FAC
Asclepias connivens large-flower milkweed FACW
Asclepias incarnata swamp milkweed OBL
Asclepias lanceolata fen-flower milkweed OBL
Asclepias longifolia long-leaf milkweed FACW
Asclepias pedicellata savannah milkweed FACW
Asclepias perennis aquatic milkweed OBL
Asclepias rubra red milkweed OBL
Asclepias viridula southern milkweed FACW
Aster carolinianus climbing aster OBL
Aster chapmanii savannah aster FACW
Aster dumosus bushy aster FAC
Aster elliottii Elliott's aster OBL
Aster eryngiifolius coyote-thistle aster FACW
Aster lateriflorus calico aster FACW
Aster spinulosus bog aster FACW
Aster subulatus saltmarsh aster OBL
Aster tenuifolius saltmarsh aster OBL
Aster umbellatus flat-top white aster FAC
Aster vimineus small white aster FACW
Athyrium filix-femina subarctic lady fern FACW
Atriplex patula halberd-leaf saltbush FACW
Avicennia germinans black mangrove OBL
Axonopus spp. carpet grass FAC
Baccharis angustifolia false-willow OBL
Baccharis dioica broom-bush false-willow FAC
Baccharis glomeruliflora groundsel tree FAC
Baccharis halimifolia eastern false-willow FAC
Bacopa spp. water-hyssop OBL
Balduina atropurpurea purple honeycomb-head FACW
Balduina uniflora one-flower honeycomb-head FACW
Bartonia spp. screwstem FACW
Batis maritima saltwort OBL
Betula nigra river birch OBL
Bidens bipinnata Spanish needles U
Bidens pilosa white beggar-ticks FAC
Bidens spp. beggar-ticks OBL
Bigelowia nudata rayless golden-rod FACW
Blechnum serrulatum swamp fern FACW
Boehmeria cylindrica small-spike false-nettle OBL

Boltonia spp. boltonia FACW
Borrichia spp. sea oxeye OBL
Brachiaria purpurascens paragrass FACW
Bucida buceras gregory wood FAC
Bumelia celastrina coastal bumelia FAC
Bumelia lycioides buckthorn bumelia FAC
Bumelia reclinata bumelia FAC
Burmannia spp. burmannia OBL
Byrsonima lucida locust-berry FAC - Keys only
Cacalia suaveolens sweet-scent indian-plantain FACW
Calamovilfa curtissii Curtiss' reed grass FACW
Callitriche spp. water-starwort OBL
Calopogon spp. grass-pinks FACW
Calycocarpum lyonii cupseed FACW
Campanula americana American bellflower FAC
Campanula floridana bellflower OBL
Canna spp. canna OBL
Canna x generalis common canna FAC
Caperonia spp. caperonia FACW
Capparis flexuosa caper-tree FACW
Cardamine bulbosa bitter-cress OBL
Cardamine pensylvanica spring-cress OBL
Carex atlantica prickly bog sedge OBL
Carex comosa bearded sedge OBL
Carex crinita fringed sedge OBL
Carex crus-corvi raven-foot sedge OBL
Carex decomposita cypress-knee sedge OBL
Carex elliottii Elliott's sedge OBL
Carex folliculata long sedge OBL
Carex gigantea large sedge OBL
Carex howei Howe's sedge OBL
Carex hyalinolepis sedge, shoreline sedge OBL
Carex leptalea bristly-stalk sedge OBL
Carex louisianica Louisiana sedge OBL
Carex lupulina hop sedge OBL
Carex lurida shallow sedge OBL
Carex spp. sedges FACW
Carex stipata stalk-grain sedge OBL
Carex walteriana Walter's sedge OBL
Carphephorus carnosus pineland chaffhead FACW
Carphephorus odoratissimus vanilla plant FAC
Carphephorus paniculatus deer-tongue FAC
Carphephorus pseudoliatris bristle-leaf chaffhead FACW
Carpinus caroliniana American hornbeam FACW
Carya aquatica water hickory OBL
Casuarina spp. casuarina FAC
Cayaponia quinqueloba five-lobe cayaponia FAC
Celtis laevigata sugar-berry; hackberry FACW
Centella asiatica coinwort FACW
Cephalanthus occidentalis buttonbush OBL
Cestrum diurnum day jessamine FAC

Chamaecyparis thyoides Atlantic white cedar OBL
Chaptalia tomentosa sunbonnet; pineland daisy FACW
Chasmanthium latifolium spanglegrass FAC
Chasmanthium sessiliflorum long-leaf Chasmanthium FAC
Chasmanthium spp. spanglegrass FACW
Chiococca spp. snowberry FAC
Chrysobalanus icaco cocoplum FACW
Cicuta spp. water-hemlock OBL
Cirsium lecontei Leconte's thistle FACW
Cirsium muticum swamp thistle OBL
Cirsium nuttallii Nuttall's thistle FACW
Cladium spp. sawgrass OBL
Cleistes divaricata rosebud OBL
Clethra alnifolia sweet pepper bush FACW
Cliftonia monophylla buckwheat-tree FACW
Colocasia esculenta elephant's ear OBL
Colubrina asiatica Asian snakewood FAC
Commelina erecta sandhill dayflower U
Commelina spp. dayflower FACW
Conocarpus erectus buttonwood FACW
Conoclinium coelestinum mistflower FAC
Coreopsis falcata sickle tickseed FACW
Coreopsis floridana Florida tickseed FACW
Coreopsis gladiata southeastern tickseed FACW
Coreopsis integrifolia ciliate-leaf tickseed FACW
Coreopsis leavenworthii Leavenworth's tickseed FACW
Coreopsis linifolia Texas tickseed FACW
Coreopsis nudata Georgia tickseed OBL
Coreopsis tripteris tall tickseed FAC
Cornus amomum silky dogwood OBL
Cornus foemina swamp dogwood FACW
Crataegus aestivalis mayhaw OBL
Crataegus marshallii parsley haw FACW
Crataegus viridis green haw FACW
Crinum americanum southern swamp-lily OBL
Croton elliottii Elliott's croton FACW
Ctenitis submarginalis brown-hair comb fern FACW
Ctenium spp. toothache grass FACW
Cupaniopsis anacardioides carrotwood FAC
Cuphea aspera common waxweed FACW
Cuphea carthagenensis Columbia waxweed FAC
Cyperus alternifolius alternate-leaf flatsedge OBL
Cyperus articulatus jointed flatsedge OBL
Cyperus cuspidatus coastal-plain flatsedge FAC
Cyperus difformis variable flatsedge OBL
Cyperus distinctus marshland flatsedge OBL
Cyperus drummondii flatsedge OBL
Cyperus entrerianus flatsedge OBL
Cyperus erythrorhizos red-root flatsedge OBL
Cyperus esculentus flatsedge FAC
Cyperus filiculmis sandhill flatsedge U

Cyperus giganteus flatsedge FAC
Cyperus globulosus Baldwin's flatsedge FAC
Cyperus haspan sheathed flatsedge OBL
Cyperus huarmensis black knotty-root flatsedge FAC
Cyperus lanceolatus epiphytic flatsedge OBL
Cyperus metzii flatsedge FAC
Cyperus ovularis flatsedge U
Cyperus papyrus papyrus flatsedge OBL
Cyperus reflexus flatsedge U
Cyperus refractus flatsedge U
Cyperus retrofractus flatsedge U
Cyperus retrorsus flatsedge FAC
Cyperus rotundus purple flatsedge FAC
***Cyperus* spp.** flatsedge FACW
Cyperus tetragonus flatsedge U
Cypselea humifusa panal FAC
Cyrilla racemiflora swamp cyrilla FAC
Decodon verticillatus swamp-loosestrife OBL
Dichondra caroliniensis pony-foot FAC
Dichromena colorata starbrush white-top sedge FACW
Dichromena floridensis Everglades white-top sedge FACW
Dichromena latifolia giant white-top sedge OBL
Dicliptera brachiata wild mudwort FACW
Digitaria pauciflora everglades grass FACW
Digitaria serotina dwarf crabgrass FAC
Diodia virginiana button-weed FACW
Dionaea muscipula Venus' flytrap FACW
Diospyros virginiana common persimmon FAC
Distichlis spicata seashore saltgrass OBL
Drosera brevifolia dwarf sundew FACW
Drosera capillaris pink sundew FACW
Drosera filiformis thread-leaf sundew OBL
Drosera intermedia spoon-leaf sundew OBL
Drosera tracyi Gulf coast sundew OBL
Drymaria cordata West Indian chickweed FAC
Dryopteris ludoviciana southern shield-fern FACW
Dulichium arundinaceum three-way sedge OBL
Dyschoriste humistrata swamp dyschoriste FACW
Echinochloa spp. jungle-rice; cockspur grass FACW
Echinodorus spp. burhead OBL
Eclipta alba yerba de Tajo FACW
Eleocharis spp. spikerush OBL
Elyonurus tripsacoides Pan-American balsam-scale FACW
Elytraria caroliniensis Carolina scaly-stem FAC
Equisetum hyemale horsetail FACW
Eragrostis spp. lovegrass FAC
Erechtites hieraciifolia fireweed FAC
Erianthus brevibarbis short-beard plumegrass FACW
Erianthus giganteus sugarcane plumegrass OBL
Erianthus strictus narrow plumegrass OBL
Erigeron quercifolius fleabane FAC

Erigeron vernus early whitetop fleabane FACW
Eriocaulon spp. pipewort OBL
Eriochloa spp. cupgrass FACW
Erithalis fruticosa black torchwood FAC
Ernodea littoralis golden-creeper FAC - Keys only
Eryngium aquaticum corn snakeroot OBL
Eryngium baldwinii Baldwin's coyote-thistle FAC
Eryngium integrifolium blue-flower coyote-thistle FACW
Eryngium prostratum creeping coyote-thistle FACW
Eryngium yuccifolium rattlesnake master FACW
Erythrodes querceticola low erythrodes FACW
Eulophia alta wild coco FACW
Eupatoriadelphus fistulosus joe-pye-weed FACW
Eupatorium leptophyllum marsh thoroughwort OBL
Eupatorium leucolepis white-bract thoroughwort FACW
Eupatorium mikanioides semaphore thoroughwort FACW
Eupatorium perfoliatum boneset FACW
Eupatorium spp. thoroughworts FAC
Euphorbia humistrata (*Chamaesyce humistrata*) spreading broomspurge FACW
Euphorbia inundata Florida spurge FACW
Euphorbia polyphylla many-leaved spurge FACW
Eustachys glauca (*Chloris glauca*) saltmarsh fingergrass FACW
Eustachys petraea fingergrass FAC
Eustoma exaltatum prairie-gentian FACW
Euthamia spp. bushy goldenrod FAC
Evolvulus convolvuloides evolvulus FACW
Evolvulus sericeus silky bindweed FACW
Ficus aurea Florida strangler fig FAC
Fimbristylis annua annual fringe-rush FACW
Fimbristylis puberula Vahl's hairy fringe-rush FACW
Fimbristylis spathacea hurricane-grass FAC
Fimbristylis spp. fringe-rush OBL
Flaveria bidentis yellowtop FAC
Flaveria floridana yellowtop FACW
Flaveria linearis yellowtop FACW
Flaveria trinervia yellowtop FAC
Forestiera acuminata swamp privet FACW
Forestiera segregata Florida privet FAC
Fothergilla gardenii dwarf witch-alder FACW
Fraxinus americana white ash U
Fraxinus spp. ash OBL
Fuirena spp. umbrella-sedge OBL
Galium tinctorium stiff marsh bedstraw FACW
Gaylussacia dumosa dwarf huckleberry FAC
Gaylussacia frondosa dangleberry FAC
Gaylussacia mosieri woolly-berry FACW
Gentiana spp. gentian FACW
Gleditsia aquatica water-locust OBL
Gleditsia triacanthos honey-locust FACW
Glyceria striata fowl mannagrass OBL
Gordonia lasianthus loblolly bay FACW

Gratiola hispida hispid hyssop FAC
Gratiola spp. hedgehyssop FACW
Guapira discolor blolly FAC - Keys only
Habenaria spp. rein orchid FACW
Halesia diptera silver-bell FACW
Harperocallis flava Harper's beauty FACW
Hartwrightia floridana Florida hartwrightia FACW
Hedychium coronarium ginger FACW
Helenium amarum pasture sneezeweed FAC
Helenium spp. sneezeweed FACW
Helianthus agrestis southeastern sunflower FACW
Helianthus angustifolius swamp sunflower FACW
Helianthus carnosus lakeside sunflower FACW
Helianthus floridanus Florida sunflower FAC
Helianthus heterophyllus wetland sunflower FACW
Helianthus simulans muck sunflower FACW
Heliotropium curassavicum seaside heliotrope FAC
Heliotropium polyphyllum heliotrope FAC
Heliotropium procumbens four-spike heliotrope FACW
Hemicarpha spp. dwarf-bulrush FACW
Heteranthera reniformis kidney-leaf mud-plantain OBL
Hibiscus aculeatus rosemallow FACW
Hibiscus coccineus scarlet rosemallow OBL
Hibiscus grandiflorus swamp rosemallow OBL
Hibiscus laevis halberd-leaf rosemallow OBL
Hibiscus moscheutos swamp rosemallow OBL
Hibiscus tiliaceus sea rosemallow FAC
Hydrochloa caroliniensis watergrass OBL
Hydrocleis nymphoides water-poppy OBL
Hydrocotyle ranunculoides floating pennywort OBL
Hydrocotyle spp. pennywort FACW
Hydrolea spp. false-fiddle-leaf OBL
Hygrophila spp. hygrophila OBL
Hymenachne amplexicaulis trompetilla OBL
Hymenocallis spp. spider-lily OBL
Hypericum chapmanii Chapman's St. John's-wort OBL
Hypericum cumulicola scrub St. John's-wort U
Hypericum drummondii Drummond's St. John's-wort U
Hypericum edisonianum Edison's St. John's-wort OBL
Hypericum fasciculatum marsh St. John's-wort OBL
Hypericum gentianoides pineweed U
Hypericum hypericoides St. Andrew's cross FAC
Hypericum lissophloeus smooth-bark St. John's-wort OBL
Hypericum microsepalum small-sepal St. John's-wort U
Hypericum nitidum Carolina St. John's-wort OBL
Hypericum prolificum shrubby St. John's-wort U
Hypericum punctatum dotted St. John's-wort U
Hypericum reductum Atlantic St. John's-wort U
Hypericum spp. St. John's-wort FACW
Hypericum tetrapetalum four-petal St. John's-wort FAC
Hypolepis repens bead fern FACW

Hypoxis spp. yellow stargrasses FACW
Hyptis alata musky mint FACW
Ilex amelanchier sarvis holly OBL
Ilex cassine dahoon holly OBL
Ilex coriacea bay-gall holly FACW
Ilex decidua deciduous holly FACW
Ilex myrtifolia myrtle holly OBL
Ilex opaca var.***opaca*** American holly FAC
Ilex verticillata winterberry OBL
Ilex vomitoria yaupon holly FAC
Illicium floridanum Florida anise OBL
Illicium parviflorum star anise FACW
Impatiens capensis spotted touch-me-not OBL
Iris spp. iris OBL
Iris verna dwarf iris U
Isoetes spp. quillwort OBL
Itea virginica virginia willow OBL
Iva frutescens marsh elder OBL
Iva microcephala little marsh elder FACW
Jacquinia keyensis joewood FAC
Juncus marginatus rush FACW
Juncus spp. rush OBL
Juncus tenuis rush FAC
Justicia brandegeana shrimp plant U
Justicia spp. water-willow OBL
Kalmia latifolia mountain laurel FACW
Kosteletzkya pentasperma coastal mallow FAC
Kosteletzkya virginica seashore mallow OBL
Lachnanthes caroliniana redroot FAC
Lachnocaulon anceps white-head bogbutton FACW
Lachnocaulon beyrichianum southern bogbutton FACW
Lachnocaulon digynum pineland bogbutton OBL
Lachnocaulon engleri Engler's bogbutton OBL
Lachnocaulon minus Small's bogbutton OBL
Laguncularia racemosa white mangrove OBL
Laportea canadensis Canada wood-nettle FACW
Leersia spp. cutgrass OBL
Leitneria floridana corkwood OBL
Leptochloa spp. sprangle-top FACW
Leptochloa virgata tropic sprangle-top FAC
Leucothoe spp. dog-hobble FACW
Liatris garberi Garber's gayfeather FACW
Liatris gracilis blazing star FAC
Liatris spicata spiked gayfeather FAC
Lilaeopsis spp. lilaeopsis OBL
Lilium catesbaei southern red lily FAC
Lilium iridollae panhandle lily OBL
Limnobium spongia frogbit OBL
Limnophila spp. marshweed OBL
Limonium carolinianum sea-lavender OBL
Lindera benzoin northern spicebush FACW

Lindera melissifolia southern spicebush OBL
Lindernia crustacea Malayan false-pimpernel FAC
Lindernia spp. false-pimpernel FACW
Linum carteri Carter's flax FACW
Linum floridanum Florida yellow flax FAC
Linum medium stiff yellow flax FAC
Linum striatum ridged yellow flax FACW
Linum westii West's flax OBL
Liparis elata (*L. nervosa*) tall liparis OBL
Lipocarpha spp. lipocarpha FACW
Liquidambar styraciflua sweetgum FACW
Liriodendron tulipifera tulip tree FACW
Listera spp. twayblade FACW
Litsea aestivalis pondspice OBL
Lobelia cardinalis cardinal flower OBL
Lobelia floridana Florida lobelia OBL
Lobelia spp. lobelia FACW
Lophiola americana golden-crest FACW
Ludwigia hirtella hairy seedbox FACW
Ludwigia maritima seaside seedbox FACW
Ludwigia spp. ludwigia; water-primrose OBL
Ludwigia suffruticosa headed seedbox FACW
Ludwigia virgata savanna seedbox FACW
Lycium carolinianum Christmas berry OBL
Lycopodium spp. clubmoss FACW
Lycopus spp. bugleweed OBL
Lyonia ligustrina maleberry FAC
Lyonia lucida fetter-bush FACW
Lyonia mariana fetter-bush FACW
Lysimachia spp. loosestrife OBL
Lythrum spp. marsh loosestrife OBL
Macbridea spp. birds-in-a-nest FACW
Macranthera flammea flameflower OBL
Magnolia virginiana var. ***australis*** sweetbay magnolia OBL
Malaxis spicata Florida adder's-mouth OBL
Manilkara bahamensis wild dilly FAC - Keys only
Manisuris cylindrica pitted jointgrass FAC
Manisuris spp. jointgrass FACW
Marshallia graminifolia grass-leaf barbara's-buttons FACW
Marshallia tenuifolia slim-leaf barbara's-buttons FACW
Maxillaria crassifolia hidden orchid OBL
Maytenus phyllanthoides Florida mayten FAC
Mecardonia spp. mecardonia FACW
Melaleuca quinquenervia punk tree FAC
Melanthera nivea squarestem FACW
Melanthium virginicum Virginia bunchflower OBL
Melochia corchorifolia chocolate-weed FAC
Metopium toxiferum poison wood FAC
Micranthemum spp. baby tears OBL
Micromeria brownei (*Satureja brownei*) Brown's savory OBL
Mimosa pigra black mimosa FAC

Mimulus alatus monkey-flower OBL
Mitreola spp. hornpod FACW
Monanthochloe littoralis keygrass OBL
Morinda royoc Keys rhubarb FACW - Keys only
Morus rubra red mulberry FAC
Muhlenbergia capillaris muhly grass OBL
Muhlenbergia expansa cutover muhly FAC
Muhlenbergia schreberi nimblewill FACW
Murdannia spp. dewflower FAC
Myosurus minimus tiny mouse-tail FAC
Myrica cerifera southern bayberry FAC
Myrica heterophylla evergreen bayberry FACW
Myrica inodora odorless bayberry FACW
Myrsine guianensis guiana myrsine FAC
Nasturtium spp. water-cress OBL
Nelumbo spp. water-lotus OBL
Nemastylis floridana fall-flowering pleatleaf FACW
Nemophila aphylla small-flower baby-blue-eyes FACW
Nephrolepis spp. sword ferns FAC
Neyraudia reynaudiana silk reed FAC
Nuphar luteum yellow cow-lily OBL
Nymphaea spp. water-lily OBL
Nymphoides spp. floating-hearts OBL
Nyssa aquatica water tupelo OBL
Nyssa ogeche ogeechee tupelo OBL
Nyssa sylvatica var. ***biflora*** swamp tupelo OBL
Oldenlandia spp. water bluets FACW
Onoclea sensibilis sensitive fern FACW
Oplismenus setarius woods grass FAC
Orontium aquaticum golden club OBL
Oryza sativa cultivated rice FAC
Osmunda cinnamomea cinnamon fern FACW
Osmunda regalis royal fern OBL
Oxypolis spp. water drop-wort OBL
Panicum abscissum (Hall) cut-throat grass FACW
Panicum anceps beaked panicum FAC
Panicum commutatum panicum FAC
Panicum dichotomiflorum fall panicum FACW
Panicum dichotomum panicum FACW
Panicum ensifolium panic grass OBL
Panicum erectifolium erect-leaf witchgrass OBL
Panicum gymnocarpon savannah panicum OBL
Panicum hemitomon maiden-cane OBL
Panicum hians gaping panicum FAC
Panicum longifolium tall thin panicum OBL
Panicum pinetorum panicum FACW
Panicum repens torpedo grass FACW
Panicum rigidulum red-top panicum FACW
Panicum scabriusculum woolly panicum OBL
Panicum scoparium panicum FACW
Panicum spretum panicum FACW

Panicum strigosum panicum FAC
Panicum tenerum bluejoint panicum OBL
Panicum tenue panicum FAC
Panicum verrucosum warty panicum FACW
Panicum virgatum switchgrass FACW
Parietaria spp. pellitory FAC
Parnassia spp. grass-of-Parnassus OBL
Paspalidium geminatum water panicum OBL
Paspalum acuminatum brook paspalum FACW
Paspalum boscianum bull paspalum FACW
Paspalum conjugatum sour paspalum FAC
Paspalum dilatatum dallisgrass FAC
Paspalum dissectum mudbank paspalum OBL
Paspalum distichum joint paspalum OBL
Paspalum fimbriatum Panama paspalum FAC
Paspalum floridanum Florida paspalum FACW
Paspalum laeve field paspalum FACW
Paspalum monostachyum gulf paspalum OBL
Paspalum plicatulum brown-seed paspalum FAC
Paspalum praecox early paspalum OBL
Paspalum pubiflorum hairy-seed paspalum FACW
Paspalum repens water paspalum OBL
Paspalum setaceum thin paspalum FAC
Paspalum urvillei vasey grass FAC
Pavonia spicata mangrove mallow FACW
Peltandra spp. arum; spoon flower OBL
Pennisetum purpureum elephant ear grass FAC
Penthorum sedoides ditch stonecrop OBL
Pentodon pentandrus Hall's pentodon OBL
Persea palustris swamp bay OBL
Phalaris spp. canary grass FAC
Philoxerus vermicularis silverhead FACW
Phragmites australis common reed OBL
Phyla spp. frog-fruit FAC
Phyllanthus caroliniensis Carolina leaf-flower FACW
Phyllanthus liebmannianus Florida leaf-flower FACW
Phyllanthus urinaria water leaf-flower FAC
Physostegia godfreyi Godfrey's dragon-head OBL
Physostegia leptophylla slender-leaf dragon-head OBL
Physostegia purpurea purple dragon-head FACW
Physostegia virginiana false dragon-head FACW
Pieris phillyreifolia climbing fetter-bush FACW
Pilea spp. clearweed FACW
Pinckneya bracteata (*P. pubens*) fever-tree OBL
Pinguicula spp. butterwort OBL
Pinus glabra spruce pine FACW
Pinus serotina pond pine FACW
Piriqueta caroliniana piriqueta FAC
Pisonia rotundata pisonia FAC - Keys only
Pithecellobium keyense blackbead FAC - Keys only
Pithecellobium unguis-cati catclaw FAC - Keys only

Planera aquatica planer tree OBL
Platanthera spp. fringed orchid OBL
Platanus occidentalis sycamore FACW
Pleea tenuifolia rush-featherling OBL
Pluchea spp. camphor-weed FACW
Pogonia ophioglossoides rose pogonia OBL
Polygala cymosa tall milkwort OBL
Polygala leptostachys sandhill milkwort U
Polygala lewtonii scrub milkwort U
Polygala polygama racemed milkwort U
Polygala spp. milkwort FACW
Polygala verticillata whorled milkwort U
Polygonum argyrocoleon silversheath smartweed U
Polygonum spp. smartweed OBL
Polygonum virginianum jumpseed FACW
Polypogon spp. rabbit-foot grass FAC
Polypremum procumbens rustweed FAC
Pontederia cordata pickerelweed OBL
Ponthieva racemosa shadow-witch FACW
Populus deltoides eastern cottonwood FACW
Populus heterophylla swamp cottonwood OBL
Proserpinaca spp. mermaid-weed OBL
Psidium cattleianum strawberry guava FAC
Psilocarya spp. baldrush OBL
Psychotria spp. wild coffee FAC
Pteris tripartita giant brake FACW
Ptilimnium capillaceum mock bishop-weed FACW
Pycnanthemum nudum coastal-plain mountain-mint FACW
Quercus laurifolia laurel oak FACW
Quercus lyrata overcup oak OBL
Quercus michauxii swamp chestnut oak FACW
Quercus nigra water oak FACW
Quercus pagoda cherry-bark oak FACW
Quercus phellos willow oak FACW
Randia aculeata box briar FAC - Keys only
Ranunculus spp. butter-cup FACW
Reimarochloa oligostachya Florida reimar grass FACW
Reynosia septentrionalis darling plum FAC - Keys only
Rhapidophyllum hystrix needle palm FACW
Rhexia parviflora white meadow-beauty OBL
Rhexia salicifolia panhandle meadow-beauty OBL
Rhexia spp. meadow-beauty FACW
Rhizophora mangle red mangrove OBL
Rhododendron viscosum swamp azalea FACW
Rhodomyrtus tomentosus downy rose-myrtle FAC
Rhynchospora cephalantha clustered beakrush OBL
Rhynchospora chapmanii Chapman's beakrush OBL
Rhynchospora corniculata short-bristle beakrush OBL
Rhynchospora decurrens swamp-forest beakrush OBL
Rhynchospora divergens spreading beakrush OBL
Rhynchospora grayi Gray's beakrush U

Rhynchospora harperi Harper's beakrush OBL
Rhynchospora intermedia pinebarren beakrush U
Rhynchospora inundata horned beakrush OBL
Rhynchospora macra large beakrush OBL
Rhynchospora megalocarpa giant-fruited beakrush U
Rhynchospora microcarpa southern beakrush OBL
Rhynchospora miliacea millet beakrush OBL
Rhynchospora mixta mingled beakrush OBL
Rhynchospora oligantha few-flower beakrush OBL
Rhynchospora spp. beakrush FACW
Rhynchospora stenophylla Chapman's beakrush OBL
Rhynchospora tracyi Tracy's beakrush OBL
Rorippa spp. yellow-cress OBL
Rosa palustris swamp rose OBL
Rotala ramosior toothcup OBL
Roystonea spp. royal palm FACW
Rubus spp. blackberries FAC
Rudbeckia fulgida orange coneflower FACW
Rudbeckia graminifolia grass-leaf coneflower FACW
Rudbeckia laciniata cut-leaf coneflower FACW
Rudbeckia mohrii Mohr's coneflower OBL
Rudbeckia nitida shiny coneflower FACW
Ruellia brittoniana Britton's wild-petunia FAC
Ruellia caroliniensis wild-petunia FAC
Ruellia noctiflora night-flowering wild-petunia FACW
Rumex spp. dock FACW
Sabal minor dwarf palmetto FACW
Sabal palmetto cabbage palm FAC
Sabatia bartramii Bartram's rose-gentian OBL
Sabatia calycina coast rose-gentian OBL
Sabatia dodecandra large rose-gentian OBL
Sabatia spp. rose-gentian FACW
Sacciolepis indica glenwood grass FAC
Sacciolepis striata American cupscale OBL
Sachsia polycephala sachsia FACW
***Sagittaria* spp.** arrowhead OBL
Salicornia spp. glasswort OBL
Salix spp. willow OBL
Sambucus canadensis elderberry FAC
Samolus spp. water pimpernel OBL
Sapium sebiferum Chinese tallow-tree FAC
Sarracenia minor hooded pitcher-plant FACW
Sarracenia spp. pitcher-plant OBL
Saururus cernuus lizard's tail OBL
Schinus terebinthifolius Brazilian pepper-tree FAC
Schizachyrium spp. bluestem FAC
Schoenolirion croceum sunny bells FACW
Schoenolirion elliottii sunny bells FACW
Schoenus nigricans black-sedge FACW
Scirpus spp. bulrush OBL
Scleria spp. nutrush FACW

Sclerolepis uniflora one-flower hardscale FACW
Scoparia dulcis sweet broom FAC
Scutellaria floridana skullcap FAC
Scutellaria integrifolia rough skullcap FAC
Scutellaria lateriflora blue skullcap OBL
Scutellaria racemosa skullcap OBL
Sebastiania fruticosa gulf sebastian-bush FAC
Selaginella apoda meadow spike-moss FACW
Senecio aureus golden ragwort OBL
Senecio glabellus butterweed OBL
Sesbania spp. rattle-bush FAC
Sesuvium spp. sea-purslane FACW
Setaria geniculata bristle grass FAC
Setaria magna foxtail OBL
Seymeria cassioides black senna FAC
Sisyrinchium atlanticum eastern blue-eye-grass FACW
Sisyrinchium capillare blue-eye-grass FACW
Sisyrinchium mucronatum Michaux's blue-eye-grass FACW
Sium suave water-parsnip OBL
Solanum bahamense canker-berry FACW
Solanum erianthum shrub nightshade FACW
Solidago elliottii Elliott's goldenrod OBL
Solidago fistulosa marsh goldenrod FACW
Solidago leavenworthii Leavenworth's goldenrod FACW
Solidago patula rough-leaf goldenrod OBL
Solidago rugosa wrinkled goldenrod FAC
Solidago sempervirens seaside goldenrod FACW
Solidago stricta willow-leaf goldenrod FACW
Sophora tomentosa coast sophora FACW
Sparganium americanum burreed OBL
Spartina alterniflora saltmarsh cordgrass OBL
Spartina bakeri sand cordgrass FACW
Spartina cynosuroides big cordgrass OBL
Spartina patens saltmeadow cordgrass FACW
Spartina spartinae gulf cordgrass OBL
Spergularia marina saltmarsh sandspurry OBL
Spermacoce glabra smooth button-plant FACW
Sphagnum spp. sphagnum moss OBL
Sphenoclea zeylanica chicken-spike FACW
Sphenopholis pensylvanica swamp wedgescale OBL
Sphenostigma coelestinum Bartram's ixia FACW
Spigelia loganioides pink-root FACW
Spilanthes americana creeping spotflower FACW
Spiranthes spp. ladies'-tresses FACW
Sporobolus floridanus Florida dropseed FACW
Sporobolus virginicus seashore dropseed OBL
Stachys lythroides hedgenettle OBL
Staphylea trifolia American bladdernut FACW
Stenandrium floridanum stenandrium FACW
Stenanthium gramineum eastern feather-bells FACW
Stillingia aquatica corkwood OBL

Stillingia sylvatica var. ***tenuis*** marsh queen's-delight FAC
Stipa avenacioides Florida needle grass FACW
Stokesia laevis stokesia FACW
Strumpfia maritima strumpfia FACW - Keys only
Styrax americana snowbell; storax OBL
Suaeda spp. sea-blite OBL
Suriana maritima bay-cedar FAC
Syngonanthus flavidulus bantam-buttons FACW
Syzygium spp. Java plum FAC
Taxodium ascendens pond cypress OBL
Taxodium distichum bald cypress OBL
Teucrium canadense American germander FACW
Thalia geniculata thalia; fire flag OBL
Thalictrum spp. meadow-rue FACW
Thelypteris spp. shield fern FACW
Thespesia populnea seaside mahoe FAC
Thrinax radiata Florida thatch palm FAC - Keys only
Tilia americana American basswood FACW
Tofieldia racemosa coastal false-asphodel OBL
Toxicodendron vernix poison sumac FACW
Trachelospermum difforme climbing-dogbane FACW
Tradescantia fluminensis trailing spiderwort FAC
Trema spp. trema FAC
Trepocarpus aethusae aethusa-like trepocarpus FACW
Triadenum spp. marsh St. John's-wort OBL
Trianthema portulacastrum horse-purslane FACW
Tridens ambiguus savannah tridens FACW
Tridens strictus long-spike tridens FACW
Triglochin striata arrow-grass OBL
Triphora spp. nodding pogonias FACW
Tripsacum dactyloides eastern gama grass FAC
Typha spp. cattail OBL
Ulmus rubra slippery elm U
Ulmus spp. elm FACW
Urechites lutea wild allamanda FACW
Utricularia spp. bladderwort OBL
Uvularia floridana Florida bellwort FACW
Vaccinium corymbosum highbush blueberry FACW
Vaccinium elliottii Elliott's blueberry FAC
Verbena scabra sandpaper vervain FACW
Verbesina chapmanii Chapman's crownbeard FACW
Verbesina heterophylla diverse-leaf crownbeard FACW
Verbesina virginica white crownbeard FAC
Vernonia angustifolia narrow-leaf ironweed U
Vernonia spp. ironweed FACW
Veronica anagallis-aquatica water speedwell OBL
Veronicastrum virginicum culver's-root FACW
Viburnum dentatum arrow-wood FACW
Viburnum nudum possum-haw viburnum FACW
Viburnum obovatum walter viburnum FACW
Vicia acutifolia four-leaf vetch FACW

Vicia floridana Florida vetch FACW
Vicia ocalensis Ocala vetch OBL
Viola affinis Leconte's violet FACW
Viola esculenta edible violet FACW
Viola lanceolata lance-leaf violet OBL
Viola primulifolia primrose-leaf violet FACW
Websteria confervoides water-meal OBL
Wedelia trilobata creeping ox-eye FAC
Woodwardia areolata chainfern OBL
Woodwardia virginica chainfern FACW
Xanthorhiza simplicissima shrubby yellow-root FACW
Xanthosoma sagittifolium elephant ear FACW
Xyris caroliniana Carolina yellow-eyed grass FACW
Xyris jupicai tropical yellow-eyed grass FACW
Xyris spp. yellow-eyed grass OBL
Yeatesia viridiflora green-flower yeatesia FACW
Zephyranthes atamasco atamasco lily FACW
Zigadenus densus crow poison FACW
Zigadenus glaberrimus atlantic deathcamas FACW
Zizania aquatica wildrice OBL
Zizaniopsis miliacea southern wildrice OBL

Any plant not specifically listed is considered an upland plant except vines, aquatic plants, and any plant species not introduced into the State of Florida as of the effective date of Chapter 62-340, F.A.C. (Effective Date July 1, 1994)

Chapter 62-340, F.A.C.
Delineation of the Landward Extent of Wetlands and Surface Waters

62-340.100 Intent.

(1) This rule's intent is to provide a unified statewide methodology for the delineation of the extent of wetlands and surface waters to satisfy the mandate of Section 373.421, F.S. This delineation methodology is intended to approximate the combined landward extent of wetlands as determined by a water management district and the Department immediately before the effective date of this rule. Before implementing the specific provisions of this methodology, the regulating agency shall attempt to identify wetlands according to the definition for wetlands in subsection 373.019(27), F.S., and subsection 62-340.200(19), F.A.C., below. The landward extent of wetlands shall be determined by the dominance of plant species, soils and other hydrologic evidence indicative of regular and periodic inundation or saturation. In all cases, attempts shall be made to locate the landward extent of wetlands visually by on site inspection, or aerial photointerpretation in combination with ground truthing, without quantitative sampling. If this cannot be accomplished, the quantitative methods in paragraph 62-301.400(1)(c), F.A.C., shall be used unless the applicant or petitioner and regulating agency agree, in writing, on an alternative method for quantitatively analyzing the vegetation on site. The methodology shall not be used to delineate areas which are not wetlands as defined in subsection 62-340.200(19), F.A.C., nor to delineate as wetlands or surface waters areas exempted from delineation by statute or agency rule.

2) The Department shall be responsible for ensuring statewide coordination and consistency in the delineation of surface waters and wetlands pursuant to this rule, by providing training and guidance to the Department, Districts, and local governments in implementing the methodology.

Specific Authority 373.421 FS. Law Implemented 373.421, 373.4211 FS. History–New 7-1-94, Formerly 17-340.100.

62-340.200 Definitions.

When used in this chapter, the following terms shall mean:

(1) "**Aquatic plant**" means a plant, including the roots, which typically floats on water or requires water for its entire structural support, or which will desiccate outside of water.

(2) "**Canopy**" means the plant stratum composed of all woody plants and palms with a trunk four inches or greater in diameter at breast height, except vines.

(3) "**Diameter at Breast Height (DBH)**" means the diameter of a plant's trunk or main stem at a height of 4.5 feet above the ground.

(4) "**Facultative plants**" means those plant species listed in subsection 62-340.450(3), F.A.C., of this chapter. For the purposes of this rule, facultative plants are not indicators of either wetland or upland conditions.

(5) "**Facultative Wet plants**" means those plant species listed in subsection 62-340.450(2), F.A.C., of this chapter.

(6) "**Ground Cover**" means the plant stratum composed of all plants not found in the canopy or subcanopy, except vines and aquatic plants.
(7) "**Ground truthing**" means verification on the ground of conditions on a site.
(8) "**Hydric Soils**" means soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile.
(9) "**Hydric Soil Indicators**" means those indicators of hydric soil conditions as identified in *Soil and Water Relationships of Florida's Ecological Communities* (Florida Soil Conservation ed. Staff 1992).
(10) "**Inundation**" means a condition in which water from any source regularly and periodically covers a land surface.
(11) "**Obligate plants**" means those plant species listed in subsection 62-340.450(1), F.A.C., of this chapter.
(12) "**Regulating agency**" means the Department of Environmental Protection, the water management districts, state or regional agencies, local governments, and any other governmental entities.
(13) "**Riverwash**" means areas of unstabilized sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers or streams so frequently that they may support little or no vegetation.
(14) "**Saturation**" means a water table six inches or less from the soil surface for soils with a permeability equal to or greater than six inches per hour in all layers within the upper 12 inches, or a water table 12 inches or less from the soil surface for soils with a permeability less than six inches per hour in any layer within the upper 12 inches.
(15) "**Seasonal High Water**" means the elevation to which the ground and surface water can be expected to rise due to a normal wet season.
(16) "**Subcanopy**" means the plant stratum composed of all woody plants and palms, exclusive of the canopy, with a trunk or main stem with a DBH between one and four inches, except vines.
(17) "**Upland plants**" means those plant species, not listed as Obligate, Facultative Wet, or Facultative by this rule, excluding vines, aquatic plants, and any plant species not introduced into the State of Florida as of the effective date of this rule.
(18) "**U.S.D.A.-S.C.S."** means the United States Department of Agriculture, Soil Conservation Service.
(19) "**Wetlands**," as defined in subsection 373.019(27), F.S., means those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto.

Specific Authority 373.421 FS. Law Implemented 373.421, 373.4211 FS. History–New 7-1-94, Formerly 17-340.200.

62-340.300 Delineation of Wetlands.

The landward extent (i.e., the boundary) of wetlands as defined in subsection 62-340.200(19), F.A.C., shall be determined by applying reasonable scientific judgment to evaluate the dominance of plant species, soils, and other hydrologic evidence of regular and periodic inundation and saturation as set forth below. In applying reasonable scientific judgment, all reliable information shall be evaluated in

determining whether the area is a wetland as defined in subsection 62-340.200(19), F.A.C.

(1) Before using the wetland delineation methodology described below, the regulating agency shall attempt to identify and delineate the landward extent of wetlands by direct application of the definition of wetlands in subsection 62-340.200(19), F.A.C., with particular attention to the vegetative communities which the definition lists as wetlands and non-wetlands. If the boundary cannot be located easily by use of the definition in subsection 62-340.200(19), F.A.C., the provisions of this rule shall be used to locate the landward extent of a wetland. In applying the provisions of this rule, the regulating agency shall attempt to locate the landward extent of wetlands visually by on site inspection, or aerial photointerpretation in combination with ground truthing.

(2) The landward extent of a wetland as defined in subsection 62-340.200(19), F.A.C., shall include any of the following areas:

(a) Those areas where the aereal extent of obligate plants in the appropriate vegetative stratum is greater than the areal extent of all upland plants in that stratum, as identified using the method in Rule 62-340.400, F.A.C., and either:

1. The substrate is composed of hydric soils or riverwash, as identified using standard U.S.D.A.-S.C.S. practices for Florida, including the approved hydric soil indicators, except where the hydric soil is disturbed by a nonhydrological mechanical mixing of the upper soil profile and the regulating agency establishes through data or evidence that hydric soil indicators would be present but for the disturbance;

2. The substrate is nonsoil, rock outcrop-soil complex, or the substrate is located within an artificially created wetland area; or

3. One or more of the hydrologic indicators listed in Rule 62-340.500, F.A.C., are present and reasonable scientific judgment indicates that inundation or saturation is present sufficient to meet the wetland definition of subsection 62-340.200(19), F.A.C.

(b) Those areas where the areal extent of obligate or facultative wet plants, or combinations thereof, in the appropriate stratum is equal to or greater than 80% of all the plants in that stratum, excluding facultative plants, and either:

1. The substrate is composed of hydric soils or riverwash, as identified using standard U.S.D.A.-S.C.S. practices for Florida, including the approved hydric soil indicators, except where the hydric soil is disturbed by a nonhydrologic mechanical mixing of the upper soil profile and the regulating agency establishes through data or evidence that hydric soil indicators would be present but for the disturbance;

2. The substrate is nonsoil, rock outcrop-soil complex, or the substrate is located within an artificially created wetland area; or

3. One or more of the hydrologic indicators listed in Rule 62-340.500, F.A.C., are present and reasonable scientific judgment indicates that inundation or saturation is present sufficient to meet the wetland definition of subsection 62-340.200(19), F.A.C.

(c) Those areas, other than pine flatwoods and improved pastures, with undrained hydric soils which meet, in situ, at least one of the criteria listed below. A hydric soil is considered undrained unless reasonable scientific judgment indicates permanent artificial alterations to the on site hydrology have resulted in conditions which would not support the formation of hydric soils.

1. Soils classified according to United States Department of Agriculture's *Keys to Soil Taxonomy* (4th ed. 1990) as Umbraqualfs, Sulfaquents, Hydraquents, Humaquepts, Histosols (except Folists), Argiaquolls, or Umbraquults.

2. Saline sands (salt flats-tidal flats).

3. Soil within a hydric mapping unit designated by the U.S.D.A.-S.C.S. as frequently flooded or depressional, when the hydric nature of the soil has been field verified using the U.S.D.A.-S.C.S. approved hydric soil indicators for Florida. If a permit applicant, or a person petitioning for a formal determination pursuant to subsection 373.421(2), F.S., disputes the boundary of a frequently flooded or depressional mapping unit, the applicant or petitioner may request that the regulating agency, in cooperation with the U.S.D.A.-S.C.S., confirm the boundary. For the purposes of subsection 120.60(2), F.S., a request for a boundary confirmation pursuant to this subparagraph shall have the same effect as a timely request for additional information by the regulating agency. The regulating agency's receipt of

the final response provided by the U.S.D.A.-S.C.S. to the request for boundary confirmation shall have the same effect as a receipt of timely requested additional information.

4. For the purposes of this paragraph only, “pine flatwoods” means a plant community type in Florida occurring on flat terrain with soils which may experience a seasonal high water table near the surface. The canopy species consist of a monotypic or mixed forest of long leaf pine or slash pine. The subcanopy is typically sparse or absent. The ground cover is dominated by saw palmetto with areas of wire grass, gallberry, and other shrubs, grasses, and forbs, which are not obligate or facultative wet species. Pine flatwoods do not include those wetland communities as listed in the wetland definition contained in subsection 62-340.200(19), F.A.C., which may occur in the broader landscape setting of pine flatwoods and which may contain slash pine. Also for the purposes of this paragraph only, “improved pasture” means areas where the dominant native plant community has been replaced with planted or natural recruitment of herbaceous species which are not obligate or facultative wet species and which have been actively maintained for livestock through mechanical means or grazing.

(d) Those areas where one or more of the hydrologic indicators listed in Rule 62-340.500, F.A.C., are present, and which have hydric soils, as identified using the U.S.D.A.-S.C.S. approved hydric soil indicators for Florida, and reasonable scientific judgment indicates that inundation or saturation is present sufficient to meet the wetland definition of subsection 62-340.200(19), F.A.C. These areas shall not extend beyond the seasonal high water elevation.

(3)(a) If the vegetation or soils of an upland or wetland area have been altered by natural or man-induced factors such that the boundary between wetlands and uplands cannot be delineated reliably by use of the methodology in subsection 62-340.300(2), F.A.C., as determined by the regulating agency, and the area has hydric soils or riverwash, as identified using standard U.S.D.A.-S.C.S. practices for Florida, including the approved hydric soil indicators, except where the hydric soil is disturbed by a non hydrologic mechanical mixing of the upper soil profile and the regulating agency establishes through data or evidence that hydric soil indicators would be present but for the disturbance, then the most reliable available information shall be used with reasonable scientific judgment to determine where the methodology in subsection 62-340.300(2), F.A.C., would have delineated the boundary between wetlands and uplands. Reliable available information may include, but is not limited to, aerial photographs, remaining vegetation, authoritative site-specific documents, or topographical consistencies.

(b) This subsection shall not apply to any area where regional or site-specific permitted activity, or activities which did not require a permit, under Sections 253.123 and 253.124, F.S. (1957), as subsequently amended, the provisions of Chapter 403, F.S. (1983), relating to dredging and filling activities, Chapter 84-79, Laws of Florida, and Part IV of Chapter 373, F.S., have altered the hydrology of the area to the extent that reasonable scientific judgment, or application of the provisions of Section 62-340.550, F.A.C., indicate that under normal circumstances the area no longer inundates or saturates at a frequency and duration sufficient to meet the wetland definition in subsection 62-340.200(19), F.A.C.

(c) This subsection shall not be construed to limit the type of evidence which may be used to delineate the landward extent of a wetland under this chapter when an activity violating the regulatory requirements of Sections 253.123 and 253.124, F.S. (1957), as subsequently amended, the provisions of Chapter 403, F.S. (1983), relating to dredging and filling activities, Chapter 84-79, Laws of Florida, and Part IV of Chapter 373, F.S., has disturbed the vegetation or soils of an area.

(4) The regulating agency shall maintain sufficient soil scientists on staff to provide evaluation or consultation regarding soil determinations in applying the methodologies set forth in subsection 62-340.300(2) or (3), F.A.C. Services provided by the U.S.D.A.-S.C.S., or other competent soil scientists, under contract or agreement with the regulating agency, may be used in lieu of, or to augment, agency staff.

Specific Authority 373.421 FS. Law Implemented 373.421, 373.4211 FS. History–New 7-1-94, Formerly 17-340.300.

62-340.400 Selection of Appropriate Vegetative Stratum.
Dominance of plant species, as described in paragraphs 62-340.300(2)(a) and 62-340.300(2)(b), F.A.C., shall be determined in a plant stratum (canopy, subcanopy, or ground cover). The top stratum shall be used to determine dominance unless the top stratum, exclusive of facultative plants, constitutes less than 10 percent areal extent, or unless reasonable scientific judgment establishes that the indicator status of the top stratum is not indicative of the hydrologic conditions on site. In such cases, the stratum most indicative of on site hydrologic conditions, considering the seasonal variability in the amount and distribution of rainfall, shall be used. The evidence concerning the presence or absence of regular and periodic inundation or saturation shall be based on in situ data. All facts and factors relating to the presence or absence of regular and periodic inundation or saturation shall be weighed in deciding whether the evidence supports shifting to a lower stratum. The presence of obligate, facultative wet, or upland plants in a lower stratum does not by itself constitute sufficient evidence to shift strata, but can be considered along with other physical data in establishing the weight of evidence necessary to shift to a lower stratum. The burden of proof shall be with the party asserting that a stratum other than the top stratum should be used to determine dominance. Facultative plants shall not be considered for purposes of determining appropriate strata or dominance.
Specific Authority 373.421 FS. Law Implemented 373.421, 373.4211 FS. History–New 7-1-94, Formerly 17-340.400.

62-340.450 Vegetative Index.
(1) Obligate Species (See Appendix A)
(2) Facultative Wet Species (See Appendix A)
(3) Facultative Species (See Appendix A)
(4) Nomenclature. Use of plants in this rule is based solely on the scientific names. Common names are included in the above lists for information purposes only. The following references shall be used by the regulating agency to resolve any uncertainty about the nomenclature or taxonomy of any plant listed by a given scientific name in this section: R. Godfrey, Trees, Shrubs and Woody Vines of Northern Florida and Adjacent Georgia & Alabama (Univ. Ga. Press, Athens 1988) and D. Lellinger, Ferns & Fern-Allies of the United States & Canada (Smithsonian Institution Press, Washington D.C. 1985) for all species covered by these references. For all other listed scientific names the following references will be followed unless the species list in this section designates a different authority next to an individual species name: R. Godfrey & J. Wooten, Aquatic and Wetland Plants of Southeastern United States: Monocotyledons (Univ. Ga. Press, Athens 1979); R. Godfrey & J. Wooten, Aquatic and Wetland Plants of Southeastern United States: Dicotyledons (Univ. Ga. Press, Athens 1979); D. & H. Correll, Flora of the Bahama Archipelago (A.R. Gantner, Germany 1982). When the species list in this section designates a different authority next to an individual species name, the regulating agency shall resolve any ambiguity in nomenclature by using the name identified in D. Hall, The Grasses of Florida (Doctoral Dissertation, Univ. of Fla., Gainesville 1978); or C. Campbell, Systematics of the Andropogon Virginicus Complex (GRAMINEAE), 64 Journal of the Arnold Arboretum 171-254 (1983).
Specific Authority 373.421 FS. Law Implemented 373.421, 373.4211 FS. History–New 7-1-94, Formerly 17-340.450.

62-340.500 Hydrologic Indicators.
The indicators below may be used as evidence of inundation or saturation when used as provided in Rule 62-340.300, F.A.C. Several of the indicators reflect a specific water elevation. These specific water elevation indicators are intended to be evaluated with meteorological information, surrounding topography and reliable hydrologic data or analyses when provided, to ensure that such indicators reflect inundation or saturation of a frequency and duration sufficient to meet the wetland definition in subsection 62-340.200(19), F.A.C., and not rare or aberrant events. These specific water elevation indicators are not intended to be extended from the site of the indicator into surrounding areas when reasonable scientific judgment indicates that the surrounding areas are not wetlands as defined in

subsection 62-340.200(19), F.A.C.

(1) **Algal mats**. The presence or remains of nonvascular plant material which develops during periods of inundation and persists after the surface water has receded.
(2) **Aquatic mosses or liverworts on trees or substrates**. The presence of those species of mosses or liverworts tolerant of or dependent on surface water inundation.
(3) **Aquatic plants**. Defined in subsection 62-340.200(1), F.A.C.
(4) **Aufwuchs**. The presence or remains of the assemblage of sessile, attached or free-living, nonvascular plants and invertebrate animals (including protozoans) which develop a community on inundated surfaces.
(5) **Drift lines and rafted debris**. Vegetation, litter, and other natural or manmade material deposited in discrete lines or locations on the ground or against fixed objects, or entangled above the ground within or on fixed objects in a form and manner which indicates that the material was waterborne. This indicator should be used with caution to ensure that the drift lines or rafted debris represent usual and recurring events typical of inundation or saturation at a frequency and duration sufficient to meet the wetland definition of subsection 62-340.200(19), F.A.C.
(6) **Elevated lichen lines**. A distinct line, typically on trees, formed by the water-induced limitation on the growth of lichens.
(7) **Evidence of aquatic fauna**. The presence or indications of the presence of animals which spend all or portions of their life cycle in water. Only those life stages which depend on being in or on water for daily survival are included in this indicator.
(8) **Hydrologic data**. Reports, measurements, or direct observation of inundation or saturation which support the presence of water to an extent consistent with the provisions of the definition of wetlands and the criteria within this rule, including evidence of a seasonal high water table at or above the surface according to methodologies set forth in *Soil and Water Relationships of Florida's Ecological Communities* (Florida Soil Conservation Staff 1992).
(9) **Morphological plant adaptations**. Specialized structures or tissues produced by certain plants in response to inundation or saturation which normally are not observed when the plant has not been subject to conditions of inundation or saturation.
(10) **Secondary flow channels**. Discrete and obvious natural pathways of water flow landward of the primary bank of a stream watercourse and typically parallel to the main channel.
(11) **Sediment deposition**. Mineral or organic matter deposited in or shifted to positions indicating water transport.
(12) **Vegetated tussocks or hummocks**. Areas where vegetation is elevated above the natural grade on a mound built up of plant debris, roots, and soils so that the growing vegetation is not subject to the prolonged effects of soil anoxia.
(13) **Water marks**. A distinct line created on fixed objects, including vegetation, by a sustained water elevation.

Specific Authority 373.421 FS. Law Implemented 373.421, 373.4211 FS. History–New 7-1-94, Formerly 17-340.500.

62-340.550 Wetland Hydrology.

A wetland delineation using the methodology described above, can be refuted by either reliable hydrologic records or site specific hydrologic data which indicate that neither inundation for at least seven consecutive days, nor saturation for at least twenty consecutive days, occurs during conditions which represent long-term hydrologic conditions. Hydrologic records or site specific hydrologic data must be of such a duration, frequency, and accuracy to demonstrate that the records or data are representative of the long-term hydrologic conditions, including the variability in quantity and seasonality of rainfall. When sufficient amounts of either reliable hydrologic records or site specific hydrologic data are not available to prove that the wetland area of concern does not inundate or saturate as described above, a site-specific field-verified analytic or numerical model may be used to demonstrate that the wetland area no longer inundates or saturates regularly or periodically under typical

long-term hydrologic conditions. Before initiating the use of a model to evaluate if a wetland delineation should be refuted based on hydrologic conditions, the applicant or petitioner shall first meet with the appropriate regulating agency and reach an agreement on the terms of study, including data collection, the specific model, model development and calibration, and model verification. If the data, analyses, or models are deemed inadequate based on the hydrologic conditions being addressed, the regulating agency shall provide a case-by-case review of the applicability of any data, analyses, or models and shall provide specific reasons, based on generally accepted scientific and engineering practices, why they are inadequate.

Specific Authority 373.421 FS. Law Implemented 373.421, 373.4211 FS. History–New 7-1-94, Formerly 17-340.550.

62-340.600 Surface Waters.

(1) For the purposes of Section 373.421, F.S., surface waters are waters on the surface of the earth, contained in bounds created naturally or artificially, including, the Atlantic Ocean, the Gulf of Mexico, bays, bayous, sounds, estuaries, lagoons, lakes, ponds, impoundments, rivers, streams, springs, creeks, branches, sloughs, tributaries, and other watercourses. However, state water quality standards apply only to those waters defined in subsection 403.031(13), F.S.

(2) The landward extent of a surface water in the State for the purposes of implementing Section 373.414, F.S., shall be the more landward of the following:

(a) Wetlands as located by Rule 62-340.300, F.A.C., of this chapter;

(b) The mean high water line elevation for tidal water bodies;

(c) The ordinary high water line for non-tidal natural water bodies;

(d) The top of the bank for artificial lakes, borrow pits, canals, ditches and other artificial water bodies with side slopes of 1 foot vertical to 4 feet horizontal or steeper, excluding spoil banks when the canals and ditches have resulted from excavation into the ground; or

(e) The seasonal high water line for artificial lakes, borrow pits, canals, ditches, and other artificial water bodies with side slopes flatter than 1 foot vertical to 4 feet horizontal along with any artificial water body created by diking or impoundment above the ground.

(3) Determinations made pursuant to paragraphs (2)(b) and (2)(c) shall be for regulatory purposes and are not intended to be a delineation of the boundaries of lands for the purposes of title.

Specific Authority 373.421 FS. Law Implemented 373.421, 373.4211, 403.031(13) FS. History–New 7-1-94, Formerly 17-340.600.

62-340.700 Exemptions for Treatment or Disposal Systems.

(1) Alteration and maintenance of the following shall be exempt from the rules adopted by the department and the water management districts to implement subsections 373.414(1) through 373.414(6), 373.414(8) and 373.414(10), F.S.; and subsection 373.414(7), F.S., regarding any authority to apply state water quality standards within any works, impoundments, reservoirs, and other watercourses described in this subsection and any authority granted pursuant to Section 373.414, F.S. (1991):

(a) Works, impoundments, reservoirs, and other watercourses constructed and operated solely for wastewater treatment or disposal in accordance with a valid permit reviewed or issued under Rules 62-28.700, 62-302.520, F.A.C., Chapters 62-17, 62-600, 62-610, 62-640, 62-650, 62-660, 62-670, 62-671, 62-673, or 62-701, F.A.C., or Section 403.0885, F.S., or rules implementing Section 403.0885, F.S., except for treatment wetlands or receiving wetlands permitted to receive wastewater pursuant to Chapter 62-611, F.A.C., or Section 403.0885, F.S., or its implementing rules;

(b) Works, impoundments, reservoirs, and other watercourses constructed solely for wastewater treatment or disposal before a construction permit was required under Chapter 403, F.S., and operated solely for wastewater treatment or disposal in accordance with a valid permit reviewed or issued under Rules 62-28.700, 62-302.520, F.A.C., Chapters 62-17, 62-600, 62-610, 62-640, 62-650, 62-660, 62-670, 62-671, 62-673, or 62-701, F.A.C., or Section 403.0885, F.S., or rules implementing Section 403.0885,

F.S., except for treatment wetlands or receiving wetlands permitted to receive wastewater pursuant to Chapter 62-611, F.A.C., or Section 403.0885, F.S., or its implementing rules;

(c) Works, impoundments, reservoirs, and other watercourses of less than 0.5 acres in combined area on a project-wide basis, constructed and operated solely for stormwater treatment in accordance with a noticed exemption under Chapter 62-25, F.A.C., or a valid permit issued under Chapters 62-25 (excluding Rule 62-25.042), 62-330, 40B-4, 40C-4, 40C-42 (excluding Rule 40C-42.0265), 40C-44, 40D-4, 40D-40, 40D-45, or 40E-4, F.A.C., except those permitted as wetland stormwater treatment systems; or

(d) Works, impoundments, reservoirs, and other watercourses of less than 0.5 acres in combined area on a project-wide basis, constructed and operated solely for stormwater treatment before a permit was required under Chapters 62-25, 40B-4, 40C-4, 40C-42, 40C-44, 40D-4, 40D-40, 40D-45, or 40E-4, F.A.C.

(2) Alteration and maintenance of the following shall be exempt from the rules adopted by the department and the water management districts to implement subsections 373.414(1), 373.414(2)(a), 373.414(8), and 373.414(10), F.S.; and subsections 373.414(3) through 373.414(6), F.S.; and subsection 373.414(7), F.S., regarding any authority to apply state water quality standards within any works, impoundments, reservoirs, and other watercourses described in this subsection and any authority granted pursuant to Section 373.414, F.S. (1991), except for authority to protect threatened and endangered species in isolated wetlands:

(a) Works, impoundments, reservoirs, and other watercourses of 0.5 acre or greater in combined area on a project-wide basis, constructed and operated solely for stormwater treatment in accordance with a noticed exemption under Chapter 62-25, F.A.C., or a valid permit issued under Chapters 62-25 (excluding Rule 62-25.042), 62-330, 40B-4, 40C-4, 40C-42 (excluding Rule 40C-42.0265), 40C-44, 40D-4, 40D-40, 40D-45, 40E-4, except those permitted as wetland stormwater treatment systems; or

(b) Works, impoundments, reservoirs, and other watercourses of 0.5 acres or greater in combined area on a project-wide basis, constructed and operated solely for stormwater treatment before a permit was required under Chapters 62-25, 40B-4, 40C-4, 40C-42, 40C-44, 40D-4, 40D-40, 40D-45, or 40E-4, F.A.C.

(3) The exemptions in subsections 62-340.700(1) and (2) shall not apply to works, impoundments, reservoirs or other watercourses that

(a) Are currently wetlands which existed before construction of the stormwater treatment system and were incorporated in it;

(b) Are proposed to be altered through expansion into wetlands or other surface waters; or

(c) Are wetlands created, enhanced, or restored as mitigation for wetland or surface water impacts under a permit issued by the Department or a water management district.

(4) Alterations and maintenance of works, impoundments, reservoirs, and other watercourses exempt under this subsection shall not be considered in determining whether any wetland permitting threshold is met or exceeded under part IV of Chapter 373, F.S.

(5) Works, impoundments, reservoirs, and other watercourses exempt under this subsection, other than isolated wetlands in systems described in subsection 62-340.700(2), F.A.C., above, shall not be delineated under Section 373.421, F.S.

(6) This exemption shall not affect the application of state water quality standards, including those applicable to Outstanding Florida Waters, at the point of discharge to waters as defined in subsection 403.031(13), F.S.

(7) As used in this subsection, “solely for” means the reason for which a work, impoundment, reservoir, or other watercourse is constructed and operated; and such construction and operation would not have occurred but for the purposes identified in subsection 62-340.700(1) or 62-340.700(2), F.A.C. Furthermore, the phrase does not refer to a work, impoundment, reservoir, or other watercourse constructed or operated for multiple purposes. Incidental uses, such as occasional recreational uses, will not render the exemption inapplicable, so long as the incidental uses are not part of the original planned purpose of the work, impoundment, reservoir, or other watercourse. However, for those works,

impoundments, reservoirs, or other watercourses described in paragraphs 62-340.700(1)(c) and 62-340.700(2)(a), F.A.C., use of the system for flood attenuation, whether originally planned or unplanned, shall be considered an incidental use, so long as the works, impoundments, reservoirs, and other watercourses are no more than 2 acres larger than the minimum area required to comply with the stormwater treatment requirements of the district or department. For the purposes of this subsection, reuse from a work, impoundment, reservoir, or other watercourse is part of treatment or disposal.
Specific Authority 373.414(9) FS. Law Implemented 373.414(9) FS. History–New 7-1-94, Formerly 17-340.700.

62-340.750 Exemption for Surface Waters or Wetlands Created by Mosquito Control Activities.
Construction, alteration, operation, maintenance, removal, and abandonment of stormwater management systems, dams, impoundments, reservoirs, appurtenant works, or works, in, on or over lands that have become surface waters or wetlands solely because of mosquito control activities undertaken as part of a governmental mosquito control program, and which lands were neither surface waters nor wetlands before such activities, shall be exempt from the rules adopted by the department and water management districts to implement subsections 373.414(1) through 373.414(6), 373.414(8), and 373.414(10), F.S.; and subsection 373.414(7), F.S., regarding any authority granted pursuant to Section 373.414, F.S. (1991). Activities exempted under this section shall not be considered in determining whether any wetland permitting threshold is met or exceeded under part IV of Chapter 373, F.S. This exemption shall not affect the regulation of impacts on other surface waters or wetlands, or the application of state water quality standards to waters as defined in subsection 403.031(13), F.S., including standards applicable to Outstanding Florida Waters.
Specific Authority 373.414(9) FS. Law Implemented 373.414(9) FS. History–New 7-1-94, Formerly 17-340.750.

See The Florida Wetlands Delineation Manual for further clarification.

Data Form Guide Notes:

Tips from NRCS Field Indicators of Hydric Soils in the United States Version 8.1, 2017:

- As long as the soil meets the definition of a hydric soil, the lack of an indicator does not preclude the soil from being hydric.
- Concentrate sampling efforts near the wetland edge and, if these soils are hydric, assume that soils in the wetter, interior portions also are hydric. The indicators were developed mostly to identify the boundary of hydric soil areas and generally work best on the margins. Not all of the obviously wetter hydric soils will be identified by the indicators.

SOIL AND WATER RELATIONSHIPS OF FLORIDA'S ECOLOGICAL COMMUNITIES
July, 1992 Adapted

Field Identification of Hydric Soils

Hydric Soil Indicator Concept

The Hydric Soil Indicator concept is based on the premise that hydric soils develop and exhibit characteristic morphologies that result from repeated periods of saturation and/or inundation for more than a few days. Saturation or inundation when combined with anaerobic microbiological activity in the soil causes a depletion of oxygen. This anaerobiosis promotes biogeochemical processes such as the accumulation of organic matter and the reduction, translocation, and/or accumulation of iron and other reducible elements. These processes result in characteristic morphologies which persist in the soil during both wet and dry periods, making them particularly useful for identifying hydric soils.

Hydric soil indicators are formed predominantly by the accumulation or loss of iron, manganese, sulfur, or carbon compounds. The presence of hydrogen sulfide gas (rotten egg odor) is a strong indicator of a hydric soil, but this indicator is found in only the wettest sites containing sulfur.

Hydric Soil Indicator Identification Procedure

To document a hydric soil, dig a hole and describe the soil profile to a depth of approximately 50 cm (20 inches). Using the completed soil description specify which of the Hydric Soil Indicators have been matched. Deeper examination of soil may be required where Hydric Soil Indicators are not easily seen within 50 cm (20 in.) of the surface. It is always recommended that soils be excavated and described as deep as necessary to make reliable interpretations. Examination to less than 50 cm (20 in.) may suffice in soils with surface horizons of organic material or mucky mineral material because these shallow organic accumulations only occur in hydric soils. Depths used in are measured from the muck or mineral soil surface unless otherwise indicated. All colors refer to moist Munsell colors.

Estimating Seasonal High Saturation

Introduction

Seasonal High Water Table (SHWT) is the shallowest depth to free water that stands in an unlined borehole or where the soil moisture tension is zero for a significant period (more than a few weeks). The depth to the estimated SHWT is the used soil interpretation in Florida. This method of estimating SHWT applies only to areas lacking hydrologic modifications. Hydrologic modifications such as ditches and dikes can make the soil either wetter or drier.
By observing soil features, SHWT predictions can be made for hydric soils as well as other soils.

Field Identification of SHWT

The procedure for field Identification of SHWT is based on the assumption that, when soils are wet enough, for a long enough duration to develop SHWT, they should exhibit certain visible properties

that are to be used to determine on-site SHWT. All SHWT determinations should be based on field observations of moist soils.

Procedure

SHWT is determined by examining soils with a hydric soil indicator in a freshly dug pit for the SHWT indicators listed below. Presence of the shallowest of the SHWT indicators listed below indicates the depth to SHWT.

1. Soils with the following hydric soil indicators have SHWT at or above the surface:
   A1 (Histosol or Histel), A2 (Histic Epipedon), A3 (Black Histic), A4 (Hydrogen Sulfide), A7 (5 cm Mucky Mineral), A8 (Muck Presence) or A9 (1 cm Muck), S4 (Sandy Gleyed Matrix), and F2 (Loamy Gleyed Matrix).
2. Soils with the following hydric soil indicators have SHWT within 6 inches of the surface:
   A5 (Stratified Layers), A6 (Organic Bodies), A11 (Depleted Below Dark Surface), A12 (Thick Dark Surface), S5 (Sandy Redox), S6 (Stripped Matrix), S7 (Dark Surface), S8 (Polyvalue Below Surface), S9 (Thin Dark Surface), F10 (Marl), and F13 (Umbric Surface).
   Depth to SHWT is the depth at which all requirements of a particular indicator are met. For example, if S6 (Stripped Matrix) starts at 4 inches, depth to SHWT is 4 inches or if S7 (Dark Surface) starts at the soil surface, depth to SHWT is the soil surface.
3. Soils with the following hydric soil indicators have SHWT within 12 inches of the surface:
   F3 (Depleted Matrix), F6 (Redox Dark Surface), and F7 (Depleted Dark Surface). Depth to SHWT is the depth at which all requirements of a particular indicator are met.
   For example, if F3 (Depleted Matrix) starts at 8 inches, depth to SHWT is 8 inches.
4. Soils with the following hydric soil indicators lack significant saturation but are inundated for long or very long duration:
   F8 (Redox Depressions) and F12 (Iron/Manganese Masses).

Data Form Guide Note:
A stand alone D Test soil field indicator is both a hydric soil field indicator and a hydrologic indicator.

The hydric soil field indicators below indicate SHWT at or above the surface, and therefore may also be used as evidence of hydrologic data under subsection 62-340.500(8), F.A.C. per Soil and Water Relationships of Florida's Ecological Communities (Florida Soil Conservation Staff 1992 Adapted)**:**

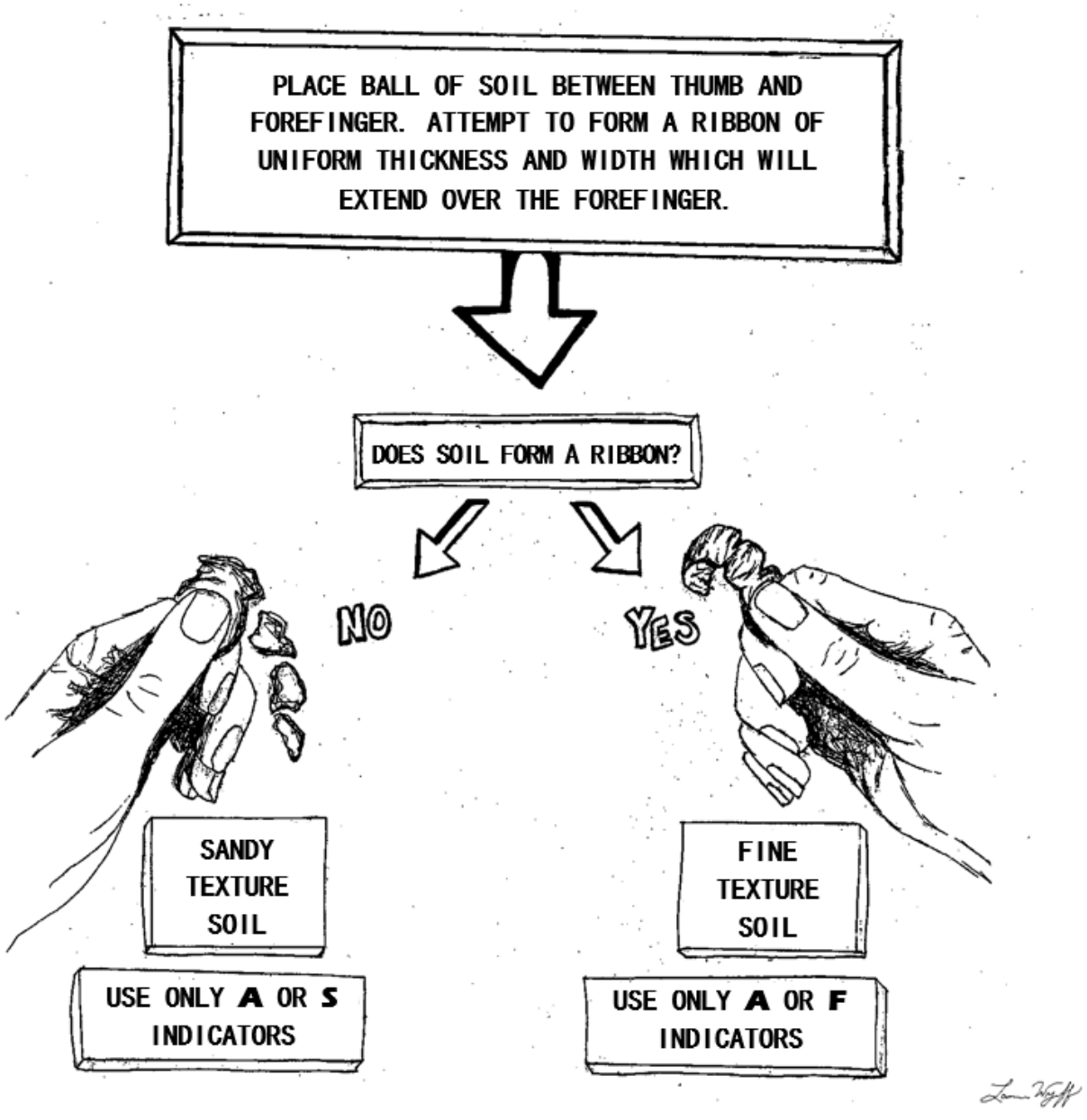
A1 – Histosol or Histel
A2 – Histic Epipedon
A3 – Black Histic
A4 – Hydrogen Sulfide
A7 – 5 cm Mucky Mineral
A8 – Muck Presence
A9 – 1 cm Muck
S4 – Sandy Gleyed Matrix
F2 – Loamy Gleyed Matrix

Or **any NRCS hydric soil field indicator** in which all requirements of that indicator are met starting at the soil surface (see SHWT Procedure above)

The hydric soil field indicator below is also a hydrologic indicator under subsection 62-340.500(11), F.A.C. evidence of sediment deposition:

A5 - Stratified Layers

Field Determination of Soil Indicator Texture



Soil Textures and Their
Hydric Soil Indicator Prefix Designations:

A - All texture soils "All soils" refers to soils with any USDA soil texture, including muck, mucky peat, and peat

S - Sandy texture soils (soils that will not ribbon) "Sandy soils" refers to those soils with a USDA soil texture of loamy fine sand and coarser, and does not include muck, mucky peat, or peat.

F - Fine texture soils (soils that will ribbon) "Loamy and clayey soils" refers to those soils with

USDA soil texture of loamy very fine sand and finer, and does not include muck, mucky peat, or peat.

Tips for Determining Texture of Soil Materials High in Organic Carbon

"Five Rub Texture Test"

If soil appears dark, gently (minimal pressure) rub wet soil material between forefinger and thumb and note how it feels.

# of Rubs	Feeling	Texture
≤ 2	Gritty	Sandy Mineral[1]
2	Greasy	*Continue to next rows*
3 to ≤ 5	Gritty	Sandy Mucky Mineral[1]
3 to ≤ 5	Plastic[2]	Check % Organic Carbon[3] to determine if Fine Mineral[1] or Fine Mucky Mineral[1]
5	Greasy	Muck[1]

[1] Results of this test only indicate texture; check NRCS hydric soil field indicators to determine if all requirements of an indicator are met

[2] Plastic: able to be molded or deformed into various shapes by moderate pressure

[3] Sufficiency of organic carbon* can be approximated using the "Color Test"[4]
**not to be confused with organic coating*

"Ten Rub Fiber Test"

If soil material is all or nearly all organic, firmly rub a moist sample 10 times in the palm of one hand with the thumb of the other and estimate proportion of fibers visible with a hand lens.

Proportion of visible fibers[5]	Organic soil texture
Less than 1/6 (<17%)	Sapric (Muck)
1/6 to 3/4 (17% - 75%)	Hemic (Mucky Peat)
More than 3/4 (>75%)	Fibric (Peat)

[5] Live roots are not considered

Tips for Approximating Composition of Soil

"Decant Tests"

Place a pea sized amount of soil in cupped palm of hand. Holding spray bottle close (~3 in.), thoroughly wet soil, filling but not overflowing palm.

↓

Break apart soil material to make a souplike suspension of particles.

↓

[4]"Color Test"

Keeping solution in palm, note its color. (Helps to determine if suspended particles are organic or fine mineral.)

- Black/Brown → Organic Material
- Gray/Cloudy → Clay and/or Silt

↓

"Sand Content Test"

Gently decant liquid solution while keeping solid material in palm.

↓

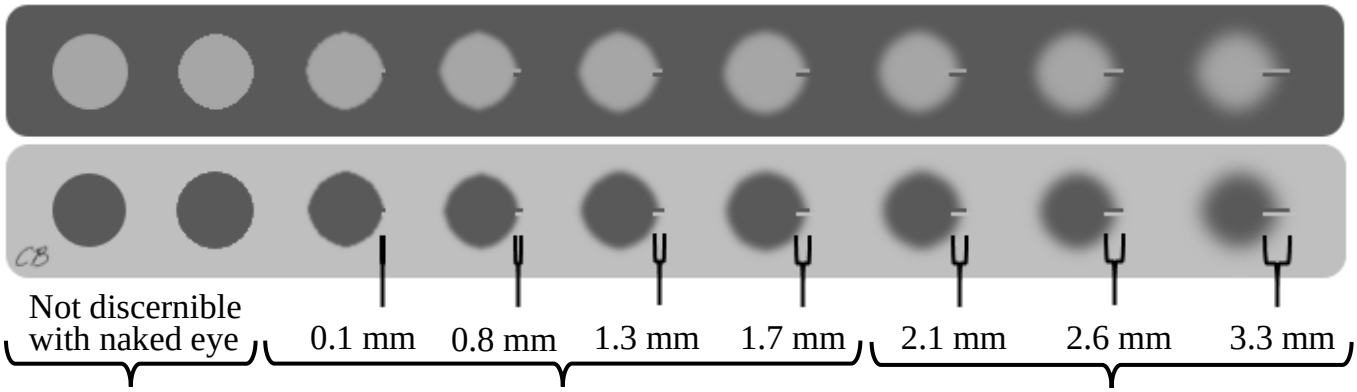
Spray, muddle, examine, drain, and repeat until solution runs nearly clear.

↓

Spread remaining soil material across palm. Compare amount of sand in relation to original pea sized clump, considering relative loss of fine soil material (clay and silt) indicated by the "Color

Test", to approximate organic vs. mineral (sand, silt, clay) content. See Fig. 7 pg. 60 for dry weight soil texture ratio requirements.

Tips for Determining Boundary Types of Features in Soil



Sharp
Color gradation is less than 0.1mm wide

Clear
Color gradation is 0.1mm to 2mm wide

Diffuse
Color gradation is greater than 2mm wide

Figure 1: Diagram for determining boundary types of features in the matrix.

Tips for Determining Contrast Between Soil Colors

ΔHue	ΔValue	ΔChroma	Contrast
	≤2	≤1	Faint
	≤2	>1 to <4	Distinct
0	>2 to <4	<4	Distinct
	any	≥4	Prominent
	≥4	any	Prominent
	≤1	≤1	Faint
	≤1	>1 to <3	Distinct
1	>1 to <3	<3	Distinct
	any	≥3	Prominent
	≥3	any	Prominent
	0	0	Faint
	0	>0 to <2	Distinct
2	>0 to <2	<2	Distinct
	any	≥2	Prominent
	≥2	any	Prominent
3+	any	any	Prominent

Table 1: Chart of delta hue (Figure 2), delta value, and delta chroma required for each level of color contrast. The last column in each row states what level of contrast exists between two colors when the Δhue, Δvalue, and Δchroma criteria within that row are met.

***Note: If both colors have value ≤3 and chroma ≤2, the contrast is faint, regardless of the change in hue.**

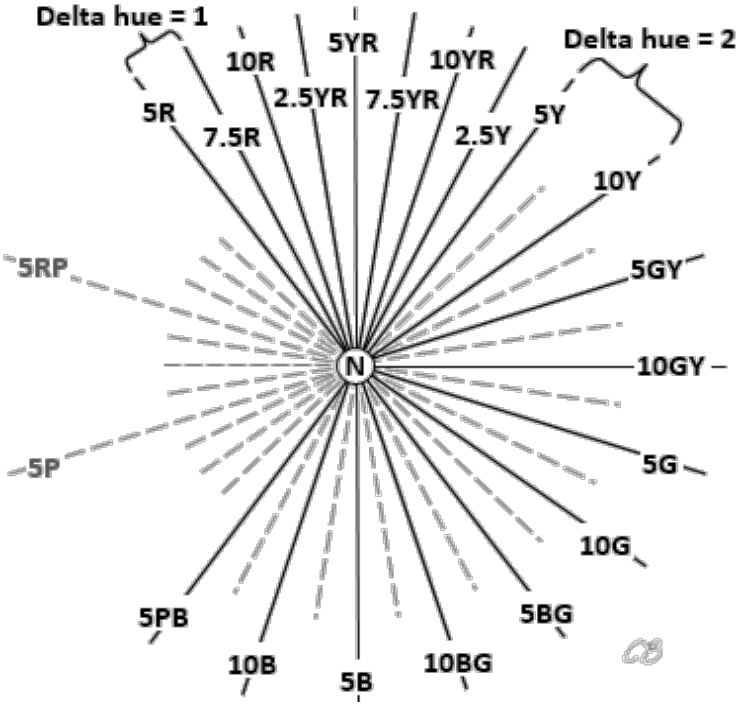


Figure 2: Relationships among the hues of the Munsell Color System. Solid lines represent hues contained in the *Munsell Soil Color Charts* (2009). Dotted lines represent all other possible 2.5 unit steps. Moving from one hue line to the adjacent hue line represents a delta hue of 1 (2.5 units). Moving from hue N to any other hue the delta hue is 1.

Adapted from the *Soil Survey Manual* (Soil Survey Staff, 1993)

Tips for Determining Contrast Between Soil Colors (continued)

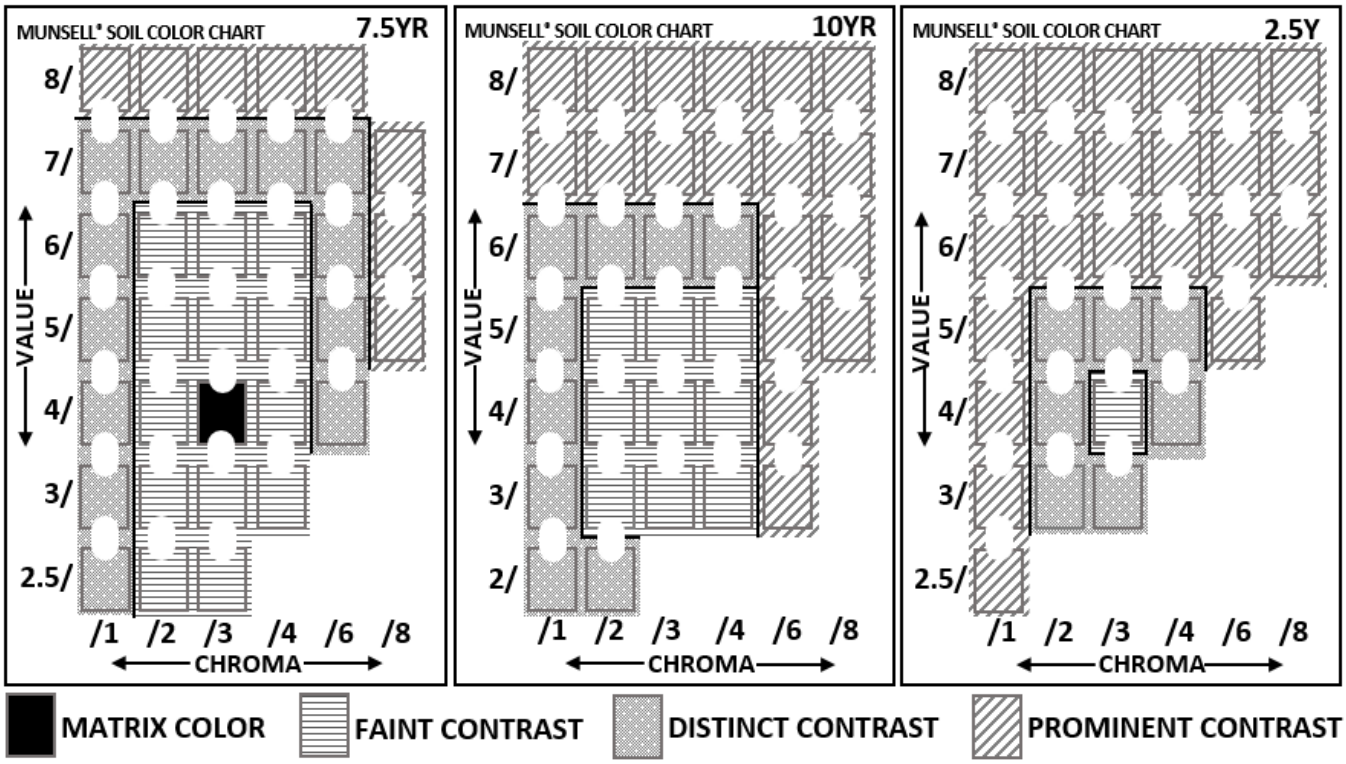


Figure 3: Using the 7.5 YR 4/3 color chip as an example matrix color, an illustration of faint, distinct, and prominent contrast between colors in relation to the matrix color in the *Munsell Soil Color Charts* (2009).

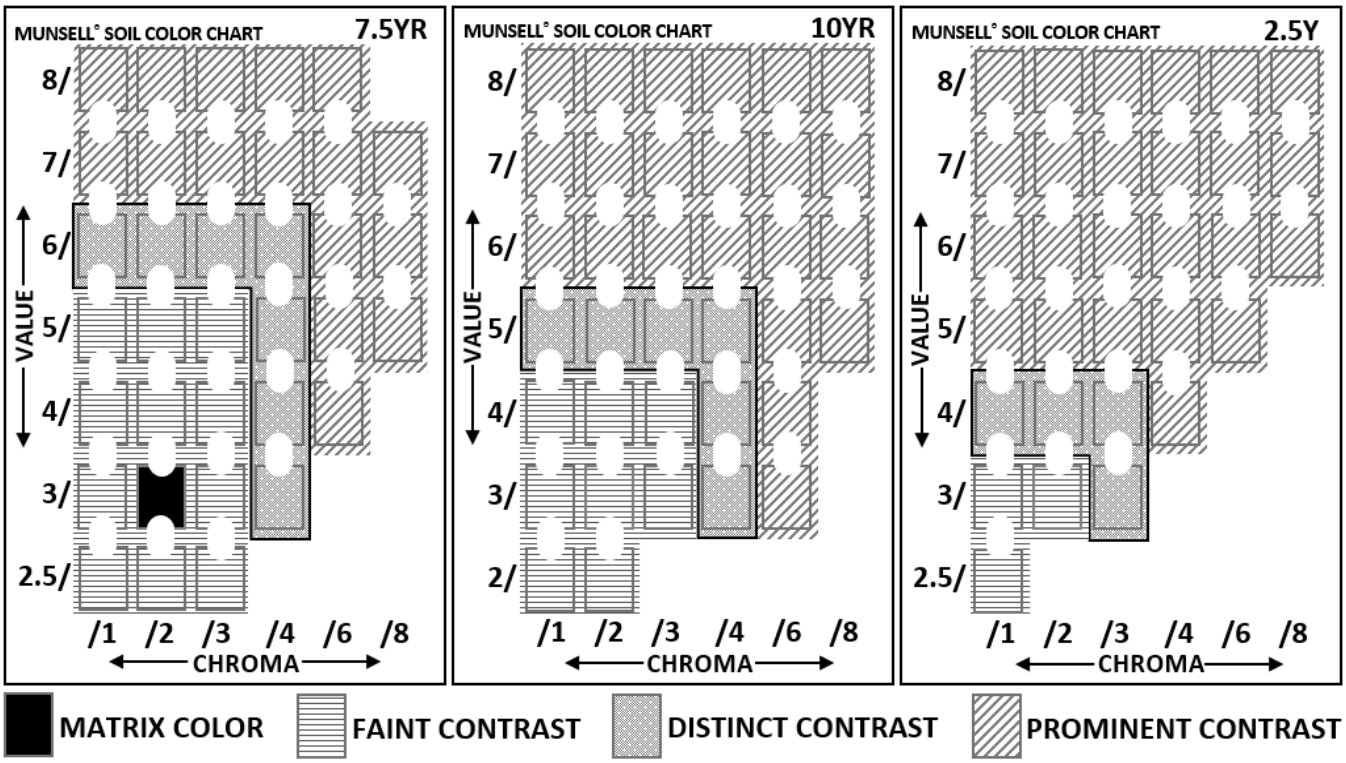
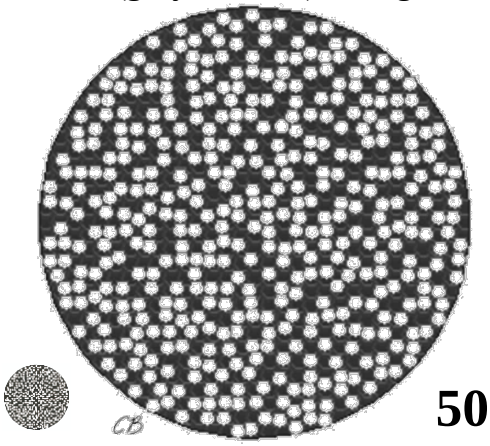


Figure 4: Using the 7.5 YR 3/2 color chip as an example matrix color, an illustration of faint, distinct, and prominent contrast between colors in relation to the matrix color in the *Munsell Soil Color Charts* (2009). Note that because the matrix has value ≤3 and chroma ≤2, all other colors with value ≤3 and chroma ≤2 are faintly contrasting despite the change in hue.

Estimating Percent Organic Coating

The round diagrams represent the appearance of uncoated (clear or white) sand grains versus coated (gray to black) sand grains within a ped face as viewed through a 10X hand lens.



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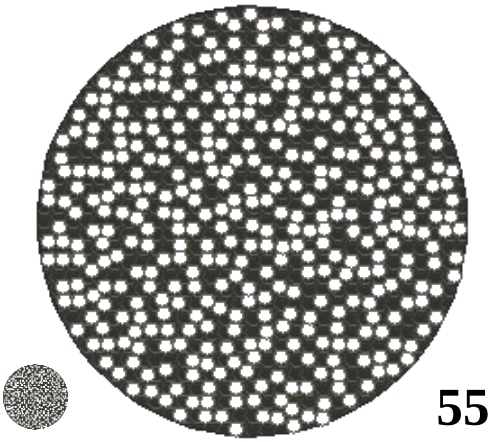

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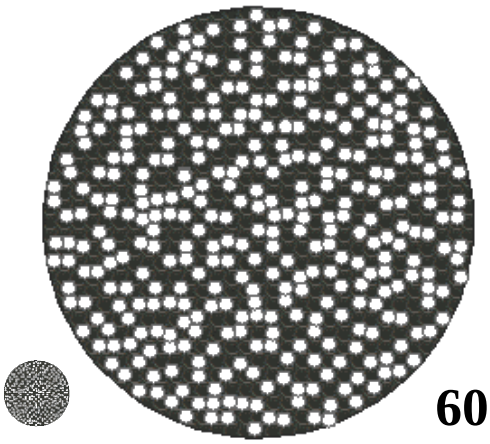

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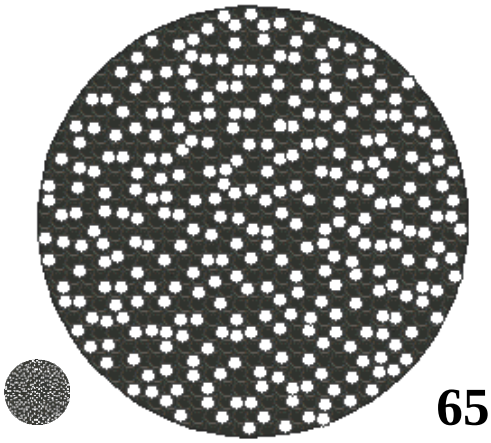

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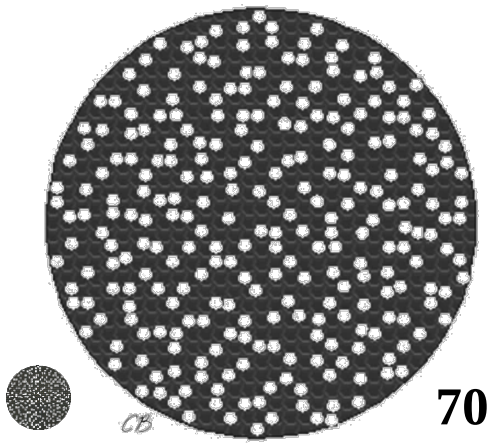

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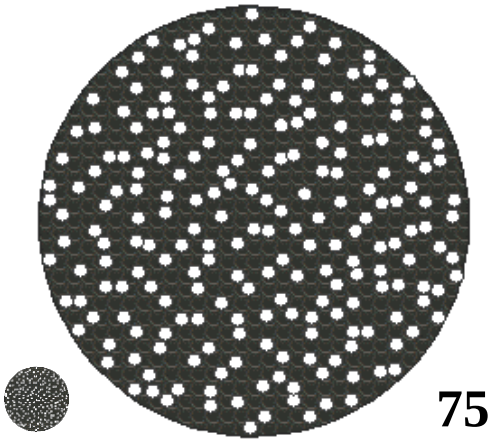

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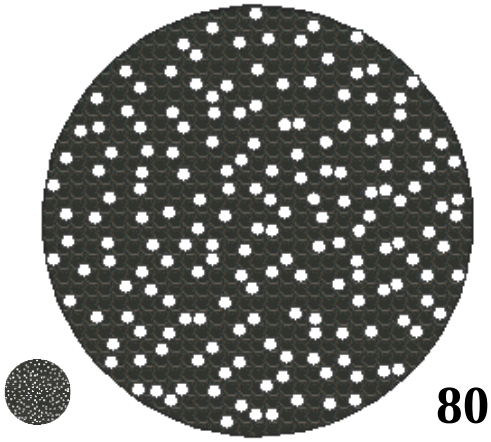

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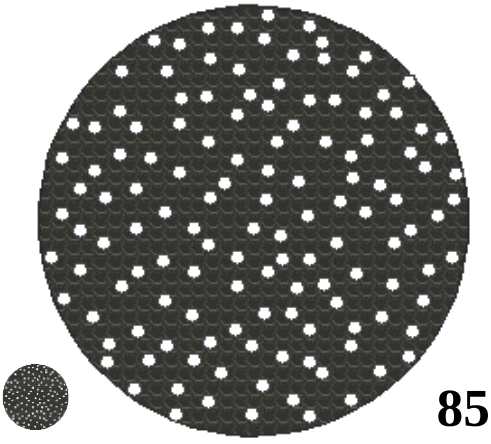

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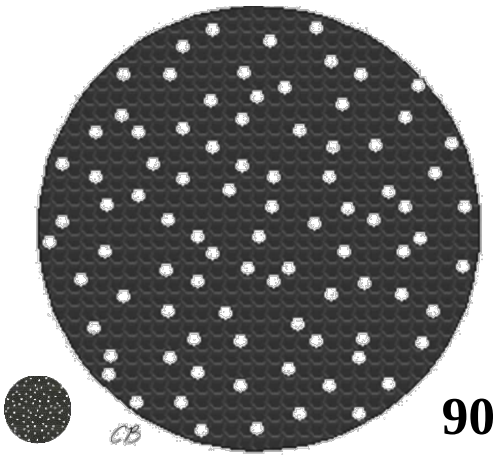

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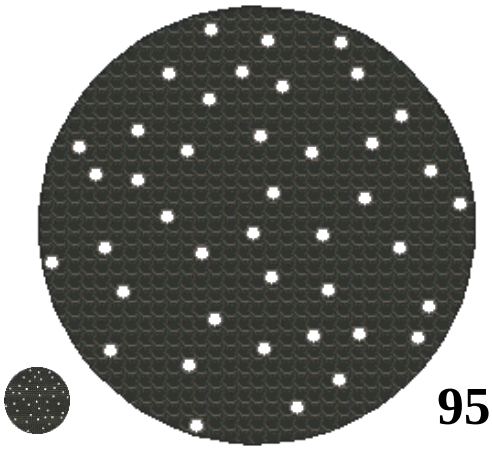

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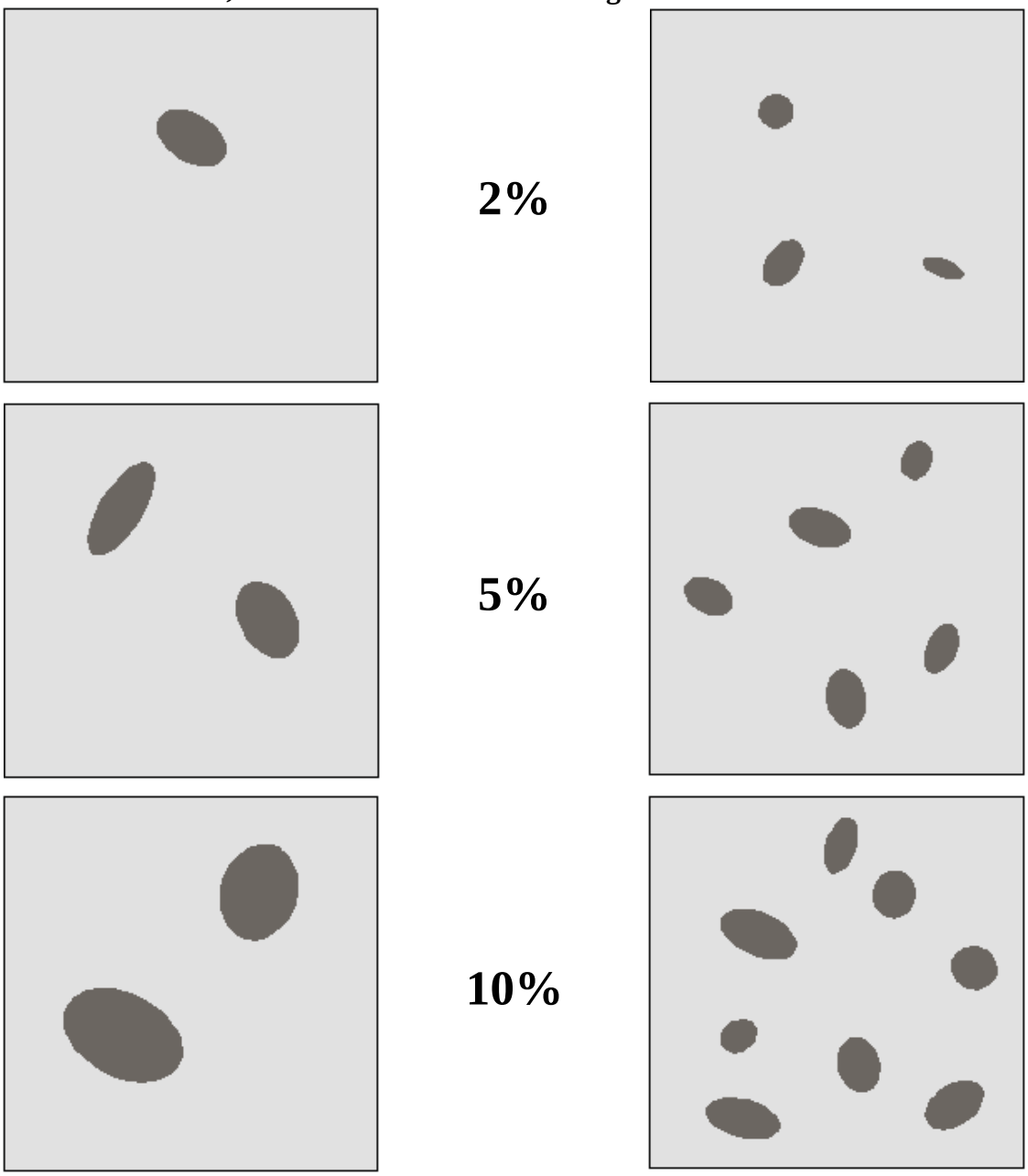
Estimating Percent Volume

The squares represent part of a grid drawn on the soil profile to estimate volume of light areas, dark areas, or redox concentrations of larger and smaller sizes.



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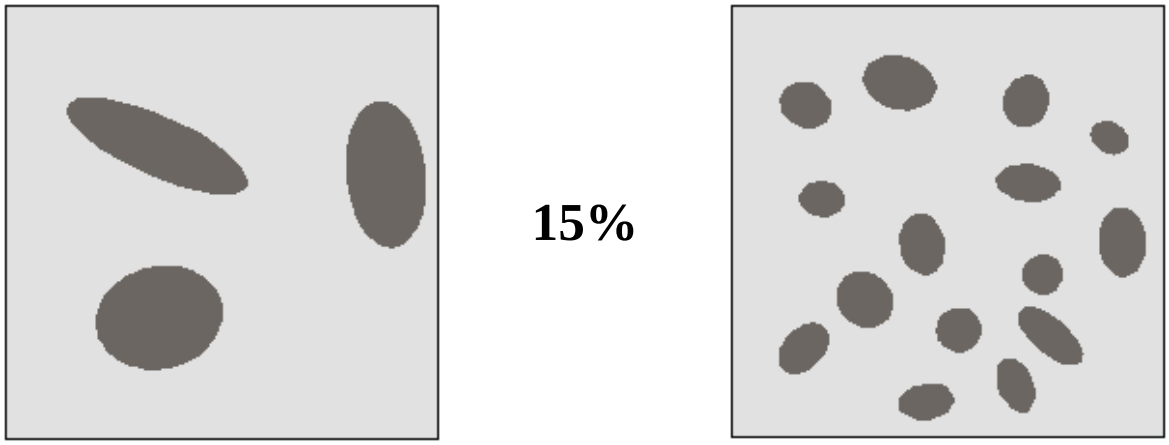
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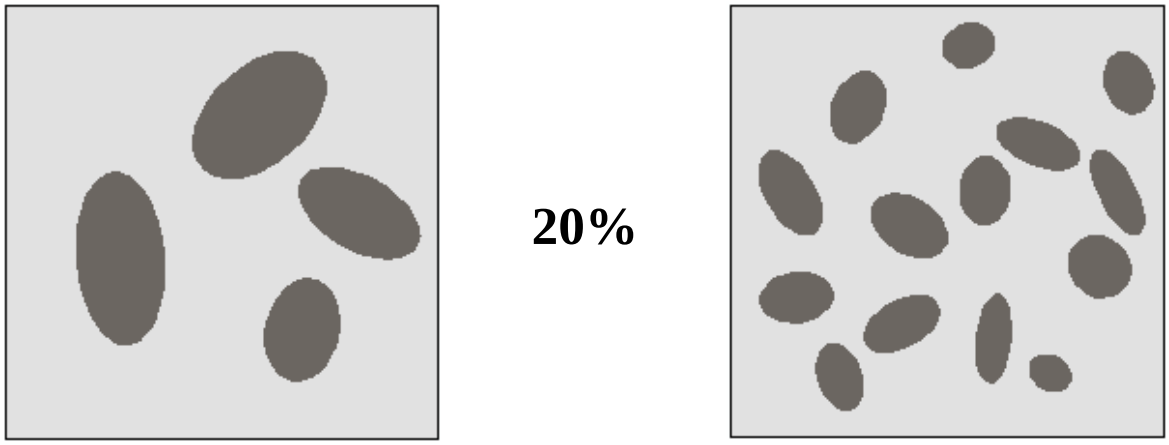
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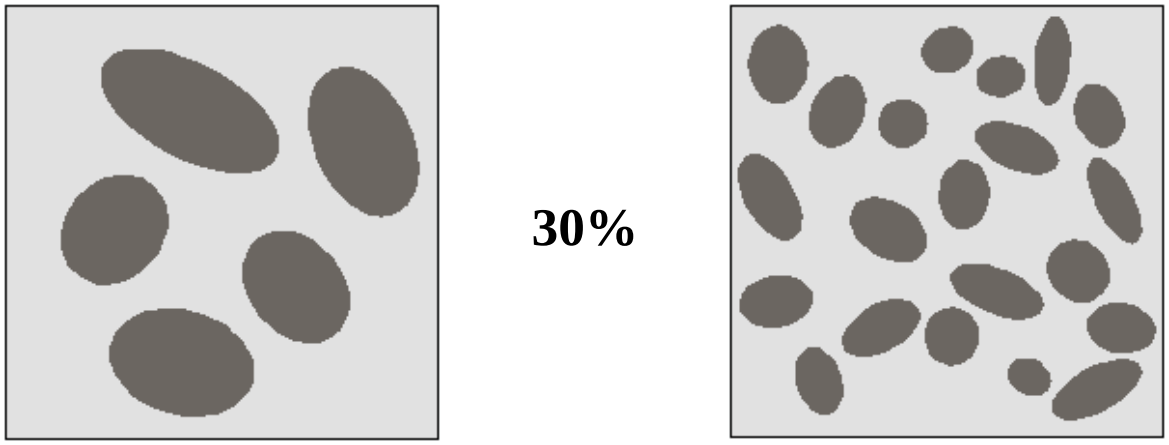
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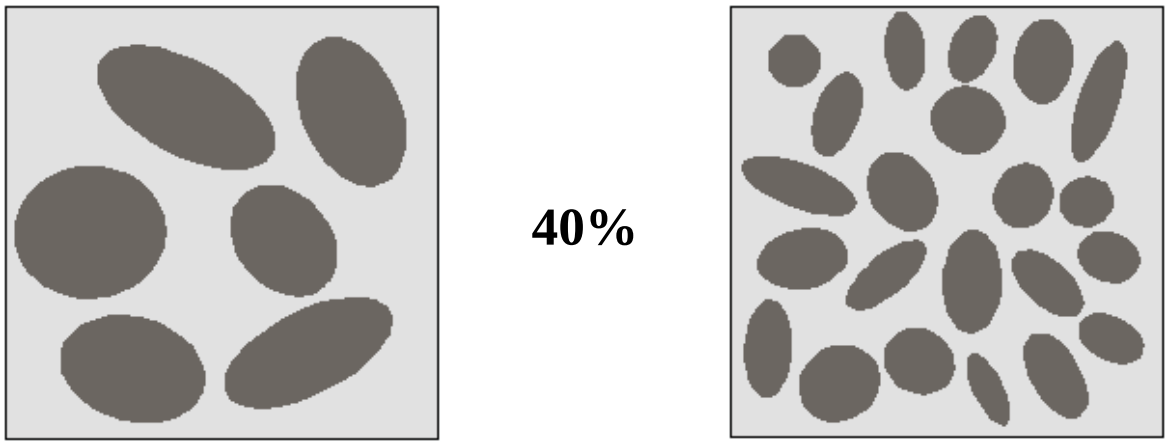
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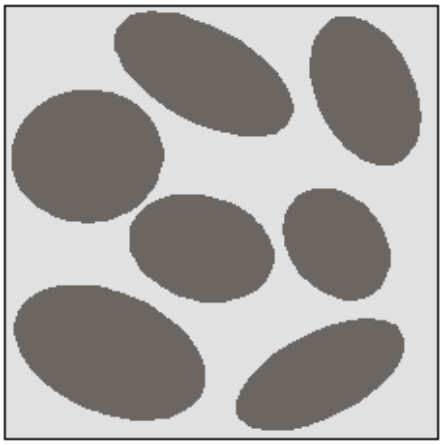
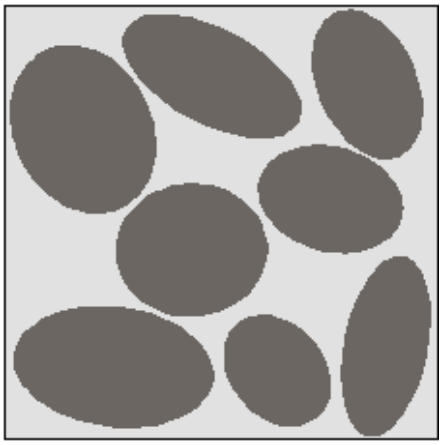


50%

(Note: when a feature (e.g. stripped areas) composes more than 50% of the volume, its color is considered to be the matrix color of the soil profile. When more than two colors are present, the color composing the majority of the volume is the matrix color.)



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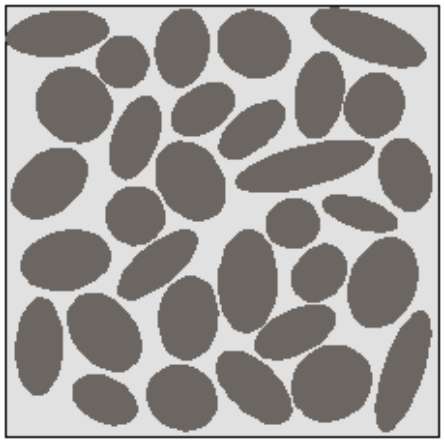

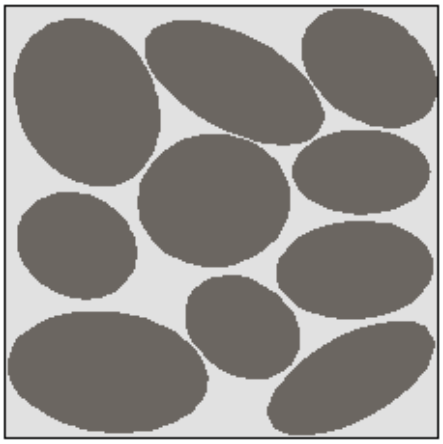

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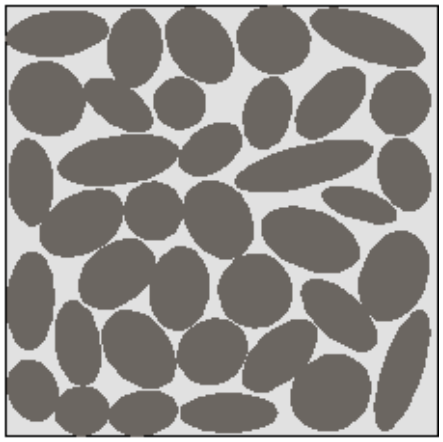

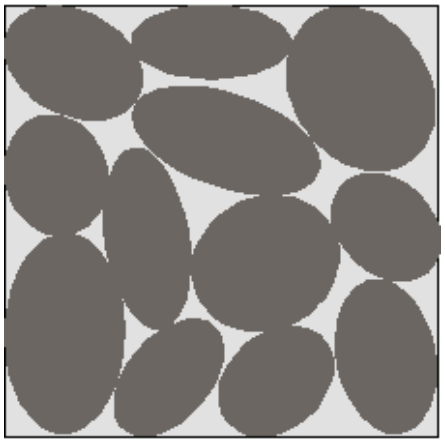

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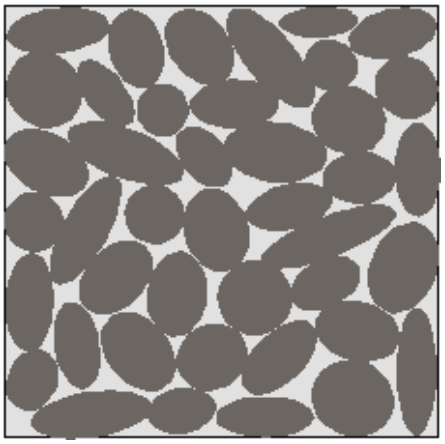


The squares represent part of a grid drawn on the soil profile to estimate volume of plant fibers, oxidized rhizospheres, or other linear features.

2%

5%

10%

17%

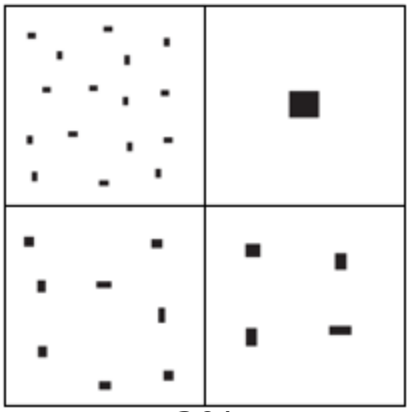
20%

30%

40%

50%

Each square is divided into quarters which depict the same percent volume using features of different sizes. These can also represent areal extents for plants.



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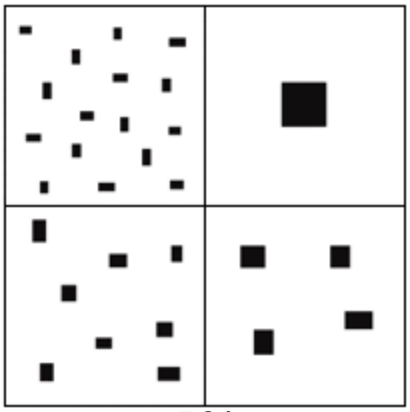

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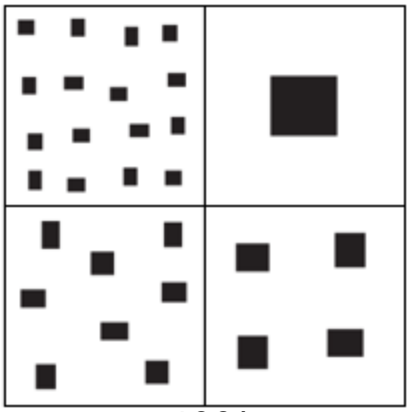

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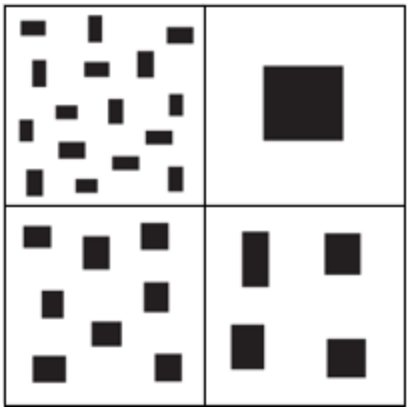

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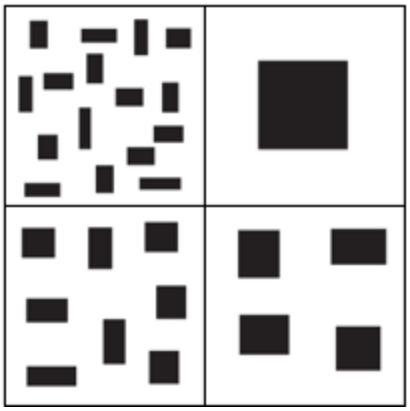

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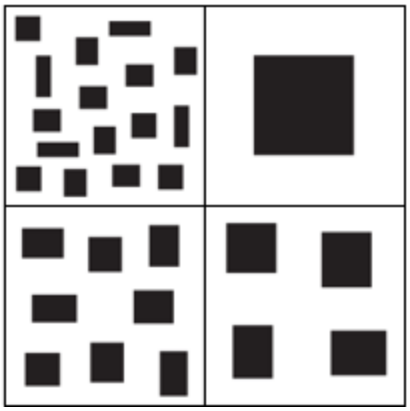

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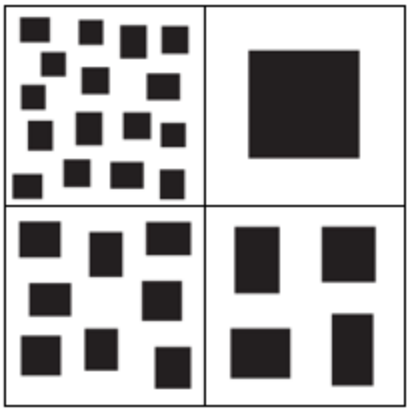

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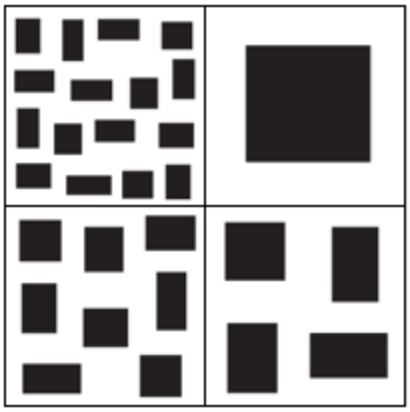

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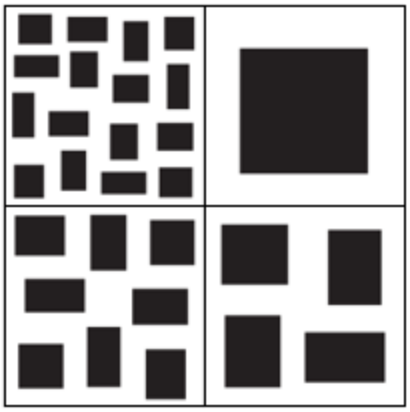

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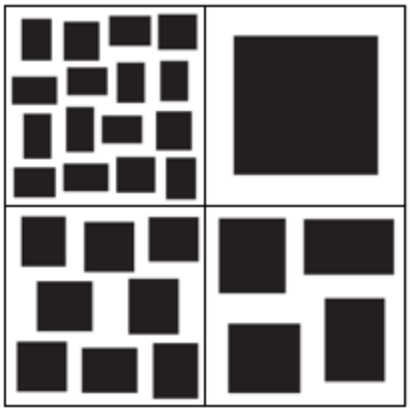

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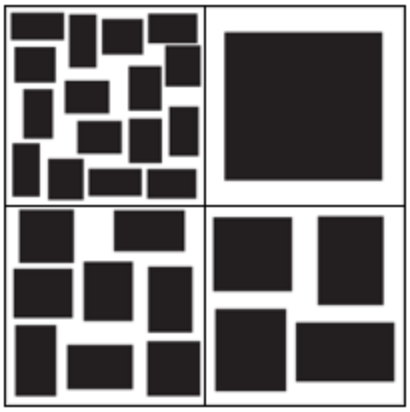

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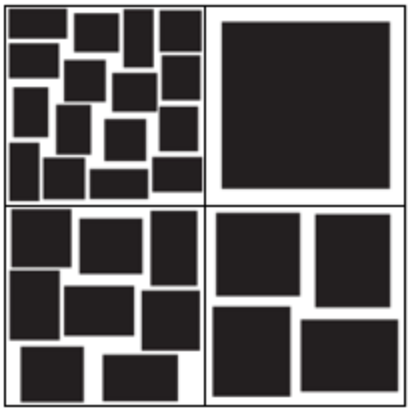

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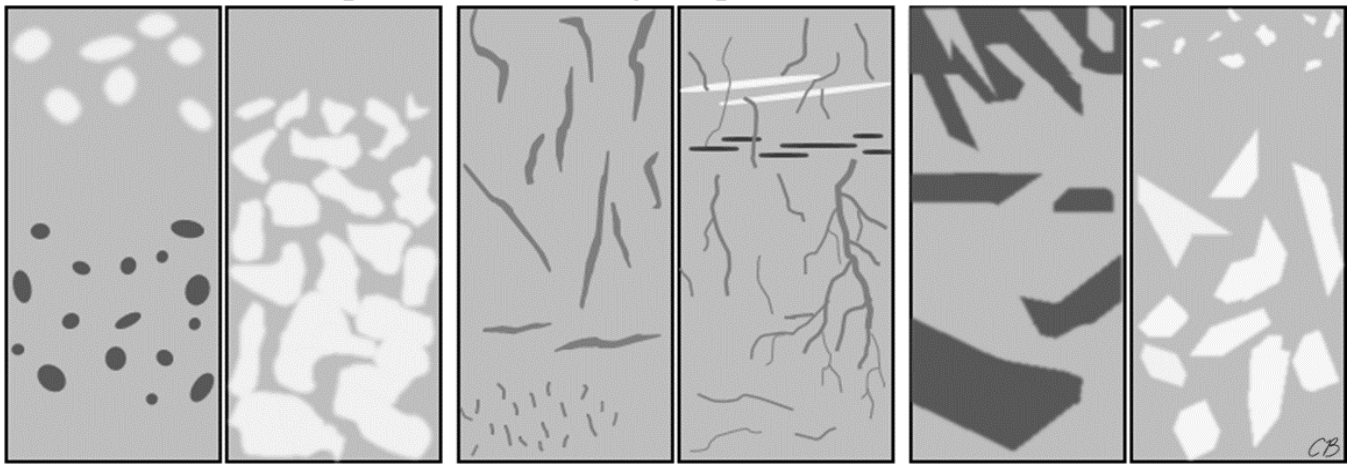
Tips for Determining Shapes of Features in Soil



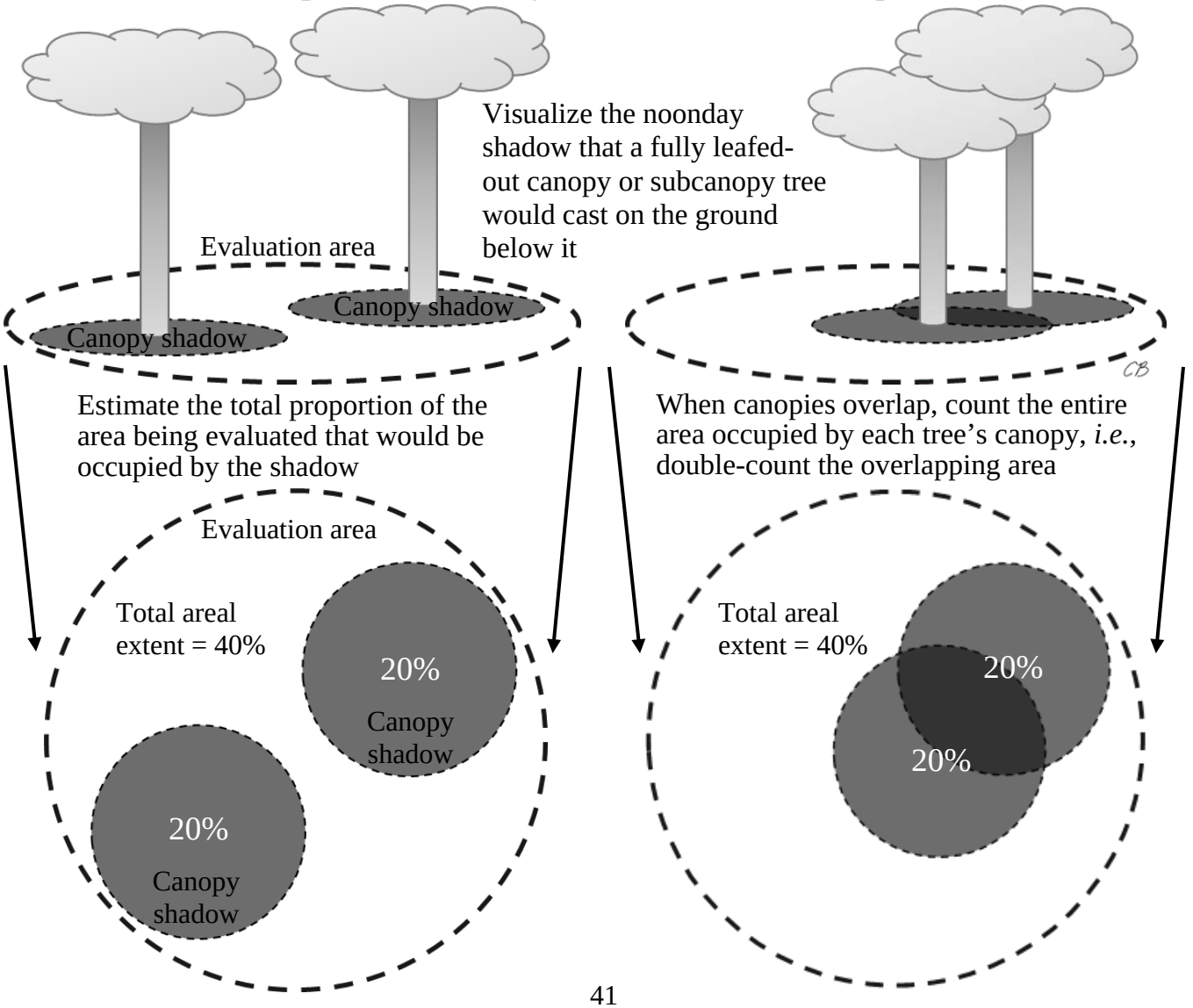
Rounded
Features with generally curved outlines (do not have to be circular; often amorphous)

Linear
Features that are generally long & narrow (typically associated with roots or burrows, sometimes mixing or deposition)

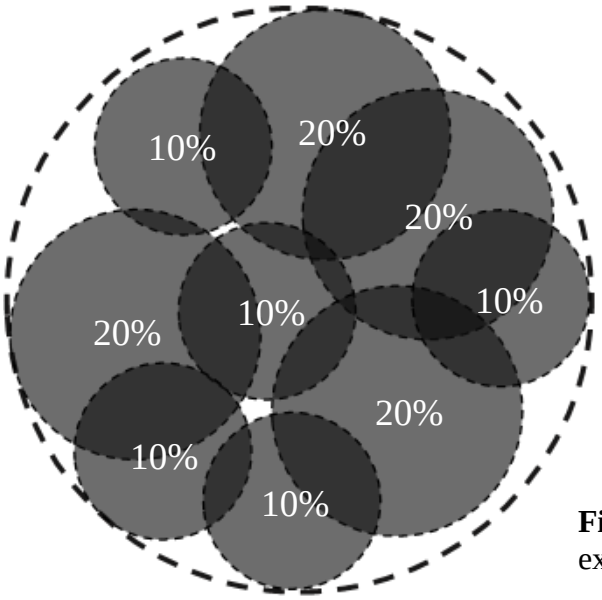
Angular
Features with generally straight outlines & defined angles (often resulting from physical mixing of soils)

Figure 5: Diagram for determining shape categories of features in the matrix.

Tips for Estimating Areal Extent of Plant Species



Tips for Estimating Areal Extent of Plant Species (continued)

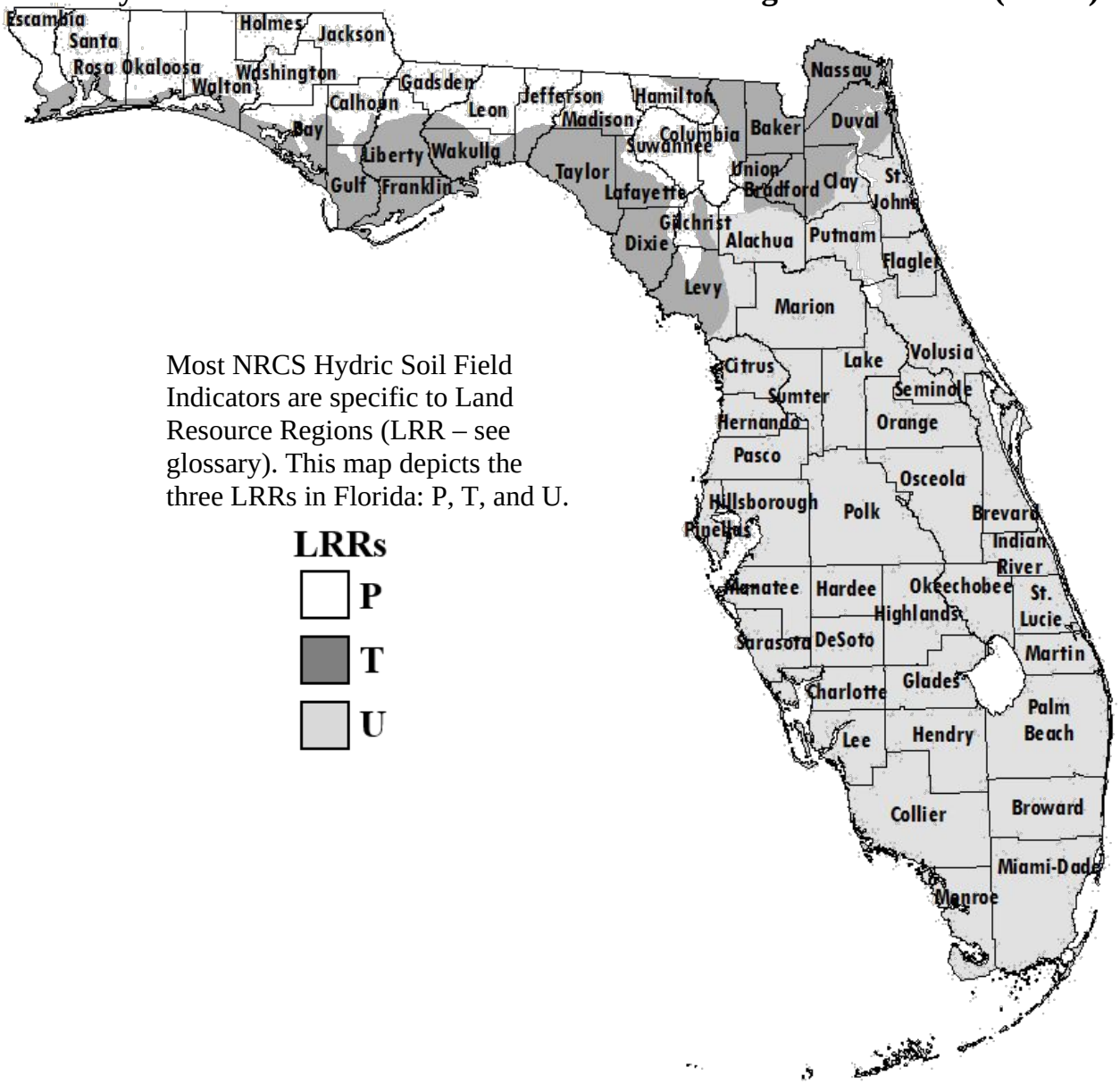


In a dense canopy where many trees overlap one another, the total areal extent of species in the evaluation area may exceed 100%, even if open sky is visible between some canopies

Total areal extent = 130%

Figure 6: Diagrams for estimating the areal extents of plants within an evaluation area.

NRCS Hydric Soil Field Indicators Land Resource Regions of Florida (LRRs)



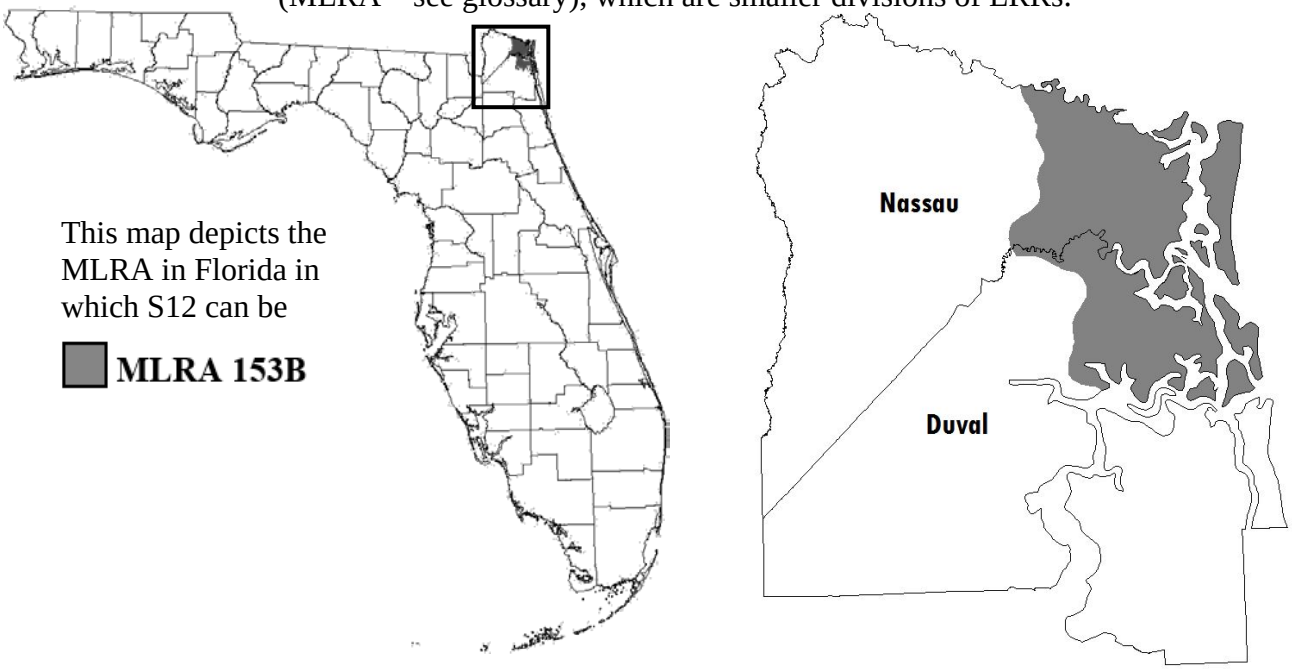
Most NRCS Hydric Soil Field Indicators are specific to Land Resource Regions (LRR – see glossary). This map depicts the three LRRs in Florida: P, T, and U.

LRRs

- P
- T
- U

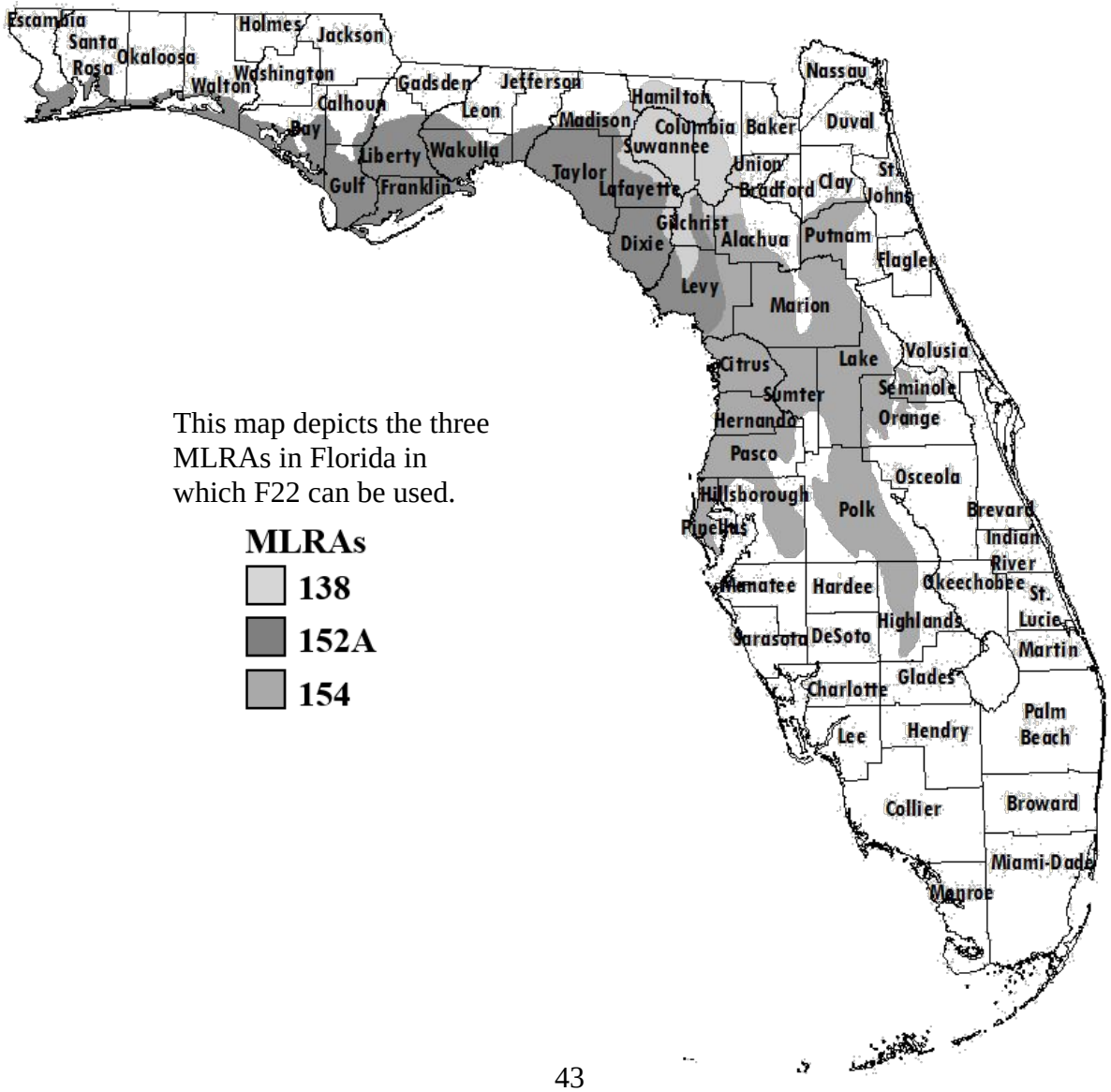
Major Land Resource Areas (MLRAs)

Two Hydric Soil Field Indicators in Florida (S12 and F22) are specific to Major Land Resource Areas (MLRA – see glossary), which are smaller divisions of LRRs.



This map depicts the MLRA in Florida in which S12 can be

MLRA 153B



This map depicts the three MLRAs in Florida in which F22 can be used.

MLRAs

138

152A

154

Hydric Soil Field Indicators:

Adapted from **Field Indicators of Hydric Soils in the United States, Version 8.1 (USDA NRCS, 2017)** to include Florida-specific indicators per Rule 62-340.300(2)(a)1., (b)1., (c)3., and (d), F.A.C.

These indicators are subdivided by prefix:
A – for All texture soils
S – for Sandy texture soils
F – for Fine texture soils
LRR or MLRA – refer to the "Land Resource Region" or the "Major Land Resource Area" in which the indicator may be used

Data Form Guide Notes
Soil profile documentation: The top of the uppermost muck (sapric) or mineral surface is the soil surface/0 inch depth for purposes of Chapter 62-340, F.A.C. Other materials, such as peat (fibric) or mucky peat (hemic) are documented by a "+" before the thickness in inches of each additional layer above the soil surface. (For example: +4 – 0 inches mucky peat, 0 – 3 inches muck)

Overlying layer(s) requirement: All mineral layers above any of the layers meeting the requirements of any indicators, except S6, F8, and F12, must have a dominant chroma of 2 or less, or the thickness of the layer(s) with a dominant chroma of more than 2 is less than 6 inches.

----------*For use in All texture soils*----------

A1. Histosol - LRR: **P, T, U**
Note: This is a stand alone D-Test indicator
Classifies as a Histosol (except Folist).
User Notes: In a Histosol, typically 40 cm (16 inches) or more of the upper 80 cm (32 inches) is organic soil material. Organic soil materials have organic-carbon contents (by weight) of 12 to 18 percent or more, depending on the clay content of the soil. These materials include muck (sapric soil material), mucky peat (hemic soil material), and peat (fibric soil material). See *Keys to Soil Taxonomy* (Soil Survey Staff, 2014) for a complete definition.

A2. Histic Epipedon - LRR: **P, T, U**
Note: This is a stand alone D-Test indicator
A histic epipedon underlain by mineral soil material with chroma of 2 or less.
User Notes: Most histic epipedons are surface horizons 20 cm (8 inches) or more thick of organic soil material. Aquic conditions or artificial drainage is required. See *Keys to Soil Taxonomy* (Soil Survey Staff, 2014) for a complete definition.

A3. Black Histic - LRR: **P, T, U**
Note: This is a stand alone D-Test indicator
A layer of peat, mucky peat, or muck 20 cm (8 inches) or more thick that starts at a depth of ≤ 15 cm (6 inches) from the soil surface; has hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less; and is underlain by mineral soil material with chroma of 2 or less.
User Notes: Unlike indicator A2, this indicator does not require proof of aquic conditions or artificial drainage.

A4. Hydrogen Sulfide - LRR: **P, T, U**
Note: This is a stand alone D-Test indicator
A hydrogen sulfide odor starting at a depth ≤ 30 cm (12 inches) from the soil surface.
User Notes: This "rotten egg smell" indicates that sulfate-sulfur has been reduced and therefore the soil is anaerobic.

A5. <u>Stratified Layers</u> - LRR: **P, T, U**

Note: This is a stand alone D-Test indicator (qualifies as sediment deposition)

Several stratified layers starting at a depth ≤ 15 cm (6 inches) from the soil surface. At least one of the layers has value of 3 or less and chroma of 1 or less, or it is muck, mucky peat, peat, or a mucky modified mineral texture. The remaining layers have chroma of 2 or less. For any sandy material that constitutes the layer with value of 3 or less and chroma of 1 or less, at least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Observed without a hand lens, the particles appear to be close to 100 percent masked.

User Notes: Use of this indicator may require assistance from a trained soil scientist with local experience. A stratified layer is depositional and not pedogenic. The minimum organic-carbon content of at least one layer of this indicator is slightly less than is required for indicator A7 (5 cm Mucky Mineral). An undisturbed sample must be observed. Individual strata are dominantly less than 2.5 cm (1 inch) thick. A hand lens is an excellent tool to aid in the identification of this indicator. Many alluvial soils have stratified layers at greater depths; these soils do not meet the requirements of this indicator. Many alluvial soils have stratified layers at the required depths but do not have chroma of 2 or less; these do not meet the requirements of this indicator. The stratified layers occur in any soil texture.

A6. <u>Organic Bodies</u> - LRR: **P, T, U**

Presence of 2 percent or more organic bodies of muck or a mucky modified mineral texture starting at a depth ≤ 15 cm (6 inches) from the soil surface.

User Notes: Organic bodies typically occur at the tips of fine roots. In order to meet the Organic Bodies indicator, the organic carbon content in organic bodies must meet the requirements of muck or mucky modified textures. The size of the organic body is not specifically defined, but the bodies are commonly 1 to 3 cm (0.5 to 1 inch) in diameter. Many organic bodies do not have the required content of organic carbon and as a result do not meet this indicator. For example, organic bodies of mucky peat (hemic material) and/or peat (fibric material) do not meet the requirements of this indicator, nor does material consisting of partially decomposed root tissue. The Organic Bodies indicator includes the indicator previously named “accretions” (Florida Soil Survey Staff, 1992).

A7. <u>5 cm Mucky Mineral</u> - LRR: **P, T, U**

Note: This is a stand alone D-Test indicator

A layer of mucky modified mineral soil material 5 cm (2 inches) or more thick, starting at a depth ≤ 15 cm (6 inches) from the soil surface.

User Notes: “Mucky” is a USDA texture modifier for mineral soils. The content of organic carbon is at least 5 percent and ranges to as high as 18 percent. The percentage required depends on the clay content of the soil; the higher the clay content, the higher the content of organic carbon required. For example, a mucky fine sandy soil contains between 5 and 12 percent organic carbon. When the amount of clay is increased as in a mucky sandy loam, the organic carbon content increases to between 7 and 14 percent.

A8. <u>Muck Presence</u> - LRR: **U**

Note: This is a stand alone D-Test indicator

A layer of muck with value of 3 or less and chroma of 1 or less, starting at a depth ≤ 15 cm (6 inches) from the soil surface.

User Notes: The presence of muck of any thickness at a depth ≤ 15 cm (6 inches) is the only requirement. Normally, this expression of anaerobiosis is at the soil surface; however, it may occur at any depth ≤ 15 cm (6 inches). Muck is sapric soil material with a minimum content of organic carbon that ranges from 12 to18 percent, depending on the content of clay. Organic soil material is called muck if virtually all of the material has undergone sufficient decomposition to prevent the identification of plant parts. Mucky peat (hemic material) and/or peat (fibric material) do not qualify. Generally, muck is black and has a “greasy” feel; sand grains should not be evident.

A9. 1 cm Muck - LRR: **P, T**

Note: This is a stand alone D-Test indicator

A layer of muck 1 cm (0.5 inch) or more thick with value of 3 or less and chroma of 1 or less and starting at a depth ≤ 15 cm (6 inches) from the soil surface.

User Notes: Unlike indicator A8 (Muck Presence), this indicator has a minimum thickness requirement of 1 cm. Normally, this expression of anaerobiosis is at the soil surface; however, it may occur at any depth ≤ 15 cm (6 inches). Muck is sapric soil material with a minimum content of organic carbon that ranges from12 to18 percent, depending on the content of clay. Organic soil material is called muck if virtually all of the material has undergone sufficient decomposition to limit the recognition of plant parts. Mucky peat (hemic material) and/or peat (fibric material) do not qualify. Generally, muck is black and has a "greasy" feel; sand grains should not be evident.

A11. Depleted Below Dark Surface - LRR: **P, T, U**

A layer with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less, starting at a depth ≤ 30 cm (12 inches) from the soil surface, and having a minimum thickness of either:

a. 15 cm (6 inches), or

b. 5 cm (2 inches) if the 5 cm consists of fragmental soil material.

Organic, loamy, or clayey layer(s) above the depleted or gleyed matrix must have value of 3 or less and chroma of 2 or less starting at a depth ≤15 cm (6 inches) from the soil surface and extend to the depleted or gleyed matrix. Any sandy material above the depleted or gleyed matrix must have value of 3 or less and chroma of 1 or less starting at a depth ≤15 cm (6 inches) from the soil surface and extend to the depleted or gleyed matrix. Viewed through a 10x or 15x hand lens, at least 70 percent of the visible sand particles must be masked with organic material. Observed without a hand lens, the sand particles appear to be close to 100 percent masked.

User Notes: This indicator often occurs in Mollisols but also applies to soils with umbric epipedons and dark colored ochric epipedons. For soils with dark colored epipedons more than 30 cm (12 inches) thick, use indicator A12. A depleted matrix requires value of 4 or more and chroma of 2 or less. Redox concentrations, including soft iron-manganese masses and/or pore linings, are required in soils with matrix colors of 4/1, 4/2, or 5/2. A, E, and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless the soil has common or many distinct or prominent redox concentrations occurring as soft masses or pore linings.

A12. Thick Dark Surface - LRR: **P, T, U**

A layer at least 15 cm (6 inches) thick with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less starting below 30 cm (12 inches) of the surface. The layer(s) above the depleted or gleyed matrix and starting at a depth ≤ 15 cm (6 inches) from the soil surface must have value of 2.5 or less and chroma of 1 or less to a depth of at least 30 cm (12 inches) and value of 3 or less and chroma of 1 or less in any remaining layers above the depleted or gleyed matrix. In any sandy material above the depleted or gleyed matrix, at least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Observed without a hand lens, the particles appear to be close to 100 percent masked.

User Notes: This indicator applies to soils that have a black layer 30 cm (12 inches) or more thick and have value of 3 or less and chroma of 1 or less in any remaining layers directly above a depleted or gleyed matrix. This indicator is most often associated with overthickened soils in concave landscape positions. A depleted matrix requires value of 4 or more and chroma of 2 or less. Redox concentrations, including soft iron-manganese masses and/or pore linings, are required in soils with matrix colors of 4/1, 4/2, or 5/2. A, E, and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless the soil has common or many distinct or prominent redox concentrations occurring as soft masses or pore linings.

----------*For use in <u>Sandy texture</u> soils*----------

S4. <u>Sandy Gleyed Matrix</u> - LRR: **P, T, U**

Note: This is a stand alone D-Test indicator

A gleyed matrix that occupies 60 percent or more of a layer starting at a depth ≤ 15 cm (6 inches) from the soil surface.

User Notes: Gley colors are not synonymous with gray colors. They are the colors on the gley color pages in the Munsell color book (X-Rite, 2009) that have hue of N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB and value of 4 or more. For this indicator, the gleyed matrix only has to be present at a depth ≤ 15 cm (6 inches) from the surface. Soils with gleyed matrices are saturated for periods of a significant duration; as a result, there is no thickness requirement for the layer.

S5. <u>Sandy Redox</u> - LRR: **P, T, U**

A layer starting at a depth ≤ 15 cm (6 inches) from the soil surface that is at least 10 cm (4 inches) thick and has a matrix with 60 percent or more chroma of 2 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings.

User Notes: "Distinct" and "prominent" are defined in the Glossary. Redox concentrations include iron and manganese masses (reddish mottles) and pore linings (Vepraskas, 1994). Included within the concept of redox concentrations are iron-manganese bodies occurring as soft masses with diffuse boundaries. Common (2 to less than 20 percent) or many (20 percent or more) redox concentrations are required (USDA, NRCS, 2002). If the soil is saturated at the time of sampling, it may be necessary to let it dry to a moist condition for redox features to become visible.

This is a very common indicator of hydric soils and is often used to identify the hydric/nonhydric soil boundary in sandy soils.

S6. <u>Stripped Matrix</u> - LRR: **P, T, U**

A layer starting at a depth ≤ 15 cm (6 inches) from the soil surface in which iron-manganese oxides and/or organic matter have been stripped from the matrix and the primary base color of the soil material has been exposed. The stripped areas and translocated oxides and/or organic matter form a faintly contrasting pattern of two or more colors with diffuse boundaries. The stripped zones are 10 percent or more of the volume and are rounded.

User Notes: This indicator includes the indicator previously named "polychromatic matrix" as well as the term "streaking." Common or many areas of stripped (unmasked) soil materials are required. The stripped areas are typically 1 to 3 cm (0.5 to 1 inch) in size but may be larger or smaller. Commonly, the stripped areas have value of 5 or more and chroma of 2 or less, and the unstripped areas have chroma of 3 and/or 4. The matrix (predominant color) may not have the material with chroma of 3 and/or 4. The mobilization and translocation of oxides and/or organic matter is the important process and should result in a splotchy pattern masked and unmasked soil areas. This may be a difficult pattern to recognize and is more evident when a horizontal slice is observed.

S7. <u>Dark Surface</u> - LRR: **P, T, U**

A layer 10 cm (4 inches) thick, starting at a depth less than or equal to the upper 15 cm (6 inches) of the soil surface, with a matrix value of 3 or less and chroma of 1 or less. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Observed without a hand lens, the particles appear to be close to 100 percent masked. The matrix color of the layer directly below the dark layer must have the same colors as those described above or any color that has chroma of 2 or less.

User Notes: An undisturbed sample must be observed. Many wet soils have a ratio of about 50 percent soil particles that are masked with organic matter and about 50 percent unmasked soil particles, giving the soils a salt-and-pepper appearance. Where the coverage is less than 70 percent, a Dark Surface indicator does not occur.

S8. Polyvalue Below Surface - LRR: **T, U**

A layer with value of 3 or less and chroma of 1 or less starting at a depth ≤ 15 cm (6 inches) from the soil surface. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Observed without a hand lens, the particles appear to be close to 100 percent masked. Directly below this layer, 5 percent or more of the soil volume has value of 3 or less and chroma of 1 or less, and the remainder of the soil volume has value of 4 or more and chroma of 1 or less to a depth of 30 cm (12 inches) or to the spodic horizon, whichever is less.

User Notes: This indicator applies to soils with a very dark gray or black surface or near-surface layer that is less than 10 cm (4 inches) thick and is underlain by a layer in which organic matter has been differentially distributed within the soils by water movement. The mobilization and translocation of organic matter result in splotchy coated and uncoated soil.

S9. Thin Dark Surface - LRR: **T, U**

A layer 5 cm (2 inches) or more thick, starting at a depth ≤ 15 cm (6 inches) from the soil surface, with value of 3 or less and chroma of 1 or less. At least 70 percent of the visible soil particles must be masked with organic material, viewed through a 10x or 15x hand lens. Observed without a hand lens, the particles appear to be close to 100 percent masked. This layer is underlain by a layer or layers with value of 4 or less and chroma of 1 or less to a depth of 30 cm (12 inches) or to the spodic horizon, whichever is less.

User Notes: This indicator applies to soils with a very dark gray or black near-surface layer that is at least 5 cm (2 inches) thick and is underlain by a layer in which organic matter has been carried downward by flowing water. The mobilization and translocation of organic matter result in an even distribution of organic matter in the eluvial (E) horizon. The chroma of 1 or less is critical because it limits application of this indicator to only those soils that are depleted of iron. This indicator commonly occurs in hydric Spodosols, but a spodic horizon is not required.

S12. Barrier Islands 1 cm Muck - MLRA: **153B**

In the swale portion of dune-and-swale complexes of barrier islands, a layer of muck 1 cm (0.5 inch) or more thick with value of 3 or less and chroma of 2 or less and starting at a depth ≤ 15 cm (6 inches) from the soil surface.

User notes: This indicator is similar to A9 but allows chroma of greater than 1, but not greater than 2. The indicator is limited to dune-and-swale complexes on barrier islands.

----------*For use in Fine texture soils*----------

F2. Loamy Gleyed Matrix - LRR: **P, T, U**

Note: This is a stand alone D-Test indicator

A gleyed matrix that occupies 60 percent or more of a layer starting at a depth ≤ 30 cm (12 inches) from the soil surface.

User Notes: Gley colors are not synonymous with gray colors. They are the colors on the gley color pages of the Munsell color book (X-Rite, 2009). They have hue of N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB and value of 4 or more. The gleyed matrix only has to be present at a depth ≤ 30 cm (12 inches) from the surface. Soils with gleyed matrices are saturated for periods of a significant duration; as a result, there is no thickness requirement for the layer.

F3. Depleted Matrix - LRR: **P, T, U**

A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and that has a minimum thickness of either:

a. 5 cm (2 inches) if the 5 cm starts at a depth ≤ 10 cm (4 inches) from the soil surface, or
b. 15 cm (6 inches), starting at a depth ≤ 25 cm (10 inches) from the soil surface.

User Notes: A depleted matrix requires a value of 4 or more and chroma of 2 or less. Redox concentrations, including soft iron-manganese masses and/or pore linings, are required in soils with matrix colors of 4/1, 4/2, or 5/2. A, E, and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless the soil has common or many distinct or prominent redox concentrations occurring as soft masses or pore linings. The low-chroma matrix must be the result of wetness and not a weathering or parent material feature.

F6. Redox Dark Surface - LRR: **P, T, U**

A layer that is at least 10 cm (4 inches) thick, starting at a depth ≤ 20 cm (8 inches) from the mineral soil surface, and has:

a. **Matrix value of 3 or less and chroma of 1 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings, or**
b. **Matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings.**

User Notes: This is a very common indicator used to delineate wetland soils that have a dark surface layer. Redox concentrations in mineral soils with a high content of organic matter and a dark surface layer are commonly small and difficult to see. The organic matter masks some or all of the concentrations that may be present. Careful examination is required to see what are commonly brownish redox concentrations in the darkened materials. If the soil is saturated at the time of sampling, it may be necessary to let it dry at least to a moist condition for redox features to become visible. Soils that are wet because of ponding or have a shallow, perched layer of saturation may have any color below the dark surface. It is recommended that delineators evaluate the hydrologic source and examine and describe the layer below the dark colored surface layer when applying this indicator.

F7. Depleted Dark Surface - LRR: **P, T, U**

Redox depletions with value of 5 or more and chroma of 2 or less in a layer that is at least 10 cm (4 inches) thick, starting at a depth ≤ 20 cm (8 inches) from the mineral soil surface, and has:

a. **Matrix value of 3 or less and chroma of 1 or less and 10 percent or more redox depletions, or**
b. **Matrix value of 3 or less and chroma of 2 or less and 20 percent or more redox depletions.**

User Notes: Care should be taken not to mistake mixing of an E or calcic horizon into the surface layer for depletions. The "pieces" of E and calcic horizons are not redox depletions. Knowledge of local conditions is required in areas where E and/or calcic horizons may be present. In soils that are wet because of subsurface saturation, the layer directly below the dark surface layer should have a depleted or gleyed matrix. Redox depletions should have associated redox concentrations that occur as Fe pore linings or masses within the depletion(s) or surrounding the depletion(s).

F8. Redox Depressions - LRR: **P, T, U**

In closed depressions subject to ponding, 5 percent or more distinct or prominent redox concentrations occurring as soft masses or pore linings in a layer that is 5 cm (2 inches) or more thick and starts at a depth ≤ 10 cm (4 inches) from the soil surface.

User Notes: This indicator occurs on depressional landforms, such as vernal pools, playa lakes, rainwater basins, "Grady" ponds, and potholes. It does not occur in microdepressions (approximately 1 m) on convex or plane landscapes.

F10. Marl - LRR: **U**

A layer of marl with value of 5 or more and chroma 2 or less starting at a depth ≤ 10 cm (4 inches) from the soil surface.

User Notes: Marl is a limnic material deposited in water by precipitation of $CaCO_3$ by algae as defined in *Soil Taxonomy* (Soil Survey Staff, 1999). It has a Munsell value of 5 or more and reacts with dilute HCl to evolve CO_2. Marl is not the carbonatic substrate material associated with limestone bedrock. Some soils have materials with all of the properties of marl, except for the required Munsell value.

These soils are hydric if the required value is present at a depth ≤ 10 cm (4 inches) from the soil surface. Normally, this indicator occurs at the soil surface.

F12. Iron/Manganese Masses - LRR: **P, T**
On flood plains, a layer 10 cm (4 inches) or more thick with 40 percent or more chroma of 2 or less and 2 percent or more distinct or prominent redox concentrations occurring as soft iron-manganese masses with diffuse boundaries. The layer starts at a depth ≤ 20 cm (8 inches) from the soil surface. Iron-manganese masses have value and chroma of 3 or less. Most commonly, they are black. The thickness requirement is waived if the layer is the mineral surface layer.
User Notes: These iron-manganese masses generally are small (2 to 5 mm in size) and have value and chroma of 3 or less. They can be dominated by manganese and therefore have a color approaching black. The low matrix chroma must be the result of wetness and not be a weathering or parent material feature. Iron-manganese masses should not be confused with the larger and redder iron nodules associated with plinthite or with concretions that have sharp boundaries. This indicator occurs on flood plains along rivers, such as the Apalachicola, Congaree, Mobile, Savannah, and Tennessee Rivers.

F13. Umbric Surface - LRR: **P, T, U**
In depressions and other concave landforms, a layer 25 cm (10 inches) or more thick, starting at a depth ≤ 15 cm (6 inches) from the soil surface, in which the upper 15 cm (6 inches) has value of 3 or less and chroma of 1 or less and in which the lower 10 cm (4 inches) has the same colors as those described above or any other color that has chroma of 2 or less.
User Notes: The thickness requirements may be slightly less than those for an umbric epipedon. Microlows (approximately 1 m) are not considered to be concave landforms. Umbric surfaces in the higher landscape positions, such as side slopes dominated by Humic Dystrudepts, are excluded.

F22. Very Shallow Dark Surface - MLRA: **138, 152A, 154**
In depressions and flood plains subject to frequent ponding and/or flooding, one of the following must be observed:

a. **If bedrock occurs between 15 cm (6 inches) and 25 cm (10 inches) of the soil surface, a layer at least 15 cm (6 inches) thick starting at a depth ≤ 10 cm (4 inches) from the soil surface with value 2.5 or less and chroma 1 or less, and the remaining soil to bedrock must have the same colors as above or any other color that has chroma 2 or less. Or,**
b. **If bedrock occurs at a depth ≤ 15 cm (6 inches) from the soil surface, more than half of the soil thickness must have value 2.5 or less and chroma 1 or less, and the remaining soil to bedrock must have the same colors as above or any other color that has a chroma 2 or less.**

NRCS Hydric Soil Field Indicators
Deepest Starting Depth Summary Table

Depth (in)	Indicator
0	A2
< 3	F22(b)
4	F3(a), F8, F10, F22(a)
6	A3, A5, A6, A7, A8, A9, A11, A12, S4, S5, S6, S7, S8, S9, S12, F13
8	F6, F7, F12
10	F3(b)
12	A4, F2
16	A1

Hydric Soil Field Indicators Simplified Checklist:

Hydric Soil Field Indicators Simplified Checklist is adapted from Field Indicators of Hydric Soils in the United States, Version 8.1 (USDA NRCS, 2017) using Florida-specific indicators per Rule 62-340.300(2)(a)1., (b)1., (c)3., and (d), F.A.C. The checklist is composed of Yes/No questions for each indicator. If any question in an indicator is answered No then the indicator is not met. If all of the questions for an indicator are answered Yes then the indicator is met.

Data Form Guide Notes:

Mineral soil texture refers to either sandy, fine, or mucky mineral textures.

Adjacent layers within a soil profile description may be combined to meet a hydric soil field indicator's layer thickness requirements provided the adjacent layers share the required properties referred to in the indicator (*E.g.*, 2 inches of sandy mucky mineral soil and 3 inches of sand with ≥70% organic coating may be combined to meet S7 provided both layers have matrix values of 3 or less and chromas of 1 or less.)

----------*For use in All texture soils*----------

A1. Histosol

Note: This is a stand alone D-Test indicator

- ✓ Is there a layer(s) of organic soil material (peat, mucky peat, and/or muck soil texture)
- ✓ Does the layer(s) satisfy either **Option A or B**

  A. Layer(s) is 16 inches or more thick
  AND
  Starts ≤16 inches from the ground surface (ground surface begins at the peat, mucky peat, muck, or mineral surface)

  B. Organic soil material layer(s) constitutes 2/3 or more of the total thickness of the soil from the ground surface to a layer dense or cemented enough to inhibit root growth (e.g. bedrock, sandstone)
  AND
  Total combined thickness of any mineral soil texture layer(s) between the ground surface and the dense/cemented layer is 4 inches or less

- ✓ Above the starting depth of this indicator, is either **Option A, B, or C** satisfied:

  A. There are no mineral soil layers above this indicator

  B. All mineral soil above this indicator has a dominant chroma of 2 or less

  C. There are less than 6 inches of mineral soil material with a dominant chroma of more than 2 above this indicator

- ❖ See Appendix B for complete requirements to classify as a Histosol

A2. Histic Epipedon

Note: This is a stand alone D-Test indicator

- ✓ Is there a layer(s) of organic soil material (peat, mucky peat, and/or muck soil texture)
- ✓ Did the layer(s) form near the ground surface (ground surface begins at the peat, mucky peat, muck, or mineral surface)
- ✓ Is the layer(s) 8 to 16 inches thick
- ✓ Is the layer(s) underlain by mineral soil texture with chroma of 2 or less
- ✓ Above the starting depth of this indicator, is either **Option A, B, or C** satisfied:

  A. There are no mineral soil layers above this indicator

  B. All mineral soil above this indicator has a dominant chroma of 2 or less

  C. There are less than 6 inches of mineral soil material with a dominant chroma of more than 2 above this indicator

- ❖ See Appendix B for complete requirements to classify as a histic epipedon

A3. Black Histic

Note: This is a stand alone D-Test indicator

- ✓ Is there a layer(s) of organic soil material (peat, mucky peat, and/or muck soil texture)
- ✓ Does the layer(s) have matrix hue of 10YR or yellower, value of 3 or less, and chroma of 1 or less
- ✓ Is the layer(s) 8 inches or more thick
- ✓ Does the layer(s) start ≤ 6 inches from the ground surface (ground surface begins at the peat, mucky peat, muck, or mineral surface)
- ✓ Is the layer(s) underlain by mineral soil texture with chroma of 2 or less

A4. Hydrogen Sulfide

Note: This is a stand alone D-Test indicator

- ✓ Is there a hydrogen sulfide odor (rotten egg smell)
- ✓ Does the hydrogen sulfide odor start ≤ 12 inches from the soil surface
- ✓ Above the starting depth of this indicator, is either **Option A, B, or C** satisfied:
  - **A.** There are no mineral soil layers above this indicator
  - **B.** All mineral soil above this indicator has a dominant chroma of 2 or less
  - **C.** There are less than 6 inches of mineral soil material with a dominant chroma of more than 2 above this indicator

A5. Stratified Layers

Note: This is a stand alone D-Test indicator (as sediment deposition)

- ✓ Are there several stratified layers due to the alternating deposition of organic matter and mineral soil material deposited by flowing water
- ✓ Do one or more of the stratified layers satisfy either **Option A, B, and/or C**
  - **A.** Layer(s) is composed of organic soil material (peat, mucky peat, and/or muck soil texture)
  - **B.** Layer(s) is composed of mucky mineral soil texture
  - **C.** Layer(s) is composed of sandy or fine soil texture
    AND
    Has value of 3 or less and chroma of 1 or less
    AND
    If layer(s) texture is sandy at least 70% of the visible sand particles are masked with organic material when viewed through a 10x or 15x hand lens
- ✓ Other than the layer(s) meeting Option A, B, and/or C, do all of the remaining stratified layers have chroma of 2 or less
- ✓ Do the stratified layers start ≤ 6 inches from the soil surface

A6. Organic Bodies

- ✓ Is there a layer(s) with organic bodies composed of muck or mucky mineral soil texture
- ✓ Are there 2% or more organic bodies within the layer(s)
- ✓ Does the layer(s) start ≤ 6 inches from the soil surface

A7. 5 cm Mucky Mineral

Note: This is a stand alone D-Test indicator

- ✓ Is there a layer(s) of mucky mineral soil texture
- ✓ Is the layer(s) 2 inches or more thick
- ✓ Does the layer(s) start ≤ 6 inches from the soil surface

A8. Muck Presence

Note: This is a stand alone D-Test indicator

- ✓ Is the soil profile located within Land Resource Region U
- ✓ Is there a layer(s) of muck soil texture
- ✓ Does the layer(s) have value of 3 or less and chroma of 1 or less

✓ Does the layer(s) start ≤ 6 inches from the soil surface

A9. 1 cm Muck

Note: This is a stand alone D-Test indicator

✓ Is the soil profile located within Land Resource Region P or T
✓ Is there a layer(s) of muck soil texture
✓ Does the layer(s) have value of 3 or less and chroma of 1 or less
✓ Is the layer(s) 0.5 inch or more thick
✓ Does the layer(s) start ≤ 6 inches from the soil surface

A11. Depleted Below Dark Surface

✓ Is there a dark layer(s) that satisfies either **Option A and/or B**

A. Layer(s) is composed of muck, fine mucky mineral, and/or fine soil texture
AND
Has value of 3 or less and chroma of 2 or less

B. Layer(s) is composed of sandy and/or sandy mucky mineral soil texture
AND
Has value of 3 or less and chroma of 1 or less
AND
Has at least 70% of the visible sand particles masked with organic material when viewed through a 10x or 15x hand lens

✓ Does the dark layer(s) start ≤ 6 inches from the soil surface
✓ Does the layer(s) immediately below the dark layer(s) satisfy either **Option A and/or B**

A. The layer(s) has a gleyed matrix (value of 4 or more on the Gley 1 or Gley 2 page in the Munsell Soil Color Book, 2009)

B. The layer(s) has a depleted matrix (value of 4 or more and chroma of 2 or less, along with 2% or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings, or a reduced matrix)

✓ Does the underlying layer(s) with the gleyed or depleted matrix have 60% or more chroma of 2 or less
✓ Does the underlying layer(s) satisfy either **Option A or B**

A. Layer(s) is 6 inches or more thick

B. Layer(s) is 2 inches or more thick
AND
Is composed of fragmental soil material

✓ Does the underlying layer(s) with the gleyed or depleted matrix start ≤ 12 inches from the soil surface

A12. Thick Dark Surface

✓ Is there a dark layer(s) that has value of 2.5 or less and chroma of 1 or less
✓ Does the dark layer(s) satisfy either **Option A and/or B**

A. Layer(s) is composed of muck, fine mucky mineral, and/or fine soil texture

B. Layer(s) is composed of sandy and/or sandy mucky mineral soil texture
AND
Has at least 70% of the visible sand particles masked with organic material when viewed through a 10x or 15x hand lens

✓ Does the dark layer(s) start ≤ 6 inches from the soil surface and extend to a depth of at least 12 inches
✓ Is there a layer(s) below the dark layer(s) that satisfies either **Option A and/or B**

A. The layer(s) has a gleyed matrix (value of 4 or more on the Gley 1 or Gley 2 page in the Munsell Soil Color Book, 2009)

B. The layer(s) has a depleted matrix (value of 4 or more and chroma of 2 or less, along with 2% or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings, or a reduced matrix)

- ✓ Does the lower layer(s) with the gleyed or depleted matrix have 60% or more chroma of 2 or less
- ✓ Is the lower layer(s) with the gleyed or depleted matrix 6 inches or more thick
- ✓ Do all remaining layers between the aforementioned dark layer(s) and the layer(s) with the gleyed or depleted matrix have value of 3 or less and chroma of 1 or less

----------For use in <u>Sandy texture</u> soils----------

S4. <u>Sandy Gleyed Matrix</u>

Note: This is a stand alone D-Test indicator

- ✓ Is there a layer(s) of sandy soil texture in which 60% or more of the layer is a gleyed matrix (value of 4 or more on the Gley 1 or Gley 2 page in the Munsell Soil Color Book, 2009)
- ✓ Does the layer(s) start ≤ 6 inches from the soil surface

S5. <u>Sandy Redox</u>

- ✓ Is there a layer(s) of sandy and/or sandy mucky mineral soil texture with 2% or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings
- ✓ Does the matrix of the layer(s) have 60% or more chroma of 2 or less
- ✓ Is the layer(s) 4 inches or more thick
- ✓ Does the layer(s) start ≤ 6 inches from the soil surface

S6. <u>Stripped Matrix</u>

- ✓ Is there a layer(s) of sandy and/or sandy mucky mineral soil texture with two or more **faintly**[1] **contrasting** colors (Contrast is due to organic matter and/or iron-manganese oxides having been stripped away from the matrix and the primary base color of the soil material has been exposed)
- ✓ Are there rounded, diffuse[2] boundaries between the faintly contrasting colors
- ✓ Do the stripped (lighter colored) areas of the faintly contrasting colors compose 10% or more of the layer(s)'s volume
- ✓ Does the layer(s) start ≤ 6 inches from the soil surface

[1] See Table 1 (p 32) to determine if contrast is faint

[2] See Figure 1 (p 32) to determine if boundaries are diffuse

S7. <u>Dark Surface</u>

- ✓ Is there a dark layer(s) of sandy, sandy mucky mineral, and/or muck soil texture with matrix value of 3 or less and chroma of 1 or less
- ✓ Does the dark layer(s)'s matrix have at least 70% of the visible sand particles masked with organic material when viewed through a 10x or 15x hand lens
- ✓ Does the dark layer(s) satisfy either **Option A or B**
  - **A.** The dark layer(s) is more than 4 inches thick
  - **B.** The dark layer(s) is exactly 4 inches thick
    AND
    The layer directly below has chroma of 2 or less
- ✓ Does the dark layer(s) start ≤ 6 inches from the soil surface

S8. <u>Polyvalue Below Surface</u>

- ✓ Is the soil profile located within Land Resource Region T or U
- ✓ Is there a dark layer(s) of sandy, sandy mucky mineral, and/or muck soil texture with value of 3 or less and chroma of 1 or less
- ✓ Does the dark layer(s) have at least 70% of the visible sand particles masked with organic material when viewed through a 10x or 15x hand lens
- ✓ Does the dark layer(s) start ≤ 6 inches from the soil surface
- ✓ Does the soil volume directly below this dark layer(s) to a depth of 12 inches from the soil surface or to the spodic horizon, whichever is less, meet both **Criteria 1 <u>and</u> 2**
  - **1.** 5% or more of the soil volume has value of 3 or less and chroma of 1 or less

AND

2. The remainder of the soil volume has value of 4 or more and chroma of 1 or less

S9. <u>Thin Dark Surface</u>

- ✓ Is the soil profile located within Land Resource Region T or U
- ✓ Is there a dark layer(s) of sandy, sandy mucky mineral, and/or muck soil texture with value of 3 or less and chroma of 1 or less
- ✓ Does the dark layer(s) have at least 70% of the visible sand particles masked with organic material when viewed through a 10x or 15x hand lens
- ✓ Is the dark layer(s) 2 inches or more thick
- ✓ Does the dark layer(s) start ≤ 6 inches from the soil surface
- ✓ Directly below this dark layer(s) is there a layer(s) with value of 4 or less and chroma of 1 or less
- ✓ Does the underlying layer(s) extend to a depth of 12 inches from the soil surface or to the spodic horizon, whichever is less

S12. <u>Barrier Islands 1 cm Muck</u>

- ✓ Is the soil profile located within the swale portion of dune-and-swale complexes of barrier islands in Major Land Resource Area 153B (See p 42)
- ✓ Is there a layer(s) of muck soil texture
- ✓ Does the layer(s) have value of 3 or less and chroma of 2 or less
- ✓ Is the layer(s) 0.5 inch or more thick
- ✓ Does the layer(s) start ≤ 6 inches from the soil surface

----------*For use in <u>Fine texture</u> soils*----------

F2. <u>Loamy Gleyed Matrix</u>

Note: This is a stand alone D-Test indicator

- ✓ Is there a layer(s) of fine soil texture in which 60% or more of the layer is a gleyed matrix (value of 4 or more on the Gley 1 or Gley 2 page in the Munsell Soil Color Book, 2009)
- ✓ Does the layer(s) start ≤ 12 inches from the soil surface
- ✓ Above the starting depth of this indicator, is either **Option A, B, or C** satisfied:
  - **A.** There are no mineral soil layers above this indicator
  - **B.** All mineral soil above this indicator has a dominant chroma of 2 or less
  - **C.** There are less than 6 inches of mineral soil material with a dominant chroma of more than 2 above this indicator

F3. <u>Depleted Matrix</u>

- ✓ Is there a layer(s) of fine soil texture with a depleted matrix (value of 4 or more and chroma of 2 or less, along with 2% or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings, or a reduced matrix)
- ✓ Does the layer(s)'s matrix have 60% or more chroma of 2 or less
- ✓ Does the layer(s) satisfy either **Option A or B**
  - **A.** Layer(s) is 2 inches or more thick
    AND
    Starts ≤ 4 inches from the soil surface
  - **B.** Layer(s) is 6 inches or more thick
    AND
    Starts ≤ 10 inches from the soil surface
- ✓ Above the starting depth of this indicator, is either **Option A, B, or C** satisfied:
  - **A.** There are no mineral soil layers above this indicator

B. All mineral soil above this indicator has a dominant chroma of 2 or less

C. There are less than 6 inches of mineral soil material with a dominant chroma of more than 2 above this indicator

F6. Redox Dark Surface

- ✓ Is there a layer(s) of fine and/or fine mucky mineral soil texture with distinct or prominent redox concentrations occurring as soft masses and/or pore linings
- ✓ Does the layer(s) with redox concentrations satisfy either **Option A or B**

A. Layer(s)'s matrix has value of 3 or less and chroma of 1 or less
AND
Has 2% or more redox concentrations

B. Layer(s)'s matrix has value of 3 or less and chroma of 2 or less
AND
Has 5% or more redox concentrations

- ✓ Is the layer(s) 4 inches or more thick
- ✓ Does the layer(s) start ≤ 8 inches from the soil surface
- ✓ Above the starting depth of this indicator, is either **Option A, B, or C** satisfied:

A. There are no mineral soil layers above this indicator

B. All mineral soil above this indicator has a dominant chroma of 2 or less

C. There are less than 6 inches of mineral soil material with a dominant chroma of more than 2 above this indicator

F7. Depleted Dark Surface

- ✓ Is there a layer(s) of fine and/or fine mucky mineral soil texture with redox depletions (lighter areas with associated redox concentrations)
- ✓ Do the redox depletions have value of 5 or more and chroma of 2 or less
- ✓ Does the layer(s) with redox depletions satisfy either **Option A and/or B**

A. Layer(s)'s matrix has value of 3 or less and chroma of 1 or less
AND
Has 10% or more distinct or prominent redox depletions

B. Layer(s)'s matrix has value of 3 or less and chroma of 2 or less
AND
Has 20% or more distinct or prominent redox depletions

- ✓ Is the layer(s) 4 inches or more thick
- ✓ Does the layer(s) start ≤ 8 inches from the soil surface
- ✓ Above the starting depth of this indicator, is either **Option A, B, or C** satisfied:

A. There are no mineral soil layers above this indicator

B. All mineral soil above this indicator has a dominant chroma of 2 or less

C. There are less than 6 inches of mineral soil material with a dominant chroma of more than 2 above this indicator

F8. Redox Depressions

- ✓ Is the soil profile located within a closed depression subject to ponding
- ✓ Is there a layer(s) of fine and/or fine mucky mineral soil texture with 5% or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings
- ✓ Is the layer(s) 2 inches or more thick
- ✓ Does the layer(s) start ≤ 4 inches from the soil surface

F10. Marl

- ✓ Is the soil profile located within Land Resource Region U
- ✓ Is there a layer(s) of marl material

- ✓ Does the layer(s) have value of 5 or more and chroma of 2 or less
- ✓ Does the layer(s) start ≤ 4 inches from the soil surface

F12. <u>Iron/Manganese Masses</u>

- ✓ Is the soil profile located within Land Resource Region P or T
- ✓ Is the soil profile located within a flood plain
- ✓ Is there a layer(s) of fine and/or fine mucky mineral soil texture with 2% or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings
- ✓ Do the redox concentrations occur as soft iron-manganese masses
- ✓ Do the iron-manganese masses have value and chroma of 3 or less
- ✓ Do the iron-manganese masses have diffuse[3] boundaries
- ✓ Does 40% or more of the layer(s) have chroma of 2 or less
- ✓ Does the layer(s) with iron-manganese masses satisfy either **Option A or B**
  - **A.** Layer(s) starts at the soil surface
  - **B.** Layer(s) is 4 inches or more thick
    AND
    Starts ≤ 8 inches from the soil surface

[3] See Figure 1 (p 32) to determine if boundaries are diffuse

F13. <u>Umbric Surface</u>

- ✓ Is the soil profile located within a depression or other concave landform
- ✓ Is there a layer(s) of fine, fine mucky mineral, and/or muck soil texture
- ✓ Is the layer(s) 10 inches or more thick
- ✓ Does the layer(s) satisfy both **Criteria 1 <u>and</u> 2**
  1. The upper 6 inches of the layer(s) has value of 3 or less and chroma of 1 or less
     AND
  2. The lower 4 inches of the layer(s) has chroma of 2 or less
- ✓ Does the layer(s) start ≤ 6 inches from the soil surface

F22. <u>Very Shallow Dark Surface</u>

- ✓ Is the soil profile located within Major Land Resource Area 138, 152A, or 154 (See p 42)
- ✓ Is the soil profile located within a depression or flood plain subject to frequent ponding and/or flooding
- ✓ Is there a dark layer(s) of fine, fine mucky mineral, and/or muck soil texture with value of 2.5 or less and chroma of 1 or less
- ✓ Does bedrock occur ≤ 10 inches from the soil surface
- ✓ Does the soil profile satisfy either **Option A or B**
  - **A.** The bedrock occurs between 6 and 10 inches from the soil surface
    AND
    The dark layer(s) is 6 inches or more thick
    AND
    Starts ≤ 4 inches from the soil surface
  - **B.** The bedrock occurs ≤ 6 inches from the soil surface
    AND
    The dark layer(s) constitutes more than half of the soil thickness
- ✓ Does all remaining soil between the dark layer(s) and the bedrock have chroma of 2 or less

Glossary from NRCS <u>Field Indicators of Hydric Soils in the United States</u> Version 8.1, 2017

As defined in this Glossary, terms marked with an asterisk (*) have definitions that are slightly different from the definitions in the referenced materials. The definitions in the Glossary are intended to assist users of this document and are not intended to add to or replace definitions in the referenced materials.

Data Form Guide Note: Definitions expressed in Chapter 62-340, F.A.C. supersede all other definitions contained within this guide when applying the rule.

A horizon. A mineral soil horizon that formed at the surface or below an O horizon where organic material is accumulating. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Accreting areas. Landscape positions in which soil material accumulates through deposition from higher elevations or upstream positions more rapidly than the rate at which soil material is being lost through erosion.

Anaerobic. A condition in which molecular oxygen is virtually absent from the soil.

Anaerobiosis. Microbiological activity under anaerobic conditions.

Aquic conditions. Conditions in the soil represented by depth of saturation, occurrence of reduction, and redoximorphic features. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

***Artificial drainage.** The use of human efforts and devices to remove free water from the soil surface or from the soil profile. The hydrology may also be modified by levees and dams, which keep water from entering a site.

CaCO3 equivalent. The acid neutralizing capacity of a soil expressed as a weight percentage of CaCO3 (molecular weight of CaCO3 equals 100).

Calcic horizon. An illuvial horizon in which carbonates have accumulated to a significant extent. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Calcium carbonate. Calcium carbonate has the chemical formula CaCO3. It effervesces when treated with cold hydrochloric acid.

Closed depressions. Low-lying areas that are surrounded by higher ground and have no natural outlet for surface drainage**.**

COE. U.S. Army Corps of Engineers.

Common. When referring to redox concentrations, redox depletions, or both, “common” represents 2 to 20 percent of the observed surface.

Concave landscapes. Landscapes in which the surface curves downward.

***Depleted matrix.** For loamy and clayey material (and sandy material in areas of indicators A11 and A12), a depleted matrix refers to the volume of a soil horizon or subhorizon in which the processes of reduction and translocation have removed or transformed iron, creating colors of low chroma and high value. A, E, and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless the soil has common or many distinct or prominent redox concentrations occurring as soft masses or pore linings. In some areas the depleted matrix may change color upon exposure to air (see Reduced matrix); this phenomenon is included in the concept of depleted matrix. The following combinations of value and chroma identify a depleted matrix:

1. Matrix value of 5 or more and chroma of 1 or less with or without redox concentrations occurring as soft masses and/or pore linings; or
2. Matrix value of 6 or more and chroma of 2 or less with or without redox concentrations occurring as soft masses and/or pore linings; or
3. Matrix value of 4 or 5 and chroma of 2 and 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings; or
4. Matrix value of 4 and chroma of 1 and 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings.

Diffuse boundary. (Figure 1 *p.32*) Used to describe redoximorphic features that grade gradually from one color to another. The color grade is commonly more than 2 mm wide. “**Clear**” is used to describe boundary color gradations intermediate between sharp and diffuse.

Distinct.[1] (Table 1 *p.32*) Readily seen but contrasting only moderately with the color to which compared. The contrast is distinct if:

1. Delta hue[2] = 0, then a) Delta value ≤2 and delta chroma >1 to <4, or
   b) Delta value >2 to <4 and delta chroma <4.
2. Delta hue = 1, then a) Delta value ≤1 and delta chroma >1 to <3, or
   b) Delta value >1 to <3 and delta chroma <3.
3. Delta hue = 2, then a) Delta value = 0 and delta chroma >0 to <2, or
   b) Delta value >0 to <2 and delta chroma <2.

[1] Regardless of the magnitude of hue difference, where both colors have value ≤3 and chroma ≤2, the contrast is faint.

[2] Data Form Guide Note: A delta hue of 1 is equal to 2.5 units (Figure 2 *p.32*), as defined in the *Soil Survey Manual* (Soil Survey Staff, 1993)

E horizon. A mineral horizon in which the dominant process is loss of silicate clay, iron, and/or aluminum, leaving a concentration of sand and silt particles. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

EPA. U.S. Environmental Protection Agency.

Epipedon. A horizon that has developed at the soil surface. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Faint. (Table 1 *p.32*) Evident only on close examination. The contrast is faint if:

1. Delta hue = 0, then delta value ≤2 and delta chroma ≤1, or
2. Delta hue = 1, then delta value ≤1 and delta chroma ≤1, or
3. Delta hue = 2, then delta value = 0 and delta chroma = 0, or

Any delta hue if both colors have value ≤3 and chroma ≤2.

Fe-Mn concretions. Firm to extremely firm, irregularly shaped bodies with sharp to diffuse boundaries. When broken in half, concretions have concentric layers. See Vepraskas (1994) for a complete discussion.

Fe-Mn nodules. Firm to extremely firm, irregularly shaped bodies with sharp to diffuse boundaries. When broken in half, nodules do not have visibly organized internal structure. See Vepraskas (1994) for a complete discussion.

Few. When referring to redox concentrations, depletions, or both, "few" represents less than 2 percent of the observed surface.

Fibric. See Peat.

Flood plain. The nearly level plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Fragmental soil material. Soil material that consists of 90 percent or more rock fragments. Less than 10 percent of the soil consists of particles 2 mm or smaller.

Frequently flooded or ponded. A frequency class in which flooding or ponding is likely to occur often under usual weather conditions (a chance of more than 50 percent in any year, or more than 50 times in 100 years).

FWS. U.S. Department of the Interior, Fish and Wildlife Service.

***g.** A horizon suffix indicating that the horizon is gray because of wetness but not necessarily that it is gleyed. All gleyed matrices (defined below) should have the suffix "g"; however, not all horizons with the "g" suffix are gleyed. For example, a horizon with the color 10YR 6/2 that is at least seasonally wet, with or without other redoximorphic features, should have the "g" suffix.

Glauconitic. Refers to a mineral aggregate that contains a micaceous mineral resulting in a characteristic green color, e.g., glauconitic shale or clay.

***Gleyed matrix.** Soils with a gleyed matrix have the following combinations of hue, value, and chroma (the soils are not glauconitic):

1. 10Y, 5GY, 10GY, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value of 4 or more and chroma of 1; or

2. 5G with value of 4 or more and chroma of 1 or 2; or
3. N with value of 4 or more

In some places the gleyed matrix may change color upon exposure to air. (See Reduced matrix). This phenomenon is included in the concept of gleyed matrix.

***Hemic.** See Mucky peat.

Histels. Organic soils that overlie permafrost and show evidence of cryoturbation. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Histic epipedon. A thick (20- to 60-cm, or 8- to 24- inch) organic soil horizon that is saturated with water at some period of the year (unless the soil is artificially drained) and that is at or near the surface of a mineral soil.

Histosols. Organic soils that have organic soil materials in more than half of the upper 80 cm (32 inches) or that have organic materials of any thickness if they overlie rock or fragmental materials that have interstices filled with organic soil materials. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Horizon. A layer, approximately parallel to the surface of the soil, distinguishable from adjacent layers by a distinctive set of properties produced by soil-forming processes. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Hydric soil definition (1994). *(See also Ch 62-340, F.A.C. definition)* A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

Hydrogen sulfide odor. The odor of H2S. It is similar to the smell of rotten eggs.

Hydromorphic features. Features in the soil caused or formed by water.

Layer(s). A horizon, subhorizon, or combination of contiguous horizons or subhorizons sharing at least one property referred to in the indicators.

Lithologic discontinuity. Occurs in a soil that has developed in more than one type of parent material. Commonly determined by a significant change in particle-size distribution, mineralogy, etc. that indicates a difference in material from which the horizons formed.

LRR. Land resource region. LRRs are geographic areas characterized by a particular pattern of soils, climate, water resources, and land use. Each LRR is assigned a different letter of the alphabet (A-Z). LRRs are defined in U.S. Department of Agriculture Handbook 296 (USDA, NRCS, 2006b).

Many. When referring to redox concentrations, depletions, or both, “many” represents more than 20 percent of the observed surface.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

***Masked.** Through redoximorphic processes, the color of soil particles is hidden by organic material, silicate clay, iron, aluminum, or some combination of these.

Matrix. The dominant soil volume that is continuous in appearance. When three colors occur, such as when a matrix, depletions, and concentrations are present, the matrix may represent less than 50 percent of the total soil volume.

MLRA. Major land resource areas. MLRAs are geographically associated divisions of land resource regions. MLRAs are defined in U.S. Department of Agriculture Handbook 296 (USDA, NRCS, 2006b).

Mollic epipedon. A mineral surface horizon that is relatively thick, dark colored, and humus rich and has high base saturation. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Mollisols. Mineral soils that have a mollic epipedon. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

***Muck.** Sapric organic soil material in which virtually all of the organic material is so decomposed that identification of plant forms is not possible. Bulk density is normally 0.2 or more. Muck has less than one-sixth fibers after rubbing, and its sodium pyrophosphate solution extract color has lower value and chroma than 5/1, 6/2, and 7/3.

***Mucky modified mineral soil material.** (Figure 7) A USDA soil texture modifier, e.g., mucky sand. Mucky modified mineral soil material that has 0 percent clay has between 5 and 12 percent organic carbon. Mucky modified mineral soil material that has 60 percent clay has between 12 and 18 percent organic carbon. Soils with an intermediate amount of clay have intermediate amounts of organic carbon. Where the organic component is peat (fibric material) or mucky peat (hemic material), mucky mineral soil material does not occur.

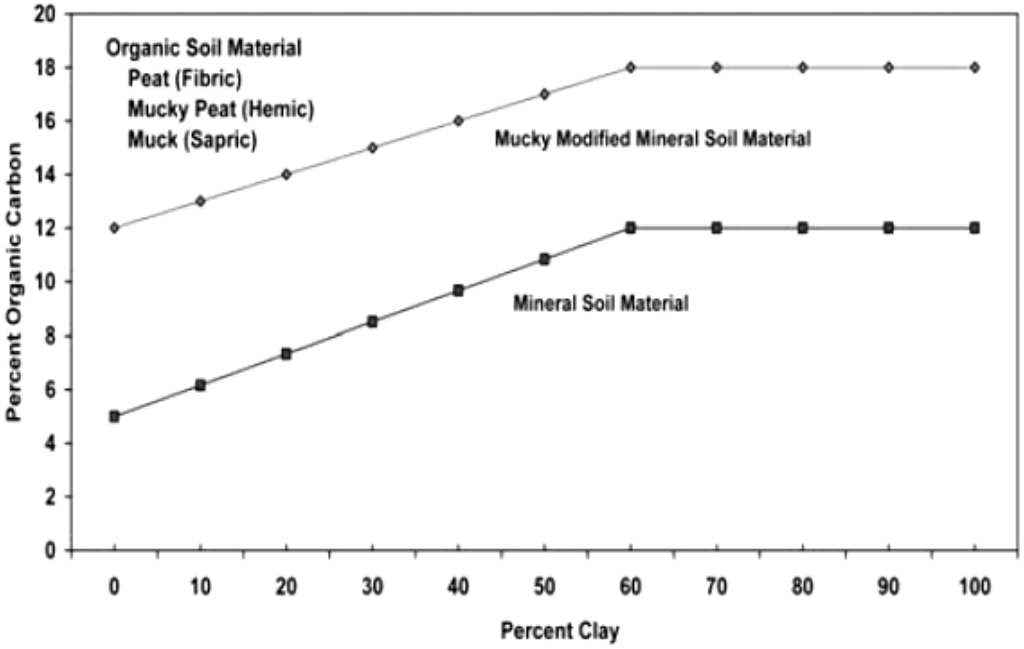


Figure 7: Percent organic carbon required for organic soil material, mucky modified mineral soil material, and mineral soil material as it is related to content of clay.

***Mucky peat.** Hemic organic material, which is characterized by decomposition that is intermediate between that of peat (fibric material) and that of muck (sapric material). Bulk density is normally between 0.1 and 0.2 g/cm3. Mucky peat does not meet the fiber content (after rubbing) or sodium pyrophosphate solution extract color requirements for either peat (fibric) or muck (sapric) soil material.

Nodules. See Fe-Mn nodules.

NRCS. USDA, Natural Resources Conservation Service (formerly Soil Conservation Service).

NTCHS. National Technical Committee for Hydric Soils.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Organic soil material. (Figure 7) Soil material that is saturated with water for long periods or artificially drained and, excluding live roots, has 18 percent or more organic carbon with 60 percent or more clay or 12 percent or more organic carbon with 0 percent clay. Soils with an intermediate amount of clay have an intermediate amount of organic carbon. If the soil is never saturated for more than a few days, it contains 20 percent or more organic carbon. Organic soil material includes muck, mucky peat, and peat.

Data Form Guide Note: Generally, organic soil material is 2 cm or smaller and decomposing.

***Peat.** Fibric organic soil material. The plant forms can be identified in virtually all of the organic material. Bulk density is normally <0.1. Peat has three-fourths or more fibers after rubbing, or it has two-fifths or more fibers after rubbing and has sodium pyrophosphate solution extract color of 7/1, 7/2, 8/2, or 8/3.

Ped. A unit of soil structure such as a block, column, granule, plate, or prism, formed by natural processes (in contrast with a clod, which is formed artificially).

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete discussion.

Ponding. Standing water in a closed depression that is removed only by percolation, evaporation, or transpiration. The ponding lasts for more than 7 days.

Pore linings. Zones of accumulation that may be either coatings on a ped or pore surface or impregnations of the matrix adjacent to the pore or ped. See Vepraskas (1994) for a complete discussion.

Prominent. (Table 1 *p.32*) Contrasts strongly in color. Color contrasts more contrasting than faint and distinct are prominent.

Red parent material. The parent material with a natural inherent reddish color attributable to the presence of iron oxides, typically hematite (Elless and Rabenhorst, 1994; Elless et al., 1996), occurring as coatings on and occluded within mineral grains. Soils that formed in red parent material have conditions that greatly retard the development and extent of the redoximorphic features that normally occur under prolonged aquic conditions. They typically have a Color Change Propensity Index (CCPI) of <30 (Rabenhorst and Parikh, 2000). Most commonly, the material consists of dark red, consolidated Mesozoic or Paleozoic sedimentary rocks, such as shale, siltstone, and sandstone, or alluvial materials derived from such rocks. Assistance from a local soil scientist may be needed to determine where red parent material occurs.

Redox concentrations. Bodies of apparent accumulation of Fe-Mn oxides. Redox concentrations include soft masses, pore linings, nodules, and concretions. For the purposes of the indicators, nodules and concretions are excluded from the concept of redox concentrations unless otherwise specified by specific indicators. See Vepraskas (1994) for a complete discussion.

Redox depletions. Bodies of low chroma (2 or less) having value of 4 or more where Fe- Mn oxides have been stripped or where both Fe-Mn oxides and clay have been stripped. Redox depletions contrast distinctly or prominently with the matrix. See Vepraskas (1994) for a complete discussion.

Redoximorphic features. Features formed by the processes of reduction, translocation, and/or oxidation of Fe and Mn oxides; formerly called mottles and low-chroma colors. See Vepraskas (1994) for a complete discussion.

Reduced matrix. A soil matrix that has low chroma and high value, but in which the color changes in hue or chroma when the soil is exposed to air. See Vepraskas (1994) for a complete discussion.

***Reduction.** For the purpose of the indicators, reduction occurs when the redox potential (Eh) is below the ferric-ferrous iron threshold as adjusted for pH. In hydric soils, this is the point when the transformation of ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}) occurs.

Relict features. Soil morphological features that reflect past hydrologic conditions of saturation and anaerobiosis. See Vepraskas (1994) for a complete discussion.

***Sapric.** See Muck.

Saturation. *(See also Ch 62-340, F.A.C. definition)* Wetness characterized by zero or positive pressure of the soil water. Almost all of the soil pores are filled with water.

Sharp boundary. Used to describe redoximorphic features that grade sharply from one color to another. The color grade is commonly less than 0.1 mm wide.

Soft masses. Noncemented redox concentrations, frequently within the soil matrix, that are of various shapes and cannot be removed as discrete units.

Soil texture. The relative proportions, by weight, of sand, silt, and clay particles in the soil material less than 2 mm in size.

Spodic horizon. A mineral soil horizon that is characterized by the illuvial accumulation of amorphous materials consisting of aluminum and organic carbon with or without iron. The spodic horizon has a minimum thickness, a minimum quantity of oxalate extractable carbon plus aluminum, and/or specific color requirements.

Stream Terrace. Flat-topped landforms in a stream valley that flank and are parallel to the stream channel, originally formed by a previous stream level, and representing the abandoned flood plain, stream bed, or valley floor produced during a past state of fluvial erosion or deposition (i.e., currently very rarely or never flooded; inactive cut and fill and/or scour and fill processes). Stream terraces may occur singularly or as a series. Erosional surfaces cut into bedrock and thinly mantled with stream deposits (alluvium) are called "strath terraces." Remnants of constructional valley floors thickly mantled with alluvium are called alluvial terraces.

Umbric epipedon. A thick, dark mineral surface horizon with base saturation of less than 50 percent. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

Vertisol. A mineral soil with 30 percent or more clay in all layers. These soils expand and shrink, depending on moisture content, and have slickensides or wedge-shaped peds. See *Soil Taxonomy* (Soil Survey Staff, 1999) for a complete definition.

***Wetland.** *(See also Ch 62-340, F.A.C. definition)* An area that has hydrophytic vegetation, hydric soils, and wetland hydrology, as per the "National Food Security Act Manual" and the 1987 *Corps of Engineers Wetlands Delineation Manual* (United States Army Corps of Engineers, 1987).

Data Form Guide Notes:

Surface Water Definitions

Definition from §373.019(19) Florida Statutes
"**Surface water**" means water upon the surface of the earth, whether contained in bounds created naturally or artificially or diffused. Water from natural springs shall be classified as surface water when it exits from the spring onto the earth's surface.

Definition from §373.019(14) Florida Statutes
"**Other watercourse**" means any canal, ditch, or other artificial watercourse in which water usually flows in a defined bed or channel. It is not essential that the flowing be uniform or uninterrupted.

Definition from §62.340.200(15) Florida Administrative Code
"**Seasonal High Water**" means the elevation to which the ground and surface water can be expected to rise due to a normal wet season.

From The Florida Wetlands Delineation Manual pg. 37
Ordinary high water is that point on the slope or bank where the surface water from the water body ceases to exert a dominant influence on the character of the surrounding vegetation and soils. The OHWL frequently encompasses areas dominated by non-listed vegetation and non-hydric soils. When the OHWL is not at a wetland edge, the general view of the area may present an "upland" appearance.

Definition from §403.803(14) Florida Statutes
"**Swale**" means a manmade trench which:
(a) Has a top width-to-depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or greater than 3 feet horizontal to 1 foot vertical;
(b) Contains contiguous areas of standing or flowing water only following a rainfall event;
(c) Is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake; and
(d) Is designed to take into account the soil erodibility, soil percolation, slope, slope length, and drainage area so as to prevent erosion and reduce pollutant concentration of any discharge.

Appendix B: Histosol and Histic Epipedon Definition

From *Keys to Soil Taxonomy* (Soil Survey Staff, 2014)

Histosols

1. Do not have andic soil properties in 60 percent or more of the thickness between the soil surface and either a depth of 60 cm or a densic, lithic, or paralithic contact or duripan if shallower; *and*

2. Have organic soil materials that meet *one or more* of the following:
   a. Overlie cindery, fragmental, or pumiceous materials and/or fill their interstices *and* directly below these materials, have a densic, lithic, or paralithic contact; *or*
   b. When added with the underlying cindery, fragmental, or pumiceous materials, total 40 cm or more between the soil surface and a depth of 50 cm; *or*
   c. Constitute two-thirds or more of the total thickness of the soil to a densic, lithic, or paralithic contact *and* have no mineral horizons or have mineral horizons with a total thickness of 10 cm or less; *or*
   d. Are saturated with water for 30 days or more per year in normal years (or are artificially drained), have an upper boundary within 40 cm of the soil surface, and have a total thickness of *either*:
      1) 60 cm or more if three-fourths or more of their volume consists of moss fibers or if their bulk density, moist, is less than 0.1 g/cm^3; *or*
      2) 40 cm or more if they consist either of Sapric or hemic materials, or of fibric materials with lessthan three-fourths (by volume) moss fibers and a bulk density, moist, of 0.1 g/cm^3 or more.

Folists (excluded from meeting indicator A1): Histosols that are saturated with water for less than 30 cumulative days during normal years (and are not artificially drained).

Histic Epipedon

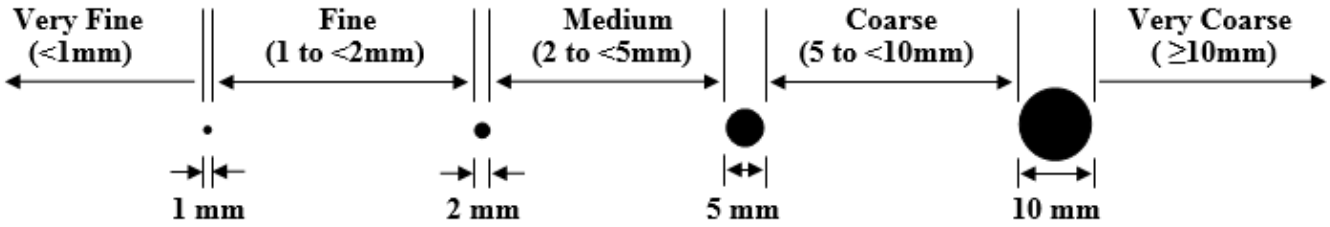
The histic epipedon is a layer (one or more horizons) that is characterized by saturation (for 30 days or more, cumulative) and reduction for some time during normal years (or is artificially drained) and e*ither*:

1. Consists of organic soil material that:
   a. Is 20 to 60 cm thick and either contains 75 percent or more (by volume) *Sphagnum* fibers or has a bulk density, moist, of less than 0.1; *or*
   b. Is 20 to 40 cm thick; *or*
2. Is an Ap horizon that, when mixed to a depth of 25 cm, has an organic-carbon content (by weight) of:
   a. 16 percent or more if the mineral fraction contains 60 percent or more clay; *or*
   b. 8 percent or more if the mineral fraction contains no clay; *or*
   c. 8 + (clay percentage divided by 7.5) percent or more if the mineral fraction contains less than 60 percent clay.

Most histic epipedons consist of organic soil material. Item 2 provides for a histic epipedon that is an Ap horizon consisting of mineral soil material. A Histic epipedon consisting of mineral soil material can also be part of a mollic or umbric epipedon.

Root Size Estimation Chart

Adapted from *Field Book for Describing Sampling Soils* version 3.0 (NRCS 2012)



Quantity Classes for Redox Features or Roots

Quantity Class	Few	Common	Many
Redox: % of Observed Surface	Less than 2%	2% to 20%	Greater than 20%
Roots: Average Count per Area*	< 1 per area*	1 to < 5 per area*	≥ 5 per area*

*Root assessment area = 1x1cm for <2mm roots, 10x10cm for 2 to <10mm, 100x100cm for ≥10mm

NRCS National Technical Committee for Hydric Soils

Hydric Soils Technical Notes contain National Technical Committee for Hydric Soils (NTCHS) updates, insights, and clarifications of the publication "Field Indicators of Hydric Soils in the United States" (USDA, NRCS, 1996 and 1998).

Hydric Soils Technical Note 4: Indicator Insights for Hydric Soil Identification

Question: I have a soil with layers that meet the color and redoximorphic requirements of several indicators; however, they do not meet any of the thickness requirements. What guidance is there regarding combining layers to meet a hydric soil indicator?

Answer: If layers/indicators are combined, the combination needs to meet the most stringent depth/thickness requirements of the combined indicators.

Example (The following table and guidance were adapted by FDEP staff to summarize Technical Note 4 and do not contain the exact text from this Note):

Layer	Depth	Matrix Color	Matrix Texture	Notes (RC = redox concentrations)
1	0-6	10YR 2/1	fine	None
2	6-8	10YR 3/1	fine	RC: 10YR 6/8, 5%, diffuse boundaries
3	8-12	10YR 5/2	fine	RC: 10YR 6/8, 10%, diffuse boundaries
4	12-20+	10YR 6/3	fine	RC: 10YR 6/8, 15%, diffuse boundaries

In this example, Layer 2 meets the requirements (except thickness) of indicator F6 – Redox Dark Surface. Layer 3 meets the requirements (except thickness) of indicator F3 – Depleted Matrix. Examining the indicator language, F6 requires a layer 4 inches thick starting within 8 inches; F3 requires a layer 6 inches thick starting within 10 inches. In this case, the soil has F6 starting within 8 inches (at 6) and has F3 starting within 10 inches (at 8); the combined thickness is 6 inches. Therefore, this soil meets the combined color, depth, and thickness requirements and should be documented as meeting hydric soil indicator(s) F6 and F3 (combined).

Hydric Soils Technical Note 13: Altered Hydric Soils

The following tables were created by FDEP staff to summarize Technical Note 13 and do not contain the exact text from this Note:

Altered Hydric Soil Type	What was modified?	Modified by what?	Modified how?	Soil status*	Example
Artificial	Hydrology or Soil	Human activities	Wetter or lower surface elevation	Hydric	Excavation/irrigation/ water impoundment
Drained/ protected	Hydrology	Human activities	Drier or barriers against flooding	Hydric	Ditches/roads/dams/ pumps/levees
Historic/ buried	Soil	Human activities	Soil placed on ground surface	Not hydric	Fill/erosional depositions
Relict	Hydrology	Geologic activities	Hydrology gone by natural means	Not hydric	Stream downcutting/ seismic activity

*See Appendix B for NRCS Hydric Soil Criteria

Soils that are no longer hydric may still exhibit redoximorphic features (called relict features), but these can be differentiated from those in contemporary (currently) hydric soils by the following characteristics:

Feature	Boundary	Nodule and Concretion Surfaces	Macropore Associated Depletions	Pore Linings	Value and Chroma
Contemporary	Diffuse	Irregular, or Smooth with red to yellow corona	Not overlain by iron rich coating	Continuous around live roots	Value $\geq$4 Chroma $\geq$4
Relict	Sharp	Smooth	Overlain by iron rich coating	Broken and unrelated to live roots	Value <4 Chroma<4

Appendix C: Hydric Soils Criteria and Technical Standard

Note: Hydric soil criteria, standards, and definitions used by the NRCS may differ from and do not supersede the criteria, standards, and definitions outlined in Chapter 62-340, F.A.C. to identify and delineate wetlands in Florida.

Soils are considered hydric by the NRCS if they:

1. Have a hydric soil indicator, or
2. Meet hydric soils list criteria 3 or 4, or
3. By data meet the Hydric Soil Technical Standard (HSTS).

Hydric Soils List Criteria (Updated by NTCHS February 2012)

1. All Histels except Folistels and Histosols except Folists; or
2. Map unit components in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, or Andic, Cumulic, Pachic, or Vitrandic subgroups that:
    a. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    b. Show evidence that the soil meets the definition of a hydric soil;
3. Map unit components that are frequently ponded for long duration or very long duration during the growing season that:
    a. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    b. Show evidence that the soil meets the definition of a hydric soil; or
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
    a. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    b. Show evidence that the soils meet the definition of a hydric soil.

Glossary of Terms Used in Hydric Soils List Criteria

Flooded means a condition in which the soil surface is temporarily covered with flowing water from any source, such as streams overflowing their banks, runoff from adjacent or surrounding slopes, inflow from the high tides, or any combination of sources.

Frequently flooded, ponded, saturated: a frequency class in which flooding, ponding, or saturation is likely to occur often under usual weather conditions (more than 50 percent chance in any year, or more than 50 times in 100 years).

Ponded means a condition in which water stands in a closed depression. The water is removed only by percolation, evaporation, or transpiration.

Long duration means a duration class in which inundation for a single event ranges from 7 days to 1 month.

Map unit components means the collection of soils and miscellaneous areas found within a map unit.

Very long duration means a duration class in which inundation for a single event is greater than 1 month.

Hydric Soil Technical Standard (HSTS) (Updated by NTCHS December 2015)

For a soil to be considered hydric by the Natural Resources Conservation Service (NRCS), Anaerobic Conditions and Saturated Conditions must exist for at least 14 consecutive days.

1. Anaerobic Conditions (as documented by a, b, or c below)
    a. Indicator of Reduction in Soils (IRIS) tubes
    b. Oxidation-reduction potential (Eh) measurements using platinum electrodes
    c. Alpha-alpha-dipyridyl dye
2. Saturated Conditions
    - Confirmed by piezometer data.
    - NTCHS recommends that the piezometer data be verified by open well data.

(Onsite precipitation data are needed to confirm normal rainfall conditions)

Data Form Guide Note:

SUPPLEMENTAL SOIL DATA

HORIZON CRITERIA – MASTER HORIZON DESIGNATIONS

O Organic soil materials (not limnic)

A Mineral; organic matter (humus) accumulation, loss of Fe, Al, clay

E Mineral; loss of Fe, Al, clay, or organic matter
B Subsurface accumulation of clay, Fe, Al, Si, humus, $CaCO_3$, $CaSO_4$; or loss of $CaCO_3$; or accumulation of sesquioxides; or subsurface soil structure
C Little or no pedogenic alteration, unconsolidated earthy material, soft bedrock
L Limnic soil materials
R Bedrock, Strongly Cemented to Indurated

HORIZON CRITERIA – SUFFIX DESIGNATIONS

a Highly decomposed organic matter
b Buried genetic horizon (not used with C horizons)
c Concretions or nodules
e Moderately decomposed organic matter
g Strong gley
h Illuvial organic matter accumulation
i Slightly decomposed organic matter
k Pedogenic carbonate accumulation
m Strong cementation (pedogenic, massive)
ma Marl (Used only with L)
n Pedogenic, exchangeable sodium accumulation
o Residual sesquioxide accumulation (pedogenic)
p Plow layer or other artificial disturbance
r Weathered or soft bedrock
s Illuvial sesquioxide accumulation
t Illuvial accumulation of silicate clay
v Plinthite
w Weak color or structure within B (used only with B)
z Pedogenic accumulation of salt more soluble than gypsum

FNAI NATURAL COMMUNITIES OF FLORIDA

HARDWOOD FORESTED UPLANDS
Slope Forest
Upland Hardwood Forest
Mesic Hammock
Rockland Hammock
Xeric Hammock

HIGH PINE AND SCRUB
Upland Mixed Woodland
Upland Pine
Sandhill
Scrub

PINE FLATWOODS AND DRY PRAIRIE
Wet Flatwoods
Mesic Flatwoods
Scrubby Flatwoods
Pine Rockland
Dry Prairie

COASTAL UPLANDS
Beach Dune
Coastal Berm
Coastal Grassland
Coastal Strand
Maritime Hammock
Shell Mound

SINKHOLES AND OUTCROP COMMUNITIES
Upland Glade
Sinkhole
Limestone Outcrop
Keys Cactus Barren

FRESHWATER NON-FORESTED WETLANDS
PRAIRIES AND BOGS
Seepage Slope
Wet Prairie
Marl Prairie
Shrub Bog
MARSHES
Depression Marsh
Basin Marsh
Coastal Interdunal Swale
Floodplain Marsh
Slough Marsh
Glades Marsh
Slough

FRESHWATER FORESTED WETLANDS
CYPRESS/TUPELO
Dome Swamp
Basin Swamp
Strand Swamp
Floodplain Swamp
HARDWOOD
Baygall
Hydric Hammock
Bottomland Forest
Alluvial Forest

MARINE AND ESTUARINE VEGETATED WETLANDS
Salt Marsh
Mangrove Swamp
Keys Tidal Rock Barren

LACUSTRINE
Clastic Upland Lake
Coastal Dune Lake
Coastal Rockland Lake
Flatwoods/Prairie Lake and Marsh Lake
River Floodplain Lake and Swamp Lake
Sandhill Upland Lake
Sinkhole Lake

RIVERINE
Alluvial Stream
Blackwater Stream
Seepage Stream
Spring-run Stream

Appendix A2: subsection 62-340.450(1), (2), (3), F.A.C. Vegetative Index Plant List by Common Name

Common Name / Botanical Name / Wetland Status

This index is for reference purposes only. Scientific names shall be used in all applications of Ch. 62-340, F.A.C. This index contains all plant species in subsection 62-340.450(1), (2), (3), F.A.C., listed alphabetically by their most widely used common names. In this index, plant species within a genus that has a consistent common name are listed by the common name of their genus, followed by the descriptor. For example, *Quercus nigra* is listed as oak, water. For families or larger taxonomic divisions in which all members are collectively referred to by a consistent common name, such as grasses, sedges, palms, orchids, and ferns, all members are listed under that group name, with the last member alphabetically being underlined to denote the end of the group. Plant species may appear multiple times within this list, as many have multiple common names. However, this list is not exhaustive.

acacia, ear-leaved *Acacia auriculiformis* FAC
alder, hazel *Alnus serrulata* OBL
algal bulrush *Websteria confervoides* OBL
allamanda, wild *Urechites lutea* FACW
alligator flag *Thalia geniculata* OBL
alligator-weed *Alternanthera philoxeroides* OBL
alligator-weed, sessile *Alternanthera sessilis* OBL
amaranth, Florida *Amaranthus floridanus* OBL
amaranth, southern *Amaranthus australis* OBL
amaranth, tidemarsh *Amaranthus cannabinus* OBL
anise, Florida *Illicium floridanum* OBL
anise, star *Illicium parviflorum* FACW
arrowhead *Sagittaria* spp. OBL
arrow-wood *Viburnum dentatum* FACW
arum *Peltandra* spp. OBL
ash *Fraxinus* spp. OBL
ash, white *Fraxinus americana* U
aster, bog *Aster spinulosus* FACW
aster, bushy *Aster dumosus* FAC
aster, calico *Aster lateriflorus* FACW
aster, climbing *Aster carolinianus* OBL
aster, coyote-thistle *Aster eryngiifolius* FACW
aster, Elliott's *Aster elliottii* OBL
aster, flat-top white *Aster umbellatus* FAC
aster, saltmarsh *Aster subulatus* OBL
aster, saltmarsh *Aster tenuifolius* OBL
aster, savannah *Aster chapmanii* FACW
aster, small white *Aster vimineus* FACW
Australian pine *Casuarina* spp. FAC
axilflower *Mecardonia* spp. FACW
azalea, swamp *Rhododendron viscosum* FACW
baby tears *Micranthemum* spp. OBL
baby-blue-eyes, small-flower *Nemophila aphylla* FACW
balsam-scale, Pan-American *Elionurus tripsacoides* FACW
bantam-buttons *Syngonanthus flavidulus* FACW
barbara's-buttons, grass-leaf *Marshallia graminifolia* FACW
barbara's-buttons, slim-leaf *Marshallia tenuifolia* FACW
basswood, American *Tilia americana* FACW
bay, swamp *Persea palustris* OBL
bayberry, evergreen *Myrica heterophylla* FACW
bayberry, odorless *Myrica inodora* FACW
bayberry, southern *Myrica cerifera* FAC
bay-cedar *Suriana maritima* FAC
beach alternanthera *Alternanthera maritima* FACW
beach creeper *Ernodea littoralis* FAC
bedstraw, stiff marsh *Galium tinctorium* FACW
beefwood *Guapira discolor* FAC
beggar-ticks *Bidens* spp. OBL

beggar-ticks, white *Bidens pilosa (B. alba)* FAC
bellflower, American *Campanula americana* FAC
bellflower, Florida *Campanula floridana* OBL
bellwort, Florida *Uvularia floridana* FACW
bindweed, dwarf *Evolvulus convolvuloides* FACW
bindweed, silky *Evolvulus sericeus* FACW
birch, river *Betula nigra* OBL
birds-in-a-nest *Macbridea* spp. FACW
bitter-cress *Cardamine bulbosa* OBL
black senna *Seymeria cassioides* FAC
blackbead *Pithecellobium keyensis* FAC
blackbead, catclaw *Pithecellobium unguis-cati* FAC
blackberry *Rubus* spp. FAC
blackgum *Nyssa sylvatica var. biflora* OBL
bladdernut, American *Staphylea trifolia* FACW
bladderpod *Sesbania* spp. FAC
bladderwort *Utricularia* spp. OBL
blazing star *Liatris gracilis* FAC
blolly *Guapira discolor* FAC
blueberry, Elliott *Vaccinium elliottii* FAC
blueberry, highbush *Vaccinium corymbosum* FACW
blue-eye-grass *Sisyrinchium capillare* FACW
blue-eye-grass, eastern *Sisyrinchium atlanticum* FACW
blue-eye-grass, Michaux's *Sisyrinchium mucronatum* FACW
bluestar, eastern *Amsonia tabernaemontana* FACW
bluethread *Burmannia* spp. OBL
bluets, water *Oldenlandia* spp. FACW
bog hemp *Boehmeria cylindrica* OBL
bogbutton, Engler's *Lachnocaulon engleri* OBL
bogbutton, pineland *Lachnocaulon digynum* OBL
bogbutton, Small's *Lachnocaulon minus* OBL
bogbutton, southern *Lachnocaulon beyrichianum* FACW
bogbutton, white-head *Lachnocaulon anceps* FACW
boneset *Eupatorium perfoliatum* FACW
box briar *Randia aculeata* FAC
box-elder *Acer negundo* FACW
bractspike, yellow *Yeatesia viridiflora* FACW
Brazilian pepper-tree *Schinus terebinthifolius* FAC
broomspurge, spreading *Euphorbia humistrata* FACW
buckwheat-tree *Cliftonia monophylla* FACW
bugleweed *Lycopus* spp. OBL
bully, buckthorn *Bumelia lycioides* FAC
bully, Florida *Bumelia reclinata* FAC
bumelia, buckthorn *Bumelia lycioides* FAC
bumelia, coastal *Bumelia celastrina* FAC
bumelia, smooth *Bumelia reclinata* FAC
bunchflower, Virginia *Melanthium virginicum* OBL
burhead *Echinodorus* spp. OBL
burnweed, American *Erechtites hieraciifolia* FAC
burreed *Sparganium americanum* OBL
bushy goldenrod *Euthamia* spp. FAC

butter-cup *Ranunculus* spp. FACW
butterweed *Senecio glabellus* OBL
butterwort *Pinguicula* spp. OBL
buttonbush *Cephalanthus occidentalis* OBL
button-plant, smooth *Spermacoce glabra* FACW
button-weed *Diodia virginiana* FACW
buttonwood *Conocarpus erectus* FACW
cajeput *Melaleuca quinquenervia* FAC
camphor-weed *Pluchea* spp. FACW
canker-berry *Solanum bahamense* FACW
canna *Canna* spp. OBL
canna, common *Canna x generalis* FAC
caperonia *Caperonia* spp. FACW
caper-tree *Capparis flexuosa* FACW
cardinal flower *Lobelia cardinalis* OBL
carrotwood *Cupaniopsis anacardioides* FAC
catsclaw *Pithecellobium unguis-cati* FAC
cattail *Typha* spp. OBL
cayaponia, five-lobe *Cayaponia quinqueloba* FAC
celestial lily *Nemastylis floridana* FACW
chaff-flower, beach *Alternanthera maritima* FACW
chaffhead, bristle-leaf *Carphephorus pseudoliatris* FACW
chaffhead, hairy *Carphephorus paniculatus* FAC
chaffhead, pineland *Carphephorus carnosus* FACW
chamber-bitter *Phyllanthus urinaria* FAC
chicken-spike *Sphenoclea zeylandica* FACW
chickweed, West Indian *Drymaria cordata* FAC
chocolate-weed *Melochia corchorifolia* FAC
chokeberry, red *Aronia arbutifolia* FACW
Christmas berry *Lycium carolinianum* OBL
clearweed *Pilea* spp. FACW
climbing-dogbane *Trachelospermum difforme* FACW
clubmoss *Lycopodium* spp. FACW
cocoplum *Chrysobalanus icaco* FACW
coinwort *Centella asiatica* FACW
colic-root *Aletris spp* FAC
colicwood *Myrsine guianensis* FAC
coneflower, cut-leaf *Rudbeckia laciniata* FACW
coneflower, grass-leaf *Rudbeckia graminifolia* FACW
coneflower, Mohr's *Rudbeckia mohrii* OBL
coneflower, orange *Rudbeckia fulgida* FACW
coneflower, Shiny *Rudbeckia nitida* FACW
coralberry *Ardisia* spp. FAC
corkwood *Leitneria floridana* OBL
corkwood *Stillingia aquatica* OBL
cottonwood, eastern *Populus deltoides* FACW
cottonwood, swamp *Populus heterophylla* OBL
coughbush *Ernodea littoralis* FAC
cowbane *Oxypolis* spp. OBL
cow-lily, yellow *Nuphar luteum* OBL
coyote-thistle, Baldwin's *Eryngium baldwinii* FAC
coyote-thistle, blue-flower *Eryngium integrifolium* FACW

coyote-thistle, creeping *Eryngium prostratum* FACW
creeping ox-eye *Wedelia trilobata* FAC
croton, Elliott's *Croton elliottii* FACW
crow poison *Zigadenus densus* FACW
crownbeard, Chapman's *Verbesina chapmanii* FACW
crownbeard, diverse-leaf *Verbesina heterophylla* FACW
crownbeard, white *Verbesina virginica* FAC
culver's-root *Veronicastrum virginicum* FACW
cupseed *Calycocarpum lyonii* FACW
cypress, bald *Taxodium distichum* OBL
cypress, pond *Taxodium ascendens* OBL
dangleberry *Gaylussacia frondosa* FAC
danglepod *Sesbania* spp. FAC
darling-plum *Reynosia septentrionalis* FAC
dasheen *Colocasia esculenta* OBL
dayflower *Commelina* spp. FACW
dayflower, sandhill *Commelina erecta* U
deathcamas, Atlantic *Zigadenus glaberrimus* FACW
deer-tongue *Carphephorus paniculatus* FAC
desert-thorn, Carolina *Lycium carolinianum* OBL
devil's claws *Pisonia rotundata* FAC
dewberry *Rubus* spp. FAC
dewflower *Murdannia* spp. FAC
ditch stonecrop *Penthorum sedoides* OBL
dock *Rumex* spp. FACW
dog-fennel *Eupatorium capillifolium* FAC
dog-hobble *Leucothoe* spp. FACW
dogwood, silky *Cornus amomum* OBL
dogwood, swamp *Cornus foemina* FACW
dollarweed *Hydrocotyle* spp. FACW
doll's daisy *Boltonia* spp. FACW
dragon-head, false *Physostegia virginiana* FACW
dragon-head, Godfrey's *Physostegia godfreyi* OBL
dragon-head, purple *Physostegia purpurea* FACW
dragon-head, slender-leaf *Physostegia leptophylla* OBL
drymary *Drymaria cordata* FAC
duck potato *Sagittaria* spp. OBL
dwarf morning-glory, bindweed *Evolvulus convolvuloides* FACW
dwarf morning-glory, silver *Evolvulus sericeus* FACW
elder, American *Sambucus canadensis* FAC
elderberry *Sambucus canadensis* FAC
elephant's ear *Colocasia esculenta* OBL
elephant's ear *Xanthosoma sagittifolium* FACW
elm *Ulmus* spp. FACW
elm, slippery *Ulmus rubra* U
false buttonweed, smooth *Spermacoce glabra* FACW
false daisy *Eclipta alba* FACW
false indigo, bastard *Amorpha fruticosa* FACW
false-asphodel, coastal *Tofieldia racemosa* OBL
false-croton *Caperonia* spp. FACW
falsefennel *Eupatorium leptophyllum* OBL
false-fiddle-leaf *Hydrolea* spp. OBL

false-foxglove *Agalinis pinetorum* FACW
false-foxglove, flax-leaf *Agalinis linifolia* OBL
false-foxglove, large purple *Agalinis purpurea* FACW
false-foxglove, saltmarsh *Agalinis maritima* OBL
false-foxglove, scale-leaf *Agalinis aphylla* FACW
false-nettle *Boehmeria cylindrica* OBL
false-pimpernel *Lindernia* spp. FACW
false-pimpernel, Malayan *Lindernia crustacea* FAC
false-willow, broom-bush *Baccharis dioica* FAC
false-willow, eastern *Baccharis halimifolia* FAC
false-willow, saltwater *Baccharis angustifolia* OBL
feather-bells, eastern *Stenanthium gramineum* FACW

FERNS

bead fern *Hypolepis repens* FACW
Boston fern *Nephrolepis exaltata* FAC
brake, giant *Pteris tripartita* FACW
bramble fern, creeping *Hypolepis repens* FACW
chainfern, netted *Woodwardia aereolata* OBL
chainfern, Virginia *Woodwardia virginica* FACW
cinnamon fern *Osmunda cinnamomea* FACW
comb fern, brown-hair *Ctenitis submarginalis* FACW
lady fern, subarctic *Athyrium filix-femina* FACW
leather fern *Acrostichum* spp. OBL
maiden fern *Thelypteris* spp. FACW
marsh fern *Thelypteris* spp. FACW
royal fern *Osmunda regalis* OBL
sensitive fern *Onoclea sensibilis* FACW
shield fern *Thelypteris* spp. FACW
swamp fern *Blechnum serrulatum* FACW
sword fern *Nephrolepis* spp. FAC
wood fern, southern *Dryopteris ludoviciana* FACW
fetter-bush *Lyonia lucida* FACW
fetter-bush, climbing *Pieris phillyreifolia* FACW
fever-tree *Pinckneya bracteata* OBL
fig, Florida strangler *Ficus aurea* FAC
fire flag *Thalia geniculata* OBL
fireweed *Erechtites hieraciifolia* FAC
flameflower *Macranthera flammea* OBL
flattop goldenrod *Euthamia* spp. FAC
flax, Carter's *Linum carteri* FACW
flax, Florida yellow *Linum floridanum* FAC
flax, ridged yellow *Linum striatum* FACW
flax, stiff yellow *Linum medium* FAC
flax, West's *Linum westii* OBL
fleabane, early whitetop *Erigeron vernus* FACW
fleabane, oakleaf *Erigeron quercifolius* FAC
floating hearts *Nymphoides* spp. OBL
frogbit *Limnobium spongia* OBL
frog-fruit *Phyla* spp. FAC
frostweed *Verbesina virginica* FAC
gayfeather, garber's *Liatris garberi* FACW
gayfeather, slender *Liatris gracilis* FAC

gayfeather, spiked *Liatris spicata* FAC
gentian *Gentiana* spp. FACW
germander, American *Teucrium canadense* FACW
ginger *Hedychium coronarium* FACW
gingerlily, white *Hedychium coronarium* FACW
glasswort *Salicornia* spp. OBL
goat-weed *Scoparia dulcis* FAC
golden club *Orontium aquaticum* OBL
golden creeper *Ernodea littoralis* FAC
golden-crest *Lophiola americana* FACW
golden-rod, Elliott's *Solidago elliottii* OBL
golden-rod, leavenworth's *Solidago leavenworthii* FACW
golden-rod, marsh *Solidago fistulosa* FACW
golden-rod, rough-leaf *Solidago patula* OBL
golden-rod, seaside *Solidago sempervirens* FACW
golden-rod, willow-leaf *Solidago stricta* FACW
golden-rod, wrinkled *Solidago rugosa* FAC
grass-of-parnassus *Parnassia* spp. OBL
grasswort *Lilaeopsis* spp. OBL

GRASSES

arrowfeather grass *Aristida purpurascens* FACW
arrow-grass *Triglochin striatam* OBL
barnyardgrass *Echinochloa* spp. FACW
basketgrass *Oplismenus setarius* FAC
blue maidencane *Amphicarpum muhlenbergianum* FACW
bluestem *Schizachyrium* spp. FAC
bluestem, big *Andropogon gerardii* FAC
bluestem, broom-sedge *Andropogon virginicus* FAC
bluestem, bushy *Andropogon glomeratus* FACW
bluestem, Mohr's *Andropogon liebmanii var. pungensis (A. mohrii)* FACW
bluestem, savannah *Andropogon arctatus* FAC
bluestem, short-spike *Andropogon brachystachys* FAC
bluestem, slim *Andropogon perangustatus* FAC
bristlegrass *Setaria geniculata* FAC
broom-sedge *Andropogon virginicus* FAC
Burma reed *Neyraudia reynaudiana* FAC
carpet grass *Axonopus* spp. FAC
cockspur grass *Echinochloa* spp. FACW
common reed *Phragmites australis* OBL
cordgrass, big *Spartina cynosuroides* OBL
cordgrass, gulf *Spartina spartinae* OBL
cordgrass, saltmarsh *Spartina alterniflora* OBL
cordgrass, saltmeadow *Spartina patens* FACW
cordgrass, sand *Spartina bakeri* FACW
crabgrass, dwarf *Digitaria serotina* FAC
crabgrass, twospike *Digitaria pauciflora* FACW
cupgrass *Eriochloa* spp. FACW
cupscale, American *Sacciolepis striata* OBL
cupscale, Indian *Sacciolepis indica* FAC
cutgrass *Leersia* spp. OBL
cut-throat grass *Panicum abscissum* FACW
dallisgrass *Paspalum dilatatum* FAC

dropseed, Florida *Sporobolus floridanus* FACW
dropseed, seashore *Sporobolus virginicus* OBL
elephantgrass *Pennisetum purpureum* FAC
everglades grass *Digitaria pauciflora* FACW
fingergrass, pinewoods *Eustachys petraea* FAC
fingergrass, saltmarsh *Eustachys glauca* FACW
fluffgrass, pineland *Tridens ambiguus* FACW
foxtail, giant *Setaria magna* OBL
foxtail, knotroot *Setaria geniculata* FAC
foxtail, tufted *Alopecurus carolinianus* FAC
gamagrass, eastern *Tripsacum dactyloides* FAC
giant cane *Arundinaria gigantea* FACW
giant cutgrass *Zizaniopsis miliacea* OBL
giant reed *Arundo donax* FAC
hilograss *Paspalum conjugatum* FAC
indian rice *Zizania aquatica* OBL
jointgrass; jointtailgrass *Manisuris* spp. FACW
jointgrass, pitted *Manisuris cylindrica* FAC
jungle-rice *Echinochloa* spp. FACW
keygrass *Monanthochloe littoralis* OBL
kissimmeegrass *Paspalidium geminatum* OBL
knotgrass *Paspalum distichum* OBL
lovegrass *Eragrostis* spp. FAC
maidencane *Panicum hemitomon* OBL
mannagrass, fowl *Glyceria striata* OBL
muhly grass, hairawn *Muhlenbergia capillaris* OBL
muhly grass, nimblewill *Muhlenbergia schreberi* FACW
muhly, cutover *Muhlenbergia expansa* FAC
napiergrass *Pennisetum purpureum* FAC
needlegrass, Florida *Stipa avenacioides* FACW
panic grass, cypress *Panicum ensifolium* OBL
panicum, beaked *Panicum anceps* FAC
panicum, bluejoint *Panicum tenerum* OBL
panicum, Eaton's *Panicum spretum* FACW
panicum, fall *Panicum dichotomiflorum* FACW
panicum, fringed *Panicum strigosum* FAC
panicum, Ft Myers *Panicum pinetorum* FACW
panicum, gaping *Panicum hians* FAC
panicum, red-top *Panicum rigidulum* FACW
panicum, savannah *Panicum gymnocarpon* OBL
panicum, shining *Panicum dichotomum* FACW
panicum, tall thin *Panicum longifolium* OBL
panicum, variable *Panicum commutatum* FAC
panicum, velvet *Panicum scoparium* FACW
panicum, warty *Panicum verrucosum* FACW
panicum, white-edge *Panicum tenue* FAC
panicum, woolly *Panicum scabriusculum* OBL
paragrass *Brachiaria purpurascens* FACW
paspalum, brook *Paspalum acuminatum* FACW
paspalum, brown-seed *Paspalum plicatulum* FAC
paspalum, bull *Paspalum boscianum* FACW
paspalum, early *Paspalum praecox* OBL

paspalum, field *Paspalum laeve* FACW
paspalum, Florida *Paspalum floridanum* FACW
paspalum, gulf *Paspalum monostachyum* OBL
paspalum, hairy-seed *Paspalum pubiflorum* FACW
paspalum, joint *Paspalum distichum* OBL
paspalum, mudbank *Paspalum dissectum* OBL
paspalum, Panama *Paspalum fimbriatum* FAC
paspalum, sour *Paspalum conjugatum* FAC
paspalum, thin *Paspalum setaceum* FAC
paspalum, water *Paspalum repens* OBL
plumegrass, narrow *Erianthus strictus* OBL
plumegrass, short-beard *Erianthus brevibarbus* FACW
plumegrass, sugarcane *Erianthus giganteus* OBL
rabbit-foot grass *Polypogon* spp. FAC
redtop *Agrostis stolonifera* FACW
reed grass, Curtiss' *Calamovilfa curtissii* FACW
reimargrass, Florida *Reimarochloa oligostachya* FACW
rice, cultivated *Oryza sativa* FAC
saltgrass, seashore *Distichlis spicata* OBL
sandgrass, Curtiss' *Calamovilfa curtissii* FACW
silk reed *Neyraudia reynaudiana* FAC
silky-scale, purple *Anthaenantia rufa* FACW
spanglegrass *Chasmanthium* spp. FACW
spanglegrass, indian *Chasmanthium latifolium* FAC
spanglegrass, long-leaf *Chasmanthium sessiliflorum* FAC
switchcane *Arundinaria gigantea* FACW
switchgrass *Panicum virgatum* FACW
three-awn grass, bottlebrush *Aristida spiciformis* FAC
three-awn grass, long-leaf *Aristida affinis* OBL
three-awn grass, pineland *Aristida stricta* FAC
three-awn grass, rhizomatous *Aristida rhizomophora* FAC
three-awn grass, wand-like *Aristida purpurascens* FACW
toothache grass *Ctenium* spp. FACW
torpedograss *Panicum repens* FACW
tridens, long-spike *Tridens strictus* FACW
tridens, savannah *Tridens ambiguus* FACW
trompetilla *Hymenachne amplexicaulis* OBL
vaseygrass *Paspalum urvillei* FAC
watergrass *Hydrochloa caroliniensis* OBL
West Indian marsh grass *Hymenachne amplexicaulis* OBL
wildrice, annual *Zizania aquatica* OBL
wildrice, southern *Zizaniopsis miliacea* OBL
wiregrass *Aristida stricta* FAC
witchgrass, cypress *Panicum ensifolium* OBL
witchgrass, erect-leaf *Panicum erectifolium* OBL
witchgrass, roughhair *Panicum strigosum* FAC
witchgrass, shining *Panicum dichotomum* FACW
witchgrass, variable *Panicum commutatum* FAC
witchgrass, velvet *Panicum scoparium* FACW
witchgrass, woolly *Panicum scabriusculum* OBL
woodoats *Chasmanthium* spp. FACW
woodoats, indian *Chasmanthium latifolium* FAC

woodoats, long-leaf *Chasmanthium sessiliflorum* FAC
woodsgrass *Oplismenus setarius* FAC
green-dragon *Arisaema* spp. FACW
green-haw *Crataegus viridis* FACW
gregory wood *Bucida buceras* FAC
groundsel tree *Baccharis glomeruliflora* FAC
guava, strawberry *Psidium cattleianum* FAC
hackberry *Celtis laevigata* FACW
hardscale, one flower *Sclerolepis uniflora* FACW
Harper's beauty *Harperocallis flava* FACW
hartwrightia, Florida *Hartwrightia floridana* FACW
hatpin *Eriocaulon* spp. OBL
hatpins, yellow *Syngonanthus flavidulus* FACW
haw, green *Crataegus viridis* FACW
haw, may *Crataegus aestivalis* OBL
haw, parsley *Crataegus marshallii* FACW
hazel-alder *Alnus serrulata* OBL
hedgehyssop *Gratiola* spp. FACW
hedgehyssop, rough *Gratiola hispida* FAC
hedgenettle *Stachys lythroides* OBL
heliotrope, four-spike *Heliotropium procumbens* FACW
heliotrope, pineland *Heliotropium polyphyllum* FAC
heliotrope, seaside *Heliotropium curassavicum* FAC
hickory, water *Carya aquatica* OBL
hobble-bush *Agarista populifolia* FACW
holly, American *Ilex opaca var. opaca* FAC
holly, bay-gall *Ilex coriacea* FACW
holly, dahoon *Ilex cassine* OBL
holly, deciduous *Ilex decidua* FACW
holly, myrtle *Ilex myrtifolia* OBL
holly, sarvis *Ilex amelanchier* OBL
holly, yaupon *Ilex vomitoria* FAC
honeycomb-head, one-flower *Balduina uniflora* FACW
honeycomb-head, purple *Balduina atropurpurea* FACW
honey-locust *Gleditsia triacanthos* FACW
hornbeam, American *Carpinus caroliniana* FACW
hornpod *Mitreola* spp. FACW
horse-purslane *Trianthema portulacastrum* FACW
horsetail *Equisetum hyemale* FACW
huckleberry, dwarf *Gaylussacia dumosa* FAC
hummingbird-flower *Macranthera flammea* OBL
hygrophila *Hygrophila* spp. OBL
hyssop, hispid *Gratiola hispida* FAC
indian-plantain, egg-leaf *Arnoglossum ovatum* FACW
indian-plantain, Georgia *Arnoglossum sulcatum* OBL
indian-plantain, sweet-scent *Cacalia suaveolens* FACW
indian-plantain, variable-leaf *Arnoglossum diversifolium* FACW
indigoberry, white *Randia aculeata* FAC
indigo-bush *Amorpha fruticosa* FACW
iris *Iris* spp. OBL
iris, dwarf *Iris verna* U
ironweed *Vernonia* spp. FACW

ironweed, narrow-leaf *Vernonia angustifolia* U
ironwood *Carpinus caroliniana* FACW
ixia, Bartram's *Sphenostigma coelestinum* FACW
ixia, fall-flowering *Nemastylis floridana* FACW
jack-in-the-pulpit *Arisaema* spp. FACW
Java plum *Syzygium* spp. FAC
jessamine, day *Cestrum diurnum* FAC
jewel weed *Impatiens capensis* OBL
joe-pye-weed *Eupatoriadelphus fistulosus* FACW
Joewood *Jacquinia keyensis* FAC
joint-vetch, India *Aeschynomene indica* FACW
joint-vetch, meadow *Aeschynomene pratensis* OBL
joyweed, seaside *Alternanthera maritima* FACW
joyweed, sessile *Alternanthera sessilis* OBL
joyweed, smooth *Alternanthera paronychioides* FAC
jumpseed *Polygonum virginianum* FACW
juniperleaf *Polypremum procumbens* FAC
justiceweed *Eupatorium leucolepis* FACW
keygrass *Monanthochloe littoralis* OBL
lakecress *Armoracia aquatica* OBL
large gallberry *Ilex coriacea* FACW
latherleaf *Colubrina asiatica* FAC
leaf-flower, Carolina *Phyllanthus caroliniensis* FACW
leaf-flower, Florida *Phyllanthus liebmannianus* FACW
leaf-flower, water *Phyllanthus urinaria* FAC
lily, atamasco *Zephyranthes atamasco* FACW
lily, panhandle *Lilium iridollae* OBL
lily, southern red *Lilium catesbaei* FAC
lizard's tail *Saururus cernuus* OBL
lobelia *Lobelia* spp. FACW
lobelia, Florida *Lobelia floridana* OBL
loblolly-bay *Gordonia lasianthus* FACW
locust-berry *Byrsonima lucida* FAC
loosestrife *Lysimachia* spp. OBL
loosestrife, marsh *Lythrum* spp. OBL
lotus, American *Nelumbo* spp. OBL
magnolia, sweetbay *Magnolia virginiana var. australis* OBL
Malabar plum *Syzygium* spp. FAC
maleberry *Lyonia ligustrina* FAC
mallow, coastal *Kosteletzkya pentasperma* FAC
mallow, mangrove *Pavonia spicata* FACW
mallow, seashore *Kosteletzkya virginica* OBL
mangrove, black *Avicennia germinans* OBL
mangrove, red *Rhizophora mangle* OBL
mangrove, white *Laguncularia racemosa* OBL
maple, red *Acer rubrum* FACW
maple, silver *Acer saccharinum* OBL
marlberry *Ardisia* spp. FAC
marsh elder *Iva frutescens* OBL
marsh elder, little *Iva microcephala* FACW
marsh loosestrife *Lythrum* spp. OBL
marsh St. John's-wort *Triadenum* spp. OBL

marsh-gentian *Eustoma exaltatum* FACW
marshpennywort *Hydrocotyle* spp. FACW
marshweed *Limnophila* spp. OBL
mayhaw *Crataegus aestivalis* OBL
mayten, Florida *Maytenus phyllanthoides* FAC
meadow-beauty *Rhexia* spp. FACW
meadow-beauty, panhandle *Rhexia salicifolia* OBL
meadow-beauty, white *Rhexia parviflora* OBL
meadow-rue *Thalictrum* spp. FACW
melonleaf, five-lobe *Cayaponia quinqueloba* FAC
mermaid-weed *Proserpinaca* spp. OBL
milkweed, aquatic *Asclepias perennis* OBL
milkweed, fen-flower *Asclepias lanceolata* OBL
milkweed, large-flower *Asclepias connivens* FACW
milkweed, long-leaf *Asclepias longifolia* FACW
milkweed, red *Asclepias rubra* OBL
milkweed, savannah *Asclepias pedicellata* FACW
milkweed, southern *Asclepias viridula* FACW
milkweed, swamp *Asclepias incarnata* OBL
milkwort *Polygala* spp. FACW
milkwort, racemed *Polygala polygama* U
milkwort, sandhill *Polygala leptostachys* U
milkwort, scrub *Polygala lewtonii* U
milkwort, tall *Polygala cymosa* OBL
milkwort, whorled *Polygala verticillata* U
mille graines *Oldenlandia* spp. FACW
mimosa, black *Mimosa pigra* FAC
mistflower *Conoclinium coelestinum* FAC
miterwort *Mitreola* spp. FACW
mock bishop-weed *Ptilimnium capillaceum* FACW
monkey-flower *Mimulus alatus* OBL
mountain-laurel *Kalmia latifolia* FACW
mountain-mint, coastal-plain *Pycnanthemum nudum* FACW
mouse-tail, tiny *Myosurus minimus* FAC
mudflower *Micranthemum* spp. OBL
mud-plantain, kidney-leaf *Heteranthera reniformis* OBL
mudwort, wild *Dicliptera brachiata* FACW
mulberry, red *Morus rubra* FAC
musclewood *Carpinus caroliniana* FACW
musky mint *Hyptis alata* FACW
myrsine, guiana *Myrsine guianensis* FAC
nakedwood, Asian *Colubrina asiatica* FAC
necklacepod, yellow *Sophora tomentosa* FACW
nettletree *Trema* spp. FAC
neverwet *Orontium aquaticum* OBL
nightshade, Bahama *Solanum bahamense* FACW
nightshade, shrub *Solanum erianthum* FACW
nodding nixie *Apteria aphylla* FACW
oak, cherry-bark *Quercus pagoda* FACW
oak, laurel *Quercus laurifolia* FACW
oak, overcup *Quercus lyrata* OBL
oak, swamp chestnut *Quercus michauxii* FACW

oak, water *Quercus nigra* FACW
oak, willow *Quercus phellos* FACW
obedient plant *Physostegia virginiana* FACW
ORCHIDS
adder's-mouth, Florida *Malaxis spicata* OBL
fringed orchid *Platanthera* spp. OBL
grass-pinks *Calopogon* spp. FACW
hidden orchid *Maxillaria crassifolia* OBL
jug orchid *Erythrodes querceticola* FACW
ladies'-tresses *Spiranthes* spp. FACW
liparis, tall *Liparis elata* OBL
noddingcaps *Triphora* spp. FACW
pogonia, rose *Pogonia ophioglossoides* OBL
pogonias, nodding *Triphora* spp. FACW
rein orchid *Habenaria* spp. FACW
rosebud orchid *Cleistes divaricata* OBL
shadow-witch *Ponthieva racemosa* FACW
snakemouth orchid *Pogonia ophioglossoides* OBL
twayblade *Listera* spp. FACW
widelip orchid *Liparis elata* OBL
wild coco *Eulophia alta* FACW
ox-eye, creeping *Wedelia trilobata* FAC
oxeye, seaside *Borrichia* spp. OBL
PALMS
palm, bluestem *Sabal minor* FACW
palm, cabbage *Sabal palmetto* FAC
palm, Florida thatch *Thrinax radiata* FAC
palm, needle *Rhapidophyllum hystrix* FACW
palm, paurotis *Acoelorraphe wrightii* OBL
palm, royal *Roystonea* spp. FACW
palmetto, dwarf *Sabal minor* FACW
panal *Cypselea humifusa* FAC
paperbark tree *Melaleuca quinquenervia* FAC
parsley-haw *Crataegus marshallii* FACW
peatmoss *Sphagnum* spp. OBL
pellitory *Parietaria* spp. FAC
pennywort *Hydrocotyle* spp. FACW
penny-wort, floating *Hydrocotyle ranunculoides* OBL
pentodon, Hall's *Pentodon pentandrus* OBL
persimmon, common *Diospyros virginiana* FAC
pickerelweed *Pontederia cordata* OBL
picklewort *Salicornia* spp. OBL
pimpernel, Florida *Anagallis pumila* FAC
pimpernel, water *Samolus* spp. OBL
pine, pond *Pinus serotina* FACW
pine, spruce *Pinus glabra* FACW
pineland daisy *Chaptalia tomentosa* FACW
pineweed *Hypericum gentianoides* U
pink-root *Spigelia loganioides* FACW
pipestem *Agarista populifolia* FACW
pipewort *Eriocaulon* spp. OBL
pitcher-plant *Sarracenia* spp. OBL

pitcher-plant, hooded *Sarracenia minor* FACW
planer tree *Planera aquatica* OBL
planetree, American *Platanus occidentalis* FACW
pleatleaf, fall-flowering *Nemastylis floridana* FACW
poison sumac *Toxicodendron vernix* FACW
poisonwood *Metopium toxiferum* FAC
pond apple *Annona glabra* OBL
pondberry *Lindera melissaefolia* OBL
pondlily, yellow *Nuphar luteum* OBL
pondspice *Litsea aestivalis* OBL
pony-foot *Dichondra caroliniensis* FAC
popcorn tree *Sapium sebiferum* FAC
portia tree *Thespesia populnea* FAC
possum-haw *Viburnum nudum* FACW
potatotree *Solanum erianthum* FACW
prairie-gentian *Eustoma exaltatum* FACW
pride-of-Big-Pine *Strumpfia maritima* FACW
primrosewillow *Ludwigia* spp. OBL
privet, swamp *Forestiera acuminata* FACW
punk tree *Melaleuca quinquenervia* FAC
queen's-delight, marsh *Stillingia sylvatica var. tenuis* FAC
quillwort *Isoetes* spp. OBL
ragwort, golden *Senecio aureus* OBL
rainlily *Zephyranthes atamasco* FACW
raspberry *Rubus* spp. FAC
rattlebox; rattle-bush *Sesbania* spp. FAC
rattlesnake master *Eryngium yuccifolium* FACW
rayless golden-rod *Bigelowia nudata* FACW
redgal *Morinda royoc* FACW
redroot *Lachnanthes caroliniana* FAC
redstem *Ammannia* spp. OBL
rose myrtle, downy *Rhodomyrtus tomentosus* FAC
rose, swamp *Rosa palustris* OBL
rose-apple *Syzygium* spp. FAC
rose-gentian *Sabatia* spp. FACW
rose-gentian, Bartram's *Sabatia bartramii* OBL
rose-gentian, coast *Sabatia calycina* OBL
rose-gentian, large *Sabatia dodecandra* OBL
rosemallow *Hibiscus aculeatus* FACW
rosemallow, crimson-eyed *Hibiscus moscheutos* OBL
rosemallow, halberd-leaf *Hibiscus laevis* OBL
rosemallow, scarlet *Hibiscus coccineus* OBL
rosemallow, sea *Hibiscus tiliaceus* FAC
rosemallow, swamp *Hibiscus grandiflorus* OBL
rush *Juncus* spp. OBL
rush, grassleaf *Juncus marginatus* FACW
rush, path *Juncus tenuis* FAC
rush, shore *Juncus marginatus* FACW
rush-featherling *Pleea tenuifolia* OBL
rustweed *Polypremum procumbens* FAC
sachsia *Sachsia polycephala* FACW
saffron plum *Bumelia celastrina* FAC

saltbush *Baccharis halimifolia* FAC
saltbush, halberd-leaf *Atriplex patula* FACW
saltwort *Batis maritima* OBL
sandmat, spreading *Euphorbia humistrata* FACW
sandspurry, saltmarsh *Spergularia marina* OBL
sandwort, Godfrey's *Arenaria godfreyi* FACW
savory, Brown's *Micromeria brownei* OBL
sawgrass *Cladium* spp. OBL
scaly-stem, Carolina *Elytraria caroliniensis* FAC
scouring-rush *Equisetum hyemale* FACW
screwstem *Bartonia* spp. FACW
sea myrtle *Baccharis halimifolia* FAC
sea oxeye *Borrichia* spp. OBL
sea-blite *Suaeda* spp. OBL
sea-lavender *Limonium carolinianum* OBL
sea-purslane *Sesuvium* spp. FACW
seaside mahoe *Thespesia populnea* FAC
sebastian-bush, gulf *Sebastiana fruticosa* FAC

SEDGES

baldrush *Psilocarya* spp. OBL
beakrush *Rhynchospora* spp. FACW
beakrush, Chapman's *Rhynchospora chapmanii* OBL
beakrush, clustered *Rhynchospora cephalantha* OBL
beakrush, few-flower *Rhynchospora oligantha* OBL
beakrush, giant-fruited *Rhynchospora megalocarpa* U
beakrush, Gray's *Rhynchospora grayi* U
beakrush, Harper's *Rhynchospora harperi* OBL
beakrush, horned *Rhynchospora inundata* OBL
beakrush, large *Rhynchospora macra* OBL
beakrush, millet *Rhynchospora miliacea* OBL
beakrush, mingled *Rhynchospora mixta* OBL
beakrush, narrow *Rhynchospora stenophylla* OBL
beakrush, pinebarren *Rhynchospora intermedia* U
beakrush, short-bristle *Rhynchospora corniculata* OBL
beakrush, southern *Rhynchospora microcarpa* OBL
beakrush, spreading *Rhynchospora divergens* OBL
beakrush, swamp-forest *Rhynchospora decurrens* OBL
beakrush, Tracy's *Rhynchospora tracyi* OBL
black-sedge *Schoenus nigricans* FACW
bogrush, black *Schoenus nigricans* FACW
bulrush *Scirpus* spp. OBL
dwarf-bulrush *Hemicarpha* spp. FACW
fimbry *Fimbristylis* spp. OBL
fimbry, annual *Fimbristylis annua* FACW
fimbry, hairy *Fimbristylis puberula* FACW
flatsedge *Cyperus* spp. FACW
flatsedge, alternate-leaf *Cyperus alternifolius* OBL
flatsedge, Asian *Cyperus metzii* FAC
flatsedge, baldwin *Cyperus globulosus* FAC
flatsedge, bentawn *Cyperus reflexus* U
flatsedge, black *Cyperus huarmensis* FAC
flatsedge, coastal-plain *Cyperus cuspidatus* FAC

flatsedge, Drummond's *Cyperus drummondii* OBL
flatsedge, epiphytic *Cyperus lanceolatus* OBL
flatsedge, giant *Cyperus giganteus* FAC
flatsedge, globe *Cyperus ovularis* U
flatsedge, hammock *Cyperus tetragonus* U
flatsedge, jointed *Cyperus articulatus* OBL
flatsedge, marshland *Cyperus distinctus* OBL
flatsedge, papyrus *Cyperus papyrus* OBL
flatsedge, pinebarrenf *Cyperus retrorsus* FAC
flatsedge, purple *Cyperus rotundus* FAC
flatsedge, red-root *Cyperus erythrorhizos* OBL
flatsedge, rough *Cyperus retrofractus* U
flatsedge, sandhill *Cyperus filiculmis* U
flatsedge, sheathed *Cyperus haspan* OBL
flatsedge, variable *Cyperus difformis* OBL
flatsedge, woodrush *Cyperus entrerianus* OBL
flatsedge, yellow *Cyperus esculentus* FAC
flatspike rush *Abildgaardia ovata* FACW
fringe-rush *Fimbristylis* spp. OBL
fringe-rush, annual *Fimbristylis annua* FACW
fringe-rush, Vahl's *Fimbristylis puberula* FACW
halfchaff sedge *Lipocarpha* spp. FACW
hurricane-grass *Fimbristylis spathacea* FAC
nut-grass, purple *Cyperus rotundus* FAC
nut-grass, yellow *Cyperus esculentus* FAC
nutrush *Scleria* spp. FACW
sedge *Carex* spp. FACW
sedge, bearded *Carex comosa* OBL
sedge, bristly-stalk *Carex leptalea* OBL
sedge, cypress-knee *Carex decomposita* OBL
sedge, Elliott's *Carex elliottii* OBL
sedge, fringed *Carex crinita* OBL
sedge, hop *Carex lupulina* OBL
sedge, Howe's *Carex howei* OBL
sedge, large *Carex gigantea* OBL
sedge, long *Carex folliculata* OBL
sedge, Louisiana *Carex louisianica* OBL
sedge, prickly bog *Carex atlantica* OBL
sedge, raven-foot *Carex crus-corvi* OBL
sedge, shallow *Carex lurida* OBL
sedge, shoreline *Carex hyalinolepis* OBL
sedge, stalk-grain *Carex stipata* OBL
sedge, Walter's *Carex walteriana* OBL
spikerush *Eleocharis* spp. OBL
three-way sedge *Dulichium arundinaceum* OBL
umbrella-sedge *Fuirena* spp. OBL
white-top sedge, Everglades *Dichromena floridensis* FACW
white-top sedge, giant *Dichromena latifolia* OBL
white-top sedge, starbrush *Dichromena colorata* FACW
seedbox *Ludwigia* spp. OBL
seedbox, hairy *Ludwigia hirtella* FACW
seedbox, headed *Ludwigia suffruticosa* FACW

seedbox, savanna *Ludwigia virgata* FACW
seedbox, seaside *Ludwigia maritima* FACW
seepweed *Suaeda* spp. OBL
seven-sisters *Crinum americanum* OBL
shaggytuft *Stenandrium floridanum* FACW
she-oak *Casuarina* spp. FAC
shrimp plant *Justicia brandegeana* U
silver-bell *Halesia diptera* FACW
silverhead *Philoxerus vermicularis* FACW
silverling *Baccharis glomeruliflora* FAC
skullcap, blue *Scutellaria lateriflora* OBL
skullcap, Florida *Scutellaria floridana* FAC
skullcap, rough *Scutellaria integrifolia* FAC
skullcap, South American *Scutellaria racemosa* OBL
skyflower *Hydrolea* spp. OBL
slimpod, eastern *Amsonia tabernaemontana* FACW
slimpod, stiff *Amsonia rigida* FACW
smartweed *Polygonum* spp. OBL
smartweed, silversheath *Polygonum argyrocoleon* U
smooth chaff-flower *Alternanthera paronychioides* FAC
snakeherb, swamp *Dyschoriste humistrata* FACW
snakeroot, corn *Eryngium aquaticum* OBL
snakewood, Asian *Colubrina asiatica* FAC
sneezeweed *Helenium* spp. FACW
sneezeweed, pasture *Helenium amarum* FAC
snowbell *Styrax americana* OBL
snowberry *Chiococca* spp. FAC
spadeleaf *Centella asiatica* FACW
Spanish needles *Bidens bipinnata* U
spatterdock *Nuphar luteum* OBL
speedwell, water *Veronica anagallis-aquatica* OBL
sphagnum moss *Sphagnum* spp. OBL
spicebush, northern *Lindera benzoin* FACW
spicebush, southern *Lindera melissaefolia* OBL
spider-lily *Hymenocallis* spp. OBL
spiderwort, trailing *Tradescantia fluminensis* FAC
spike-moss, meadow *Selaginella apoda* FACW
spindle-root *Ludwigia hirtella* FACW
spoon flower *Peltandra* spp. OBL
spotflower, creeping *Spilanthes americana* FACW
sprangle-top *Leptochloa* spp. FACW
sprangle-top, tropic *Leptochloa virgata* FAC
spring-cress *Cardamine pensylvanica* OBL
spurge, Florida *Euphorbia inundata* FACW
spurge, many-leaved *Euphorbia polyphylla* FACW
squarestem *Melanthera nivea* FACW
St. Andrew's cross *Hypericum hypericoides* FAC
St. John's-wort *Hypericum* spp. FACW
St. John's-wort, Atlantic *Hypericum reductum* U
St. John's-wort, Carolina *Hypericum nitidum* OBL
St. John's-wort, Chapman's *Hypericum chapmanii* OBL
St. John's-wort, dotted *Hypericum punctatum* U

St. John's-wort, Drummond's *Hypericum drummondii* U
St. John's-wort, Edison's *Hypericum edisonianum* OBL
St. John's-wort, four-petal *Hypericum tetrapetalum* FAC
St. John's-wort, marsh *Triadenum* spp. OBL
St. John's-wort, peelbark *Hypericum fasciculatum* OBL
St. John's-wort, scrub *Hypericum cumulicola* U
St. John's-wort, shrubby *Hypericum prolificum* U
St. John's-wort, small-sepal *Hypericum microsepalum* U
St. John's-wort, smooth-bark *Hypericum lissophloeus* OBL
St. John's Susan *Rudbeckia nitida* FACW
staggerbush, piedmont *Lyonia mariana* FACW
stargrasses, yellow *Hypoxis* spp. FACW
stitchwort, Godfrey's *Arenaria godfreyi* FACW
Stoke's aster *Stokesia laevis* FACW
storax *Styrax americana* OBL
string-lily *Crinum americanum* OBL
stripeseed *Piriqueta caroliniana* FAC
sugar-berry *Celtis laevigata* FACW
sumpweed, bigleaf *Iva frutescens* OBL
sunbonnet *Chaptalia tomentosa* FACW
sundew, dwarf *Drosera brevifolia* FACW
sundew, Gulf coast *Drosera tracyi* OBL
sundew, pink *Drosera capillaris* FACW
sundew, spoon-leaf *Drosera intermedia* OBL
sundew, thread-leaf *Drosera filiformis* OBL
sunflower, Florida *Helianthus floridanus* FAC
sunflower, lakeside *Helianthus carnosus* FACW
sunflower, muck *Helianthus simulans* FACW
sunflower, southeastern *Helianthus agrestis* FACW
sunflower, swamp *Helianthus angustifolius* FACW
sunflower, wetland *Helianthus heterophyllus* FACW
sunny bells, white *Schoenolirion elliottii* FACW
sunny bells, yellow *Schoenolirion croceum* FACW
swamp-lily, southern *Crinum americanum* OBL
swamp-loosestrife *Decodon verticillatus* OBL
swampprivet, eastern *Forestiera acuminata* FACW
swampprivet, Florida *Forestiera segregata* FAC
swampweed *Hygrophila* spp. OBL
sweet broom *Scoparia dulcis* FAC
sweet pepper bush *Clethra alnifolia* FACW
sweetbay *Magnolia virginiana var. australis* OBL
sweetgum *Liquidambar styraciflua* FACW
sycamore, American *Platanus occidentalis* FACW
tallow-tree, Chinese *Sapium sebiferum* FAC
thistle, Leconte's *Cirsium lecontei* FACW
thistle, Nuttall's *Cirsium nuttallii* FACW
thistle, swamp *Cirsium muticum* OBL
thoroughwort, marsh *Eupatorium leptophyllum* OBL
thoroughwort, semaphore *Eupatorium mikanioides* FACW
thoroughwort, white-bract *Eupatorium leucolepis* FACW
thoroughworts *Eupatorium* spp. FAC
tickseed, ciliate-leaf *Coreopsis integrifolia* FACW

tickseed, Florida *Coreopsis floridana* FACW
tickseed, Georgia *Coreopsis nudata* OBL
tickseed, Leavenworth's *Coreopsis leavenworthii* FACW
tickseed, sickle *Coreopsis falcata* FACW
tickseed, southeastern *Coreopsis gladiata* FACW
tickseed, tall *Coreopsis tripteris* FAC
tickseed, Texas *Coreopsis linifolia* FACW
titi, black *Cliftonia monophylla* FACW
titi, swamp *Cyrilla racemiflora* FAC
toothcup *Ammannia* spp. OBL
toothcup *Rotala ramosior* OBL
torchwood, black *Erithalis fruticosa* FAC
touch-me-not, spotted *Impatiens capensis* OBL
trema *Trema* spp. FAC
tulip tree *Liriodendron tulipifera* FACW
tupelo, ogeechee *Nyssa ogeche* OBL
tupelo, swamp *Nyssa sylvatica var. biflora* OBL
tupelo, water *Nyssa aquatica* OBL
turtleweed *Batis maritima* OBL
twinflower, swamp *Dyschoriste humistrata* FACW
vanillaleaf; vanilla plant *Carphephorus odoratissimus* FAC
Venus' flytrap *Dionaea muscipula* FACW
vervain, sandpaper *Verbena scabra* FACW
vetch, Florida *Vicia floridana* FACW
vetch, four-leaf *Vicia acutifolia* FACW
vetch, Ocala *Vicia ocalensis* OBL
viburnum, possum-haw *Viburnum nudum* FACW
viburnum, walter *Viburnum obovatum* FACW
violet, edible *Viola esculenta* FACW
violet, lance-leaf *Viola lanceolata* OBL
violet, Leconte's *Viola affinis* FACW
violet, primrose-leaf *Viola primulifolia* FACW
Virginia willow *Itea virginica* OBL
water drop-wort *Oxypolis* spp. OBL
water snowflake *Nymphoides* spp. OBL
water-cress *Nasturtium* spp. OBL
water-elm *Planera aquatica* OBL
water-hemlock *Cicuta* spp. OBL
water-hoarhound *Lycopus* spp. OBL
water-hyssop *Bacopa* spp. OBL
water-lily *Nymphaea* spp. OBL
water-locust *Gleditsia aquatica* OBL
water-lotus *Nelumbo* spp. OBL
water-meal *Websteria confervoides* OBL
water-parsnip *Sium suave* OBL
water-plantain, subcordate *Alisma subcordatum* OBL
waterpod *Hydrolea* spp. OBL
water-poppy *Hydrocleis nymphoides* OBL
water-primrose *Ludwigia* spp. OBL
water-starwort *Callitriche* spp. OBL
water-willow *Justicia* spp. OBL
wax myrtle *Myrica cerifera* FAC

waxweed, Columbia *Cuphea carthagenensis* FAC
waxweed, common *Cuphea aspera* FACW
wedgescale, swamp *Sphenopholis pensylvanica* OBL
white-cedar, Atlantic *Chamaecyparis thyoides* OBL
whitenymph *Trepocarpus aethusae* FACW
wild coffee *Psychotria* spp. FAC
wild corndog *Typha* spp. OBL
wild dilly *Manilkara bahamensis* FAC
wild petunia *Ruellia caroliniensis* FAC
wild taro *Colocasia esculenta* OBL
wild-petunia, Britton's *Ruellia brittoniana* FAC
wild-petunia, night-flowering *Ruellia noctiflora* FACW
willow *Salix* spp. OBL
winterberry *Ilex verticillata* OBL
witch-alder, dwarf *Fothergilla gardenii* FACW
wood-nettle, Canada *Laportea canadensis* FACW
wood-sage *Teucrium canadense* FACW
woolly-berry *Gaylussacia mosieri* FACW
yellow stargrasses *Hypoxis* spp. FACW
yellow-cress *Rorippa* spp. OBL
yellow-eyed grass *Xyris* spp. OBL
yellow-eyed-grass, Carolina *Xyris caroliniana* FACW
yellow-eyed-grass, Richard's *Xyris jupicai* FACW
yellow-poplar *Liriodendron tulipifera* FACW
yellow-root, shrubby *Xanthorhiza simplicissima* FACW
yellowtop, clustered *Flaveria trinervia* FAC
yellowtop, coastalplain *Flaveria bidentis* FAC
yellowtop, Florida *Flaveria floridana* FACW
yellowtop, narrowleaf *Flaveria linearis* FACW
yerba de Tajo *Eclipta alba* FACW

Recommended 5-Step Field Wetland Delineation Procedure

1. Identify the indisputable wetland area and the indisputable upland area.
2. In the area between the indisputable wetlands and uplands, identify the most landward boundary of where the vegetation meets A or B test criteria.
3. In the area between the indisputable wetlands and uplands, identify the most landward boundary of where hydrologic indicators are present.
4. Between the vegetation test boundary and the hydrologic indicator boundary, identify the most landward hydric soil boundary.
5. Applying the wetland definition and reasonable scientific judgment, evaluate and modify if necessary the most landward boundary of the wetland based on the A, B, C, or D tests delineated by the previous steps.

Required Equipment for the Implementation of Chapter 62-340, F.A.C.

Sharpshooter Shovel (minimum soil examination of 20 inch+)
Munsell Soil Color Charts
Hand Lens (10x-15x)
Soil survey map for inspection area
Soil knife
Spray bottle (misting)
Tape measure

Suggested Equipment for the Implementation of Chapter 62-340, F.A.C.

FDEP Data Form Guide
FDEP Chapter 62-340, F.A.C. Data Form
Appropriate plant identification manuals
Appropriate soil information documents
A copy of Chapter 62-340, F.A.C.
Florida Wetlands Delineation Manual
Compass
Camera with extra batteries
Towel
Pens and pencils
Permanent Markers – two colors preferably
GPS Units
Flagging tape
Pin flags
4-foot level
First Aid
Sunscreen
Insect Repellent
Plant presses
Auger
Waterproof equipment case

Chapter 62-340, F.A.C. Data Form Instructions

Introduction

The purpose of the Chapter 62-340, F.A.C. Data Form (hereafter Form) is to record relevant information at a specific point to demonstrate whether the point is a wetland, a non-wetland surface water, or an upland according to the methodology set forth in Ch. 62-340, F.A.C. The Form is intended to be filled out after the field evaluator has made a determination.

Any time a regulatory agency concludes that an area is a non-wetland surface water, wetland, or upland at least one data point should be documented, i.e., once a conclusion informally or formally has been made by the regulatory agency at least one complete data form supporting that conclusion is required.

The number of data forms required will depend on the size and variability of the site inspection area. There is no size threshold or maximum number of data forms required for an inspection site. Reasonable scientific judgement should be used to determine the number of required data forms on a case by case basis.

(a) For the delineation of the landward extent of wetlands and other surface waters, at least one delineation data point along the boundary shall be verified and documented by the regulatory agency during the visual site inspection pursuant to Chapter 62-340.100(1) F.A.C. Documentation of a delineation data point shall include two data forms; one representative of the waterward area adjacent to the data point, the other representative of the landward or upland area adjacent to the data point. The two complete data forms at a delineation data point will document failure or satisfaction of all methodology criteria pursuant to Chapter 62-340 F.A.C. and changes in evidence used to determine the boundary delineation at that point.

A delineation data point will be documented for each homogeneous boundary within the site inspection area. If all delineation boundaries on site are homogenous in character, one data point is sufficient for documentation. One delineation data point representative of homogeneous boundaries found in other locations throughout the site is sufficient for documentation.

For purposes of the delineation data point, “homogeneous boundary” means all or part of a site delineation that is sufficiently similar in current condition to be delineated determine the landward extent of wetlands and other surface waters with a particular “test(s)” or interpretation of evidence as contemplated in Chapter 62-340 F.A.C. Characteristics that distinguish homogeneous boundaries may include, but are not limited to:

1. plant community type,
2. surface water type,
3. hydrologic indicators,
4. soils,
5. alterations to plants, hydrology, or soils,
6. hydrologic isolation or connection to waters of the State, or
7. other current condition expression which separate it from other boundaries on site.

(b) For identification or conclusions regarding the absence or presence of a non-wetland surface water, wetland, or upland classification by the regulatory agency within the site inspection area, at least one data form within homogeneous areas of classification shall be verified and documented by the regulatory agency during the visual site inspection pursuant to Chapter 62-340.100(1) F.A.C.

Documentation of an identification data point shall include one data form representative of the area of classification. The data form at an identification data point will document failure or satisfaction of all methodology criteria pursuant to Chapter 62-340 F.A.C. and evidence used to determine the upland, wetland, or non-wetland surface water classification.

An identification data point will be documented for each homogeneous area within the site inspection area. If all areas on site are homogenous in character, one data point is sufficient for documentation. One data point representative of homogeneous areas found in other locations throughout the site is sufficient for documentation.

For purposes of the identification data point, “homogeneous area” means all or part of a site inspection area that is sufficiently similar in current condition to classify with a particular “test(s)” or interpretation of evidence as contemplated in Chapter 62-340 F.A.C. Characteristics that distinguish a homogeneous area may include, but are not limited to:

1. upland classification,
2. wetland classification,
3. non-wetland surface water classification,
4. hydrologic isolation or connection to waters of the State,
5. plant community type,
6. surface water type,
7. hydrologic indicators,
8. soils,
9. alterations to plants, hydrology, or soils, or
10. other current condition expression which separate it from other areas on site.

This instructional document provides explanations of each question in the Form and guidance on how to answer them. Numbered (and lettered) bullet points, as well as anything denoted by “#” in this document refer directly to the corresponding question with that number in the Form. Citations from Chapter 62-340, F.A.C. (hereafter 62-340) and associated references are given to show where questions are drawn from and provide further clarity. For any question on the Form that requires an open-ended explanation that will not fit in the space provided, write “See note [#]” and continue the explanation with its identifying number in the “Notes” section at the end.

Site Information

1. The date on which the field data were collected on site. If the data were collected over multiple days, select the earliest date and note the other collection dates in the Notes section.
2. The staff that were present on site at the time of data collection, denoted at minimum by first initial and last name.

3. The initials of the staff member(s) that recorded data on this Form. A space for initials is provided in later sections to document the "plant recorder" and "soil describer" if completed by multiple parties.
4. The county in which the point being described lies.
5. The name of the larger site within which a point is being described (*e.g.*, a project name or parcel owner's name). If a tracking number exists (*e.g.*, from PA) include this as well.
6. A unique name to identify the specific point being described (*e.g.,* the delineation flag number closest to the point or a unique combination of letters and numbers). It is also recommended to take a GPS reading if possible and record the coordinates here. Write this identifier at the top of each of the other sheets in the Form in the box labeled "Point ID/Location". This will identify the sheets in case they get separated.
7. If the location of the described point is not going to be surveyed, attempt to locate at least 2, but preferably 3 or more stationary objects nearby that are easily identifiable and expected to remain in their fixed location indefinitely, such as utility poles, survey markers, road intersections, corners of buildings, etc. Standing at each object, record the compass bearing and the distance to the described point. This will allow triangulation to the point's location in the future.
8. The legal condition of the site.
    - If the point is unaltered or if all alterations at the point are exempt, authorized, permitted, or grandfathered select "Authorized or legal condition".
    - If any unauthorized alterations have occurred at the point, select "Unauthorized or illegal condition".
9. The type of evaluation being performed on site.
    - If only the presence or absence of a wetland or other surface water is being determined, select "Identification."
    - If a boundary between a wetland or other surface water and an upland is being marked, select "Delineation".

    Then select whether the point being described is in a wetland, a non-wetland surface water, or an upland. If the point lies within both a wetland and another type of surface water, select "Wetland".
    - ***For identifications, the data form should characterize the entire homogenous area being identified, whereas for delineations, the data forms should characterize the change on either side of the boundary at a specific point.***

Vegetation

10. Appropriate vegetative stratum: 62-340.400
    - The Rule defines 3 plant strata (Canopy, Subcanopy, and Groundcover) in 62-340.200
    - If vegetation is absent from the area, select "Vegetation Absent at Point" and skip to #14. Otherwise, select one stratum using the guidelines in 62-340.400, F.A.C.
    - The top stratum shall be used unless either:
        - The top stratum constitutes less than 10% areal extent, in which case the next lower stratum shall be used, as long as that stratum constitutes 10% areal extent or is the groundcover stratum. OR
        - The top stratum is not indicative of hydrologic conditions on site, in which case the stratum most indicative of hydrologic conditions shall be used. Either

subcanopy or ground cover may be selected depending on which is most indicative of hydrologic conditions.
  - ***Facultative plants shall not be considered in the determination of areal extent or appropriateness of strata.***
  - ***All evidence shall be considered when shifting to a lower stratum (e.g. number or wetland species compared to upland species, landform, plant community type, regional specificity); the statuses of plant(s) in a lower stratum are not by themselves sufficient evidence to shift strata.***
- Explain why the stratum was selected. "Normal expression" may be sufficient when the top stratum is used. Additional explanations may include: selective clearing of only wetland or upland tree species; planting of only upland or wetland species; recruitment of invasive exotic species.

11. Plant List 62-340.200(2),(6),(16), 62-340.400, 62-340.450
- Select an evaluation area for the plant community.
  - The area should be just large enough to capture the species diversity and abundance of the plant community at the described point.
  - The area should not extend into different hydrologic conditions or adjacent plant communities – this may dictate the shape of the area.
- Record the scientific name of each plant species in the evaluation area in the "Binomial of Observed Species" column.
  - Nomenclature from 62-340.450 must be used, regardless of taxonomic changes.
  - Record all plants in all three strata. Use one line per species.
  - Recorded plants must have their main stem rooted within the evaluation area.
- Record the 62-340.450 status (Upland, Facultative, Facultative Wet, or Obligate) in the "Status" column.
  - Select one of the following status abbreviations: U, F, FW, or O.
  - ***Exotic species that naturalized on or after July 1, 1994 are considered Facultative. Otherwise, all species were given a status, so those naturalized prior to July 1, 1994 but not listed in 62-340.450 are Upland.***
  - ***If desired for land management or mitigation assessment purposes, names and percentages of vines and aquatic plants may be included within the notes section but not in section 11.***
- For each listed species, record its percent areal extent in the Canopy, Subcanopy, and Groundcover strata (defined in 62-340.200) in the appropriately named columns.
  - See "Tips for Determining Areal Extent of Plants" In the "Chapter 62-340, F.A.C. Data Form Guide" (hereafter "Guide") for guidance.
  - For species not fully leafed out, evaluate areal extent as it would be when fully leafed out. Do not evaluate dead plants nor attempt to predict plants that would be present under different circumstances. This plant list reflects the conditions on the day of the evaluation, as is. If needed, past or predicted (e.g. when no vegetation is present) plant lists should be documented in the notes section.
- Refer to the stratum selected in #10. Use the numbers only from the column of the selected stratum. For each species in the selected stratum, transfer the areal

extent from the selected stratum column to the status column (Upland, Facultative, Fac. Wet, or Obligate) that corresponds to that species.
- Use the boxes at the bottom right of the table to total the areal extents in the Upland, Facultative, Fac. Wet, and Obligate columns.

12. A Test vegetation: 62-340.300(2)(a)
    - For percent Obligate and percent Upland transfer the percent areal extent total from the Obligate and Upland columns in #11.
    - Evaluate whether the total areal extent of Obligate plants is greater than that of Upland plants. If they are equal, select “No”.
13. B Test vegetation: 62-340.300(2)(b)
    - Add the totals from the Obligate and Fac. Wet columns in #11 to determine their combined value.
    - Add the total from the Upland column in #11 to the Obligate and Fac. Wet total to determine their combined value.
    - Divide the first result by the second result and multiply by 100 to obtain the percent of Obligate and Fac. Wet plants in relation to all plants, excluding Facultative.

 Vegetative Photo Tips:
- Document unknown plants by photographing features used in identification.
- Take plant community shots in each of the four cardinal directions (North, South, East, and West) at the described point. Plant community shots should include enough detail to identify species in the canopy, subcanopy, and ground cover. Additional shots may include canopy, subcanopy, or groundcover areal extents.

Soils

14. Indicate the Land Resource Region or, if necessary, the Major Land Resource Area where the described point is located.
    - The Land Resource Regions can be determined in two NRCS publications “Field Indicators of Hydric Soils in the United States” (hereafter “NRCS FIHSUS”) or “Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin”.
    - There are two hydric soil field indicators (S12 & F22) which require a specific Major Land Resource Area. The Major Land Resource Areas can be determined in the NRCS publication “Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin”.
15. Determine if it is possible to examine and describe a soil profile.
    - If it is possible to examine and describe any depth of soil, whether the soil is naturally or artificially occurring in that environment, select “Yes”.
    - If it is not possible to examine the soil due to it being in an inaccessible area, under water, composed of rock or a cemented layer, no soil present, etc.; select “No”, explain why, and skip to #18.
16. Describe the soil profile.
    - Determine the different horizons (i.e. layers) of the soil profile. Horizon is defined in the glossary of NRCS FIHSUS. NRCS horizon designations (*e.g.*, O, A, E) are not necessary nor recommended for Chapter 62-340, F.A.C. soil profile descriptions.

- ***Soil material is defined in "Keys to Soil Taxonomy" as both mineral material less than 2 mm in diameter and decomposing organic material that is less than 20 mm in its smallest dimension. All material not meeting these requirements is considered nonsoil. Fragmental soil material (defined in the glossary of NRCS FIHSUS) should be treated as soil in the profile description and noted as fragmental in the notes column.***

- Determine the beginning and ending depth in inches for each horizon.
  - The 0-inch depth is the soil surface, which is the muck or mineral surface (whether natural or fill) according to "Soil and Water Relationships of Florida's Ecological Communities".
  - If peat, mucky peat, or a nonsoil with an accessible soil underneath exists on top of the muck or mineral surface, the beginning depth will begin with a '+' and the number of inches above the muck (e.g.+3 -0) or mineral surface the horizon starts.
- Determine the Matrix hue, value, and chroma for each horizon.
  - Matrix is defined in the glossary of NRCS FIHSUS.
  - ***The Matrix color should be determined in moist condition using a "Munsell Soil Color" book without sunglasses and ideally with normal sunlight (e.g. not early in the morning, late in the day, or under smoky conditions). With practice, compensation can be made for the differences unless the light is so subdued that the distinctions between colors chips are not apparent.***
  - For nonsoil horizons, write N/A.
- Determine the Matrix texture for each horizon.
  - Recommended Matrix textures are peat, mucky peat, muck, mucky mineral, marl (as defined in glossary and described in the Introduction of NRCS FIHSUS), sand, and fine (defined below). See the Guide for "Field Determination of Soil Indicator Texture" and "Tips for Determining Texture of Soil materials with High Organic Content".
  - Sand refers to USDA textures of loamy fine sand and coarser.
  - Fine refers to USDA textures of loamy very fine sand and finer.
  - "Mucky" as in mucky peat or mucky mineral is a texture modifier and does not constitute the presence of muck. See "NRCS FIHSUS" for definition of muck, mucky modified mineral soil material, and mucky peat.
  - For nonsoil horizons, write N/A.
- Determine the percentage of sand in the Matrix masked with organic material.
  - ***Determinations are conducted with a 10x or 15x hand lens. See "Estimating Percent Organic Carbon" in the Guide. A hand lens is strongly recommended for consistency and legal challenges, in lieu of the naked eye, due to:***
    - ***No NRCS guidance for distance of the observer from the soil being assessed (i.e. 6 inches or 6 feet),***
    - ***No NRCS guidance for the lighting conditions under which the soil is being assessed (i.e. shade or full sun),***
    - ***No NRCS percentage definition for "particles appear to be close to 100% masked" (i.e. 99% or 85%)***

        - ***No NRCS guidance regarding vision requirements of the observer estimating organic coating percentages (i.e. 20/20 or 20/15 vision).***
    - For Matrix values ≤ 3 in only sandy matrix soil layers, estimate percent organic coatings of the sand.
    - While sand may be visible within the horizon, the sand is not the matrix for textures of peat, mucky peat, muck, or mucky mineral layers, therefore, percent organic coating is not required to determine hydric soil status. Likewise, mucky mineral sand will not contain less than 70% organic coating and therefore, also does not require organic coating estimates to determine hydric soil status.
    - If the Matrix has a value higher than 3, write N/A, as these colors are unlikely to approach 70% or more organic coating in sandy matrix soils.
- Describe any soil features contained within the horizon and record any other relevant notes. There may be more than one of each type of feature within a horizon. If no features are present in the horizon, write "None".
    - DAs are areas darker than the Matrix's color. LAs are areas lighter than the Matrix's color. These are larger characteristics of the horizon and not micro-characteristics such as: sparsely dispersed value differences between single grains of sand, finely dispersed value differences between single grains of sand giving a salt and pepper appearance, or inclusions of shell fragments. For DA and LA areas record in moist condition the hue, value, and chroma; percent volume in the layer; the boundary (sharp, clear, diffuse; defined in the glossary of NRCS FIHSUS); and the shape (rounded, linear, angular; see "Tips for Determining Shapes of Features in Soil" in the Guide). Percent organic coating of sand is not required for DAs and LAs.
    - RCs are redox concentrations, which are defined in the glossary of NRCS FIHSUS. For these areas record in moist condition the hue, value, and chroma; percent volume in the layer; the boundary (sharp, clear, diffuse); and the shape (rounded, linear, angular).
    - OBs are organic bodies. Organic bodies must have a muck or mucky mineral texture. There are no size requirements for OBs, but generally 1- 3 cm in diameter. For OBs record the texture and the percent volume in the horizon. Percent organic coating of sand is not required for OBs.
    - Features generally must have a percent volume less than the Matrix's percent volume for each horizon, and the sum of the Matrix's and all features' volumes in a horizon must equal 100%. One exception may be a high percentage of redox concentrations making the matrix of the layer appear to be a high chroma matrix when in fact these are hydric soil features occurring in a lower chroma matrix. Another exception may be a horizon with abundant organic bodies of muck or mucky mineral texture within a sandy matrix. The matrix is not muck or mucky mineral, the matrix is sandy with many and numerous hydric soil indicators in the form of organic bodies.
    - Note if the horizon has been nonhydrologically physically mixed (PM) to the extent that the disturbance is a dominant characteristic of the horizon or is precluding reliable identification of hydric soil field indicators.
    - Note if the horizon is nonsoil and describe the type of material.

- Note if the horizon is fill, as defined in 62-330, F.A.C.
- Note if the fill material has blended in with natural soil material or developed contemporary hydric soil features (i.e. not imported within the fill material).
- Describe any significant features (DAs, LAs, RCs, OBs), inclusions (features that are not the same soil texture as the Matrix), or nonsoil materials within the fill horizon.

17. Check off which Hydric Soil Field Indicators are present, if any, and specify their beginning and ending depths.
    - Hydric soil field indicator requirements may be found in NRCS FIHSUS. See the Guide for a "Hydric Soil Field Indicators Simplified Checklist".
    - A hydric soil field indicator is only met and should only be selected if all the required characteristics, including depth, are documented within the soil profile description.
    - If hydric soil field indicators are combined, both indicators must be checked and documented (see example below).
    - ***NRCS periodically updates FIHSUS so check for additional hydric soil field indicators within the appropriate LRR or MLRA. If an indicator is met which is not included within the list in #17, identify the indicator and its beginning and ending depths.***
    - ***National Technical Committee for Hydric Soils Technical Note 4 explains how to combine certain indicators to satisfy their unmet thickness requirements.***

Documentation Example:

	Indicator Present	Begin Depth	End Depth
1.	S5/F3	5	14+

18. Determine if there is any nonsoil at or within 12 inches of the ground surface.
    - Is there an impenetrable layer at the soil surface or within 12 inches of the soil surface, if so, select "yes."
    - If the entire upper 12 inches is composed of soil material, select "no".
    - If it is impossible to examine the soil profile due to it being in an inaccessible area, underwater, physically mixed, hydrologically mixed, or otherwise disturbed, such that hydric soil field indicators cannot express or be reliably identified, select "Indeterminable".
19. Determine the hydric status of the soil.
    - If one or more of the hydric soil field indicators in #17 are checked, select "Hydric".
    - Select "Hydric" if the soil is in a reliable condition and meets the definition of hydric soil in 62-340.200(8). This definition may be met without a hydric soil field indicator being present. See Notes above "Field Identification of Hydric Soils," as well as the "Hydric Soil Technical Standard (HSTS)" in the Guide.
    - Select "Non-hydric" if the soil is in a reliable condition and no hydric soil field indicators are checked in #17 or if the definition of hydric soil in 62-340.200(8) is not met.

- Select “Inconclusive” if the soil profile is in an unreliable condition (i.e. disturbed/mixed soil, insufficient evaluation depth due to presence of nonsoil or standing water, lack of site access, etc.) and hydric status cannot be evaluated.
- Explain the reason for the hydric status selected. “See #17” may be sufficient if the soil was hydric due to one or more hydric soil field indicators being checked.

20. Note whether the depth of the soil profile is 20 inches or greater from the soil surface according to Soil and Water Relationships of Florida’s Ecological Communities. If the profile is less than 20 inches from the soil surface explain why. Explanation options are not limited to the examples provided in the Data Form.
    - **Length of shovel is not an appropriate limitation of profile depth**.
21. Determine the height or depth of the observed standing water from the soil surface.
    - Select whether the water level is above the soil surface or below (in the soil pit). If the water table is below, ideally, wait enough time for the water table to stabilize before taking a measurement. Alternatively, estimate depth to water table from observed lateral side wall intrusion of water.
    - If no standing water is observed or no lateral water intrusion is observed in the soil pit, select “Not Observed” and leave the space provided for the measurement blank.

📷 Soil Profile Photo Tips:

- Each soil photo should be taken in either full sun or full shade, in a moist condition, cleaned (with all smearing removed and no shovel slices within the profile), preferably as a flat trench-cut 16-20 inch profile instead of a conical spoil plug. Ensure the soil profile has not been crushed, compacted, contains shovel cuts through the profile, or otherwise altered during the process of removing the profile.
- Soil Profile ID photograph-
    - Demarcate each horizon (i.e. layer) by scoring the soil profile surface so the depths of each layer are easily identifiable within the photo.
    - Take a photo of the entire soil profile with scale (i.e. measuring tape at soil surface). Angle of photo should be 90^{o} to the profile face. Include the 62-340 Data Form sheet with box 1-9 visible within the photo to document point ID location information.
    - Ensure the background does not visually interfere with the edges of the soil profile being photographed. Interferences such as side cast material from cleaning, backgrounds of similar color and texture, etc. make distinction of colors and patterns difficult.
    - **If a peat or mucky peat layers are present two profile ID photographs will be necessary. The first photo shall document the entire length of the profile with the measuring tape or scale device beginning at the top including any peat or mucky peat layer(s). The second photo will show the tape measure or scale device beginning at the muck or mineral surface (i.e. 0 inches) and shall be used for purposes of describing the profile.**
- Soil Profile
    - Follow the same procedures in the Soil profile ID above, but remove the Data form, and frame the photo as close to the soil profile as possible while including all layers.
- Soil horizon

- Take photos of each horizon pointing out any distinguishing features (DAs, LAs, OBs, RCs) with scale. Take close-ups of

- Cross sections (soil horizon/critical depth)
  - Cross section the middle of each individual soil horizon, horizontally, taking photos of any distinguishing features or characteristics (DAs, LAs, OBs, RCs) with scale.
  - When needed, cross section photos at the 6 inch depth (for sandy soils) or other critical depth for meeting a hydric soil field indicator should be taken. If hydric soil field indicator(s) begin(s) at the soil surface photograph the surface of the soil profile close-up.
- Other Hydric Soil Characteristics or Features
  - Photograph characteristics used in determining hydric condition of soils (e.g. muck smeared fingers, results of fiber rub test, color of decant test water, etc.)
  - Photograph any inclusions of shell, charcoal, fill material, texture, or other lithologic discontinuities, etc.
- Photograph the water table
  - Photograph if the water level is above the soil surface or below (in the soil pit). If the water table is below, ideally, wait enough time for the water table to stabilize before taking a measurement and photographing. Alternatively, estimate depth to water table from observed lateral sidewall intrusion of water and photograph the evidence of intrusion, pointing out the lateral sidewall seepage.

Hydrology

22. Hydrologic indicators 62-340.500
    - Investigate the area immediately around the described point (no further than the area used to evaluate the plant community) for each of the 13 listed Hydrologic Indicators.
      - For any indicator present and representative of normal wet season or high water hydrology, check the corresponding box in the “Present at or near…” column
      - For any indicator present that is not representative of normal wet season or high water hydrology, e.g. resulting from rare or aberrant events, check the corresponding box in the “Present but not reflective…” column.
      - ***For identifications, the data form should characterize the entire homogenous area being identified and all hydrologic indicators, whereas for delineations, the data forms should characterize the change on either side of the boundary at a specific point.***
    - If the site investigation is being performed during the dry season or a drought, or if it is believed that a Hydrologic Indicator that is currently absent would be present during normal wet season or high water conditions, check the corresponding box in the “Predicted…” column.
    - If the described point is the waterward area adjacent to the data point side of the delineation boundary, investigate the area within 100 feet waterward of the point for each of the 13 listed Hydrologic Indicators.
      - For any indicator present within the 100 ft area, check the corresponding box in the “Within 100 ft…” column.

- These indicators are **not** considered for purposes of meeting the A, B, or D Tests at the data point, but offer details of the larger landscape context of the point.

➢ For any checked indicators, provide all relevant supporting information in the corresponding box in the last column.
- For any indicator that expresses in different forms (aquatic moss, aquatic plants, rafted debris, aquatic fauna, hydrologic data, morphological plant adaptations, tussocks or hummocks) describe the indicator type and the species on which it expresses (e.g., *Lemna sp.,* crayfish chimneys, A8 Muck Presence, adventitious roots on *Hypericum spp*., tussocked *Andropogon*).
- For any indicator within 100 ft of the point (checked in the "Within 100 ft…" column), record its approximate distance and compass direction from the point along with the name of the species on which it expresses.
- For any indicator that reflects a water elevation (algal mats, aquatic mosses, aquatic plants, or rafted debris deposited on surfaces; elevated lichen lines, hydrologic data, adventitious roots as morphological plant adaptations, tussocks or hummocks, water marks) measure its height from the ground and record the measurement and the species name of the species on which it expresses.
- If the "Present but not reflective…" box is checked for any indicator, explain why it is not reflective of normal hydrology.

➢ To determine the estimated Seasonal High Water at the point, review the recorded indicators present at the point for any that reflected a water elevation, including any indicators of inundation at or above the soil surface.
- If the described point is within an Upland select "N/A".
- If there are no indicators that reflect a water elevation, select "No water level indicators".
- If any indicators reflect an inundation water elevation, determine the highest elevation from either the ground surface (begins at the peat, mucky peat, muck, or mineral surface) or soil surface (begins at the muck or mineral surface).
  - If the ground and soil surface are the same at the described point, record the highest water elevation as is and select "Above soil surface".
  - If there is a difference between ground and soil surface or if the soil surface elevation is unknown, record the highest water elevation as is and select "Above ground surface".
  - If indicators reflect inundation without reflecting a specific elevation (e.g. algal mats on the ground), record the Seasonal High Water as 0 and select "Above ground surface" or "Above soil surface" using the above guidelines.

23. If any of the 13 listed Hydrologic Indicators were checked in the "Present at or very near…" or "Predicted…" columns, select "Yes", otherwise, select "No".

📷 Hydrologic Indicator Photo Tips:
- Take photos documenting the observed hydrologic indicators.
  - Include a visible scale such as a measuring tape or ruler. Use a level pointer (e.g. soil knife, stick, finger) to help visually identify height of feature.

- Hold the camera level to the height of the indicator so the photo accurately depicts the height of the measured indicator.
- Photos depicting water level indicators consistently on several specimens are also recommended, if available.

Criteria Tests

24. Delineation by Wetland Definition §62-340.300(1),
    a) Determine if a wetland delineation resulting in a wetland boundary has been performed.
        - If the "Work Type" selected in #9 is "Delineation" and the Data Form is describing a point on either side of a wetland boundary, select "Yes".
        - If the "Work Type" selected in #9 is "Identification" or if the delineated line is a non-wetland surface water boundary, select "No" and skip to #25.
    b) Determine if the wetland boundary could be easily delineated using the definition of wetlands.
        - If the boundary could be easily delineated by the individual evaluator by following a clear break in the vegetative community, topographic elevations, landform type, regional or site specific hydrologic indicators or soil changes, etc., indicative of a frequency and duration of inundation or saturation sufficient to support the wetland definition, select "Yes".
        - If the boundary could not be easily located in this manner and more in-depth inspection was necessary, select "No".

25. A & B Test Wetland Criteria §62-340.300(2)(a),(b),
    a) A Test vegetation: 62-340.300(2)(a)
    Consult #10 and #12 to select answer. If "Vegetation Absent at Point" skip to #25f.
    b) B Test vegetation: 62-340.300(2)(b)
    Consult #13 to select answer.
    c) A & B Test hydric soils: 62-340.300(2)(a)1 and (b)1
    Consult #19 to select answer, unless #19 was "Inconclusive" due to nonhydrological mixing of the profile. In this case, use any available evidence or data to determine whether a hydric soil would be present if not for the mixing of the profile. If a hydric soil would be present, select "Yes", otherwise select "Indeterminable".
    d) A & B Test other soils or substrates: 62-340.300(2)(a)1,2 and (b)1,2 and 62-340.200(13)
    If the substrate is composed of Riverwash (defined in 62-340.200(13)), nonsoil (see #18), rock outcrop-soil complex, or located in an artificially created wetland area, select Yes, otherwise select No.
        - Rock Outcrop-Soil Complex refers to areas where the underlying rock substrate has been exposed in multiple locations. While some of these areas have been labeled in Map Units as a soil type with the words Rock Outcrop Complex, any area with exposed bare rock mixed in with the surrounding soil would meet this requirement. See the NRCS publication Soil Survey Manual for more details.

- Artificially created wetland areas could consist of ditches, borrow pits, mitigation creation sites, etc.

e) A & B Test hydrologic indicators: 62-340.300(2)(a)3 and (b)3
Consult #23 to select answer.

f) A Test criteria summary: 62-340.300(2)(a)
Consult note under #25f to select answer.

g) B Test criteria summary: 62-340.300(2)(b)
Consult note under #25g to select answer.

h) A & B Test reliability: 62-340.300(3)
If evaluation of any of the answers in #25a-e was affected by conditions or alterations on the site, natural or man-made, such that any answers were incomplete, indeterminable, or unreliable, select "Yes".

26. C Test Criteria

a) C Test conditional requirements: 62-340.300(2)(c)4
If the point meets any of the C-test definitions of pine flatwoods, improved pasture, or drained soils, select "Yes", select which of the three definitions are met, and skip to #26d and select "No".
   - ***If any facultative wet or obligate species are present in the ground cover, the point is <u>NOT</u> pine flatwoods or improved pasture.***
   - ***If any contemporary hydric soil field indicators are present, the point does <u>NOT</u> have drained soils.***

b) C Test saline sands and soil taxonomy: 62-340.300(2)(c)1,2
   - If the described point is within a salt flat or tidal flat select "Yes".
   - If the soil at the point has been field verified as an Umbraqualf, Sulfaquent, Hydraquent, Humaquept, Histosols (except Folists), Argiaquoll, or Umbraquult by a soil scientist according to *Keys to Soil Taxonomy* (USDA, 4th ed. 1990), select "Yes". If field verification by a soil scientist was not attempted, select "No".
   - ***If hydric soil field indicator A1 – Histosol has been checked in #17, then a Histosol has been field verified, select "Yes."***

c) C Test map unit designations: 62-340.300(2)(c)3
   - If the described point lies within a USDA-NRCS Soil Survey Map Unit that is designated as frequently flooded, depressional, or water <u>and</u> if a hydric soil field indicator has been met (see #16), select "Yes".
     - ***Map Units may be designated by name (e.g., "Felda fine sand, depressional") and/or by the information in the "Water Features" table within the Soil Survey. Those with a Flooding Frequency of "frequent" are frequently flooded, and those with a Ponding Frequency of "frequent" or a High Water Table above the soil surface are depressional.***
   - If the map unit is not frequently flooded, depressional, or water, select "No".
   - If the soil was determined to be non-hydric, select "No".
   - If the map unit is frequently flooded, depressional, or water but the soil was determined to be inconclusive, select "Inconclusive".
   - Record the map unit name regardless of the answer selected.

d) C Test criteria summary: 62-340.300(2)(c)

Consult under #26d to select answer.

e) C Test reliability: 62-340.300(3)
If evaluation of any of the answers in #26a-c was affected by conditions or alterations on the site, natural or man-made, such that any answers were incomplete, indeterminable, or unreliable, select “Yes”.

27. D Test Criteria
    a) D Test hydric soils: 62-340.300(2)(d)
        - If a hydric soil field indicator was checked in #17, select “Yes”.
        - If a hydric soil field indicator was not checked in #17, select “No”, even if the definition of hydric soil was met. Then skip to #27d and select “No”.
        - If the soil was deemed “Inconclusive” in #19, select “Inconclusive” and do not attempt to predict if a hydric soil would be present but for any disturbance. Then skip to #27d and select “No”.
    b) D Test hydric soils that are hydrologic indicators: 62-340.300(2)(d), 62-340.500(8),(11)
    If any hydric soil field indicator in #17 began at the soil surface (0-inch depth), or if any of the “stand-alone D-Test” indicators listed in this question were checked in #17, select “Yes”.
        - If indicator A5 was checked, make sure that Sediment Deposition is marked as “Present at or very near…” in #22
        - If A1, A2, A3, A4, A7, A8, A9, S4, or F2 were checked or if any other indicator began at the soil surface, make sure that Hydrologic Data is marked as “Present at or very near…” in #22.
    c) D Test hydrologic indicator: 62-340.300(2)(d)
    This answer should match the answer given in #23.
    d) D Test criteria summary: 62-340.300(2)(d)
    The D Test is met if #27a was answered “Yes” and at least one of #27b or #27c was answered “Yes”. If these criteria are met, select “Yes”.
    e) D Test reliability: 62-340.300(3)
    If evaluation of any of the answers in #27a-c was affected by conditions or alterations on the site, natural or man-made, such that any answers were incomplete, indeterminable, or unreliable, select “Yes”.

Altered Sites Tests

28. Determine if any conditions or alterations on the site, natural or man-made, have masked or eliminated expression of any wetland indicators (*e.g.*, plants, soils, hydrologic indicators) such that the wetland cannot be completely or reliably identified or delineated.
    - If #25h, 26e, or 27e were answered “Yes”, select “Yes”.
    - If the criteria tests could be evaluated reliably but more abundant, diverse, or persuasive evidence would be present but for the alterations, select “Yes”.
    - If there are no alterations, select “No” and skip to #32.
    - If alterations have occurred on a site, but all wetland indicators are expressing normally and reliably and on-site evidence is deemed sufficient, select “No” and skip to #32.

- **Selecting "No" may possibly limit utilization of other reliable information in the documentation.**

29. Authorized or Legally Altered Vegetation and Soils: 62-340.300(3)(a)
    a) Determine if the vegetation on site has been altered by authorized or legal activities (*e.g.*, by mowing, planting, tree harvesting, fire, landscaping, herbicide, site preparation, etc.) such that its expression is incomplete or unreliable.
        - If so, select "Yes" and describe the alterations and their effects on vegetation.
        - If vegetation was not affected by alterations or if any alterations were unauthorized, select "No".
    b) Determine if the soils on site have been altered by authorized or legal activities (*e.g.*, by animals such as hogs or livestock, or by authorized plowing, disking, scalping, filling, shallow rutting, etc.) such that they cannot be evaluated completely or reliably.
        - If so, select "Yes" and describe the alterations and their effects on the soils.
        - If soils were not affected by alterations or if any alterations were unauthorized, select "No".
        - If "No" was selected for both 29a and 29b, indicating the vegetation and soils were not affected by any legal or authorized alterations, skip to #30.
    c) Select which of the four criteria tests could not be completely or reliably evaluated due to the legal alterations to vegetation or soils on site. These answers will often reflect those in #25h, 26e, and 27e.
    d) Determine if the described point would be identified or delineated as a wetland using the methodology in 62-340.300 if the altering activities were stopped and the site given time to recover normal expression of vegetation and soils. Use reasonable scientific judgement and the most reliable available information to make this determination. A reference point in an unaltered or more reliable condition, described on a separate Data Form, is recommended if possible.
        - If the point would be a wetland given normal expression, select "Yes".
        - Otherwise, select "No", explain why this conclusion was reached, and skip to #30.
    e) If #29d was answered "Yes", indicate which components of 62-340.300 would express following the cessation of legal alterations.
        - Include evidence that is currently present as well as evidence that is predicted to be present.
        - "Plants" can refer to the vegetative community, A and B test plant ratios, or both.
    f) Select which tests are predicted to be passed following the cessation of alterations, including tests that are currently being passed.
        - ***If a wetland has been determined to be present using any of the 62-340.300 tests, "Wetland Definition" should be selected.***
        - Explain why it is believed that these tests would be passed. "See [reference point name]" is sufficient when a reference point has been described on a separate Form. Otherwise, list whatever evidence was used in the conclusion.

30. Authorized or Legally Altered Hydrology: 62-340.300(3)(b)
    a) Determine if authorized or permitted activities have altered wetland hydrology in a way that either lowers the water table or raises the soil surface, thereby reducing wetland hydrology.
        - If so, select "Yes", and explain the alteration and its effects.

- If hydrology has been unchanged or if frequency or duration of saturation or inundation has increased, select “No” and skip to #31.
- If the site is and has always been an upland, select “No” and skip to #31.
- If the decreased hydrology is a result of unauthorized activities (including water use permits that are out of compliance), select “No” and skip to #31.

b) Determine if the authorized activities have completely eliminated wetland hydrology at the described point (i.e. point has been converted to upland). If wetland hydrology was reduced but not fully eliminated, select “No” and skip to #31. Otherwise, select “Yes”.

c) Determine if elimination of wetland hydrology was accomplished solely by dredging or filling activities authorized by Part IV of Chapter 373, F.S. and if the elimination is therefore permanent.
- If so, select “Yes”. This means that the point is now legally converted to an upland. Skip to #31.
- If wetland hydrology was eliminated by activities in Part II of Chapter 373, F.S., such as water use permits, select “No”. These areas are still considered wetlands even if they lack wetland hydrology and may temporarily not be expressing wetland characteristics.
- If wetland hydrology was eliminated by temporary alterations such as surface water pumps, or by temporary conditions such as droughts, select “No”. These areas are still considered wetlands even if they lack wetland hydrology and may temporarily not be expressing wetland characteristics.

d) If the elimination of wetland hydrology is temporary or not authorized by Part IV of Chapter 373, F.S., indicate which components of 62-340.300 would express following the cessation of hydrologic alterations and return of normal wetland hydrology.
- Include evidence that is currently present as well as evidence that is predicted to be present with the return of wetland hydrology.
- “Plants” can refer to the vegetative community, A and B test plant ratios, or both.

e) Select which tests are predicted to be passed following the cessation of alterations, including tests that are currently being passed.
- ***If a wetland has been determined to be present using any of the 62-340.300 tests, “Wetland Definition” should be selected.***
- Explain why it is believed that these tests would be passed. “See [reference point name]” is sufficient when a reference point in an unaltered or more reliable condition has been described on a separate Form. Otherwise, list whatever evidence was used in the conclusion.

31. Illegal or Unauthorized Altered Sites: 62-340.300(3)(c)

a) Determine if any alterations that are in violation of regulatory requirements have occurred at the described point and have affected normal expression of any wetland characteristics.
- If so, select “Yes” and describe the alterations and how they have affected the normal wetland condition.
- Otherwise, select “No” and skip to #32.

b) Select which of the four criteria tests could not be completely or reliably evaluated due to the unauthorized alterations on site. These answers will often reflect those in #25h, 26e, and 27e.

c) Determine if the described point would have been identified or delineated as a wetland immediately prior to the unauthorized alterations. Use reasonable scientific judgement and all available information to make this determination in a forensic manner. A reference point in an unaltered or more reliable condition, described on a separate Data Form, is recommended if possible.
   - If the point would have been a wetland immediately prior to the unauthorized alterations, or if it is still currently a wetland despite the alterations, select "Yes".
   - Otherwise, select "No", explain why this area was an upland immediately prior to the unauthorized alteration and how the conclusion was reached, then skip to #32.

d) If #31c was answered "Yes", predict which components of 62-340.300 would have been present immediately prior to the unauthorized alterations.
   - Include evidence that is currently present as well as evidence that is predicted to have been present.
   - "Plants" can refer to the vegetative community, A and B test plant ratios, or both.

e) Select which tests would have been passed immediately prior to the alterations, including tests that are currently being passed.
   - ➢ ***If a wetland has been determined to be present using any of the 62-340.300 tests, "Wetland Definition" should be selected.***
   - Explain why it is believed that these tests would have been passed. "See [reference point name]" is sufficient when a reference point has been described on a separate Form. Otherwise, list whatever evidence was used in the conclusion.

Summaries

32. Wetland and Other Surface Water Summary

a) Wetland Summary
   - If the described point is in a **normal condition** with no alterations, use reasonable scientific judgement to determine if the conclusions made in #25f, 25g, 26d, and 27d are reliable and if the described point meets the wetland definition in 62-340.200(19).
     - o If any of the criteria tests were reliably passed or if the definition of wetlands was met, select "Yes" and indicate which tests were reliably passed.
       - ➢ ***If a wetland has been determined to be present using any of the 62-340.300 tests, "Wetland Definition" should be selected.***
     - o If any answers in #25f, 25g, 26d, and 27d are different from the answers to #32 (*i.e.,* a criteria test was deemed unreliable), explain how this conclusion was reached with reasonable scientific judgement.
   - If **authorized or legal alterations to plants or soils** have occurred at the described point, this answer should reflect those in #29d, e, and f.
   - If **authorized or legal alterations to hydrology** have occurred at the described point, this answer should reflect those in #30c, d, and e. If dredge or fill alterations authorized by Part IV of Chapter 373, F.S. have permanently and completely eliminated wetland hydrology at the point, the point has legally been converted to an upland.
   - If **unauthorized or illegal alterations** affected any aspect of normal wetland expression, this answer should reflect those in #31c, d, and e.

- If any of the **altered sites tests** were used, summary answers 31e are likely to differ from those in #25f, 25g, 26d, and 27d; if they do, explain why. "See #[29, 30, or 31]" may be a sufficient explanation if all relevant details have been documented in that section.

b) Mean High Water: 62-340.600(2)(b)
- If there are no tidal water bodies nearby, select "No".
- If a licensed Professional Land Surveyor has located the Mean High Water Line of a tidal water body and the point is located at or waterward of that line, select "Yes".
- If a survey is not currently available, select "MHWL unknown".
- ***Determination of Mean High Water for 62-340 is not for purposes of title.***

c) Ordinary High Water: 62-340.600(2)(c)
- If there are no bodies of open water within a distance close enough to exert a dominant influence on the hydrology of the point, select "No".
- If an open water body exists nearby that is natural (not man-made) and non-tidal, determine its Ordinary High Water Line by direct field observation.
  - If the described point is at or waterward of this line, select "Yes".
  - ***Ordinary High Water is defined on page 37 of The "Florida Wetlands Delineation Manual", which is available for download on the Department's website, and on page 6 of the Form.***
  - ***Water bodies must have little to no emergent vegetation and have standing or flowing water during normal wet season or high water that exerts an influence on the landscape. They may be ephemeral.***
  - ***For non-tidal natural water systems only, the 2.33 return frequency interval (i.e. Mean Annual Flood) may be an acceptable approximation for Ordinary High Water***
  - ***Determination of Ordinary High Water for 62-340 is not for purposes of title.***

d) Top of Bank: 62-340.600(2)(d)
- If the point is not in or near an artificially created water body or watercourse with side slopes of 1 foot vertical to 4 feet horizontal or steeper, select "No".
- If the point is in or near an artificially created water body or watercourse with side slopes of 1 foot vertical to 4 feet horizontal or steeper, determine where the top of the bank is.
  - If the point is at or waterward of the top of the bank, select "Yes".
  - Do not include spoil banks from excavation when determining top of bank.

e) Seasonal High Water: 62-340.600(2)(e)
- If there are no artificially created water bodies or watercourses with side slopes flatter than 1 foot vertical to 4 feet horizontal within a distance close enough to exert an influence on the hydrology of the point, select "No".
- If an artificially created water body or watercourse with side slopes flatter than 1 foot vertical to 4 feet horizontal exists nearby, determine its Seasonal High Water Line.
  - If the described point is at or waterward of this line, select "Yes".
  - ***Seasonal High Water is defined in 62-340.200(15)***

2. Photographs
   a) Take photographs of the evidence used to draw conclusions about wetland or other surface waters at the described point. Photo documentation tips may be found in the relevant sections above. Recommended photos include, but are not limited to:

- Vegetation: landscape photos in the four cardinal directions, plant species important to the identification or delineation of the surface water, unusual plant morphology, etc.
- Soil: soil profile with ID, soil profile close-up, soil horizon(s) close-up, hydric soil indicator(s) close-up, unusual soil characteristics, landscape location of soil pit, observed water in soil pit, etc.
- Hydrology: hydrologic indicators, hydrologic indicator height from ground with tape measure, non-wetland surface water indicators (*e.g.*, basal scarring, stained leaves, drainage patterns), nearby water bodies or water control structures that may influence area hydrology, etc.

b) For each photo, record the number from the memory card that identifies the photo. This will allow easy identification of the photo when downloaded to a computer. If multiple photos are taken of the same subject, these can be listed within the same metadata box.
c) Specify what is in the photo. Include a compass direction for landscape photos.
d) Write the initials of who took each photo. This should match a name listed in #2. Photos cannot be used as evidence in litigation without a known photographer.

Optional Video Documentation Suggestions

- Video documentation of the same features and characteristics in the photo tips above may be taken in video format as well.
- Videos should include a statement of who is shooting the video, any other person in the video, the date recorded, the location of the site and location of the video on the site with minimal narration, explanation, or background noise.

Notes

Record any relevant information that was not captured in another part of the form

- General description and conditions of the site and its surrounding landscape
- Current or recent weather conditions
- Information relied upon for determination of non-wetland surface water boundaries
- Features that are not specified in 62-340.500 as indicators of wetland hydrology, but that were used in conjunction with reasonable scientific judgment to guide conclusions (*e.g.*, indicators used by the Army Corps)
- Text that would not fit in the space provided in another part of the form
  - Write “See note [#]” in the space provided
  - Begin text with matching [#] in Notes section
- Species of vines and aquatic plants with areal extents
- Indicate results of a fiber rub test or decant test if instrumental to a hydric soil determination. Document with photos as applicable.

References

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Appendix L

Additional Criteria for Dam Systems

1. Applicability

This appendix contains the four criteria referenced in this Volume, subsection 8.4.5, *Dam Systems*. These criteria apply to proposed construction of new dams and alteration of existing dams, as defined in paragraph 2.0(a)27. in this Volume and meets the dam thresholds specified in the applicable Volume II. These criteria do not apply to a levee or levee system, as defined in paragraphs 2.0(a)66. and 67., respectively, in this Volume. The four criteria require: 1) providing dam system information, 2) establishing a Downstream Hazard Potential, 3) developing an Emergency Action Plan for a High Hazard Potential or Significant Hazard Potential dam, and 4) submitting a Condition Assessment Report for a High Hazard Potential or Significant Hazard Potential dam. These criteria and their requirements are described in detail below.

Applicants with such dam projects shall provide the required information to the permitting agency in the application submittal, and electronically submit this information to the Department at DamSafety@FloridaDEP.gov or mail it to the State Dam Safety Officer, Florida Department of Environmental Protection, 2600 Blair Stone Road, Mail Station 3595, Tallahassee, Florida 32399. Applicants are encouraged to contact the permitting agency to request a pre-application meeting to discuss the applicability of these criteria and best approaches to meet the requirements for their specific dam project.

2. Dam System Information

Form 62-330.301(25), "Dam System Information", incorporated by reference in subsection 62-330.301(2) shall be completed in accordance with the instructions on the form. This information will be maintained by the Department to provide a repository for these systems, and for dissemination where needed in the event of an emergency situation.

3. Downstream Hazard Potential

A Downstream Hazard Potential shall be determined for each dam based on probable loss of human life or adverse impacts on economic, environmental, and lifeline interests, and other concerns, such as water quality degradation, should the dam or appurtenant structures fail (e.g., breach) or are mis-operated (e.g., unscheduled release). Importantly, the Downstream Hazard Potential does not reflect the current safety, structural integrity, or flood routing capacity of a dam and its appurtenant structures. Also, the Downstream Hazard Potential may change over time (typically, it will increase as the downstream area is developed). Lastly, for dams in series, each upstream dam shall have a Downstream Hazard Potential equal to or greater than the next downstream dam.

(1) Classification

The Downstream Hazard Potential shall be classified as one of the three categories described below.

a) High Hazard Potential (HHP) – Failure or mis-operation of the dam will probably cause the loss of human life. Economic, environmental, and lifeline losses may also occur, but are not necessary for this classification.

b) Significant Hazard Potential (SHP) – Failure or mis-operation would result in no probable loss of human life, but may cause economic loss, environmental damage, disruption of lifeline interests, or impact other concerns, such as water quality degradation.

c) Low Hazard Potential (LHP) – Failure or mis-operation is not expected to result in loss of human life and may result in low economic and/or environmental losses, that are largely limited to the owner's property.

The table below shows the expected consequences for each Downstream Hazard Potential.

Downstream Hazard Potential	**Loss of Human Life**	**Economic, Environmental, & Lifeline Losses**
High	Probable	Yes, but not necessary
Significant	None expected	Yes
Low	None expected	Low and generally limited to owner's property

(2) Evaluation

For each dam, the applicant shall provide the Downstream Hazard Potential and supporting information for its determination that is developed in a manner consistent with the following methodologies:

a) Obvious LHP dams – The Photo-Based Mapping method may be used to provide inundation maps without an engineering analysis for dams less than or equal to 10 feet in dam height and less than or equal to 1,000 acre-feet maximum storage, with no downstream structures and roads at or below the elevation of the dam crest within the expected inundation area. The dam height and maximum storage definitions to use are provided in form 62-330.301(25), *Dam System Information*. Refer to the *Emergency Action Plan Template For Florida Dams Instruction Manual* (DEP January 2023) on how to use Photo-Based Mapping to estimate conservative flood areas. The *Emergency Action Plan Template For Florida Dams Instruction Manual* is available on the [DEP website]. Submit an aerial map(s), elevation contour or digital elevation map(s), field survey (if available), dam geometry, reservoir capacity, locations and types of downstream structures, a depiction of the anticipated flood extent and a discussion of the expected consequences and Downstream Hazard Potential. The maps must be at legible scales to see structures and details. This method of classification, including the supporting information, does not need to be certified by a registered professional.

b) Probable LHP dams – A Simplified Engineering Analysis may be used where there are few structures or roads below the dam crest and the downstream terrain is relatively flat and constant. The methodology to perform a Simplified Engineering Analysis is described in the *Emergency Action Plan Template For Florida Dams Instruction Manual* (DEP January 2023). Submit a report, including aerial map(s), elevation contour or digital elevation map(s), field survey (if available), dam and downstream geometry, reservoir capacity, locations and types of downstream structures, engineering calculations, and inundation maps, and evacuation maps, including peak flood wave depth, peak flood wave stage, and peak flood wave arrival times at the locations of interest downstream of the dam, a discussion of the study input and output parameters and expected consequences, and the Downstream Hazard Potential. If the Downstream Hazard Potential is not LHP, refer to paragraph 3.2.c below to perform an inundation study using hydrologic-hydrodynamic modeling. A registered professional must certify the Simplified Engineering Analysis and Downstream Hazard Potential designation.

c) SHP and HHP dams. For dams that do not fit the descriptions above, the Downstream Hazard Potential shall be determined through an inundation study performed using hydrologic-hydrodynamic modeling software with two-dimensional unsteady state flow capability, preferably HEC-RAS 2D, version 6, or equivalent. The inundation report, including inundation and evacuation

maps for an Emergency Action Plan, shall meet the *Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures* (FEMA P-946, July 2013), which is incorporated by reference in subsection 62-330.010(4). The Downstream Hazard Potential shall be stated in the inundation report and certified by a registered professional qualified in the evaluation of dam systems.

4. Emergency Action Plan

An emergency action plan (EAP), as defined in paragraph 2.0(a)44 in this Volume, shall be developed for each SHP and HHP dam. The EAP may include multiple dams that are owned by the same owner(s), if they are in close proximity with one another or in succession. An EAP provides the dam owner, the dam owner's engineer, emergency management officials, and other personnel and responders with clear instructions to take should an anomalous or emergency condition develop at a dam. The EAP format is not mandatory, but the EAP shall address six basic elements: 1) detection and classification, 2) roles and responsibilities, 3) notification flow charts and contact information, 4) response procedures, 5) inundation and evacuation maps, and 6) appendixes for training, exercises, and updates. The completed EAP shall be signed and dated by the applicant or an authorized representative.

The *Emergency Action Plan Template for Florida Dams* (DEP January 2023; EAP Template) and accompanying instruction manual, *Emergency Action Plan Template For Florida Dams Instruction Manual* (DEP January 2023), are available for use to facilitate EAP development, provide consistency, and reduce costs; however, use of the EAP Template is not required. The *Emergency Action Plan Template for Florida Dams* is available on the [DEP website]. The EAP Template characterizes abnormal occurrences in three types of events: Unusual (a slowly developing event), Watch (a rapidly developing event), and Warning (an imminent or ongoing dam failure). The template may be modified to provide additional information, such as an alert system activation plan, cascading dam inundation maps, monitoring and operating plans, and multiple owners' information.

5. Condition Assessment

A Condition Assessment Report (CAR) shall be provided for each existing SHP and HHP dam. The CAR shall include completed Form 62-330.311(4), *Condition Assessment Report for Florida Dams*, incorporated by reference in subsection 62-330.311(7), F.A.C., and required supporting information, if applicable, as described below. The information in this form may be completed through a combination of new and historical inspections performed within the past five years, as long as the data are still representative of the dam condition. Copies of the original inspection reports are to be included in the CAR. The current overall condition assessment of Satisfactory, Fair, Poor, or Unsatisfactory, as defined in the form, shall be designated for each dam and certified by a registered professional qualified in the evaluation of dam systems.

Appendix M

Rainfall Criteria

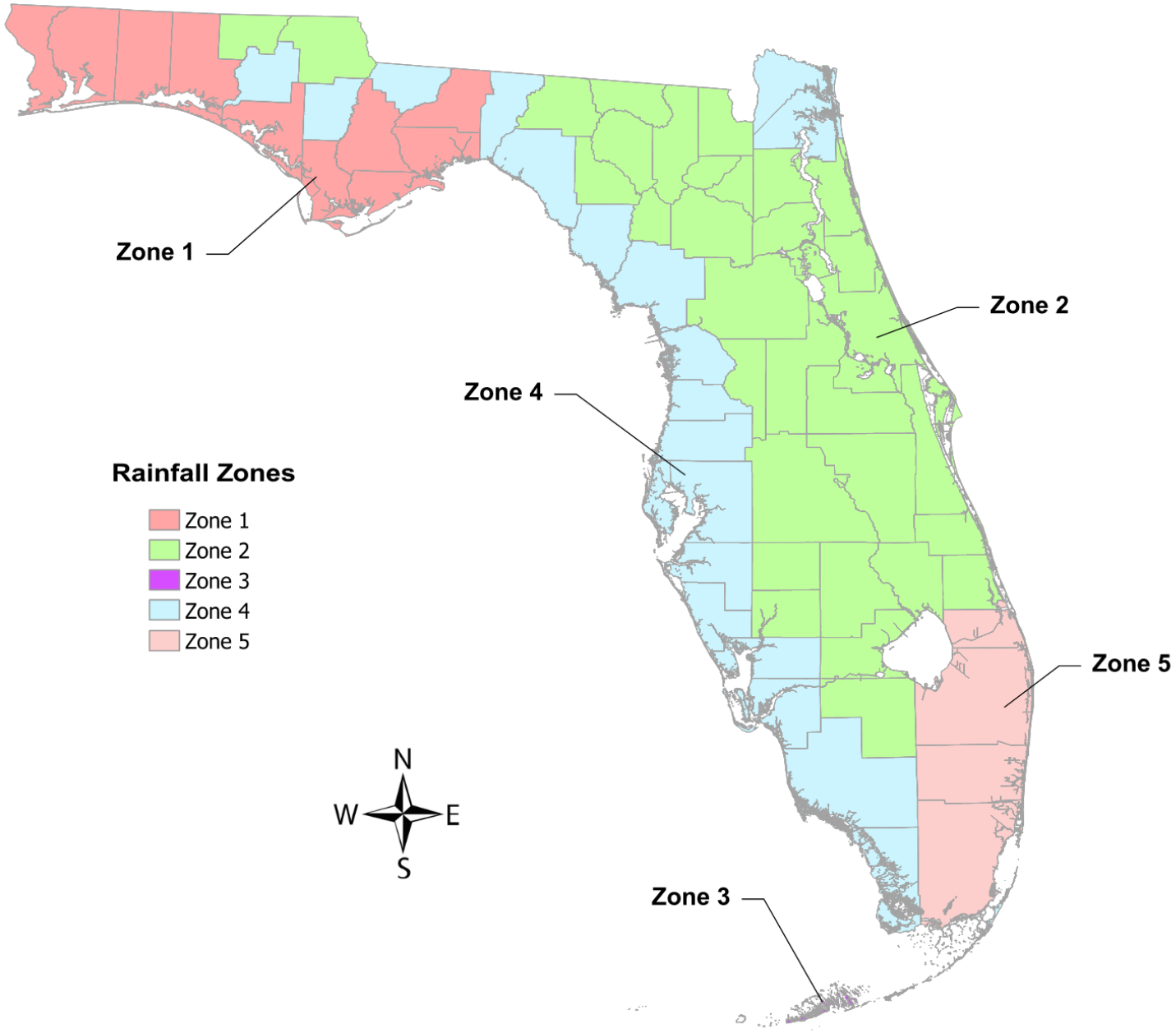


Figure 1: Designated Meteorological Regions (Zones) in Florida

Table 1: Counties Included in the Designated Meteorological Zones

ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5
Bay	Alachua	Monroe County - Florida Keys from Key Largo to Key West	Charlotte	Broward
Escambia	Baker		Citrus	Miami-Dade
Franklin	Bradford		Collier	Martin
Gulf	Brevard		Dixie	Palm Beach
Leon	Calhoun		Duval	
Liberty	Clay		Hernando	
Okaloosa	Columbia		Hillsborough	
Santa Rosa	Desoto		Jefferson	
Wakulla	Flagler		Lee	
Walton	Gadsden		Levy	
	Gilchrist		Manatee	
	Glades		Mainland	
	Hamilton		Monroe	
	Hardee		Nassau	
	Hendry		Pasco	
	Highlands		Pinellas	
	Holmes		Sarasota	
	Indian River		Taylor	
	Jackson		Washington	
	Lafayette			
	Lake			
	Madison			
	Marion			
	Okeechobee			
	Orange			
	Osceola			
	Polk			
	Putnam			
	Seminole			
	St. Johns			
	St. Lucie			
	Sumter			
	Suwannee			
	Union			
	Volusia			

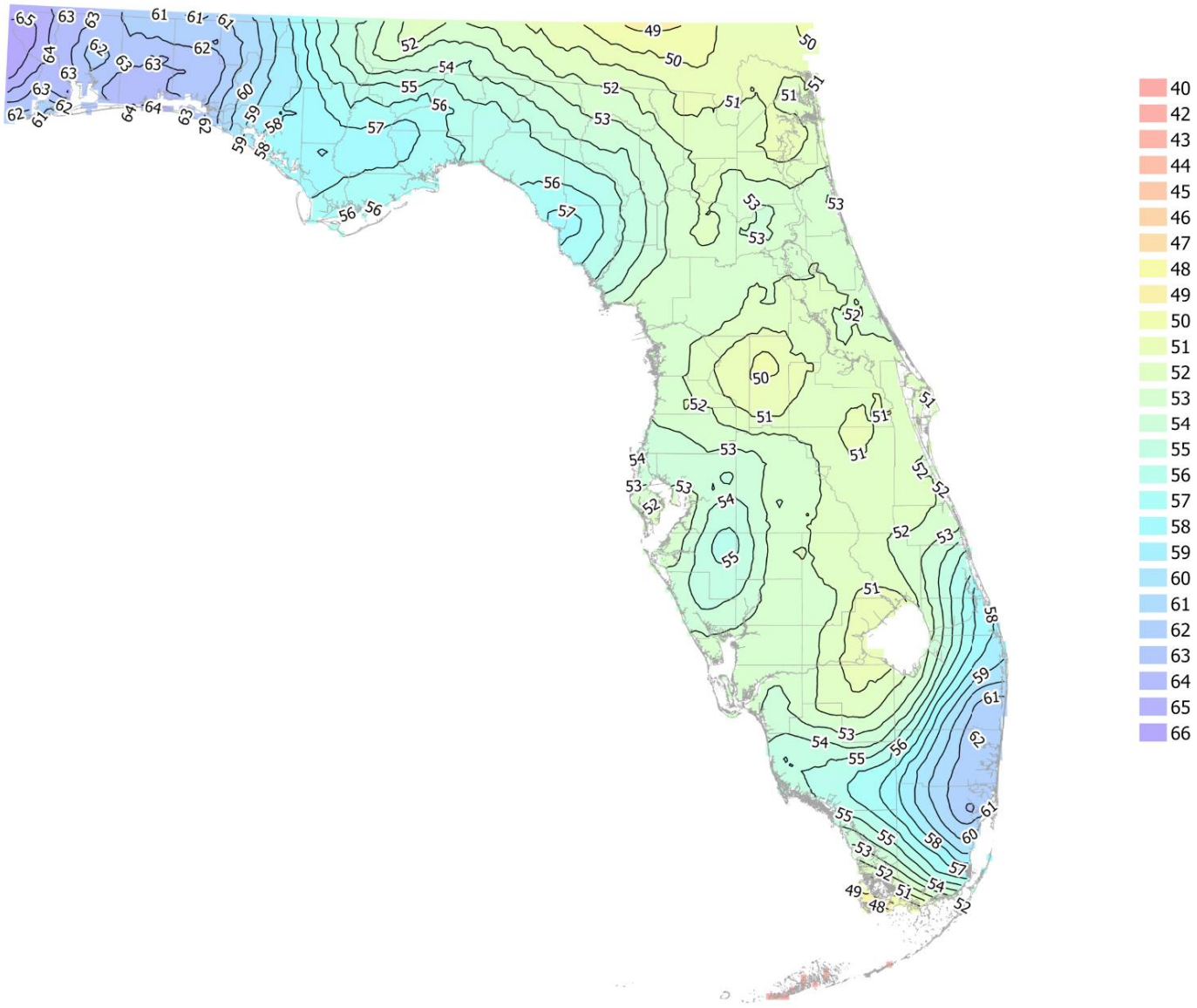


Figure 2: Average Annual Rainfall Isopleth Map for Florida

Appendix N
Mean Annual Runoff Coefficients (ROC Value) as a Function of DCIA Percentage and Non-DCIA Curve Number

ZONE 1
Mean Annual Runoff Coefficients (ROC Value) as a Function of DCIA Percentage and Non-DCIA Curve Number

NDCIA CN	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	0.006	0.048	0.090	0.132	0.175	0.217	0.259	0.301	0.343	0.386	0.428	0.470	0.512	0.554	0.596	0.639	0.681	0.723	0.765	0.807	0.849
35	0.009	0.051	0.093	0.135	0.177	0.219	0.261	0.303	0.345	0.387	0.429	0.471	0.513	0.555	0.597	0.639	0.681	0.723	0.765	0.807	0.849
40	0.014	0.056	0.098	0.139	0.181	0.223	0.265	0.307	0.348	0.390	0.432	0.474	0.515	0.557	0.599	0.641	0.682	0.724	0.766	0.808	0.849
45	0.020	0.062	0.103	0.145	0.186	0.228	0.269	0.311	0.352	0.394	0.435	0.476	0.518	0.559	0.601	0.642	0.684	0.725	0.767	0.808	0.849
50	0.029	0.070	0.111	0.152	0.193	0.234	0.275	0.316	0.357	0.398	0.439	0.480	0.521	0.562	0.603	0.644	0.685	0.726	0.767	0.808	0.849
55	0.039	0.079	0.120	0.161	0.201	0.242	0.282	0.323	0.363	0.404	0.444	0.485	0.525	0.566	0.606	0.647	0.687	0.728	0.768	0.809	0.849
60	0.052	0.092	0.132	0.172	0.212	0.252	0.291	0.331	0.371	0.411	0.451	0.491	0.531	0.570	0.610	0.650	0.690	0.730	0.770	0.810	0.849
65	0.069	0.108	0.147	0.186	0.225	0.264	0.303	0.342	0.381	0.420	0.459	0.498	0.537	0.576	0.615	0.654	0.693	0.732	0.771	0.810	0.849
70	0.092	0.130	0.167	0.205	0.243	0.281	0.319	0.357	0.395	0.433	0.471	0.508	0.546	0.584	0.622	0.660	0.698	0.736	0.774	0.812	0.849
75	0.121	0.158	0.194	0.230	0.267	0.303	0.340	0.376	0.412	0.449	0.485	0.522	0.558	0.595	0.631	0.667	0.704	0.740	0.777	0.813	0.849
80	0.162	0.196	0.230	0.265	0.299	0.334	0.368	0.402	0.437	0.471	0.506	0.540	0.574	0.609	0.643	0.678	0.712	0.746	0.781	0.815	0.849
85	0.220	0.252	0.283	0.315	0.346	0.378	0.409	0.441	0.472	0.503	0.535	0.566	0.598	0.629	0.661	0.692	0.724	0.755	0.787	0.818	0.849
90	0.312	0.339	0.366	0.393	0.419	0.446	0.473	0.500	0.527	0.554	0.581	0.608	0.634	0.661	0.688	0.715	0.742	0.769	0.796	0.823	0.849
95	0.478	0.496	0.515	0.533	0.552	0.571	0.589	0.608	0.626	0.645	0.664	0.682	0.701	0.719	0.738	0.757	0.775	0.794	0.812	0.831	0.849
98	0.656	0.666	0.676	0.685	0.695	0.705	0.714	0.724	0.734	0.743	0.753	0.763	0.772	0.782	0.792	0.801	0.811	0.821	0.830	0.840	0.849

ZONE 2

Mean Annual Runoff Coefficients (ROC Value) as a Function of DCIA Percentage and Non-DCIA Curve Number

NDCIA CN	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	0.002	0.043	0.083	0.123	0.164	0.204	0.244	0.285	0.325	0.366	0.406	0.446	0.487	0.527	0.567	0.608	0.648	0.688	0.729	0.769	0.809
35	0.004	0.044	0.085	0.125	0.165	0.205	0.246	0.286	0.326	0.366	0.407	0.447	0.487	0.528	0.568	0.608	0.648	0.689	0.729	0.769	0.809
40	0.007	0.047	0.087	0.127	0.167	0.207	0.248	0.288	0.328	0.368	0.408	0.448	0.488	0.528	0.569	0.609	0.649	0.689	0.729	0.769	0.809
45	0.010	0.050	0.090	0.130	0.170	0.210	0.250	0.290	0.330	0.370	0.410	0.450	0.490	0.530	0.570	0.610	0.650	0.690	0.729	0.769	0.809
50	0.015	0.055	0.095	0.134	0.174	0.214	0.254	0.293	0.333	0.373	0.412	0.452	0.492	0.531	0.571	0.611	0.651	0.690	0.730	0.770	0.809
55	0.022	0.061	0.101	0.140	0.179	0.219	0.258	0.298	0.337	0.376	0.416	0.455	0.494	0.534	0.573	0.613	0.652	0.691	0.731	0.770	0.809
60	0.030	0.069	0.108	0.147	0.186	0.225	0.264	0.303	0.342	0.381	0.420	0.459	0.498	0.537	0.576	0.615	0.654	0.693	0.731	0.770	0.809
65	0.042	0.080	0.119	0.157	0.195	0.234	0.272	0.311	0.349	0.387	0.426	0.464	0.502	0.541	0.579	0.618	0.656	0.694	0.733	0.771	0.809
70	0.057	0.095	0.133	0.170	0.208	0.245	0.283	0.321	0.358	0.396	0.433	0.471	0.509	0.546	0.584	0.621	0.659	0.697	0.734	0.772	0.809
75	0.079	0.116	0.152	0.189	0.225	0.262	0.298	0.335	0.371	0.408	0.444	0.481	0.517	0.554	0.590	0.627	0.663	0.700	0.736	0.773	0.809
80	0.111	0.146	0.181	0.216	0.251	0.285	0.320	0.355	0.390	0.425	0.460	0.495	0.530	0.565	0.600	0.635	0.670	0.705	0.740	0.774	0.809
85	0.160	0.192	0.225	0.257	0.290	0.322	0.355	0.387	0.420	0.452	0.485	0.517	0.550	0.582	0.614	0.647	0.679	0.712	0.744	0.777	0.809
90	0.242	0.270	0.299	0.327	0.355	0.384	0.412	0.440	0.469	0.497	0.526	0.554	0.582	0.611	0.639	0.667	0.696	0.724	0.753	0.781	0.809
95	0.404	0.424	0.444	0.464	0.485	0.505	0.525	0.546	0.566	0.586	0.606	0.627	0.647	0.667	0.688	0.708	0.728	0.749	0.769	0.789	0.809
98	0.595	0.605	0.616	0.627	0.638	0.648	0.659	0.670	0.680	0.691	0.702	0.713	0.723	0.734	0.745	0.756	0.766	0.777	0.788	0.799	0.809

ZONE 3
Mean Annual Runoff Coefficients (ROC Value) as a Function of DCIA Percentage and Non-DCIA Curve Number

NDCIA CN	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	0.008	0.047	0.087	0.126	0.165	0.205	0.244	0.283	0.323	0.362	0.401	0.441	0.480	0.519	0.559	0.598	0.637	0.677	0.716	0.756	0.795
35	0.012	0.051	0.090	0.129	0.168	0.207	0.247	0.286	0.325	0.364	0.403	0.442	0.482	0.521	0.560	0.599	0.638	0.677	0.717	0.756	0.795
40	0.016	0.055	0.094	0.133	0.172	0.211	0.250	0.289	0.328	0.367	0.406	0.445	0.483	0.522	0.561	0.600	0.639	0.678	0.717	0.756	0.795
45	0.022	0.061	0.099	0.138	0.177	0.215	0.254	0.292	0.331	0.370	0.408	0.447	0.486	0.524	0.563	0.602	0.640	0.679	0.718	0.756	0.795
50	0.029	0.067	0.105	0.144	0.182	0.220	0.259	0.297	0.335	0.374	0.412	0.450	0.488	0.527	0.565	0.603	0.642	0.680	0.718	0.757	0.795
55	0.037	0.075	0.113	0.151	0.189	0.227	0.265	0.302	0.340	0.378	0.416	0.454	0.492	0.530	0.568	0.605	0.643	0.681	0.719	0.757	0.795
60	0.048	0.085	0.123	0.160	0.197	0.235	0.272	0.309	0.347	0.384	0.421	0.459	0.496	0.533	0.571	0.608	0.645	0.683	0.720	0.758	0.795
65	0.061	0.098	0.134	0.171	0.208	0.244	0.281	0.318	0.355	0.391	0.428	0.465	0.501	0.538	0.575	0.611	0.648	0.685	0.721	0.758	0.795
70	0.078	0.114	0.149	0.185	0.221	0.257	0.293	0.329	0.365	0.400	0.436	0.472	0.508	0.544	0.580	0.616	0.651	0.687	0.723	0.759	0.795
75	0.100	0.135	0.170	0.204	0.239	0.274	0.308	0.343	0.378	0.413	0.447	0.482	0.517	0.552	0.586	0.621	0.656	0.691	0.725	0.760	0.795
80	0.131	0.164	0.197	0.231	0.264	0.297	0.330	0.363	0.397	0.430	0.463	0.496	0.529	0.562	0.596	0.629	0.662	0.695	0.728	0.762	0.795
85	0.177	0.208	0.239	0.269	0.300	0.331	0.362	0.393	0.424	0.455	0.486	0.517	0.548	0.579	0.609	0.640	0.671	0.702	0.733	0.764	0.795
90	0.252	0.279	0.306	0.333	0.360	0.388	0.415	0.442	0.469	0.496	0.523	0.550	0.578	0.605	0.632	0.659	0.686	0.713	0.741	0.768	0.795
95	0.399	0.419	0.439	0.458	0.478	0.498	0.518	0.538	0.557	0.577	0.597	0.617	0.637	0.656	0.676	0.696	0.716	0.735	0.755	0.775	0.795
98	0.578	0.589	0.600	0.611	0.622	0.633	0.643	0.654	0.665	0.676	0.687	0.697	0.708	0.719	0.730	0.741	0.752	0.762	0.773	0.784	0.795

ZONE 4
Mean Annual Runoff Coefficients (ROC Value) as a Function of DCIA Percentage and Non-DCIA Curve Number

NDCIA CN	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	0.004	0.045	0.086	0.127	0.168	0.209	0.250	0.291	0.332	0.373	0.414	0.455	0.496	0.536	0.577	0.618	0.659	0.700	0.741	0.782	0.823
35	0.007	0.048	0.089	0.129	0.170	0.211	0.252	0.293	0.333	0.374	0.415	0.456	0.497	0.537	0.578	0.619	0.660	0.701	0.741	0.782	0.823
40	0.011	0.051	0.092	0.133	0.173	0.214	0.254	0.295	0.336	0.376	0.417	0.458	0.498	0.539	0.579	0.620	0.661	0.701	0.742	0.782	0.823
45	0.016	0.056	0.096	0.137	0.177	0.217	0.258	0.298	0.339	0.379	0.419	0.460	0.500	0.540	0.581	0.621	0.662	0.702	0.742	0.783	0.823
50	0.022	0.062	0.102	0.142	0.182	0.222	0.262	0.302	0.342	0.382	0.423	0.463	0.503	0.543	0.583	0.623	0.663	0.703	0.743	0.783	0.823
55	0.030	0.070	0.109	0.149	0.189	0.228	0.268	0.308	0.347	0.387	0.427	0.466	0.506	0.546	0.585	0.625	0.664	0.704	0.744	0.783	0.823
60	0.040	0.080	0.119	0.158	0.197	0.236	0.275	0.314	0.353	0.393	0.432	0.471	0.510	0.549	0.588	0.627	0.667	0.706	0.745	0.784	0.823
65	0.054	0.092	0.131	0.169	0.208	0.246	0.285	0.323	0.362	0.400	0.438	0.477	0.515	0.554	0.592	0.631	0.669	0.708	0.746	0.785	0.823
70	0.071	0.109	0.147	0.184	0.222	0.259	0.297	0.335	0.372	0.410	0.447	0.485	0.522	0.560	0.598	0.635	0.673	0.710	0.748	0.785	0.823
75	0.096	0.132	0.168	0.205	0.241	0.277	0.314	0.350	0.387	0.423	0.459	0.496	0.532	0.568	0.605	0.641	0.678	0.714	0.750	0.787	0.823
80	0.130	0.165	0.199	0.234	0.268	0.303	0.338	0.372	0.407	0.442	0.476	0.511	0.546	0.580	0.615	0.650	0.684	0.719	0.754	0.788	0.823
85	0.182	0.214	0.246	0.278	0.310	0.342	0.374	0.406	0.438	0.470	0.502	0.534	0.566	0.599	0.631	0.663	0.695	0.727	0.759	0.791	0.823
90	0.266	0.294	0.322	0.350	0.378	0.406	0.433	0.461	0.489	0.517	0.545	0.573	0.600	0.628	0.656	0.684	0.712	0.740	0.767	0.795	0.823
95	0.429	0.449	0.469	0.488	0.508	0.528	0.547	0.567	0.587	0.606	0.626	0.646	0.665	0.685	0.705	0.725	0.744	0.764	0.784	0.803	0.823
98	0.616	0.626	0.636	0.647	0.657	0.667	0.678	0.688	0.699	0.709	0.719	0.730	0.740	0.750	0.761	0.771	0.782	0.792	0.802	0.813	0.823

ZONE 5
Mean Annual Runoff Coefficients (ROC Value) as a Function of DCIA Percentage and Non-DCIA Curve Number

NDCIA CN	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	0.008	0.048	0.088	0.128	0.168	0.208	0.248	0.288	0.328	0.368	0.408	0.448	0.488	0.528	0.568	0.608	0.648	0.688	0.728	0.768	0.808
35	0.012	0.052	0.092	0.132	0.171	0.211	0.251	0.291	0.331	0.370	0.410	0.450	0.490	0.529	0.569	0.609	0.649	0.689	0.728	0.768	0.808
40	0.018	0.057	0.097	0.136	0.176	0.215	0.255	0.294	0.334	0.373	0.413	0.452	0.492	0.531	0.571	0.611	0.650	0.690	0.729	0.769	0.808
45	0.025	0.064	0.103	0.142	0.182	0.221	0.260	0.299	0.338	0.377	0.417	0.456	0.495	0.534	0.573	0.612	0.651	0.691	0.730	0.769	0.808
50	0.034	0.072	0.111	0.150	0.189	0.227	0.266	0.305	0.343	0.382	0.421	0.460	0.498	0.537	0.576	0.614	0.653	0.692	0.731	0.769	0.808
55	0.044	0.082	0.121	0.159	0.197	0.235	0.273	0.312	0.350	0.388	0.426	0.464	0.502	0.541	0.579	0.617	0.655	0.693	0.732	0.770	0.808
60	0.057	0.095	0.132	0.170	0.207	0.245	0.282	0.320	0.357	0.395	0.433	0.470	0.508	0.545	0.583	0.620	0.658	0.695	0.733	0.770	0.808
65	0.073	0.110	0.147	0.183	0.220	0.257	0.294	0.330	0.367	0.404	0.441	0.477	0.514	0.551	0.588	0.624	0.661	0.698	0.735	0.771	0.808
70	0.093	0.129	0.165	0.201	0.236	0.272	0.308	0.344	0.379	0.415	0.451	0.486	0.522	0.558	0.594	0.629	0.665	0.701	0.737	0.772	0.808
75	0.120	0.155	0.189	0.223	0.258	0.292	0.327	0.361	0.395	0.430	0.464	0.498	0.533	0.567	0.602	0.636	0.670	0.705	0.739	0.774	0.808
80	0.157	0.189	0.222	0.254	0.287	0.319	0.352	0.385	0.417	0.450	0.482	0.515	0.547	0.580	0.613	0.645	0.678	0.710	0.743	0.775	0.808
85	0.209	0.239	0.269	0.299	0.329	0.359	0.389	0.419	0.449	0.479	0.509	0.538	0.568	0.598	0.628	0.658	0.688	0.718	0.748	0.778	0.808
90	0.292	0.318	0.343	0.369	0.395	0.421	0.447	0.472	0.498	0.524	0.550	0.576	0.602	0.627	0.653	0.679	0.705	0.731	0.756	0.782	0.808
95	0.445	0.464	0.482	0.500	0.518	0.536	0.554	0.572	0.590	0.609	0.627	0.645	0.663	0.681	0.699	0.717	0.736	0.754	0.772	0.790	0.808
98	0.614	0.624	0.633	0.643	0.653	0.662	0.672	0.682	0.692	0.701	0.711	0.721	0.730	0.740	0.750	0.760	0.769	0.779	0.789	0.798	0.808

Appendix O

Traditional BMP Treatment Efficiencies

Directions for use

This listing of BMPs defines the treatment efficiencies for total phosphorous (TP) and total nitrogen (TN) for traditional BMPs. Applicants will determine the predicted pollutant loading from their post development site the treatment efficiency required as described in applicant's Handbook Volume I. Treatment efficiencies for traditional BMPs alone are listed in the table. Some BMPs do not have a static efficiency and the applicant will have to refer to the formulas or tables provided to calculate the BMP's efficiency. Applicants will design their system so that their BMP's Efficiency, either by itself or in series with others, matches the required efficiency set forth in AH Vol I. BMPs designed in series will have their treatment efficiencies calculated by the formula listed in the BMP Treatment Train section.

All BMPs are required to meet all the design requirements outlined in the applicable Applicant's Handbook Volume II.

Table 1: of BMP Efficiencies

BMP	TP Reduction	TN Reduction	Data Source
Retention Pond and Retention Systems	Based on percent reduction using project's percent directly connected impervious area (DCIA), non-DCIA curve number (CN), and rainfall zone	Based on percent reduction using project's percent directly connected impervious area (DCIA), non-DCIA curve number (CN), and rainfall zone	Evaluation of current stormwater design criteria within the state of Florida, Harper and Baker 2007
Wet detention ponds	Formula based on Average Annual Residence Time for Removal Efficiency of Total Phosphorus	Formula based on Average Annual Residence Time Removal Efficiency of Total Nitrogen	Evaluation of current stormwater design criteria within the state of Florida, Harper and Baker 2007
Baffle boxes (gravity-based separators)—First generation	2.30%	0.50%	Final report, Contract S0236, Effectiveness of baffle boxes plus media filter, by GPI Southeast 2010; Demonstration bio media for ultra-urban stormwater treatment, by University of Central Florida (UCF) for Florida Department of Transportation (FDOT); and Final report, Contract S0497, Baffle box with media filtration installation and effectiveness evaluation by City of Casselberry,

BMP	TP Reduction	TN Reduction	Data Source
Baffle boxes (gravity-based separators)—Second generation	15.50%	19.05%	Final report, Contract S0236, Effectiveness of baffle boxes plus media filter, by GPI Southeast 2010; Demonstration bio media for ultra-urban stormwater treatment, by University of Central Florida (UCF) for Florida Department of Transportation (FDOT); and Final report, Contract S0497, Baffle box with media filtration installation and effectiveness evaluation by City of Casselberry,
Baffle boxes (gravity-based separators)—Second generation plus media filter	Media Mix Efficiency	Media Mix Efficiency	Final report, Contract S0236, Effectiveness of baffle boxes plus media filter, by GPI Southeast 2010; Demonstration bio media for ultra-urban stormwater treatment, by University of Central Florida (UCF) for Florida Department of Transportation (FDOT); and Final report, Contract S0497, Baffle box with media filtration installation and effectiveness evaluation by City of Casselberry,
Hydrodynamic separators (including vortex and continuous deflector separators [CDS] units)	10%	N/A	Final Report, Contract S0095, Sanford Stormceptor Project, 2008; Final Report, Contract WM793, Broadway Outfall Project, 2006

BMP	TP Reduction	TN Reduction	Data Source
Catch basin inserts/inlet filter cleanout (drainage features and units with no specific water quality treatment mechanism), including the following: • Curb inlets. • Area catch basins. • Pavement catch basins. • Projects serving drainage and conveyance functions.	Determine annual average dry weight/volume of material collected over a period of 3 years (or representative period of current effort) and enter values into the Florida Stormwater Association (FSA) University of Florida (UF) Municipal Separate Storm Sewer (MS4) BMP Toolkit (FINAL MS4 Load Reduction Tool 2019 or newer version) for estimated TP reduction	Determine annual average dry weight/volume of material collected over a period of 3 years (or representative period of current effort) and enter values into the Florida Stormwater Association (FSA) University of Florida (UF) Municipal Separate Storm Sewer (MS4) BMP Toolkit (FINAL MS4 Load Reduction Tool 2019 or newer version) for estimated TN reduction	2019 Final Report (or newer version), FSA UF MS4 BMP Project
Green Stormwater Infrastructure Efforts Including: Green Roofs, Rain gardens, Swales with blocks, Bioswales, Tree boxes, Tree wells, Vegetated Natural Buffers, Vegetated filter strip, Pervious Pavement Systems	Use appropriate retention or detention calculation for volume captured then add an additional removal based on plant, soil and media selections in a treatment train configuration.	Use appropriate retention or detention calculation for volume captured then add an additional removal based on plant, soil and media selections in a treatment train configuration.	Evaluation of current stormwater design criteria within the state of Florida, Harper and Baker 2007
Floating islands/managed aquatic plant systems (MAPS)	12% removal with 5 % pond coverage based on harvesting at least every 12 months.	12% removal with 5 % pond coverage based on harvesting at least every 12 months.	Floating Wetland Systems for Nutrient Removal in Stormwater Ponds Wanielista and Chang 2012
Littoral Zone	Maximum 10% removal with a minimum littoral zone area as described in AH Volume II.	Maximum 10% removal with a minimum littoral zone area as described in AH Volume II.	Nutrient Removal From Urban Strom Urban Stormwater Using Floating Stormwater Using Floating Treatment Wetland System Kamrul Islam 2011 Quantifying the Effect of a Vegetated Littoral Zone on Wet Detention Pond Pollutant Load Reduction DB Environmental, Inc. (2005)

BMP	TP Reduction	TN Reduction	Data Source
Stormwater harvesting	Estimate annual load of stormwater (and percentage of total if not 100 %) not discharged because used for irrigation	Estimate annual load of stormwater (and percentage of total if not 100 %) not discharged because used for irrigation	Evaluated on case-by-case basis (to estimate volume of stormwater reuse, use the rate-efficiency-volume [REV] curve methodology used by DEP. Based on 1991 Wanielista, M., Y. Yousef, G. Harper, and L. Dansereau, Design Curves for the Reuse of Stormwater and 1992 Wanielista, M. and J. Bradner, Maintaining the Balance)
Stormwater alum injection systems	Based on dosage determined in jar testing	Based on dosage determined in jar testing	Harper, H., and J. Herr 1998 study for DEP – Alum treatment of stormwater: The first ten years

Treatment Train

BMPs can be implemented in combination or in conjunction with one another in a series called a best management practice treatment train. Where BMPs are used in series, the calculated overall efficiency of the treatment train must account for the reduced loading or concentrations that are available for removal by the subsequent downstream treatment device. This relationship is shown in Equation 9-5. This equation assumes each BMP acts independently of upstream BMPs, and that upstream BMPs do not impact performance of downstream BMPs. As stormwater pollutant concentrations are reduced in each BMP in the treatment train, the ability of a downstream BMP in the treatment train should not be arbitrarily reduced when used in Equation 9-5. The overall design removal calculations for a BMP treatment train should reflect any objective information where there is an identifiable causal relationship where a downstream unit treatment efficiency would be diminished in some manner by the operation of a specific upstream treatment unit. If such a causal relationship exists where the BMP acts in combination with the upstream BMP, the designer should consider the use of another methodology to accurately determine the resultant efficiency of the overall BMP treatment train.

Equation 9-5: Overall Treatment Train Efficiency for systems in series

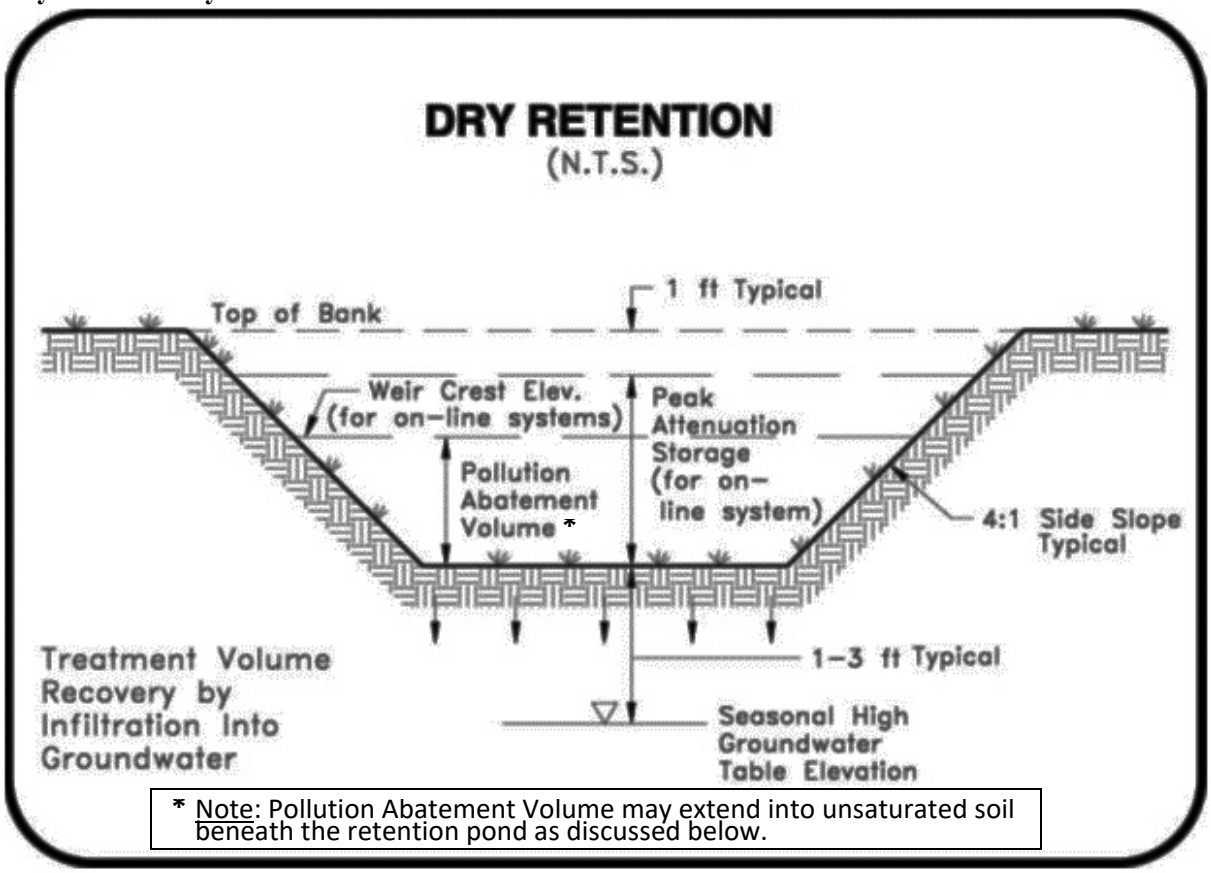
$$Overall\ Treatment\ Train\ Efficiency = Eff1 + [(1 - Eff1)x\ Eff2] + [\{(1 - Eff1) - ((1 - Eff1)xEff2)\}\ x\ Eff3\ ]$$

$$or\ (in\ simplified\ form)$$

$$= 1 - [(1 - Eff1) \times (1 - Eff2) \times (1 - Eff3) \times \ldots \times (1 - Effn)]$$

where:
Eff1 = efficiency (as a decimal) of initial or first treatment system
Eff2 = efficiency (as a decimal) of second treatment system
Eff3 = efficiency (as a decimal) of third treatment system
Effn = efficiency (as a decimal) of the n^{th} treatment system

Dry Retention Systems



The average annual effectiveness is calculated using an event maximum runoff volume that can be captured in the retention system. This maximum volume is expressed as inches over the catchment area and is called the design volume. It is adjusted for the Curve Number (CN) applied to the non-directly connected impervious area (NDCIA) and the directly connected impervious area (DCIA).

Recovery of the required treatment volume (Pollution Abatement Volume, or PAV) must be achieved within 72 hours or less, equivalent to the volume recovery period utilized for generation of the performance efficiency summarized in the tables. Ability of the pond to achieve this recovery rate must be certified by a registered professional engineer. The required PAV may include the effective unsaturated soil volume beneath the retention pond, to the elevation of the seasonal high groundwater level; however, the PAV inside and above the pond bottom shall at least equal 0.5 inches over the project drainage are for the pond. All side slopes and bottom areas of the pond must be seeded or sodded with water-tolerant grass species grown on sandy soils. If sod is used as the vegetative cover on the bottom of the pond, changes in permeability of the basin resulting from the sod must be included in evaluation of the recovery period for the pond. Inlets and outlets must be located as far apart as possible to prevent short-circuiting. Oil and grease skimmers must be provided at all outfall structures. Other requirements related to side slopes, fencing, maintenance berms, and access will adhere to applicable local agency criteria.

There are 80 tables reflecting design retention depths for five rainfall regions. Each region has a table for 17 different design retention depths. For DCIA and CN other than increments of 5, linear interpolation between the values is performed.

Mean Annual Mass Removal Efficiencies for 0.25-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	86.2	81.3	73.3	65.5	58.7	53.0	48.3	44.2	40.8	37.9	35.3	33.1	31.1	29.4	27.8	26.4	25.1	24.0	22.9	21.9
35	81.6	78.7	71.7	64.5	58.0	52.5	47.9	44.0	40.6	37.7	35.2	33.0	31.0	29.3	27.8	26.4	25.1	23.9	22.9	21.9
40	76.4	75.5	69.6	63.1	57.1	51.9	47.4	43.6	40.3	37.5	35.0	32.9	30.9	29.2	27.7	26.3	25.1	23.9	22.9	21.9
45	70.7	71.7	67.2	61.4	55.9	51.0	46.8	43.1	40.0	37.2	34.8	32.7	30.8	29.1	27.6	26.3	25.0	23.9	22.9	21.9
50	64.7	67.5	64.2	59.4	54.5	50.0	46.0	42.6	39.5	36.9	34.6	32.5	30.7	29.0	27.5	26.2	25.0	23.9	22.9	21.9
55	58.6	62.8	60.9	57.0	52.7	48.7	45.1	41.8	39.0	36.5	34.2	32.3	30.5	28.9	27.4	26.1	24.9	23.9	22.9	21.9
60	52.8	57.8	57.1	54.2	50.7	47.1	43.9	40.9	38.3	35.9	33.8	31.9	30.2	28.7	27.3	26.0	24.9	23.8	22.8	21.9
65	47.3	52.6	53.0	51.1	48.3	45.3	42.5	39.8	37.4	35.3	33.3	31.5	29.9	28.4	27.1	25.9	24.8	23.8	22.8	21.9
70	42.2	47.3	48.6	47.6	45.6	43.2	40.8	38.5	36.4	34.4	32.6	31.0	29.5	28.1	26.9	25.7	24.7	23.7	22.8	21.9
75	37.8	42.2	43.9	43.7	42.4	40.7	38.8	36.9	35.1	33.4	31.8	30.4	29.0	27.8	26.6	25.5	24.5	23.6	22.7	21.9
80	34.0	37.5	39.1	39.4	38.8	37.7	36.4	34.9	33.5	32.1	30.8	29.5	28.3	27.2	26.2	25.2	24.3	23.5	22.7	21.9
85	30.8	33.1	34.3	34.8	34.7	34.2	33.4	32.5	31.4	30.4	29.4	28.4	27.4	26.5	25.7	24.8	24.1	23.3	22.6	21.9
90	27.9	29.2	29.9	30.3	30.3	30.2	29.8	29.3	28.8	28.2	27.5	26.8	26.2	25.5	24.9	24.2	23.6	23.0	22.5	21.9
95	25.3	25.6	25.8	25.9	26.0	25.9	25.8	25.6	25.4	25.2	24.9	24.6	24.3	24.0	23.6	23.3	23.0	22.6	22.3	21.9
98	23.8	23.8	23.8	23.7	23.7	23.6	23.5	23.4	23.3	23.2	23.1	23.0	22.9	22.8	22.6	22.5	22.4	22.2	22.1	21.9

Mean Annual Mass Removal Efficiencies for 0.50-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	91.8	91.5	88.3	84.0	79.5	75.0	70.7	66.6	62.9	59.6	56.5	53.6	51.1	48.7	46.6	44.6	42.8	41.1	39.6	38.1
35	88.2	89.1	86.6	82.8	78.6	74.3	70.1	66.2	62.6	59.3	56.3	53.5	51.0	48.7	46.5	44.6	42.8	41.1	39.6	38.1
40	84.0	86.3	84.4	81.2	77.4	73.4	69.4	65.7	62.2	59.0	56.0	53.3	50.8	48.5	46.4	44.5	42.7	41.1	39.6	38.1
45	79.6	82.9	81.9	79.3	75.9	72.2	68.5	65.0	61.7	58.6	55.7	53.0	50.6	48.4	46.3	44.4	42.7	41.0	39.5	38.1
50	74.8	79.1	79.0	77.0	74.1	70.8	67.4	64.1	61.0	58.0	55.3	52.7	50.4	48.2	46.2	44.3	42.6	41.0	39.5	38.1
55	70.1	74.9	75.6	74.2	71.9	69.1	66.1	63.0	60.1	57.3	54.7	52.3	50.0	47.9	46.0	44.2	42.5	40.9	39.5	38.1
60	65.5	70.4	71.7	71.1	69.4	67.0	64.4	61.7	59.1	56.5	54.1	51.8	49.6	47.6	45.8	44.0	42.4	40.9	39.5	38.1
65	61.0	65.8	67.5	67.6	66.4	64.7	62.5	60.2	57.8	55.5	53.3	51.1	49.1	47.2	45.5	43.8	42.3	40.8	39.4	38.1
70	56.7	61.1	63.1	63.6	63.1	61.9	60.2	58.3	56.3	54.3	52.3	50.3	48.5	46.8	45.1	43.5	42.1	40.7	39.4	38.1
75	52.7	56.6	58.6	59.3	59.3	58.6	57.5	56.0	54.4	52.7	51.0	49.3	47.7	46.1	44.6	43.2	41.8	40.5	39.3	38.1
80	49.1	52.2	54.1	55.0	55.2	54.9	54.2	53.2	52.1	50.8	49.4	48.0	46.6	45.3	44.0	42.7	41.5	40.3	39.2	38.1
85	46.1	48.3	49.7	50.5	50.8	50.8	50.5	49.9	49.2	48.3	47.3	46.3	45.2	44.2	43.1	42.1	41.0	40.0	39.1	38.1
90	43.5	44.8	45.6	46.1	46.4	46.5	46.4	46.1	45.7	45.2	44.6	44.0	43.3	42.6	41.9	41.1	40.4	39.6	38.9	38.1
95	41.1	41.5	41.8	41.9	42.0	42.1	42.0	41.9	41.8	41.6	41.3	41.1	40.8	40.4	40.1	39.7	39.3	38.9	38.5	38.1
98	39.8	39.8	39.8	39.8	39.8	39.7	39.7	39.6	39.5	39.4	39.3	39.2	39.1	39.0	38.9	38.7	38.6	38.4	38.3	38.1

Mean Annual Mass Removal Efficiencies for 0.75-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	94.0	94.9	93.4	91.0	88.1	85.0	81.8	78.7	75.5	72.6	69.7	67.0	64.5	62.1	59.8	57.7	55.7	53.8	52.1	50.5
35	91.2	93.0	91.9	89.8	87.2	84.2	81.2	78.2	75.2	72.3	69.5	66.8	64.3	62.0	59.7	57.6	55.7	53.8	52.1	50.5
40	88.1	90.5	90.1	88.3	86.0	83.3	80.5	77.6	74.7	71.9	69.2	66.6	64.1	61.8	59.6	57.6	55.6	53.8	52.1	50.5
45	84.5	87.7	87.9	86.5	84.5	82.1	79.5	76.8	74.0	71.4	68.8	66.3	63.9	61.6	59.5	57.5	55.5	53.7	52.0	50.5
50	80.8	84.6	85.2	84.4	82.8	80.7	78.3	75.8	73.3	70.7	68.3	65.9	63.6	61.4	59.3	57.3	55.5	53.7	52.0	50.5
55	77.1	81.1	82.2	81.9	80.7	79.0	76.9	74.6	72.3	70.0	67.6	65.4	63.2	61.1	59.1	57.2	55.3	53.6	52.0	50.5
60	73.2	77.5	79.0	79.1	78.3	76.9	75.2	73.2	71.1	69.0	66.9	64.7	62.7	60.7	58.8	56.9	55.2	53.5	51.9	50.5
65	69.6	73.8	75.4	75.8	75.5	74.5	73.2	71.5	69.7	67.8	65.9	63.9	62.0	60.2	58.4	56.7	55.0	53.4	51.9	50.5
70	66.1	69.9	71.7	72.3	72.3	71.7	70.8	69.5	68.0	66.4	64.7	63.0	61.3	59.6	57.9	56.3	54.8	53.3	51.8	50.5
75	62.7	66.0	67.8	68.6	68.8	68.5	67.9	67.1	65.9	64.7	63.3	61.8	60.3	58.8	57.3	55.9	54.5	53.1	51.7	50.5
80	59.6	62.2	63.8	64.7	65.1	65.1	64.8	64.2	63.4	62.5	61.4	60.3	59.1	57.8	56.6	55.3	54.0	52.8	51.6	50.5
85	56.8	58.7	60.0	60.8	61.2	61.4	61.3	61.0	60.5	59.9	59.1	58.3	57.4	56.5	55.5	54.5	53.5	52.5	51.4	50.5
90	54.5	55.6	56.4	57.0	57.3	57.5	57.5	57.4	57.2	56.8	56.4	55.9	55.4	54.7	54.1	53.4	52.7	51.9	51.2	50.5
95	52.5	52.9	53.2	53.3	53.5	53.6	53.6	53.6	53.5	53.4	53.2	53.0	52.8	52.5	52.2	51.9	51.6	51.2	50.8	50.5
98	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.6	51.6	51.5	51.4	51.3	51.3	51.2	51.1	51.0	50.8	50.7	50.6	50.5

Mean Annual Mass Removal Efficiencies for 1.00-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	95.3	96.5	95.9	94.4	92.5	90.3	87.9	85.5	83.1	80.6	78.2	75.8	73.6	71.4	69.2	67.2	65.3	63.4	61.6	60.0
35	93.1	94.9	94.6	93.3	91.6	89.5	87.3	85.0	82.7	80.3	77.9	75.6	73.4	71.2	69.1	67.1	65.2	63.4	61.6	60.0
40	90.7	93.0	93.0	92.0	90.5	88.6	86.6	84.4	82.1	79.9	77.6	75.4	73.2	71.1	69.0	67.0	65.2	63.3	61.6	60.0
45	88.0	90.7	91.0	90.5	89.2	87.5	85.6	83.6	81.5	79.3	77.2	75.0	72.9	70.9	68.8	66.9	65.1	63.3	61.6	60.0
50	85.0	88.0	88.8	88.6	87.6	86.2	84.5	82.7	80.7	78.7	76.6	74.6	72.6	70.6	68.6	66.8	65.0	63.2	61.6	60.0
55	81.8	85.3	86.4	86.3	85.7	84.6	83.2	81.5	79.8	77.9	75.9	74.0	72.1	70.2	68.4	66.6	64.8	63.1	61.5	60.0
60	78.7	82.3	83.6	83.9	83.5	82.7	81.5	80.1	78.6	76.9	75.1	73.4	71.6	69.8	68.0	66.3	64.7	63.0	61.5	60.0
65	75.6	79.1	80.6	81.2	81.0	80.5	79.6	78.5	77.2	75.7	74.1	72.5	70.9	69.3	67.6	66.0	64.4	62.9	61.4	60.0
70	72.7	75.9	77.5	78.2	78.3	78.0	77.4	76.5	75.5	74.2	72.9	71.5	70.1	68.6	67.1	65.6	64.2	62.7	61.3	60.0
75	69.9	72.7	74.2	75.0	75.3	75.2	74.8	74.2	73.4	72.5	71.4	70.3	69.1	67.8	66.5	65.1	63.8	62.5	61.2	60.0
80	67.2	69.5	70.8	71.7	72.1	72.1	72.0	71.6	71.1	70.4	69.6	68.7	67.8	66.7	65.6	64.5	63.4	62.2	61.1	60.0
85	64.8	66.5	67.6	68.3	68.7	68.9	68.9	68.7	68.4	68.0	67.5	66.8	66.1	65.4	64.5	63.7	62.8	61.8	60.9	60.0
90	62.7	63.7	64.4	65.0	65.3	65.5	65.6	65.6	65.5	65.2	65.0	64.6	64.2	63.7	63.1	62.6	61.9	61.3	60.6	60.0
95	61.1	61.5	61.8	62.0	62.1	62.2	62.3	62.3	62.3	62.2	62.1	62.0	61.8	61.6	61.4	61.2	60.9	60.6	60.3	60.0
98	60.7	60.7	60.7	60.8	60.8	60.8	60.8	60.8	60.7	60.7	60.7	60.6	60.6	60.5	60.4	60.3	60.3	60.2	60.1	60.0

Mean Annual Mass Removal Efficiencies for 1.25-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	96.1	97.3	97.2	96.3	94.9	93.4	91.6	89.7	87.8	85.8	83.8	81.8	79.9	77.9	76.0	74.2	72.4	70.6	68.9	67.3
35	94.5	96.1	96.2	95.4	94.1	92.7	91.0	89.2	87.4	85.5	83.5	81.6	79.7	77.8	75.9	74.1	72.3	70.6	68.9	67.3
40	92.5	94.5	94.8	94.2	93.2	91.9	90.3	88.6	86.9	85.0	83.2	81.3	79.5	77.6	75.8	74.0	72.3	70.6	68.9	67.3
45	90.4	92.7	93.2	92.8	92.0	90.9	89.4	87.9	86.3	84.5	82.8	81.0	79.2	77.4	75.6	73.9	72.2	70.5	68.9	67.3
50	88.0	90.6	91.3	91.2	90.6	89.7	88.4	87.0	85.5	83.9	82.2	80.5	78.8	77.1	75.4	73.7	72.1	70.4	68.9	67.3
55	85.4	88.2	89.2	89.3	88.9	88.2	87.2	86.0	84.6	83.1	81.6	80.0	78.4	76.7	75.1	73.5	71.9	70.3	68.8	67.3
60	82.7	85.7	86.9	87.2	87.0	86.5	85.7	84.7	83.5	82.2	80.8	79.3	77.8	76.3	74.8	73.2	71.7	70.2	68.8	67.3
65	80.1	83.1	84.4	84.9	84.9	84.5	83.9	83.1	82.1	81.0	79.8	78.5	77.1	75.7	74.3	72.9	71.5	70.1	68.7	67.3
70	77.6	80.3	81.7	82.4	82.5	82.4	81.9	81.3	80.6	79.7	78.6	77.5	76.3	75.1	73.8	72.5	71.2	69.9	68.6	67.3
75	75.2	77.6	79.0	79.7	80.0	79.9	79.7	79.3	78.7	78.0	77.2	76.3	75.3	74.2	73.1	72.0	70.9	69.7	68.5	67.3
80	73.0	74.9	76.1	76.8	77.2	77.3	77.3	77.0	76.6	76.1	75.5	74.8	74.0	73.2	72.3	71.4	70.4	69.4	68.4	67.3
85	70.9	72.3	73.3	73.9	74.3	74.5	74.6	74.5	74.3	73.9	73.5	73.1	72.5	71.9	71.2	70.5	69.8	69.0	68.2	67.3
90	69.2	70.0	70.6	71.1	71.4	71.6	71.7	71.7	71.7	71.5	71.3	71.1	70.7	70.4	70.0	69.5	69.0	68.5	67.9	67.3
95	67.8	68.1	68.4	68.6	68.7	68.9	68.9	69.0	69.0	69.0	68.9	68.9	68.7	68.6	68.5	68.3	68.1	67.8	67.6	67.3
98	67.7	67.7	67.7	67.8	67.8	67.8	67.8	67.8	67.8	67.8	67.8	67.8	67.7	67.7	67.6	67.6	67.5	67.5	67.4	67.3

Mean Annual Mass Removal Efficiencies for 1.50-inches of Retention for Zone 1

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	96.8	97.8	98.0	97.5	96.5	95.3	94.0	92.5	90.9	89.3	87.7	86.0	84.3	82.7	81.0	79.3	77.7	76.1	74.6	73.1
35	95.5	96.9	97.1	96.7	95.8	94.7	93.5	92.1	90.6	89.0	87.4	85.8	84.1	82.5	80.9	79.3	77.7	76.1	74.6	73.1
40	93.9	95.6	96.0	95.7	95.0	94.0	92.8	91.5	90.1	88.6	87.1	85.5	83.9	82.3	80.7	79.2	77.6	76.1	74.6	73.1
45	92.1	94.2	94.7	94.5	93.9	93.1	92.0	90.8	89.5	88.1	86.6	85.1	83.6	82.1	80.6	79.0	77.5	76.0	74.5	73.1
50	90.3	92.5	93.1	93.1	92.7	92.0	91.1	90.0	88.8	87.5	86.1	84.7	83.3	81.8	80.3	78.9	77.4	75.9	74.5	73.1
55	88.2	90.5	91.3	91.4	91.2	90.7	89.9	89.0	87.9	86.8	85.5	84.2	82.8	81.5	80.1	78.6	77.2	75.8	74.4	73.1
60	85.9	88.3	89.3	89.6	89.6	89.2	88.6	87.8	86.9	85.9	84.7	83.5	82.3	81.0	79.7	78.4	77.0	75.7	74.4	73.1
65	83.5	86.0	87.2	87.7	87.7	87.5	87.0	86.4	85.7	84.8	83.8	82.8	81.7	80.5	79.3	78.1	76.8	75.6	74.3	73.1
70	81.4	83.7	85.0	85.5	85.7	85.6	85.3	84.8	84.2	83.5	82.7	81.8	80.9	79.9	78.8	77.7	76.5	75.4	74.2	73.1
75	79.4	81.4	82.5	83.2	83.5	83.5	83.3	83.0	82.6	82.1	81.4	80.7	79.9	79.1	78.1	77.2	76.2	75.2	74.1	73.1
80	77.4	79.1	80.1	80.8	81.1	81.2	81.2	81.0	80.8	80.4	79.9	79.4	78.8	78.1	77.3	76.5	75.7	74.9	74.0	73.1
85	75.7	76.9	77.7	78.3	78.6	78.8	78.9	78.9	78.7	78.5	78.2	77.8	77.4	76.9	76.3	75.8	75.1	74.5	73.8	73.1
90	74.2	74.9	75.4	75.9	76.2	76.4	76.5	76.5	76.5	76.4	76.3	76.1	75.8	75.5	75.2	74.8	74.4	74.0	73.6	73.1
95	73.1	73.3	73.6	73.8	73.9	74.0	74.1	74.2	74.2	74.2	74.2	74.2	74.1	74.0	73.9	73.8	73.6	73.5	73.3	73.1
98	73.1	73.1	73.2	73.2	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.2	73.2	73.2	73.1	73.1

Mean Annual Mass Removal Efficiencies for 1.75-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	97.3	98.1	98.4	98.2	97.6	96.6	95.6	94.4	93.2	91.8	90.4	89.0	87.6	86.1	84.7	83.3	81.8	80.4	79.0	77.6
35	96.1	97.4	97.7	97.6	97.0	96.1	95.1	94.0	92.8	91.5	90.2	88.8	87.4	86.0	84.6	83.2	81.8	80.4	79.0	77.6
40	94.9	96.4	96.8	96.7	96.2	95.5	94.5	93.5	92.4	91.1	89.9	88.5	87.2	85.8	84.4	83.1	81.7	80.3	78.9	77.6
45	93.5	95.3	95.8	95.7	95.3	94.6	93.8	92.9	91.8	90.6	89.5	88.2	86.9	85.6	84.2	82.9	81.6	80.2	78.9	77.6
50	92.0	93.9	94.5	94.5	94.2	93.7	93.0	92.1	91.2	90.1	89.0	87.8	86.6	85.3	84.0	82.8	81.5	80.2	78.9	77.6
55	90.3	92.3	93.0	93.1	92.9	92.5	92.0	91.2	90.4	89.4	88.4	87.3	86.1	85.0	83.8	82.6	81.3	80.1	78.8	77.6
60	88.4	90.5	91.3	91.5	91.5	91.2	90.8	90.1	89.4	88.6	87.7	86.7	85.6	84.5	83.4	82.3	81.1	80.0	78.8	77.6
65	86.4	88.4	89.4	89.8	89.9	89.7	89.4	88.9	88.3	87.6	86.8	86.0	85.0	84.0	83.0	82.0	80.9	79.8	78.7	77.6
70	84.4	86.4	87.4	88.0	88.1	88.1	87.9	87.5	87.0	86.4	85.8	85.1	84.3	83.4	82.5	81.6	80.6	79.6	78.6	77.6
75	82.6	84.4	85.4	86.0	86.2	86.3	86.2	85.9	85.6	85.1	84.6	84.0	83.4	82.7	81.9	81.1	80.3	79.4	78.5	77.6
80	81.0	82.4	83.3	83.9	84.2	84.3	84.3	84.2	84.0	83.7	83.3	82.8	82.4	81.8	81.2	80.6	79.9	79.1	78.4	77.6
85	79.4	80.5	81.2	81.7	82.0	82.2	82.3	82.3	82.2	82.0	81.8	81.5	81.2	80.8	80.4	79.9	79.3	78.8	78.2	77.6
90	78.1	78.8	79.3	79.6	79.9	80.1	80.2	80.3	80.3	80.2	80.1	80.0	79.8	79.6	79.3	79.0	78.7	78.4	78.0	77.6
95	77.3	77.5	77.8	77.9	78.1	78.2	78.3	78.3	78.4	78.4	78.4	78.4	78.4	78.3	78.2	78.1	78.0	77.9	77.7	77.6
98	77.4	77.5	77.5	77.6	77.6	77.7	77.7	77.7	77.7	77.7	77.7	77.7	77.7	77.7	77.7	77.7	77.7	77.6	77.6	77.6

Mean Annual Mass Removal Efficiencies for 2.00-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	97.9	98.5	98.6	98.6	98.3	97.6	96.7	95.8	94.8	93.7	92.5	91.3	90.0	88.8	87.5	86.2	85.0	83.7	82.4	81.2
35	96.7	97.8	98.1	98.1	97.8	97.1	96.3	95.4	94.4	93.4	92.2	91.1	89.9	88.7	87.4	86.2	84.9	83.7	82.4	81.2
40	95.6	97.0	97.5	97.4	97.1	96.6	95.8	94.9	94.0	93.0	91.9	90.8	89.7	88.5	87.3	86.0	84.8	83.6	82.4	81.2
45	94.5	96.1	96.6	96.6	96.3	95.8	95.2	94.4	93.5	92.6	91.6	90.5	89.4	88.3	87.1	85.9	84.7	83.6	82.4	81.2
50	93.3	95.0	95.5	95.6	95.4	94.9	94.4	93.7	93.0	92.1	91.1	90.1	89.1	88.0	86.9	85.8	84.6	83.5	82.3	81.2
55	91.9	93.7	94.3	94.4	94.2	93.9	93.5	92.9	92.2	91.4	90.6	89.6	88.7	87.7	86.6	85.6	84.5	83.4	82.3	81.2
60	90.4	92.1	92.8	93.0	93.0	92.8	92.4	91.9	91.3	90.6	89.9	89.1	88.2	87.3	86.3	85.3	84.3	83.3	82.2	81.2
65	88.7	90.4	91.2	91.5	91.6	91.5	91.2	90.8	90.3	89.8	89.1	88.4	87.6	86.8	85.9	85.0	84.1	83.1	82.2	81.2
70	87.0	88.6	89.4	89.9	90.1	90.1	89.9	89.6	89.2	88.7	88.2	87.6	86.9	86.2	85.4	84.6	83.8	83.0	82.1	81.2
75	85.3	86.8	87.7	88.2	88.4	88.5	88.4	88.2	87.9	87.6	87.1	86.7	86.1	85.5	84.9	84.2	83.5	82.8	82.0	81.2
80	83.8	85.1	85.8	86.3	86.7	86.8	86.8	86.7	86.5	86.3	86.0	85.6	85.2	84.7	84.2	83.7	83.1	82.5	81.9	81.2
85	82.5	83.4	84.0	84.5	84.8	85.0	85.0	85.0	84.9	84.8	84.6	84.4	84.1	83.8	83.4	83.1	82.6	82.2	81.7	81.2
90	81.4	81.9	82.4	82.7	82.9	83.1	83.2	83.3	83.3	83.3	83.2	83.1	82.9	82.8	82.6	82.3	82.1	81.8	81.5	81.2
95	80.7	80.9	81.1	81.2	81.4	81.5	81.6	81.6	81.7	81.7	81.7	81.7	81.7	81.7	81.6	81.6	81.5	81.4	81.3	81.2
98	80.9	80.9	81.0	81.0	81.1	81.1	81.1	81.2	81.2	81.2	81.2	81.2	81.2	81.2	81.2	81.2	81.2	81.2	81.2	81.2

Mean Annual Mass Removal Efficiencies for 2.25-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.4	98.8	98.9	98.9	98.7	98.2	97.6	96.8	95.9	95.0	94.0	93.0	91.9	90.8	89.7	88.6	87.5	86.3	85.2	84.1
35	97.2	98.1	98.4	98.5	98.3	97.9	97.2	96.5	95.6	94.7	93.8	92.8	91.8	90.7	89.6	88.5	87.4	86.3	85.2	84.1
40	96.2	97.4	97.8	97.9	97.8	97.3	96.8	96.1	95.3	94.4	93.5	92.6	91.6	90.5	89.5	88.4	87.3	86.2	85.1	84.1
45	95.3	96.7	97.2	97.3	97.1	96.7	96.2	95.5	94.8	94.0	93.2	92.3	91.3	90.3	89.3	88.3	87.2	86.2	85.1	84.1
50	94.3	95.8	96.3	96.5	96.3	95.9	95.5	94.9	94.3	93.6	92.8	91.9	91.0	90.1	89.1	88.1	87.1	86.1	85.1	84.1
55	93.2	94.8	95.3	95.4	95.3	95.0	94.6	94.2	93.6	93.0	92.3	91.5	90.6	89.8	88.9	87.9	87.0	86.0	85.0	84.1
60	92.0	93.5	94.1	94.3	94.2	94.0	93.7	93.3	92.8	92.3	91.6	90.9	90.2	89.4	88.6	87.7	86.8	85.9	85.0	84.1
65	90.6	92.0	92.7	92.9	93.0	92.9	92.7	92.4	92.0	91.5	90.9	90.3	89.7	89.0	88.2	87.4	86.6	85.8	84.9	84.1
70	89.1	90.4	91.1	91.5	91.6	91.6	91.5	91.3	91.0	90.5	90.1	89.6	89.0	88.4	87.8	87.1	86.4	85.6	84.8	84.1
75	87.6	88.8	89.5	90.0	90.2	90.3	90.2	90.1	89.8	89.5	89.2	88.8	88.3	87.8	87.3	86.7	86.1	85.4	84.7	84.1
80	86.2	87.2	87.9	88.4	88.6	88.8	88.8	88.7	88.6	88.4	88.1	87.8	87.5	87.1	86.7	86.2	85.7	85.2	84.6	84.1
85	85.0	85.8	86.4	86.8	87.0	87.2	87.3	87.3	87.2	87.1	86.9	86.8	86.5	86.3	86.0	85.6	85.3	84.9	84.5	84.1
90	84.0	84.5	84.9	85.2	85.4	85.6	85.7	85.7	85.7	85.7	85.7	85.6	85.5	85.4	85.2	85.0	84.8	84.6	84.3	84.1
95	83.4	83.6	83.8	84.0	84.1	84.2	84.3	84.3	84.4	84.4	84.4	84.4	84.4	84.4	84.4	84.3	84.3	84.2	84.1	84.1
98	83.7	83.7	83.8	83.8	83.9	83.9	83.9	84.0	84.0	84.0	84.0	84.0	84.0	84.1	84.1	84.1	84.1	84.1	84.1	84.1

Mean Annual Mass Removal Efficiencies for 2.50-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.7	99.1	99.1	99.1	99.0	98.7	98.2	97.6	96.8	96.1	95.2	94.3	93.4	92.5	91.5	90.5	89.5	88.5	87.4	86.4
35	97.7	98.4	98.6	98.7	98.6	98.4	97.9	97.3	96.6	95.8	95.0	94.2	93.3	92.3	91.4	90.4	89.4	88.4	87.4	86.4
40	96.7	97.8	98.2	98.3	98.2	98.0	97.5	96.9	96.3	95.5	94.8	93.9	93.1	92.2	91.3	90.3	89.3	88.4	87.4	86.4
45	95.9	97.2	97.6	97.8	97.7	97.4	97.0	96.4	95.8	95.2	94.4	93.7	92.8	92.0	91.1	90.2	89.3	88.3	87.4	86.4
50	95.1	96.5	97.0	97.1	97.0	96.7	96.3	95.9	95.3	94.7	94.1	93.3	92.6	91.7	90.9	90.0	89.2	88.2	87.3	86.4
55	94.3	95.6	96.1	96.3	96.2	95.9	95.6	95.2	94.7	94.2	93.6	92.9	92.2	91.5	90.7	89.9	89.0	88.2	87.3	86.4
60	93.3	94.6	95.1	95.3	95.2	95.0	94.8	94.4	94.0	93.6	93.0	92.4	91.8	91.1	90.4	89.6	88.9	88.1	87.2	86.4
65	92.2	93.4	93.9	94.1	94.1	94.0	93.8	93.6	93.2	92.9	92.4	91.9	91.3	90.7	90.0	89.4	88.7	87.9	87.2	86.4
70	90.8	91.9	92.5	92.8	92.9	92.9	92.8	92.6	92.4	92.0	91.6	91.2	90.7	90.2	89.6	89.1	88.4	87.8	87.1	86.4
75	89.5	90.5	91.1	91.5	91.6	91.7	91.7	91.6	91.4	91.1	90.8	90.4	90.1	89.6	89.2	88.7	88.1	87.6	87.0	86.4
80	88.2	89.1	89.7	90.1	90.3	90.4	90.4	90.4	90.3	90.1	89.9	89.6	89.3	89.0	88.6	88.2	87.8	87.4	86.9	86.4
85	87.1	87.8	88.3	88.6	88.9	89.0	89.1	89.1	89.0	89.0	88.8	88.7	88.5	88.3	88.0	87.7	87.4	87.1	86.8	86.4
90	86.3	86.7	87.0	87.3	87.5	87.6	87.7	87.8	87.8	87.8	87.7	87.7	87.6	87.5	87.3	87.2	87.0	86.8	86.6	86.4
95	85.8	85.9	86.1	86.2	86.3	86.4	86.5	86.6	86.6	86.6	86.7	86.7	86.7	86.7	86.6	86.6	86.6	86.5	86.5	86.4
98	86.0	86.1	86.1	86.2	86.2	86.2	86.3	86.3	86.3	86.3	86.3	86.3	86.4	86.4	86.4	86.4	86.4	86.4	86.4	86.4

Mean Annual Mass Removal Efficiencies for 2.75-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.9	99.3	99.3	99.3	99.2	99.0	98.6	98.2	97.5	96.9	96.2	95.4	94.6	93.8	92.9	92.0	91.1	90.2	89.3	88.3
35	98.2	98.7	98.8	98.9	98.9	98.7	98.4	97.9	97.3	96.7	96.0	95.2	94.5	93.6	92.8	91.9	91.1	90.2	89.2	88.3
40	97.2	98.1	98.4	98.5	98.5	98.4	98.0	97.6	97.0	96.4	95.7	95.0	94.3	93.5	92.7	91.8	91.0	90.1	89.2	88.3
45	96.4	97.5	97.9	98.1	98.1	97.9	97.6	97.1	96.6	96.1	95.4	94.8	94.1	93.3	92.5	91.7	90.9	90.1	89.2	88.3
50	95.8	97.0	97.4	97.6	97.6	97.4	97.0	96.6	96.2	95.6	95.1	94.5	93.8	93.1	92.4	91.6	90.8	90.0	89.2	88.3
55	95.1	96.3	96.8	96.9	96.9	96.7	96.4	96.0	95.6	95.1	94.6	94.1	93.5	92.8	92.1	91.4	90.7	89.9	89.1	88.3
60	94.4	95.5	95.9	96.1	96.0	95.9	95.7	95.3	95.0	94.6	94.1	93.6	93.1	92.5	91.9	91.2	90.5	89.8	89.1	88.3
65	93.4	94.5	94.9	95.1	95.1	95.0	94.8	94.6	94.3	93.9	93.6	93.1	92.6	92.1	91.5	90.9	90.3	89.7	89.0	88.3
70	92.3	93.2	93.7	93.9	94.0	94.0	93.9	93.7	93.5	93.2	92.9	92.5	92.1	91.7	91.2	90.7	90.1	89.5	88.9	88.3
75	91.0	91.9	92.4	92.7	92.9	92.9	92.9	92.8	92.6	92.4	92.2	91.9	91.5	91.1	90.7	90.3	89.9	89.4	88.9	88.3
80	89.9	90.6	91.1	91.5	91.7	91.8	91.8	91.8	91.7	91.5	91.3	91.1	90.9	90.6	90.3	89.9	89.6	89.2	88.8	88.3
85	88.9	89.5	89.9	90.2	90.4	90.5	90.6	90.6	90.6	90.5	90.4	90.3	90.1	89.9	89.7	89.5	89.2	89.0	88.7	88.3
90	88.1	88.5	88.8	89.0	89.2	89.3	89.4	89.4	89.5	89.5	89.4	89.4	89.3	89.2	89.1	89.0	88.9	88.7	88.5	88.3
95	87.7	87.8	88.0	88.1	88.2	88.3	88.4	88.4	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.4	88.4	88.3
98	87.9	88.0	88.0	88.1	88.1	88.1	88.2	88.2	88.2	88.2	88.3	88.3	88.3	88.3	88.3	88.3	88.3	88.3	88.3	88.3

Mean Annual Mass Removal Efficiencies for 3.00-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.1	99.4	99.5	99.4	99.3	99.2	99.0	98.6	98.1	97.5	96.9	96.2	95.5	94.8	94.1	93.3	92.4	91.6	90.8	89.9
35	98.6	99.0	99.1	99.1	99.1	99.0	98.7	98.4	97.9	97.3	96.7	96.1	95.4	94.7	94.0	93.2	92.4	91.6	90.8	89.9
40	97.7	98.4	98.6	98.7	98.7	98.7	98.5	98.1	97.6	97.1	96.5	95.9	95.2	94.6	93.8	93.1	92.3	91.5	90.8	89.9
45	96.9	97.8	98.2	98.4	98.4	98.3	98.1	97.7	97.3	96.8	96.2	95.7	95.0	94.4	93.7	93.0	92.2	91.5	90.7	89.9
50	96.3	97.3	97.8	98.0	98.0	97.9	97.6	97.2	96.9	96.4	95.9	95.4	94.8	94.2	93.5	92.9	92.2	91.4	90.7	89.9
55	95.7	96.8	97.3	97.4	97.4	97.3	97.0	96.7	96.4	96.0	95.5	95.0	94.5	93.9	93.3	92.7	92.0	91.4	90.7	89.9
60	95.2	96.2	96.6	96.8	96.7	96.6	96.4	96.1	95.8	95.4	95.0	94.6	94.1	93.6	93.1	92.5	91.9	91.3	90.6	89.9
65	94.5	95.3	95.8	95.9	95.9	95.8	95.7	95.4	95.2	94.9	94.5	94.1	93.7	93.3	92.8	92.3	91.7	91.1	90.6	89.9
70	93.5	94.3	94.7	94.9	95.0	94.9	94.8	94.7	94.5	94.2	93.9	93.6	93.3	92.9	92.4	92.0	91.5	91.0	90.5	89.9
75	92.4	93.2	93.6	93.8	93.9	93.9	93.9	93.8	93.7	93.5	93.3	93.0	92.7	92.4	92.1	91.7	91.3	90.9	90.4	89.9
80	91.3	92.0	92.4	92.6	92.8	92.9	92.9	92.9	92.8	92.7	92.6	92.4	92.1	91.9	91.6	91.3	91.0	90.7	90.3	89.9
85	90.4	90.9	91.3	91.5	91.7	91.8	91.9	91.9	91.9	91.8	91.7	91.6	91.5	91.3	91.1	90.9	90.7	90.5	90.2	89.9
90	89.7	90.0	90.3	90.5	90.6	90.8	90.8	90.9	90.9	90.9	90.9	90.8	90.8	90.7	90.6	90.5	90.4	90.2	90.1	89.9
95	89.3	89.4	89.6	89.7	89.8	89.8	89.9	90.0	90.0	90.0	90.1	90.1	90.1	90.1	90.1	90.1	90.0	90.0	90.0	89.9
98	89.6	89.6	89.6	89.7	89.7	89.7	89.8	89.8	89.8	89.8	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9	89.9

Mean Annual Mass Removal Efficiencies for 3.25-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.3	99.5	99.6	99.5	99.5	99.4	99.2	98.9	98.5	98.1	97.5	96.9	96.3	95.7	95.0	94.3	93.6	92.8	92.1	91.3
35	98.8	99.2	99.3	99.2	99.2	99.1	99.0	98.7	98.3	97.9	97.3	96.8	96.2	95.6	94.9	94.2	93.5	92.8	92.0	91.3
40	98.2	98.7	98.8	98.9	98.9	98.9	98.7	98.5	98.1	97.7	97.2	96.6	96.0	95.4	94.8	94.1	93.5	92.7	92.0	91.3
45	97.4	98.1	98.5	98.6	98.6	98.6	98.4	98.2	97.8	97.4	96.9	96.4	95.8	95.3	94.7	94.0	93.4	92.7	92.0	91.3
50	96.7	97.7	98.1	98.2	98.3	98.2	98.1	97.8	97.4	97.0	96.6	96.1	95.6	95.1	94.5	93.9	93.3	92.6	92.0	91.3
55	96.2	97.2	97.6	97.8	97.9	97.8	97.6	97.3	97.0	96.6	96.2	95.8	95.3	94.8	94.3	93.8	93.2	92.6	91.9	91.3
60	95.8	96.7	97.1	97.3	97.3	97.2	97.0	96.8	96.5	96.2	95.8	95.4	95.0	94.6	94.1	93.6	93.0	92.5	91.9	91.3
65	95.3	96.1	96.5	96.6	96.6	96.5	96.3	96.2	95.9	95.6	95.3	95.0	94.6	94.2	93.8	93.4	92.9	92.4	91.8	91.3
70	94.5	95.3	95.6	95.7	95.7	95.7	95.6	95.5	95.3	95.1	94.8	94.5	94.2	93.9	93.5	93.1	92.7	92.2	91.8	91.3
75	93.6	94.2	94.5	94.7	94.8	94.8	94.8	94.7	94.6	94.4	94.2	94.0	93.8	93.5	93.2	92.8	92.5	92.1	91.7	91.3
80	92.6	93.1	93.5	93.7	93.8	93.9	93.9	93.9	93.8	93.7	93.6	93.4	93.2	93.0	92.8	92.5	92.2	91.9	91.6	91.3
85	91.7	92.1	92.4	92.6	92.8	92.9	93.0	93.0	93.0	92.9	92.9	92.8	92.6	92.5	92.3	92.2	92.0	91.8	91.5	91.3
90	91.0	91.3	91.6	91.7	91.9	92.0	92.0	92.1	92.1	92.1	92.1	92.1	92.0	91.9	91.9	91.8	91.7	91.6	91.4	91.3
95	90.7	90.8	91.0	91.0	91.1	91.2	91.2	91.3	91.3	91.4	91.4	91.4	91.4	91.4	91.4	91.4	91.4	91.4	91.3	91.3
98	90.9	91.0	91.0	91.0	91.1	91.1	91.1	91.1	91.2	91.2	91.2	91.2	91.2	91.2	91.3	91.3	91.3	91.3	91.3	91.3

Mean Annual Mass Removal Efficiencies for 3.50-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.4	99.6	99.6	99.6	99.6	99.5	99.4	99.2	98.8	98.4	98.0	97.5	97.0	96.4	95.8	95.2	94.5	93.8	93.1	92.4
35	99.0	99.3	99.4	99.4	99.4	99.3	99.2	99.0	98.7	98.3	97.9	97.4	96.8	96.3	95.7	95.1	94.5	93.8	93.1	92.4
40	98.5	98.9	99.1	99.1	99.1	99.1	98.9	98.8	98.5	98.1	97.7	97.2	96.7	96.2	95.6	95.0	94.4	93.8	93.1	92.4
45	97.8	98.4	98.7	98.8	98.8	98.8	98.7	98.5	98.2	97.9	97.4	97.0	96.5	96.0	95.5	94.9	94.3	93.7	93.1	92.4
50	97.2	98.0	98.3	98.5	98.5	98.5	98.4	98.2	97.9	97.5	97.2	96.8	96.3	95.8	95.3	94.8	94.2	93.7	93.1	92.4
55	96.7	97.5	97.9	98.1	98.2	98.1	98.0	97.8	97.5	97.2	96.8	96.5	96.0	95.6	95.1	94.7	94.1	93.6	93.0	92.4
60	96.3	97.1	97.5	97.7	97.7	97.7	97.5	97.3	97.1	96.8	96.5	96.1	95.7	95.3	94.9	94.5	94.0	93.5	93.0	92.4
65	95.9	96.6	97.0	97.2	97.2	97.1	96.9	96.8	96.6	96.3	96.0	95.7	95.4	95.1	94.7	94.3	93.9	93.4	92.9	92.4
70	95.4	96.0	96.3	96.4	96.4	96.4	96.3	96.1	96.0	95.8	95.5	95.3	95.0	94.7	94.4	94.1	93.7	93.3	92.9	92.4
75	94.6	95.1	95.4	95.5	95.6	95.6	95.5	95.4	95.3	95.2	95.0	94.8	94.6	94.4	94.1	93.8	93.5	93.2	92.8	92.4
80	93.7	94.1	94.4	94.6	94.7	94.7	94.7	94.7	94.6	94.5	94.4	94.3	94.1	93.9	93.7	93.5	93.3	93.0	92.7	92.4
85	92.9	93.2	93.5	93.6	93.8	93.8	93.9	93.9	93.9	93.8	93.8	93.7	93.6	93.5	93.4	93.2	93.0	92.8	92.6	92.4
90	92.2	92.4	92.6	92.8	92.9	93.0	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.0	92.9	92.8	92.8	92.7	92.5	92.4
95	91.9	92.0	92.1	92.2	92.3	92.3	92.4	92.4	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.5	92.4
98	92.1	92.1	92.2	92.2	92.2	92.2	92.3	92.3	92.3	92.3	92.3	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.4

Mean Annual Mass Removal Efficiencies for 3.75-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.6	99.7	99.7	99.7	99.7	99.6	99.5	99.4	99.1	98.8	98.4	98.0	97.5	97.0	96.4	95.9	95.3	94.7	94.1	93.4
35	99.2	99.4	99.5	99.5	99.5	99.4	99.3	99.2	99.0	98.6	98.3	97.8	97.4	96.9	96.4	95.8	95.2	94.6	94.0	93.4
40	98.8	99.1	99.2	99.3	99.2	99.2	99.1	99.0	98.8	98.5	98.1	97.7	97.2	96.8	96.3	95.7	95.2	94.6	94.0	93.4
45	98.2	98.7	98.9	99.0	99.0	99.0	98.9	98.8	98.6	98.3	97.9	97.5	97.1	96.6	96.1	95.6	95.1	94.6	94.0	93.4
50	97.6	98.2	98.5	98.7	98.7	98.7	98.6	98.5	98.3	98.0	97.7	97.3	96.9	96.5	96.0	95.5	95.0	94.5	94.0	93.4
55	97.1	97.9	98.2	98.4	98.4	98.4	98.3	98.2	97.9	97.7	97.4	97.0	96.6	96.3	95.8	95.4	94.9	94.5	93.9	93.4
60	96.7	97.5	97.8	98.0	98.1	98.1	98.0	97.8	97.5	97.3	97.0	96.7	96.4	96.0	95.6	95.2	94.8	94.4	93.9	93.4
65	96.4	97.1	97.4	97.6	97.6	97.6	97.4	97.3	97.1	96.9	96.6	96.4	96.1	95.7	95.4	95.1	94.7	94.3	93.9	93.4
70	96.0	96.6	96.9	97.0	97.0	97.0	96.9	96.7	96.6	96.4	96.2	96.0	95.7	95.4	95.2	94.9	94.5	94.2	93.8	93.4
75	95.5	95.9	96.1	96.2	96.3	96.3	96.2	96.1	96.0	95.9	95.7	95.5	95.3	95.1	94.9	94.6	94.4	94.1	93.7	93.4
80	94.7	95.0	95.2	95.4	95.5	95.5	95.5	95.4	95.4	95.3	95.2	95.0	94.9	94.7	94.6	94.4	94.2	93.9	93.7	93.4
85	93.8	94.1	94.4	94.5	94.6	94.7	94.7	94.7	94.7	94.7	94.6	94.5	94.4	94.3	94.2	94.1	93.9	93.8	93.6	93.4
90	93.2	93.4	93.6	93.7	93.8	93.9	93.9	94.0	94.0	94.0	94.0	94.0	93.9	93.9	93.8	93.8	93.7	93.6	93.5	93.4
95	92.9	93.0	93.1	93.2	93.2	93.3	93.3	93.4	93.4	93.4	93.5	93.5	93.5	93.5	93.5	93.5	93.5	93.5	93.4	93.4
98	93.1	93.1	93.2	93.2	93.2	93.2	93.3	93.3	93.3	93.3	93.3	93.3	93.4	93.4	93.4	93.4	93.4	93.4	93.4	93.4

Mean Annual Mass Removal Efficiencies for 4.00-inches of Retention for Zone 1 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.6	99.7	99.8	99.8	99.7	99.7	99.6	99.5	99.3	99.0	98.7	98.3	97.9	97.5	97.0	96.5	95.9	95.4	94.8	94.3
35	99.3	99.5	99.6	99.6	99.6	99.5	99.5	99.3	99.2	98.9	98.6	98.2	97.8	97.4	96.9	96.4	95.9	95.4	94.8	94.3
40	99.0	99.3	99.4	99.4	99.4	99.3	99.3	99.2	99.0	98.8	98.5	98.1	97.7	97.3	96.8	96.3	95.8	95.3	94.8	94.3
45	98.5	98.9	99.1	99.1	99.1	99.1	99.1	99.0	98.8	98.6	98.3	97.9	97.6	97.2	96.7	96.3	95.8	95.3	94.8	94.3
50	98.0	98.5	98.7	98.9	98.9	98.9	98.8	98.7	98.6	98.3	98.1	97.7	97.4	97.0	96.6	96.2	95.7	95.2	94.8	94.3
55	97.5	98.1	98.4	98.6	98.6	98.6	98.6	98.5	98.3	98.1	97.8	97.5	97.1	96.8	96.4	96.0	95.6	95.2	94.7	94.3
60	97.1	97.8	98.1	98.3	98.3	98.3	98.3	98.1	98.0	97.7	97.5	97.2	96.9	96.6	96.3	95.9	95.5	95.1	94.7	94.3
65	96.8	97.4	97.8	97.9	98.0	98.0	97.9	97.7	97.5	97.3	97.1	96.9	96.6	96.3	96.0	95.7	95.4	95.0	94.7	94.3
70	96.5	97.1	97.3	97.5	97.5	97.5	97.4	97.2	97.1	96.9	96.7	96.5	96.3	96.1	95.8	95.5	95.2	94.9	94.6	94.3
75	96.1	96.5	96.7	96.8	96.8	96.8	96.8	96.7	96.6	96.4	96.3	96.1	96.0	95.8	95.5	95.3	95.1	94.8	94.5	94.3
80	95.5	95.8	95.9	96.1	96.1	96.1	96.1	96.1	96.0	95.9	95.8	95.7	95.6	95.4	95.3	95.1	94.9	94.7	94.5	94.3
85	94.7	95.0	95.1	95.3	95.3	95.4	95.4	95.4	95.4	95.4	95.3	95.2	95.1	95.0	94.9	94.8	94.7	94.6	94.4	94.3
90	94.1	94.3	94.4	94.5	94.6	94.7	94.7	94.8	94.8	94.8	94.8	94.7	94.7	94.7	94.6	94.6	94.5	94.4	94.3	94.3
95	93.8	93.9	94.0	94.0	94.1	94.1	94.2	94.2	94.2	94.3	94.3	94.3	94.3	94.3	94.3	94.3	94.3	94.3	94.3	94.3
98	94.0	94.0	94.0	94.0	94.1	94.1	94.1	94.1	94.1	94.2	94.2	94.2	94.2	94.2	94.2	94.2	94.2	94.2	94.2	94.3

Mean Annual Mass Removal Efficiencies for 0.25-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	94.4	90.4	83.0	75.1	68.0	61.9	56.6	52.1	48.3	44.9	42.0	39.4	37.2	35.1	33.3	31.7	30.2	28.8	27.6	26.4
35	91.8	88.8	82.0	74.5	67.6	61.5	56.4	51.9	48.1	44.8	41.9	39.4	37.1	35.1	33.3	31.7	30.2	28.8	27.6	26.4
40	88.2	86.6	80.6	73.5	66.9	61.1	56.0	51.7	47.9	44.7	41.8	39.3	37.1	35.0	33.2	31.6	30.2	28.8	27.6	26.4
45	83.9	83.8	78.7	72.3	66.1	60.4	55.6	51.4	47.7	44.5	41.7	39.2	37.0	35.0	33.2	31.6	30.1	28.8	27.6	26.4
50	78.8	80.4	76.4	70.7	64.9	59.6	55.0	50.9	47.3	44.2	41.5	39.0	36.8	34.9	33.1	31.5	30.1	28.8	27.6	26.4
55	73.2	76.4	73.6	68.7	63.5	58.6	54.2	50.3	46.9	43.9	41.2	38.8	36.7	34.8	33.0	31.5	30.1	28.7	27.5	26.4
60	67.4	71.8	70.2	66.3	61.7	57.3	53.2	49.6	46.3	43.4	40.8	38.6	36.5	34.6	32.9	31.4	30.0	28.7	27.5	26.4
65	61.4	66.7	66.3	63.4	59.5	55.6	51.9	48.6	45.5	42.9	40.4	38.2	36.2	34.4	32.8	31.3	29.9	28.7	27.5	26.4
70	55.7	61.1	61.8	59.8	56.8	53.5	50.4	47.3	44.6	42.1	39.8	37.7	35.9	34.1	32.6	31.1	29.8	28.6	27.5	26.4
75	50.1	55.2	56.5	55.6	53.5	50.9	48.3	45.7	43.3	41.1	39.0	37.1	35.4	33.8	32.3	30.9	29.7	28.5	27.4	26.4
80	45.0	49.1	50.7	50.6	49.4	47.6	45.6	43.6	41.6	39.7	37.9	36.2	34.7	33.2	31.9	30.7	29.5	28.4	27.4	26.4
85	40.3	43.2	44.5	44.8	44.3	43.4	42.1	40.7	39.2	37.8	36.3	35.0	33.7	32.5	31.3	30.2	29.2	28.2	27.3	26.4
90	36.0	37.5	38.3	38.6	38.5	38.1	37.5	36.7	35.9	35.0	34.0	33.1	32.2	31.3	30.4	29.5	28.7	27.9	27.2	26.4
95	31.7	32.1	32.3	32.4	32.3	32.2	32.0	31.7	31.4	31.0	30.6	30.2	29.7	29.3	28.8	28.3	27.9	27.4	26.9	26.4
98	29.3	29.3	29.2	29.1	29.0	28.9	28.8	28.6	28.5	28.3	28.2	28.0	27.8	27.7	27.5	27.3	27.1	26.9	26.6	26.4

Mean Annual Mass Removal Efficiencies for 0.50-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	97.0	96.7	94.8	91.7	87.9	83.8	79.7	75.7	71.9	68.4	65.2	62.1	59.4	56.9	54.5	52.3	50.3	48.4	46.7	45.1
35	95.2	95.5	93.8	90.9	87.3	83.4	79.3	75.4	71.7	68.3	65.0	62.1	59.3	56.8	54.4	52.3	50.3	48.4	46.7	45.1
40	92.9	94.0	92.5	89.9	86.5	82.7	78.9	75.1	71.4	68.0	64.9	61.9	59.2	56.7	54.4	52.2	50.2	48.4	46.7	45.1
45	90.2	91.9	90.9	88.6	85.5	81.9	78.2	74.6	71.1	67.7	64.6	61.7	59.1	56.6	54.3	52.2	50.2	48.4	46.7	45.1
50	86.7	89.2	88.9	87.0	84.2	80.9	77.4	73.9	70.5	67.3	64.3	61.5	58.9	56.5	54.2	52.1	50.2	48.3	46.6	45.1
55	82.7	86.1	86.4	84.9	82.6	79.6	76.4	73.1	69.9	66.8	63.9	61.2	58.6	56.3	54.1	52.0	50.1	48.3	46.6	45.1
60	78.5	82.6	83.4	82.5	80.6	78.0	75.1	72.1	69.1	66.1	63.4	60.8	58.3	56.0	53.9	51.9	50.0	48.2	46.6	45.1
65	74.2	78.6	79.8	79.5	78.1	76.0	73.5	70.7	68.0	65.3	62.7	60.2	57.9	55.7	53.6	51.7	49.9	48.2	46.6	45.1
70	69.8	74.2	75.8	76.0	75.2	73.5	71.4	69.1	66.6	64.2	61.8	59.5	57.3	55.3	53.3	51.4	49.7	48.1	46.5	45.1
75	65.4	69.6	71.4	71.9	71.5	70.4	68.8	66.9	64.9	62.7	60.6	58.6	56.6	54.7	52.8	51.1	49.5	47.9	46.5	45.1
80	61.4	64.9	66.6	67.3	67.2	66.5	65.5	64.1	62.5	60.8	59.0	57.3	55.5	53.9	52.2	50.7	49.2	47.7	46.4	45.1
85	57.6	60.1	61.6	62.2	62.3	62.0	61.3	60.4	59.3	58.1	56.8	55.4	54.0	52.7	51.3	50.0	48.7	47.4	46.2	45.1
90	54.1	55.4	56.2	56.7	56.8	56.7	56.4	55.9	55.2	54.5	53.6	52.8	51.8	50.9	49.9	48.9	47.9	46.9	46.0	45.1
95	50.1	50.5	50.7	50.8	50.8	50.8	50.6	50.4	50.2	49.9	49.5	49.1	48.7	48.2	47.7	47.2	46.7	46.1	45.6	45.1
98	47.8	47.7	47.7	47.6	47.6	47.5	47.4	47.2	47.1	46.9	46.8	46.6	46.5	46.3	46.1	45.9	45.7	45.5	45.3	45.1

Mean Annual Mass Removal Efficiencies for 0.75-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	97.9	98.2	97.5	96.2	94.4	92.1	89.6	86.9	84.1	81.3	78.5	75.9	73.3	70.9	68.5	66.3	64.2	62.2	60.4	58.6
35	96.7	97.3	96.8	95.6	93.8	91.7	89.2	86.6	83.8	81.1	78.4	75.7	73.2	70.8	68.5	66.3	64.2	62.2	60.4	58.6
40	95.0	96.1	95.9	94.8	93.1	91.1	88.7	86.2	83.5	80.8	78.2	75.6	73.1	70.7	68.4	66.2	64.2	62.2	60.4	58.6
45	93.0	94.7	94.6	93.7	92.2	90.3	88.1	85.6	83.1	80.5	77.9	75.4	72.9	70.6	68.3	66.2	64.1	62.2	60.4	58.6
50	90.7	92.8	93.1	92.4	91.1	89.3	87.3	85.0	82.5	80.0	77.5	75.1	72.7	70.4	68.2	66.1	64.0	62.1	60.3	58.6
55	88.0	90.6	91.1	90.7	89.7	88.1	86.3	84.1	81.8	79.4	77.0	74.7	72.4	70.1	68.0	65.9	64.0	62.1	60.3	58.6
60	84.8	87.9	88.8	88.7	88.0	86.7	85.0	83.0	80.9	78.7	76.5	74.2	72.0	69.8	67.8	65.8	63.8	62.0	60.3	58.6
65	81.5	84.9	86.2	86.3	85.8	84.8	83.4	81.7	79.8	77.8	75.7	73.6	71.5	69.5	67.5	65.5	63.7	61.9	60.2	58.6
70	78.1	81.7	83.1	83.5	83.2	82.5	81.4	80.0	78.4	76.6	74.7	72.8	70.9	68.9	67.1	65.2	63.5	61.8	60.2	58.6
75	74.9	78.1	79.6	80.2	80.2	79.8	79.0	77.9	76.5	75.0	73.4	71.7	70.0	68.3	66.5	64.8	63.2	61.6	60.1	58.6
80	71.6	74.3	75.8	76.5	76.7	76.5	76.0	75.2	74.1	73.0	71.7	70.3	68.8	67.3	65.8	64.3	62.8	61.4	60.0	58.6
85	68.6	70.6	71.8	72.5	72.8	72.7	72.4	71.9	71.2	70.3	69.3	68.3	67.1	65.9	64.7	63.5	62.2	61.0	59.8	58.6
90	65.7	66.9	67.7	68.1	68.3	68.3	68.2	67.9	67.5	66.9	66.3	65.6	64.9	64.0	63.2	62.3	61.4	60.5	59.5	58.6
95	62.7	63.0	63.2	63.3	63.4	63.4	63.3	63.2	63.0	62.8	62.5	62.2	61.8	61.4	61.0	60.5	60.1	59.6	59.1	58.6
98	60.8	60.8	60.8	60.7	60.7	60.6	60.5	60.4	60.3	60.2	60.1	59.9	59.8	59.6	59.5	59.3	59.2	59.0	58.8	58.6

Mean Annual Mass Removal Efficiencies for 1.00-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.5	98.8	98.5	97.9	96.9	95.6	94.1	92.3	90.4	88.4	86.3	84.2	82.1	80.0	77.9	75.9	74.0	72.2	70.3	68.6
35	97.5	98.2	98.0	97.4	96.5	95.3	93.7	92.0	90.2	88.2	86.2	84.1	82.0	79.9	77.9	75.9	74.0	72.1	70.3	68.6
40	96.4	97.3	97.2	96.8	95.9	94.8	93.3	91.7	89.9	87.9	85.9	83.9	81.8	79.8	77.8	75.8	73.9	72.1	70.3	68.6
45	94.8	96.1	96.3	96.0	95.2	94.1	92.7	91.2	89.4	87.6	85.6	83.6	81.6	79.6	77.7	75.8	73.9	72.1	70.3	68.6
50	93.0	94.8	95.2	94.9	94.3	93.3	92.0	90.5	88.9	87.1	85.3	83.3	81.4	79.5	77.5	75.6	73.8	72.0	70.3	68.6
55	91.0	93.2	93.7	93.6	93.1	92.3	91.1	89.8	88.2	86.6	84.8	82.9	81.1	79.2	77.3	75.5	73.7	72.0	70.2	68.6
60	88.8	91.2	92.0	92.0	91.7	91.0	90.0	88.8	87.4	85.9	84.2	82.4	80.7	78.9	77.1	75.3	73.6	71.9	70.2	68.6
65	86.2	88.9	89.9	90.2	90.0	89.5	88.7	87.6	86.4	85.0	83.4	81.8	80.2	78.5	76.8	75.1	73.4	71.8	70.2	68.6
70	83.6	86.4	87.5	88.0	88.0	87.6	86.9	86.1	85.1	83.8	82.5	81.0	79.5	77.9	76.4	74.8	73.2	71.6	70.1	68.6
75	81.0	83.6	84.9	85.5	85.6	85.3	84.9	84.2	83.4	82.4	81.2	80.0	78.6	77.2	75.8	74.3	72.9	71.5	70.0	68.6
80	78.6	80.8	82.0	82.5	82.8	82.7	82.4	81.9	81.3	80.5	79.6	78.5	77.4	76.3	75.0	73.8	72.5	71.2	69.9	68.6
85	76.1	77.7	78.7	79.3	79.6	79.7	79.5	79.2	78.8	78.2	77.5	76.7	75.9	74.9	74.0	72.9	71.9	70.8	69.7	68.6
90	73.9	74.8	75.5	75.9	76.1	76.2	76.2	76.0	75.7	75.3	74.9	74.4	73.8	73.2	72.5	71.8	71.0	70.3	69.4	68.6
95	71.5	71.8	72.0	72.1	72.2	72.2	72.2	72.1	72.0	71.9	71.7	71.4	71.2	70.9	70.6	70.2	69.9	69.5	69.0	68.6
98	70.2	70.2	70.2	70.2	70.1	70.1	70.1	70.0	69.9	69.8	69.7	69.7	69.6	69.4	69.3	69.2	69.0	68.9	68.8	68.6

Mean Annual Mass Removal Efficiencies for 1.25-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.9	99.1	99.0	98.7	98.1	97.3	96.4	95.2	93.9	92.4	90.9	89.3	87.7	86.0	84.3	82.6	80.9	79.2	77.6	76.0
35	98.1	98.6	98.6	98.3	97.7	97.0	96.1	94.9	93.7	92.3	90.8	89.2	87.6	85.9	84.2	82.5	80.9	79.2	77.6	76.0
40	97.2	98.0	98.0	97.8	97.3	96.6	95.7	94.6	93.4	92.0	90.5	89.0	87.4	85.8	84.1	82.5	80.8	79.2	77.6	76.0
45	96.1	97.1	97.3	97.1	96.7	96.1	95.2	94.2	93.0	91.7	90.3	88.8	87.2	85.6	84.0	82.4	80.7	79.1	77.6	76.0
50	94.7	96.0	96.4	96.3	96.0	95.4	94.6	93.6	92.5	91.3	89.9	88.5	87.0	85.4	83.8	82.2	80.7	79.1	77.5	76.0
55	93.0	94.8	95.3	95.3	95.1	94.6	93.9	93.0	91.9	90.8	89.5	88.1	86.7	85.2	83.6	82.1	80.6	79.0	77.5	76.0
60	91.3	93.3	94.0	94.1	94.0	93.6	92.9	92.2	91.2	90.1	88.9	87.7	86.3	84.9	83.4	81.9	80.4	78.9	77.5	76.0
65	89.4	91.6	92.4	92.7	92.6	92.3	91.8	91.1	90.3	89.3	88.3	87.1	85.8	84.5	83.1	81.7	80.3	78.8	77.4	76.0
70	87.5	89.6	90.6	91.0	91.0	90.8	90.4	89.8	89.1	88.3	87.4	86.3	85.2	83.9	82.7	81.4	80.0	78.7	77.3	76.0
75	85.4	87.4	88.5	89.0	89.1	89.0	88.7	88.3	87.7	87.0	86.2	85.3	84.3	83.3	82.1	80.9	79.7	78.5	77.3	76.0
80	83.4	85.2	86.2	86.7	86.9	86.9	86.7	86.4	86.0	85.5	84.8	84.1	83.3	82.3	81.4	80.4	79.3	78.2	77.1	76.0
85	81.6	82.9	83.7	84.2	84.4	84.5	84.4	84.2	84.0	83.6	83.1	82.5	81.9	81.2	80.4	79.6	78.8	77.9	76.9	76.0
90	79.7	80.5	81.0	81.4	81.6	81.7	81.7	81.7	81.5	81.3	80.9	80.6	80.1	79.7	79.1	78.6	78.0	77.4	76.7	76.0
95	77.9	78.2	78.4	78.5	78.6	78.7	78.7	78.6	78.6	78.4	78.3	78.2	78.0	77.8	77.5	77.3	77.0	76.7	76.3	76.0
98	77.1	77.1	77.1	77.1	77.1	77.1	77.0	77.0	76.9	76.9	76.8	76.8	76.7	76.6	76.5	76.4	76.3	76.2	76.1	76.0

Mean Annual Mass Removal Efficiencies for 1.50-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.2	99.4	99.3	99.1	98.7	98.2	97.6	96.8	95.9	94.9	93.7	92.5	91.3	89.9	88.6	87.2	85.7	84.3	82.9	81.5
35	98.6	99.0	99.0	98.8	98.5	98.0	97.4	96.6	95.7	94.7	93.6	92.4	91.2	89.8	88.5	87.1	85.7	84.3	82.9	81.5
40	97.8	98.4	98.5	98.4	98.1	97.6	97.1	96.3	95.5	94.5	93.4	92.2	91.0	89.7	88.4	87.1	85.7	84.3	82.9	81.5
45	96.9	97.8	98.0	97.9	97.6	97.2	96.7	96.0	95.1	94.2	93.1	92.0	90.8	89.6	88.3	87.0	85.6	84.2	82.9	81.5
50	95.9	96.9	97.2	97.2	97.0	96.7	96.2	95.5	94.7	93.8	92.8	91.8	90.6	89.4	88.2	86.9	85.5	84.2	82.8	81.5
55	94.6	95.9	96.3	96.4	96.3	96.0	95.6	95.0	94.2	93.4	92.4	91.4	90.3	89.2	88.0	86.7	85.4	84.1	82.8	81.5
60	93.1	94.7	95.3	95.5	95.4	95.2	94.8	94.3	93.6	92.8	92.0	91.0	90.0	88.9	87.7	86.5	85.3	84.0	82.8	81.5
65	91.7	93.4	94.1	94.4	94.4	94.2	93.9	93.4	92.8	92.1	91.3	90.5	89.5	88.5	87.4	86.3	85.1	83.9	82.7	81.5
70	90.1	91.9	92.7	93.0	93.1	93.0	92.7	92.3	91.9	91.2	90.6	89.8	88.9	88.0	87.0	86.0	84.9	83.8	82.6	81.5
75	88.5	90.2	91.0	91.5	91.6	91.6	91.4	91.1	90.7	90.2	89.6	88.9	88.2	87.4	86.5	85.6	84.6	83.6	82.6	81.5
80	86.9	88.4	89.2	89.6	89.9	89.9	89.8	89.6	89.3	88.9	88.4	87.9	87.3	86.6	85.9	85.1	84.2	83.3	82.4	81.5
85	85.4	86.5	87.2	87.6	87.9	88.0	87.9	87.8	87.6	87.3	87.0	86.6	86.1	85.6	85.0	84.4	83.7	83.0	82.3	81.5
90	84.1	84.7	85.1	85.4	85.6	85.7	85.8	85.7	85.6	85.5	85.3	85.0	84.7	84.4	84.0	83.5	83.1	82.6	82.0	81.5
95	82.7	82.9	83.1	83.2	83.3	83.3	83.4	83.4	83.4	83.3	83.2	83.1	83.0	82.8	82.6	82.4	82.2	82.0	81.8	81.5
98	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.1	82.1	82.1	82.0	82.0	81.9	81.9	81.8	81.7	81.7	81.6	81.5

Mean Annual Mass Removal Efficiencies for 1.75-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.4	99.5	99.5	99.4	99.1	98.8	98.3	97.8	97.2	96.4	95.6	94.6	93.6	92.6	91.5	90.4	89.2	88.0	86.8	85.6
35	98.9	99.2	99.2	99.1	98.9	98.6	98.1	97.6	97.0	96.3	95.4	94.5	93.5	92.5	91.4	90.3	89.2	88.0	86.8	85.6
40	98.3	98.8	98.9	98.8	98.6	98.3	97.9	97.4	96.8	96.1	95.3	94.4	93.4	92.4	91.4	90.3	89.1	88.0	86.8	85.6
45	97.5	98.3	98.4	98.4	98.2	97.9	97.5	97.1	96.5	95.8	95.0	94.2	93.2	92.3	91.2	90.2	89.1	87.9	86.8	85.6
50	96.7	97.6	97.8	97.8	97.7	97.5	97.1	96.7	96.2	95.5	94.8	93.9	93.0	92.1	91.1	90.1	89.0	87.9	86.7	85.6
55	95.7	96.8	97.1	97.2	97.1	96.9	96.6	96.2	95.7	95.1	94.4	93.6	92.8	91.9	90.9	89.9	88.9	87.8	86.7	85.6
60	94.5	95.8	96.3	96.4	96.4	96.3	96.0	95.7	95.2	94.6	94.0	93.3	92.5	91.6	90.7	89.8	88.8	87.7	86.7	85.6
65	93.3	94.7	95.3	95.5	95.6	95.5	95.3	95.0	94.5	94.0	93.4	92.8	92.1	91.3	90.4	89.5	88.6	87.6	86.6	85.6
70	92.0	93.5	94.2	94.5	94.6	94.5	94.4	94.1	93.7	93.3	92.8	92.2	91.5	90.8	90.1	89.3	88.4	87.5	86.6	85.6
75	90.8	92.1	92.9	93.2	93.4	93.4	93.3	93.1	92.8	92.4	92.0	91.5	90.9	90.3	89.6	88.9	88.2	87.3	86.5	85.6
80	89.6	90.7	91.4	91.8	92.0	92.0	92.0	91.9	91.6	91.3	91.0	90.6	90.1	89.6	89.1	88.5	87.8	87.1	86.4	85.6
85	88.4	89.2	89.8	90.2	90.4	90.5	90.5	90.4	90.3	90.1	89.8	89.5	89.2	88.8	88.4	87.9	87.4	86.8	86.2	85.6
90	87.3	87.8	88.2	88.4	88.6	88.7	88.8	88.7	88.7	88.6	88.4	88.2	88.0	87.8	87.5	87.2	86.8	86.4	86.0	85.6
95	86.2	86.4	86.6	86.7	86.8	86.8	86.9	86.9	86.9	86.8	86.8	86.7	86.7	86.6	86.4	86.3	86.1	86.0	85.8	85.6
98	86.0	86.0	86.0	86.0	86.1	86.1	86.1	86.0	86.0	86.0	86.0	86.0	85.9	85.9	85.9	85.8	85.8	85.7	85.6	85.6

Mean Annual Mass Removal Efficiencies for 2.00-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.5	99.7	99.6	99.6	99.4	99.1	98.8	98.4	97.9	97.4	96.8	96.1	95.3	94.4	93.6	92.6	91.7	90.7	89.7	88.7
35	99.2	99.4	99.4	99.4	99.2	99.0	98.6	98.2	97.8	97.3	96.6	95.9	95.2	94.4	93.5	92.6	91.6	90.7	89.7	88.7
40	98.6	99.0	99.1	99.1	98.9	98.7	98.4	98.0	97.6	97.1	96.5	95.8	95.1	94.3	93.4	92.5	91.6	90.6	89.7	88.7
45	98.0	98.6	98.8	98.7	98.6	98.4	98.1	97.8	97.4	96.9	96.3	95.6	94.9	94.1	93.3	92.5	91.5	90.6	89.6	88.7
50	97.3	98.1	98.3	98.3	98.2	98.0	97.8	97.5	97.1	96.6	96.1	95.4	94.7	94.0	93.2	92.4	91.5	90.6	89.6	88.7
55	96.6	97.4	97.7	97.8	97.7	97.6	97.4	97.1	96.7	96.3	95.8	95.2	94.5	93.8	93.0	92.2	91.4	90.5	89.6	88.7
60	95.6	96.6	97.0	97.1	97.1	97.0	96.9	96.6	96.3	95.9	95.4	94.9	94.2	93.6	92.8	92.1	91.3	90.4	89.6	88.7
65	94.5	95.7	96.2	96.4	96.5	96.4	96.3	96.0	95.7	95.4	94.9	94.4	93.9	93.3	92.6	91.9	91.1	90.3	89.5	88.7
70	93.5	94.7	95.3	95.5	95.7	95.6	95.5	95.3	95.1	94.8	94.4	93.9	93.4	92.9	92.3	91.6	90.9	90.2	89.5	88.7
75	92.5	93.6	94.2	94.5	94.7	94.7	94.7	94.5	94.3	94.0	93.7	93.3	92.9	92.4	91.9	91.3	90.7	90.1	89.4	88.7
80	91.5	92.5	93.1	93.4	93.6	93.7	93.6	93.5	93.4	93.2	92.9	92.6	92.2	91.8	91.4	90.9	90.4	89.9	89.3	88.7
85	90.6	91.3	91.8	92.1	92.3	92.4	92.4	92.4	92.3	92.1	91.9	91.7	91.4	91.1	90.8	90.4	90.0	89.6	89.2	88.7
90	89.7	90.1	90.5	90.7	90.9	91.0	91.0	91.0	91.0	90.9	90.8	90.6	90.5	90.3	90.1	89.9	89.6	89.3	89.0	88.7
95	88.9	89.1	89.2	89.3	89.4	89.5	89.5	89.5	89.5	89.5	89.5	89.4	89.4	89.3	89.2	89.2	89.0	88.9	88.8	88.7
98	88.8	88.8	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.8	88.8	88.8	88.8	88.7	88.7	88.7

Mean Annual Mass Removal Efficiencies for 2.25-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.7	99.7	99.7	99.7	99.6	99.4	99.1	98.8	98.5	98.1	97.6	97.0	96.4	95.8	95.0	94.3	93.5	92.7	91.8	91.0
35	99.3	99.5	99.6	99.5	99.4	99.2	99.0	98.7	98.3	97.9	97.5	96.9	96.3	95.7	95.0	94.3	93.5	92.7	91.8	91.0
40	99.0	99.2	99.3	99.3	99.2	99.0	98.8	98.5	98.2	97.8	97.3	96.8	96.2	95.6	94.9	94.2	93.4	92.6	91.8	91.0
45	98.4	98.9	99.0	99.0	98.9	98.8	98.6	98.3	98.0	97.6	97.2	96.7	96.1	95.5	94.8	94.1	93.4	92.6	91.8	91.0
50	97.8	98.5	98.6	98.7	98.6	98.5	98.3	98.0	97.7	97.4	97.0	96.5	95.9	95.4	94.7	94.0	93.3	92.5	91.8	91.0
55	97.2	97.9	98.2	98.2	98.2	98.1	97.9	97.7	97.4	97.1	96.7	96.3	95.8	95.2	94.6	93.9	93.2	92.5	91.7	91.0
60	96.5	97.3	97.6	97.7	97.7	97.6	97.5	97.3	97.0	96.8	96.4	96.0	95.5	95.0	94.4	93.8	93.1	92.4	91.7	91.0
65	95.6	96.5	96.9	97.1	97.1	97.1	97.0	96.8	96.6	96.3	96.0	95.6	95.2	94.7	94.2	93.6	93.0	92.3	91.7	91.0
70	94.6	95.6	96.1	96.3	96.4	96.4	96.4	96.3	96.1	95.8	95.5	95.2	94.8	94.4	93.9	93.4	92.8	92.2	91.6	91.0
75	93.8	94.7	95.2	95.5	95.7	95.7	95.7	95.6	95.4	95.2	95.0	94.7	94.4	94.0	93.6	93.1	92.6	92.1	91.5	91.0
80	93.0	93.8	94.3	94.6	94.8	94.9	94.9	94.8	94.7	94.5	94.3	94.1	93.8	93.5	93.1	92.8	92.4	91.9	91.4	91.0
85	92.3	92.9	93.3	93.6	93.7	93.8	93.9	93.8	93.8	93.7	93.5	93.4	93.1	92.9	92.6	92.4	92.0	91.7	91.3	91.0
90	91.6	92.0	92.3	92.5	92.6	92.7	92.7	92.7	92.7	92.7	92.6	92.5	92.4	92.2	92.1	91.9	91.7	91.5	91.2	91.0
95	91.0	91.2	91.3	91.4	91.4	91.5	91.5	91.5	91.6	91.5	91.5	91.5	91.5	91.4	91.4	91.3	91.2	91.1	91.1	91.0
98	91.0	91.0	91.0	91.0	91.1	91.1	91.1	91.1	91.1	91.1	91.1	91.1	91.1	91.1	91.0	91.0	91.0	91.0	91.0	91.0

Mean Annual Mass Removal Efficiencies for 2.50-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.7	99.8	99.8	99.8	99.7	99.6	99.4	99.1	98.8	98.5	98.1	97.7	97.2	96.7	96.1	95.5	94.9	94.2	93.5	92.7
35	99.5	99.6	99.7	99.6	99.6	99.4	99.3	99.0	98.7	98.4	98.0	97.6	97.2	96.6	96.1	95.5	94.8	94.2	93.4	92.7
40	99.2	99.4	99.5	99.5	99.4	99.3	99.1	98.9	98.6	98.3	97.9	97.5	97.1	96.6	96.0	95.4	94.8	94.1	93.4	92.7
45	98.7	99.1	99.2	99.2	99.2	99.0	98.9	98.7	98.4	98.1	97.8	97.4	97.0	96.5	95.9	95.4	94.7	94.1	93.4	92.7
50	98.2	98.8	98.9	98.9	98.9	98.8	98.6	98.4	98.2	97.9	97.6	97.2	96.8	96.4	95.8	95.3	94.7	94.1	93.4	92.7
55	97.7	98.3	98.5	98.6	98.5	98.5	98.3	98.1	97.9	97.7	97.4	97.0	96.6	96.2	95.7	95.2	94.6	94.0	93.4	92.7
60	97.1	97.8	98.0	98.1	98.1	98.1	97.9	97.8	97.6	97.4	97.1	96.8	96.4	96.0	95.6	95.1	94.5	93.9	93.3	92.7
65	96.4	97.1	97.5	97.6	97.6	97.6	97.5	97.4	97.2	97.0	96.8	96.5	96.2	95.8	95.4	94.9	94.4	93.9	93.3	92.7
70	95.6	96.4	96.8	97.0	97.1	97.1	97.0	96.9	96.8	96.6	96.4	96.1	95.8	95.5	95.1	94.7	94.2	93.8	93.3	92.7
75	94.8	95.6	96.0	96.3	96.4	96.5	96.4	96.4	96.3	96.1	95.9	95.7	95.5	95.2	94.8	94.5	94.1	93.6	93.2	92.7
80	94.1	94.8	95.3	95.5	95.7	95.8	95.8	95.7	95.7	95.5	95.4	95.2	95.0	94.8	94.5	94.2	93.8	93.5	93.1	92.7
85	93.6	94.1	94.4	94.7	94.8	94.9	95.0	95.0	94.9	94.9	94.7	94.6	94.5	94.3	94.1	93.8	93.6	93.3	93.0	92.7
90	93.1	93.4	93.6	93.8	93.9	94.0	94.1	94.1	94.1	94.0	94.0	93.9	93.8	93.7	93.6	93.4	93.3	93.1	92.9	92.7
95	92.7	92.8	92.9	93.0	93.0	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.0	93.0	92.9	92.9	92.8	92.7
98	92.7	92.7	92.7	92.7	92.7	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.7	92.7	92.7	92.7

Mean Annual Mass Removal Efficiencies for 2.75-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.8	99.9	99.9	99.8	99.8	99.7	99.5	99.4	99.1	98.8	98.5	98.2	97.8	97.4	96.9	96.4	95.9	95.3	94.7	94.1
35	99.6	99.7	99.7	99.7	99.7	99.6	99.4	99.3	99.0	98.8	98.5	98.1	97.8	97.4	96.9	96.4	95.9	95.3	94.7	94.1
40	99.4	99.5	99.6	99.6	99.5	99.4	99.3	99.1	98.9	98.6	98.4	98.0	97.7	97.3	96.8	96.4	95.8	95.3	94.7	94.1
45	99.0	99.3	99.4	99.4	99.3	99.2	99.1	98.9	98.7	98.5	98.2	97.9	97.6	97.2	96.8	96.3	95.8	95.2	94.7	94.1
50	98.6	99.0	99.1	99.2	99.1	99.0	98.9	98.7	98.6	98.3	98.1	97.8	97.5	97.1	96.7	96.2	95.7	95.2	94.7	94.1
55	98.1	98.6	98.8	98.8	98.8	98.7	98.6	98.5	98.3	98.1	97.9	97.6	97.3	97.0	96.6	96.1	95.7	95.2	94.6	94.1
60	97.6	98.2	98.4	98.5	98.5	98.4	98.3	98.2	98.0	97.9	97.6	97.4	97.1	96.8	96.4	96.0	95.6	95.1	94.6	94.1
65	97.0	97.6	97.9	98.0	98.1	98.0	98.0	97.9	97.7	97.6	97.4	97.2	96.9	96.6	96.2	95.9	95.5	95.0	94.6	94.1
70	96.4	97.0	97.3	97.5	97.6	97.6	97.5	97.5	97.4	97.2	97.1	96.9	96.6	96.3	96.0	95.7	95.3	94.9	94.5	94.1
75	95.7	96.4	96.7	96.9	97.0	97.1	97.0	97.0	96.9	96.8	96.7	96.5	96.3	96.1	95.8	95.5	95.2	94.8	94.5	94.1
80	95.1	95.6	96.0	96.3	96.4	96.5	96.5	96.5	96.4	96.3	96.2	96.1	95.9	95.7	95.5	95.3	95.0	94.7	94.4	94.1
85	94.6	95.0	95.3	95.6	95.7	95.8	95.8	95.8	95.8	95.8	95.7	95.6	95.5	95.3	95.2	95.0	94.8	94.6	94.3	94.1
90	94.2	94.5	94.7	94.9	95.0	95.0	95.1	95.1	95.1	95.1	95.1	95.0	94.9	94.9	94.8	94.6	94.5	94.4	94.2	94.1
95	93.9	94.0	94.1	94.2	94.3	94.3	94.3	94.4	94.4	94.4	94.4	94.4	94.4	94.3	94.3	94.3	94.2	94.2	94.1	94.1
98	94.0	94.0	94.0	94.0	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1	94.1

Mean Annual Mass Removal Efficiencies for 3.00-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.9	99.9	99.9	99.9	99.8	99.8	99.7	99.5	99.3	99.1	98.9	98.6	98.3	97.9	97.6	97.1	96.7	96.2	95.7	95.1
35	99.7	99.8	99.8	99.8	99.7	99.7	99.6	99.4	99.2	99.0	98.8	98.5	98.2	97.9	97.5	97.1	96.7	96.2	95.7	95.1
40	99.5	99.6	99.7	99.7	99.6	99.6	99.5	99.3	99.1	98.9	98.7	98.4	98.1	97.8	97.5	97.1	96.6	96.2	95.7	95.1
45	99.2	99.4	99.5	99.5	99.5	99.4	99.3	99.2	99.0	98.8	98.6	98.3	98.1	97.7	97.4	97.0	96.6	96.1	95.6	95.1
50	98.8	99.2	99.3	99.3	99.3	99.2	99.1	99.0	98.8	98.6	98.4	98.2	97.9	97.6	97.3	96.9	96.5	96.1	95.6	95.1
55	98.4	98.9	99.0	99.1	99.0	99.0	98.9	98.8	98.6	98.5	98.3	98.0	97.8	97.5	97.2	96.9	96.5	96.1	95.6	95.1
60	98.0	98.5	98.7	98.7	98.7	98.7	98.6	98.5	98.4	98.2	98.1	97.9	97.6	97.4	97.1	96.8	96.4	96.0	95.6	95.1
65	97.5	98.0	98.3	98.4	98.4	98.4	98.3	98.2	98.1	98.0	97.8	97.6	97.4	97.2	96.9	96.6	96.3	95.9	95.6	95.1
70	97.0	97.5	97.8	97.9	98.0	98.0	97.9	97.9	97.8	97.7	97.6	97.4	97.2	97.0	96.8	96.5	96.2	95.9	95.5	95.1
75	96.4	97.0	97.2	97.4	97.5	97.5	97.5	97.5	97.4	97.3	97.2	97.1	96.9	96.8	96.5	96.3	96.1	95.8	95.5	95.1
80	95.9	96.3	96.6	96.8	97.0	97.0	97.0	97.0	97.0	96.9	96.9	96.8	96.6	96.5	96.3	96.1	95.9	95.7	95.4	95.1
85	95.4	95.8	96.1	96.2	96.4	96.5	96.5	96.5	96.5	96.5	96.4	96.3	96.3	96.1	96.0	95.9	95.7	95.5	95.3	95.1
90	95.1	95.4	95.5	95.7	95.8	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.8	95.8	95.7	95.6	95.5	95.4	95.3	95.1
95	95.0	95.0	95.1	95.2	95.2	95.3	95.3	95.3	95.3	95.4	95.4	95.4	95.3	95.3	95.3	95.3	95.3	95.2	95.2	95.1
98	95.0	95.1	95.1	95.1	95.1	95.1	95.1	95.1	95.1	95.1	95.2	95.2	95.2	95.2	95.2	95.2	95.1	95.1	95.1	95.1

Mean Annual Mass Removal Efficiencies for 3.25-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.9	99.9	99.9	99.9	99.9	99.8	99.8	99.6	99.5	99.3	99.1	98.9	98.6	98.3	98.0	97.7	97.3	96.9	96.4	96.0
35	99.8	99.8	99.9	99.8	99.8	99.8	99.7	99.6	99.4	99.2	99.0	98.8	98.5	98.3	98.0	97.6	97.3	96.9	96.4	96.0
40	99.6	99.7	99.7	99.7	99.7	99.7	99.6	99.5	99.3	99.1	99.0	98.7	98.5	98.2	97.9	97.6	97.2	96.8	96.4	96.0
45	99.4	99.5	99.6	99.6	99.6	99.5	99.4	99.3	99.2	99.0	98.8	98.6	98.4	98.2	97.9	97.5	97.2	96.8	96.4	96.0
50	99.1	99.3	99.4	99.4	99.4	99.4	99.3	99.2	99.1	98.9	98.7	98.5	98.3	98.1	97.8	97.5	97.2	96.8	96.4	96.0
55	98.7	99.1	99.2	99.2	99.2	99.2	99.1	99.0	98.9	98.7	98.6	98.4	98.2	98.0	97.7	97.4	97.1	96.8	96.4	96.0
60	98.4	98.8	98.9	99.0	99.0	98.9	98.9	98.8	98.7	98.5	98.4	98.2	98.0	97.8	97.6	97.3	97.0	96.7	96.4	96.0
65	98.0	98.4	98.6	98.6	98.7	98.6	98.6	98.5	98.4	98.3	98.2	98.0	97.9	97.7	97.5	97.2	96.9	96.7	96.3	96.0
70	97.5	97.9	98.2	98.3	98.3	98.3	98.3	98.2	98.2	98.1	98.0	97.8	97.7	97.5	97.3	97.1	96.8	96.6	96.3	96.0
75	97.0	97.4	97.7	97.8	97.9	97.9	97.9	97.9	97.8	97.8	97.7	97.6	97.4	97.3	97.1	96.9	96.7	96.5	96.3	96.0
80	96.5	96.9	97.2	97.3	97.4	97.5	97.5	97.5	97.5	97.4	97.4	97.3	97.2	97.1	96.9	96.8	96.6	96.4	96.2	96.0
85	96.1	96.4	96.7	96.8	96.9	97.0	97.0	97.1	97.1	97.0	97.0	96.9	96.9	96.8	96.7	96.6	96.4	96.3	96.1	96.0
90	95.9	96.1	96.2	96.3	96.4	96.5	96.5	96.6	96.6	96.6	96.6	96.6	96.5	96.5	96.4	96.3	96.3	96.2	96.1	96.0
95	95.8	95.8	95.9	96.0	96.0	96.0	96.1	96.1	96.1	96.1	96.1	96.1	96.1	96.1	96.1	96.1	96.1	96.0	96.0	96.0
98	95.9	95.9	95.9	95.9	95.9	95.9	95.9	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0

Mean Annual Mass Removal Efficiencies for 3.50-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.9	99.9	99.9	99.9	99.9	99.9	99.8	99.7	99.6	99.5	99.3	99.1	98.9	98.6	98.4	98.1	97.8	97.4	97.0	96.7
35	99.8	99.9	99.9	99.9	99.8	99.8	99.8	99.7	99.5	99.4	99.2	99.0	98.8	98.6	98.3	98.0	97.7	97.4	97.0	96.7
40	99.7	99.8	99.8	99.8	99.8	99.7	99.7	99.6	99.5	99.3	99.2	99.0	98.8	98.5	98.3	98.0	97.7	97.4	97.0	96.7
45	99.5	99.7	99.7	99.7	99.7	99.6	99.6	99.5	99.4	99.2	99.1	98.9	98.7	98.5	98.2	98.0	97.7	97.4	97.0	96.7
50	99.3	99.5	99.5	99.5	99.5	99.5	99.4	99.3	99.2	99.1	98.9	98.8	98.6	98.4	98.2	97.9	97.6	97.3	97.0	96.7
55	98.9	99.2	99.3	99.4	99.4	99.3	99.3	99.2	99.1	99.0	98.8	98.7	98.5	98.3	98.1	97.9	97.6	97.3	97.0	96.7
60	98.6	99.0	99.1	99.2	99.2	99.1	99.1	99.0	98.9	98.8	98.7	98.5	98.4	98.2	98.0	97.8	97.5	97.3	97.0	96.7
65	98.3	98.7	98.8	98.9	98.9	98.9	98.8	98.8	98.7	98.6	98.5	98.4	98.2	98.1	97.9	97.7	97.5	97.2	96.9	96.7
70	97.9	98.3	98.5	98.5	98.6	98.6	98.6	98.5	98.4	98.4	98.3	98.2	98.0	97.9	97.7	97.6	97.4	97.2	96.9	96.7
75	97.5	97.8	98.1	98.2	98.2	98.3	98.2	98.2	98.2	98.1	98.0	97.9	97.8	97.7	97.6	97.4	97.3	97.1	96.9	96.7
80	97.1	97.4	97.6	97.7	97.8	97.9	97.9	97.9	97.9	97.8	97.8	97.7	97.6	97.5	97.4	97.3	97.2	97.0	96.8	96.7
85	96.7	97.0	97.1	97.3	97.4	97.4	97.5	97.5	97.5	97.5	97.5	97.4	97.4	97.3	97.2	97.1	97.0	96.9	96.8	96.7
90	96.5	96.6	96.8	96.9	97.0	97.0	97.1	97.1	97.1	97.1	97.1	97.1	97.1	97.0	97.0	96.9	96.9	96.8	96.7	96.7
95	96.4	96.5	96.5	96.6	96.6	96.7	96.7	96.7	96.7	96.7	96.8	96.8	96.8	96.8	96.7	96.7	96.7	96.7	96.7	96.7
98	96.5	96.5	96.5	96.6	96.6	96.6	96.6	96.6	96.6	96.6	96.6	96.6	96.6	96.6	96.6	96.6	96.7	96.7	96.7	96.7

Mean Annual Mass Removal Efficiencies for 3.75-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.9	99.9	100.0	100.0	99.9	99.9	99.9	99.8	99.7	99.6	99.4	99.3	99.1	98.9	98.6	98.4	98.1	97.8	97.5	97.2
35	99.9	99.9	99.9	99.9	99.9	99.9	99.8	99.7	99.6	99.5	99.4	99.2	99.0	98.8	98.6	98.4	98.1	97.8	97.5	97.2
40	99.8	99.8	99.9	99.8	99.8	99.8	99.7	99.7	99.6	99.5	99.3	99.2	99.0	98.8	98.6	98.3	98.1	97.8	97.5	97.2
45	99.6	99.7	99.8	99.7	99.7	99.7	99.7	99.6	99.5	99.4	99.2	99.1	98.9	98.7	98.5	98.3	98.1	97.8	97.5	97.2
50	99.4	99.6	99.6	99.6	99.6	99.6	99.5	99.5	99.4	99.3	99.1	99.0	98.8	98.7	98.5	98.3	98.0	97.8	97.5	97.2
55	99.1	99.4	99.5	99.5	99.5	99.5	99.4	99.3	99.2	99.1	99.0	98.9	98.7	98.6	98.4	98.2	98.0	97.7	97.5	97.2
60	98.9	99.2	99.3	99.3	99.3	99.3	99.2	99.2	99.1	99.0	98.9	98.8	98.6	98.5	98.3	98.1	97.9	97.7	97.5	97.2
65	98.6	98.9	99.0	99.1	99.1	99.1	99.0	99.0	98.9	98.8	98.7	98.6	98.5	98.4	98.2	98.0	97.9	97.7	97.4	97.2
70	98.3	98.6	98.7	98.8	98.8	98.8	98.8	98.8	98.7	98.6	98.5	98.5	98.3	98.2	98.1	98.0	97.8	97.6	97.4	97.2
75	97.9	98.2	98.4	98.5	98.5	98.5	98.5	98.5	98.4	98.4	98.3	98.3	98.2	98.1	98.0	97.8	97.7	97.6	97.4	97.2
80	97.5	97.8	98.0	98.1	98.2	98.2	98.2	98.2	98.2	98.1	98.1	98.0	98.0	97.9	97.8	97.7	97.6	97.5	97.3	97.2
85	97.2	97.4	97.6	97.7	97.8	97.8	97.9	97.9	97.9	97.9	97.8	97.8	97.8	97.7	97.6	97.6	97.5	97.4	97.3	97.2
90	97.0	97.1	97.2	97.3	97.4	97.4	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.4	97.4	97.3	97.3	97.2
95	96.9	97.0	97.0	97.1	97.1	97.2	97.2	97.2	97.2	97.2	97.2	97.3	97.3	97.3	97.3	97.3	97.2	97.2	97.2	97.2
98	97.0	97.1	97.1	97.1	97.1	97.1	97.1	97.1	97.1	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2

Mean Annual Mass Removal Efficiencies for 4.00-inches of Retention in Zone 2 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.9	100.0	100.0	100.0	100.0	99.9	99.9	99.8	99.8	99.7	99.6	99.4	99.3	99.1	98.9	98.7	98.4	98.2	97.9	97.6
35	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.8	99.7	99.6	99.5	99.4	99.2	99.0	98.8	98.6	98.4	98.2	97.9	97.6
40	99.8	99.9	99.9	99.9	99.9	99.8	99.8	99.7	99.7	99.6	99.5	99.3	99.2	99.0	98.8	98.6	98.4	98.2	97.9	97.6
45	99.7	99.8	99.8	99.8	99.8	99.8	99.7	99.7	99.6	99.5	99.4	99.3	99.1	98.9	98.8	98.6	98.4	98.1	97.9	97.6
50	99.6	99.7	99.7	99.7	99.7	99.7	99.6	99.6	99.5	99.4	99.3	99.2	99.0	98.9	98.7	98.5	98.3	98.1	97.9	97.6
55	99.3	99.5	99.6	99.6	99.6	99.6	99.5	99.4	99.4	99.3	99.2	99.1	98.9	98.8	98.6	98.5	98.3	98.1	97.9	97.6
60	99.1	99.3	99.4	99.4	99.4	99.4	99.4	99.3	99.2	99.2	99.1	99.0	98.8	98.7	98.6	98.4	98.2	98.1	97.8	97.6
65	98.8	99.1	99.2	99.3	99.3	99.2	99.2	99.1	99.1	99.0	98.9	98.8	98.7	98.6	98.5	98.3	98.2	98.0	97.8	97.6
70	98.6	98.8	98.9	99.0	99.0	99.0	99.0	99.0	98.9	98.8	98.8	98.7	98.6	98.5	98.4	98.3	98.1	98.0	97.8	97.6
75	98.2	98.5	98.6	98.7	98.7	98.8	98.8	98.7	98.7	98.6	98.6	98.5	98.4	98.4	98.3	98.2	98.0	97.9	97.8	97.6
80	97.9	98.1	98.3	98.4	98.4	98.5	98.5	98.5	98.4	98.4	98.4	98.3	98.3	98.2	98.1	98.1	98.0	97.9	97.7	97.6
85	97.6	97.8	97.9	98.0	98.1	98.1	98.2	98.2	98.2	98.2	98.1	98.1	98.1	98.0	98.0	97.9	97.9	97.8	97.7	97.6
90	97.4	97.5	97.6	97.7	97.8	97.8	97.8	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.8	97.8	97.8	97.7	97.7	97.6
95	97.4	97.4	97.5	97.5	97.5	97.6	97.6	97.6	97.6	97.6	97.7	97.7	97.7	97.7	97.7	97.7	97.7	97.6	97.6	97.6
98	97.5	97.5	97.5	97.5	97.5	97.5	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6	97.6

Mean Annual Mass Removal Efficiencies for 0.25-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	82.7	81.2	75.5	69.3	63.6	58.6	54.2	50.4	47.0	44.1	41.4	39.1	37.1	35.2	33.5	32.0	30.6	29.3	28.1	27.0
35	77.8	78.2	73.6	68.0	62.7	58.0	53.7	50.0	46.8	43.9	41.3	39.0	37.0	35.1	33.4	31.9	30.5	29.2	28.1	27.0
40	72.7	74.9	71.5	66.6	61.7	57.2	53.2	49.6	46.4	43.6	41.1	38.9	36.8	35.0	33.4	31.9	30.5	29.2	28.1	27.0
45	67.3	71.3	69.0	64.9	60.5	56.3	52.5	49.1	46.0	43.3	40.9	38.7	36.7	34.9	33.3	31.8	30.5	29.2	28.1	27.0
50	61.8	67.4	66.3	62.9	59.1	55.3	51.7	48.5	45.6	42.9	40.6	38.5	36.5	34.8	33.2	31.7	30.4	29.2	28.0	27.0
55	56.5	63.2	63.2	60.7	57.4	54.0	50.8	47.8	45.0	42.5	40.2	38.2	36.3	34.6	33.1	31.7	30.4	29.1	28.0	27.0
60	51.5	58.8	59.9	58.2	55.5	52.6	49.7	46.9	44.3	42.0	39.8	37.9	36.1	34.4	32.9	31.6	30.3	29.1	28.0	27.0
65	46.7	54.3	56.2	55.4	53.4	50.9	48.3	45.9	43.5	41.3	39.3	37.5	35.8	34.2	32.8	31.4	30.2	29.0	28.0	27.0
70	42.4	49.7	52.3	52.2	50.8	48.9	46.8	44.6	42.5	40.5	38.7	37.0	35.4	33.9	32.5	31.3	30.1	29.0	28.0	27.0
75	38.8	45.1	48.0	48.6	47.9	46.5	44.8	43.1	41.3	39.5	37.9	36.3	34.9	33.5	32.2	31.1	29.9	28.9	27.9	27.0
80	35.5	40.7	43.4	44.5	44.4	43.7	42.5	41.1	39.7	38.3	36.9	35.5	34.2	33.0	31.9	30.8	29.7	28.8	27.9	27.0
85	32.7	36.5	38.7	39.9	40.3	40.1	39.5	38.6	37.6	36.5	35.4	34.4	33.3	32.3	31.3	30.4	29.5	28.6	27.8	27.0
90	30.6	32.8	34.3	35.2	35.7	35.8	35.6	35.2	34.7	34.1	33.4	32.7	31.9	31.2	30.4	29.7	29.0	28.3	27.6	27.0
95	29.1	29.8	30.3	30.7	30.9	31.0	31.0	31.0	30.8	30.6	30.3	30.0	29.7	29.4	29.0	28.6	28.2	27.8	27.4	27.0
98	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.4	28.3	28.2	28.0	27.9	27.8	27.6	27.5	27.3	27.2	27.0

Mean Annual Mass Removal Efficiencies for 0.50-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	87.6	89.1	87.6	84.8	81.5	77.8	74.3	70.9	67.8	64.9	62.1	59.6	57.2	55.0	52.9	51.0	49.2	47.6	46.0	44.5
35	83.5	86.5	85.6	83.4	80.4	77.0	73.6	70.4	67.4	64.5	61.9	59.4	57.0	54.9	52.8	51.0	49.2	47.5	46.0	44.5
40	79.3	83.5	83.4	81.7	79.1	76.0	72.9	69.8	66.9	64.2	61.6	59.1	56.9	54.7	52.7	50.9	49.1	47.5	46.0	44.5
45	74.9	80.3	80.9	79.7	77.6	74.9	72.0	69.1	66.4	63.7	61.2	58.9	56.6	54.6	52.6	50.8	49.1	47.5	45.9	44.5
50	70.5	76.7	78.1	77.6	75.9	73.5	70.9	68.3	65.7	63.2	60.8	58.5	56.4	54.4	52.5	50.7	49.0	47.4	45.9	44.5
55	66.3	72.9	75.0	75.1	73.9	71.9	69.6	67.3	64.9	62.6	60.3	58.1	56.1	54.1	52.3	50.6	48.9	47.4	45.9	44.5
60	62.1	68.9	71.7	72.4	71.6	70.1	68.2	66.1	64.0	61.8	59.7	57.7	55.7	53.8	52.1	50.4	48.8	47.3	45.9	44.5
65	58.0	64.9	68.1	69.3	69.1	68.0	66.5	64.7	62.8	60.9	59.0	57.1	55.2	53.5	51.8	50.2	48.7	47.2	45.8	44.5
70	54.4	60.9	64.2	65.8	66.2	65.6	64.5	63.0	61.5	59.8	58.1	56.3	54.6	53.0	51.4	49.9	48.5	47.1	45.8	44.5
75	51.1	57.0	60.4	62.2	62.9	62.7	62.1	61.0	59.8	58.4	56.9	55.4	53.9	52.4	51.0	49.6	48.3	47.0	45.7	44.5
80	48.5	53.5	56.5	58.3	59.1	59.3	59.1	58.5	57.6	56.6	55.4	54.2	52.9	51.6	50.4	49.2	47.9	46.8	45.6	44.5
85	46.7	50.3	52.7	54.2	55.1	55.5	55.6	55.3	54.9	54.2	53.4	52.6	51.6	50.6	49.6	48.5	47.5	46.5	45.5	44.5
90	45.4	47.6	49.1	50.2	51.0	51.4	51.7	51.7	51.5	51.2	50.8	50.3	49.7	49.0	48.3	47.6	46.8	46.1	45.3	44.5
95	44.8	45.6	46.2	46.7	47.1	47.3	47.5	47.6	47.6	47.5	47.4	47.2	47.0	46.7	46.4	46.1	45.7	45.3	44.9	44.5
98	45.2	45.3	45.4	45.4	45.5	45.5	45.5	45.6	45.5	45.5	45.5	45.4	45.3	45.3	45.2	45.0	44.9	44.8	44.7	44.5

Mean Annual Mass Removal Efficiencies for 0.75-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	89.7	92.3	91.6	90.3	88.4	86.2	83.8	81.3	78.7	76.2	73.8	71.5	69.3	67.3	65.3	63.4	61.6	59.9	58.3	56.7
35	86.6	89.8	89.8	88.9	87.2	85.3	83.1	80.7	78.2	75.8	73.5	71.3	69.2	67.1	65.2	63.3	61.6	59.9	58.3	56.7
40	82.9	87.1	87.9	87.3	85.9	84.2	82.2	80.0	77.7	75.4	73.2	71.0	69.0	67.0	65.1	63.2	61.5	59.8	58.2	56.7
45	79.3	84.4	85.7	85.5	84.5	83.0	81.2	79.2	77.1	74.9	72.8	70.7	68.7	66.8	64.9	63.1	61.4	59.8	58.2	56.7
50	75.8	81.4	83.2	83.5	82.8	81.6	80.1	78.3	76.3	74.3	72.3	70.3	68.4	66.5	64.7	63.0	61.3	59.7	58.2	56.7
55	72.2	78.3	80.5	81.2	80.9	80.1	78.8	77.2	75.4	73.5	71.7	69.8	68.0	66.2	64.5	62.8	61.2	59.7	58.2	56.7
60	69.0	75.0	77.6	78.6	78.7	78.3	77.3	75.9	74.3	72.7	71.0	69.2	67.5	65.9	64.2	62.6	61.1	59.6	58.1	56.7
65	65.7	71.6	74.4	75.8	76.3	76.2	75.5	74.4	73.1	71.7	70.1	68.6	67.0	65.4	63.9	62.4	60.9	59.5	58.1	56.7
70	62.5	68.2	71.2	72.8	73.6	73.8	73.4	72.7	71.6	70.4	69.1	67.7	66.3	64.9	63.5	62.1	60.7	59.3	58.0	56.7
75	59.8	64.9	67.9	69.7	70.6	71.1	71.0	70.6	69.8	68.9	67.8	66.7	65.5	64.2	62.9	61.7	60.4	59.2	57.9	56.7
80	57.5	61.8	64.6	66.4	67.5	68.1	68.2	68.0	67.6	67.0	66.2	65.3	64.3	63.3	62.2	61.2	60.0	58.9	57.8	56.7
85	56.0	59.3	61.6	63.1	64.2	64.8	65.1	65.1	64.9	64.6	64.1	63.5	62.8	62.1	61.3	60.4	59.5	58.6	57.7	56.7
90	55.4	57.4	58.9	60.0	60.8	61.3	61.7	61.9	61.9	61.8	61.6	61.3	60.9	60.5	59.9	59.4	58.8	58.1	57.4	56.7
95	55.5	56.2	56.8	57.3	57.7	58.1	58.3	58.5	58.6	58.7	58.7	58.6	58.5	58.4	58.2	57.9	57.7	57.4	57.1	56.7
98	56.5	56.6	56.8	56.9	57.0	57.1	57.1	57.2	57.2	57.2	57.2	57.2	57.2	57.2	57.1	57.1	57.0	56.9	56.8	56.7

Mean Annual Mass Removal Efficiencies for 1.00-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	91.1	93.7	94.0	92.9	91.7	90.3	88.6	86.8	85.0	83.1	81.1	79.1	77.2	75.3	73.5	71.8	70.1	68.5	67.0	65.5
35	88.6	91.8	92.2	91.6	90.7	89.5	87.9	86.3	84.5	82.7	80.8	78.9	77.0	75.2	73.4	71.7	70.1	68.5	67.0	65.5
40	85.9	89.4	90.4	90.3	89.6	88.5	87.1	85.6	83.9	82.2	80.4	78.6	76.8	75.0	73.3	71.6	70.0	68.5	66.9	65.5
45	82.5	86.9	88.5	88.7	88.2	87.3	86.1	84.8	83.3	81.7	80.0	78.2	76.5	74.8	73.1	71.5	69.9	68.4	66.9	65.5
50	79.4	84.4	86.4	86.9	86.7	86.0	85.0	83.9	82.5	81.0	79.4	77.8	76.1	74.5	72.9	71.3	69.8	68.3	66.9	65.5
55	76.6	81.9	84.0	84.9	85.0	84.5	83.7	82.8	81.6	80.3	78.8	77.3	75.7	74.2	72.7	71.2	69.7	68.3	66.9	65.5
60	73.8	79.1	81.6	82.7	83.0	82.8	82.3	81.6	80.6	79.4	78.1	76.7	75.2	73.8	72.4	70.9	69.5	68.2	66.8	65.5
65	71.1	76.4	78.9	80.3	80.8	80.9	80.6	80.1	79.4	78.4	77.2	75.9	74.6	73.3	72.0	70.7	69.4	68.0	66.8	65.5
70	68.6	73.5	76.2	77.6	78.4	78.8	78.7	78.5	77.9	77.1	76.2	75.1	73.9	72.8	71.5	70.3	69.1	67.9	66.7	65.5
75	66.3	70.6	73.3	74.9	75.9	76.4	76.6	76.5	76.1	75.6	74.9	74.0	73.0	72.0	71.0	69.9	68.8	67.7	66.6	65.5
80	64.3	68.0	70.5	72.1	73.2	73.9	74.2	74.3	74.1	73.8	73.3	72.6	71.9	71.1	70.2	69.3	68.4	67.5	66.5	65.5
85	63.1	65.9	67.9	69.4	70.4	71.2	71.6	71.8	71.8	71.6	71.3	70.9	70.5	69.9	69.3	68.6	67.9	67.1	66.3	65.5
90	62.7	64.5	65.9	67.0	67.8	68.4	68.8	69.1	69.2	69.2	69.1	68.9	68.7	68.4	68.0	67.6	67.1	66.6	66.1	65.5
95	63.3	64.0	64.6	65.1	65.5	65.8	66.1	66.3	66.4	66.5	66.6	66.6	66.6	66.5	66.4	66.3	66.1	66.0	65.7	65.5
98	64.7	64.8	65.0	65.1	65.2	65.3	65.4	65.5	65.5	65.6	65.6	65.6	65.6	65.7	65.7	65.6	65.6	65.6	65.5	65.5

Mean Annual Mass Removal Efficiencies for 1.25-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	92.1	94.5	95.2	94.8	93.7	92.7	91.5	90.2	88.7	87.3	85.7	84.2	82.6	81.0	79.4	77.8	76.3	74.8	73.4	72.0
35	90.0	92.9	93.9	93.5	92.7	91.9	90.8	89.6	88.2	86.9	85.4	83.9	82.4	80.8	79.3	77.7	76.2	74.8	73.4	72.0
40	87.8	91.2	92.2	92.2	91.7	91.0	90.1	89.0	87.7	86.4	85.0	83.6	82.1	80.6	79.1	77.6	76.2	74.7	73.3	72.0
45	85.4	89.0	90.3	90.7	90.5	90.0	89.2	88.2	87.0	85.9	84.6	83.2	81.8	80.4	78.9	77.5	76.1	74.7	73.3	72.0
50	82.3	86.7	88.4	89.2	89.2	88.9	88.2	87.3	86.3	85.2	84.1	82.8	81.5	80.1	78.7	77.3	75.9	74.6	73.3	72.0
55	79.7	84.4	86.6	87.4	87.6	87.5	87.0	86.3	85.4	84.5	83.5	82.3	81.1	79.8	78.4	77.1	75.8	74.5	73.2	72.0
60	77.4	82.3	84.4	85.5	85.9	86.0	85.7	85.1	84.4	83.7	82.8	81.7	80.6	79.4	78.1	76.9	75.6	74.4	73.2	72.0
65	75.3	79.8	82.2	83.4	84.1	84.2	84.1	83.8	83.3	82.7	81.9	81.0	80.0	78.9	77.8	76.6	75.4	74.3	73.1	72.0
70	73.1	77.5	79.9	81.3	82.0	82.3	82.4	82.3	82.0	81.5	80.9	80.1	79.3	78.3	77.3	76.3	75.2	74.1	73.1	72.0
75	71.2	75.1	77.4	78.9	79.7	80.3	80.5	80.6	80.4	80.1	79.7	79.1	78.4	77.6	76.7	75.8	74.9	73.9	73.0	72.0
80	69.6	72.8	75.0	76.4	77.4	78.1	78.5	78.7	78.7	78.5	78.2	77.8	77.3	76.7	76.0	75.2	74.5	73.7	72.8	72.0
85	68.5	71.0	72.9	74.2	75.1	75.8	76.3	76.6	76.7	76.7	76.6	76.3	76.0	75.5	75.1	74.5	73.9	73.3	72.7	72.0
90	68.4	69.9	71.2	72.2	73.0	73.6	74.0	74.3	74.5	74.6	74.6	74.6	74.4	74.2	73.9	73.6	73.3	72.9	72.4	72.0
95	69.3	70.0	70.5	71.0	71.4	71.7	72.0	72.2	72.4	72.5	72.6	72.6	72.6	72.6	72.6	72.5	72.4	72.3	72.2	72.0
98	70.9	71.0	71.2	71.3	71.4	71.5	71.6	71.7	71.8	71.8	71.9	71.9	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0

Mean Annual Mass Removal Efficiencies for 1.50-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	92.8	95.2	95.9	95.9	95.3	94.3	93.3	92.3	91.2	90.1	88.8	87.6	86.3	84.9	83.6	82.3	80.9	79.6	78.2	77.0
35	91.0	93.8	94.7	94.9	94.3	93.5	92.7	91.8	90.8	89.7	88.5	87.3	86.0	84.8	83.5	82.2	80.8	79.5	78.2	77.0
40	89.1	92.3	93.5	93.6	93.3	92.7	92.0	91.2	90.3	89.2	88.1	87.0	85.8	84.6	83.3	82.0	80.8	79.5	78.2	77.0
45	87.2	90.7	91.9	92.2	92.1	91.8	91.2	90.5	89.7	88.7	87.7	86.6	85.5	84.3	83.1	81.9	80.7	79.4	78.2	77.0
50	85.1	88.6	90.1	90.7	90.9	90.7	90.4	89.7	89.0	88.1	87.1	86.2	85.1	84.0	82.9	81.7	80.5	79.3	78.1	77.0
55	82.4	86.5	88.3	89.2	89.6	89.6	89.3	88.8	88.2	87.4	86.6	85.7	84.7	83.7	82.7	81.5	80.4	79.2	78.1	77.0
60	80.2	84.5	86.6	87.7	88.1	88.2	88.1	87.7	87.2	86.6	85.9	85.1	84.3	83.3	82.4	81.3	80.2	79.1	78.0	77.0
65	78.4	82.6	84.7	85.9	86.5	86.7	86.7	86.5	86.1	85.6	85.1	84.4	83.7	82.9	82.0	81.0	80.0	79.0	78.0	77.0
70	76.7	80.6	82.7	84.0	84.7	85.1	85.2	85.1	84.9	84.6	84.1	83.6	83.0	82.3	81.5	80.7	79.8	78.8	77.9	77.0
75	75.1	78.5	80.7	82.0	82.8	83.3	83.5	83.6	83.5	83.3	83.1	82.7	82.2	81.6	81.0	80.3	79.5	78.6	77.8	77.0
80	73.8	76.7	78.6	79.9	80.7	81.3	81.7	81.9	82.0	82.0	81.8	81.6	81.2	80.8	80.3	79.7	79.1	78.4	77.7	77.0
85	72.9	75.1	76.7	77.9	78.8	79.4	79.9	80.2	80.3	80.4	80.4	80.3	80.1	79.8	79.5	79.0	78.6	78.1	77.5	77.0
90	72.9	74.3	75.4	76.3	77.0	77.6	78.0	78.4	78.6	78.7	78.8	78.8	78.8	78.6	78.5	78.2	78.0	77.7	77.3	77.0
95	74.0	74.6	75.1	75.5	75.9	76.2	76.5	76.8	77.0	77.1	77.2	77.3	77.3	77.3	77.3	77.3	77.2	77.2	77.1	77.0
98	75.8	75.9	76.0	76.2	76.3	76.4	76.4	76.5	76.6	76.7	76.7	76.8	76.8	76.9	76.9	76.9	76.9	76.9	77.0	77.0

Mean Annual Mass Removal Efficiencies for 1.75-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	93.3	95.6	96.4	96.6	96.3	95.6	94.7	93.8	92.9	92.0	91.0	89.9	88.8	87.8	86.6	85.5	84.3	83.2	82.0	80.8
35	91.8	94.4	95.4	95.7	95.5	94.8	94.1	93.3	92.5	91.6	90.7	89.7	88.6	87.6	86.5	85.4	84.3	83.1	82.0	80.8
40	90.2	93.1	94.3	94.7	94.5	94.0	93.4	92.7	92.0	91.2	90.4	89.4	88.4	87.4	86.3	85.3	84.2	83.1	82.0	80.8
45	88.6	91.8	93.1	93.5	93.4	93.1	92.6	92.1	91.5	90.8	89.9	89.0	88.1	87.1	86.2	85.1	84.1	83.0	81.9	80.8
50	86.9	90.3	91.6	92.1	92.2	92.1	91.8	91.4	90.9	90.2	89.5	88.6	87.7	86.9	85.9	85.0	84.0	82.9	81.9	80.8
55	84.9	88.3	89.9	90.6	91.0	91.1	90.9	90.6	90.2	89.6	88.9	88.1	87.4	86.6	85.7	84.8	83.8	82.9	81.9	80.8
60	82.7	86.4	88.2	89.2	89.7	89.9	89.9	89.7	89.3	88.8	88.2	87.6	86.9	86.2	85.4	84.6	83.7	82.8	81.8	80.8
65	80.9	84.6	86.7	87.7	88.4	88.6	88.7	88.6	88.3	87.9	87.5	86.9	86.4	85.7	85.0	84.3	83.5	82.6	81.8	80.8
70	79.6	83.0	85.0	86.2	86.8	87.2	87.4	87.4	87.2	87.0	86.6	86.2	85.7	85.2	84.6	84.0	83.2	82.5	81.7	80.8
75	78.3	81.4	83.2	84.4	85.2	85.7	85.9	86.0	86.0	85.8	85.6	85.3	85.0	84.6	84.1	83.5	82.9	82.3	81.6	80.8
80	77.2	79.8	81.5	82.7	83.5	84.0	84.3	84.5	84.6	84.6	84.5	84.4	84.1	83.8	83.5	83.1	82.6	82.0	81.5	80.8
85	76.6	78.5	79.9	80.9	81.7	82.2	82.7	83.0	83.2	83.3	83.3	83.3	83.2	83.0	82.8	82.5	82.1	81.7	81.3	80.8
90	76.4	77.7	78.7	79.5	80.2	80.7	81.1	81.4	81.7	81.9	82.0	82.1	82.1	82.0	81.9	81.8	81.6	81.4	81.1	80.8
95	77.6	78.1	78.6	79.0	79.4	79.7	80.0	80.3	80.5	80.6	80.8	80.9	80.9	81.0	81.0	81.0	81.0	81.0	80.9	80.8
98	79.5	79.7	79.8	79.9	80.0	80.1	80.2	80.3	80.4	80.5	80.5	80.6	80.6	80.7	80.7	80.8	80.8	80.8	80.8	80.8

Mean Annual Mass Removal Efficiencies for 2.00-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	93.8	95.9	96.7	97.0	97.0	96.6	95.8	95.0	94.2	93.4	92.6	91.7	90.8	89.8	88.9	87.9	86.9	85.9	84.9	83.9
35	92.4	94.9	95.8	96.2	96.3	95.9	95.2	94.5	93.8	93.1	92.3	91.5	90.6	89.7	88.7	87.8	86.8	85.9	84.9	83.9
40	91.0	93.8	94.9	95.4	95.4	95.1	94.5	93.9	93.3	92.7	92.0	91.2	90.4	89.5	88.6	87.7	86.8	85.8	84.8	83.9
45	89.7	92.7	93.9	94.5	94.4	94.2	93.8	93.3	92.8	92.3	91.6	90.9	90.1	89.2	88.4	87.6	86.7	85.8	84.8	83.9
50	88.2	91.4	92.8	93.3	93.3	93.3	93.0	92.7	92.3	91.8	91.2	90.5	89.8	89.0	88.2	87.4	86.6	85.7	84.8	83.9
55	86.9	90.0	91.3	91.9	92.2	92.2	92.2	91.9	91.6	91.2	90.7	90.1	89.4	88.7	87.9	87.2	86.4	85.6	84.7	83.9
60	85.0	88.2	89.7	90.6	91.0	91.2	91.2	91.1	90.9	90.5	90.1	89.6	88.9	88.3	87.7	87.0	86.3	85.5	84.7	83.9
65	83.2	86.4	88.2	89.2	89.8	90.1	90.2	90.2	90.0	89.7	89.4	88.9	88.4	87.9	87.3	86.7	86.1	85.4	84.6	83.9
70	81.7	85.0	86.7	87.8	88.5	88.9	89.1	89.1	89.1	88.8	88.6	88.2	87.8	87.4	86.9	86.4	85.8	85.2	84.6	83.9
75	80.8	83.5	85.3	86.4	87.1	87.6	87.9	88.0	87.9	87.9	87.7	87.4	87.1	86.8	86.4	86.0	85.6	85.0	84.5	83.9
80	80.0	82.3	83.8	84.9	85.6	86.2	86.5	86.6	86.7	86.8	86.7	86.6	86.4	86.2	85.9	85.6	85.2	84.8	84.4	83.9
85	79.5	81.2	82.5	83.4	84.1	84.6	85.0	85.3	85.5	85.6	85.6	85.6	85.5	85.4	85.3	85.1	84.9	84.6	84.2	83.9
90	79.5	80.6	81.5	82.2	82.8	83.3	83.6	83.9	84.2	84.3	84.5	84.6	84.6	84.6	84.6	84.5	84.4	84.3	84.1	83.9
95	80.6	81.1	81.5	81.9	82.2	82.5	82.8	83.0	83.2	83.4	83.5	83.6	83.7	83.8	83.9	83.9	83.9	83.9	83.9	83.9
98	82.4	82.6	82.7	82.8	82.9	83.1	83.2	83.2	83.3	83.4	83.5	83.5	83.6	83.7	83.7	83.7	83.8	83.8	83.9	83.9

Mean Annual Mass Removal Efficiencies for 2.25-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	94.1	96.2	97.0	97.3	97.4	97.2	96.7	96.0	95.2	94.5	93.8	93.0	92.3	91.5	90.6	89.8	88.9	88.0	87.1	86.2
35	92.9	95.3	96.2	96.6	96.8	96.6	96.1	95.5	94.8	94.2	93.5	92.8	92.1	91.3	90.5	89.7	88.8	88.0	87.1	86.2
40	91.7	94.3	95.4	95.9	96.1	95.9	95.5	95.0	94.4	93.8	93.2	92.5	91.9	91.1	90.4	89.5	88.7	87.9	87.1	86.2
45	90.6	93.3	94.6	95.1	95.3	95.1	94.8	94.4	93.9	93.4	92.8	92.2	91.6	90.9	90.2	89.4	88.6	87.9	87.1	86.2
50	89.4	92.3	93.6	94.2	94.3	94.2	94.0	93.7	93.3	92.9	92.5	91.9	91.3	90.7	90.0	89.3	88.5	87.8	87.0	86.2
55	88.2	91.2	92.5	93.1	93.3	93.3	93.2	93.0	92.7	92.4	92.0	91.5	91.0	90.4	89.7	89.1	88.4	87.7	87.0	86.2
60	87.0	89.7	91.1	91.8	92.1	92.3	92.3	92.2	92.0	91.8	91.5	91.0	90.6	90.1	89.5	88.9	88.2	87.6	86.9	86.2
65	85.3	88.1	89.6	90.5	91.0	91.3	91.4	91.4	91.3	91.1	90.9	90.5	90.1	89.7	89.1	88.6	88.1	87.5	86.9	86.2
70	83.8	86.6	88.2	89.2	89.8	90.2	90.4	90.5	90.5	90.4	90.2	89.9	89.6	89.2	88.8	88.3	87.9	87.4	86.8	86.2
75	82.9	85.3	86.9	87.9	88.6	89.1	89.3	89.5	89.6	89.5	89.4	89.2	89.0	88.7	88.3	88.0	87.6	87.2	86.7	86.2
80	82.2	84.3	85.7	86.7	87.4	87.9	88.2	88.4	88.5	88.5	88.5	88.4	88.3	88.1	87.8	87.6	87.3	87.0	86.6	86.2
85	81.9	83.4	84.6	85.5	86.1	86.6	86.9	87.2	87.4	87.5	87.5	87.5	87.5	87.4	87.3	87.1	87.0	86.8	86.5	86.2
90	82.1	83.0	83.8	84.5	85.0	85.4	85.7	86.0	86.2	86.4	86.5	86.6	86.7	86.7	86.7	86.7	86.6	86.5	86.4	86.2
95	83.0	83.5	83.9	84.2	84.5	84.8	85.0	85.2	85.4	85.6	85.7	85.8	85.9	86.0	86.1	86.2	86.2	86.2	86.3	86.2
98	84.8	84.9	85.0	85.1	85.3	85.4	85.5	85.6	85.6	85.7	85.8	85.9	85.9	86.0	86.0	86.1	86.1	86.2	86.2	86.2

Mean Annual Mass Removal Efficiencies for 2.50-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	94.3	96.4	97.2	97.5	97.6	97.6	97.3	96.8	96.1	95.4	94.7	94.1	93.4	92.7	92.0	91.3	90.5	89.7	88.9	88.1
35	93.3	95.6	96.5	96.9	97.1	97.1	96.8	96.3	95.7	95.1	94.5	93.9	93.2	92.6	91.9	91.2	90.4	89.7	88.9	88.1
40	92.3	94.7	95.8	96.3	96.5	96.5	96.3	95.8	95.3	94.7	94.2	93.6	93.0	92.4	91.7	91.1	90.3	89.6	88.9	88.1
45	91.2	93.9	95.0	95.6	95.9	95.9	95.6	95.2	94.8	94.3	93.8	93.3	92.8	92.2	91.6	90.9	90.2	89.5	88.8	88.1
50	90.3	93.0	94.2	94.9	95.1	95.1	94.9	94.6	94.3	93.8	93.4	93.0	92.5	92.0	91.4	90.8	90.1	89.5	88.8	88.1
55	89.3	92.1	93.4	94.0	94.2	94.2	94.1	93.9	93.7	93.3	93.0	92.6	92.2	91.7	91.2	90.6	90.0	89.4	88.8	88.1
60	88.4	91.0	92.2	92.9	93.1	93.3	93.3	93.2	93.0	92.8	92.5	92.2	91.8	91.4	90.9	90.4	89.9	89.3	88.7	88.1
65	87.2	89.6	90.9	91.6	92.1	92.3	92.4	92.4	92.3	92.2	92.0	91.7	91.4	91.0	90.7	90.2	89.7	89.2	88.7	88.1
70	85.8	88.2	89.5	90.5	91.0	91.3	91.5	91.6	91.6	91.5	91.4	91.2	90.9	90.6	90.3	89.9	89.5	89.0	88.6	88.1
75	84.7	87.0	88.3	89.2	89.9	90.3	90.6	90.7	90.8	90.8	90.7	90.6	90.4	90.2	89.9	89.6	89.2	88.9	88.5	88.1
80	84.0	85.9	87.2	88.1	88.8	89.2	89.6	89.8	89.9	90.0	90.0	89.9	89.8	89.7	89.5	89.2	89.0	88.7	88.4	88.1
85	83.8	85.3	86.3	87.1	87.7	88.2	88.5	88.8	89.0	89.1	89.1	89.1	89.1	89.1	89.0	88.8	88.7	88.5	88.3	88.1
90	84.1	85.0	85.8	86.4	86.8	87.2	87.5	87.8	88.0	88.1	88.3	88.3	88.4	88.4	88.4	88.4	88.3	88.3	88.2	88.1
95	85.1	85.5	85.9	86.2	86.5	86.7	86.9	87.1	87.3	87.4	87.5	87.7	87.8	87.8	87.9	88.0	88.0	88.1	88.1	88.1
98	86.7	86.8	86.9	87.0	87.1	87.2	87.3	87.4	87.5	87.6	87.6	87.7	87.8	87.8	87.9	87.9	88.0	88.0	88.1	88.1

Mean Annual Mass Removal Efficiencies for 2.75-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	94.6	96.5	97.3	97.7	97.8	97.9	97.7	97.4	96.8	96.2	95.6	94.9	94.4	93.7	93.1	92.4	91.8	91.1	90.4	89.6
35	93.6	95.9	96.7	97.1	97.3	97.4	97.3	97.0	96.5	95.9	95.3	94.7	94.2	93.6	93.0	92.4	91.7	91.0	90.3	89.6
40	92.8	95.1	96.1	96.6	96.8	97.0	96.8	96.5	96.0	95.5	95.0	94.5	94.0	93.4	92.8	92.2	91.6	91.0	90.3	89.6
45	91.8	94.3	95.4	96.0	96.3	96.4	96.3	96.0	95.6	95.1	94.7	94.2	93.7	93.2	92.7	92.1	91.6	90.9	90.3	89.6
50	91.0	93.6	94.8	95.4	95.7	95.8	95.6	95.4	95.0	94.7	94.3	93.9	93.5	93.0	92.5	92.0	91.5	90.9	90.3	89.6
55	90.2	92.8	94.0	94.7	95.0	95.0	94.9	94.7	94.5	94.2	93.9	93.5	93.2	92.8	92.3	91.8	91.3	90.8	90.2	89.6
60	89.4	92.0	93.2	93.8	94.0	94.1	94.2	94.0	93.9	93.7	93.4	93.1	92.9	92.5	92.1	91.7	91.2	90.7	90.2	89.6
65	88.7	90.9	92.0	92.7	93.1	93.3	93.3	93.3	93.2	93.1	92.9	92.7	92.5	92.2	91.8	91.4	91.1	90.6	90.1	89.6
70	87.5	89.6	90.8	91.6	92.1	92.3	92.5	92.5	92.5	92.5	92.4	92.2	92.0	91.8	91.5	91.2	90.9	90.5	90.1	89.6
75	86.4	88.4	89.7	90.4	91.0	91.3	91.6	91.7	91.8	91.8	91.8	91.7	91.6	91.4	91.2	90.9	90.7	90.3	90.0	89.6
80	85.8	87.4	88.6	89.4	90.0	90.4	90.7	90.9	91.0	91.1	91.1	91.1	91.0	90.9	90.8	90.6	90.4	90.2	89.9	89.6
85	85.5	86.8	87.7	88.5	89.0	89.4	89.8	90.0	90.2	90.3	90.4	90.4	90.4	90.4	90.4	90.3	90.1	90.0	89.8	89.6
90	85.8	86.6	87.3	87.9	88.3	88.7	89.0	89.2	89.4	89.6	89.7	89.8	89.8	89.9	89.9	89.9	89.8	89.8	89.7	89.6
95	86.9	87.2	87.6	87.8	88.1	88.3	88.5	88.7	88.9	89.0	89.1	89.2	89.3	89.4	89.5	89.5	89.5	89.6	89.6	89.6
98	88.4	88.5	88.6	88.7	88.8	88.9	88.9	89.0	89.1	89.1	89.2	89.3	89.3	89.4	89.4	89.5	89.5	89.6	89.6	89.6

Mean Annual Mass Removal Efficiencies for 3.00-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	94.9	96.7	97.4	97.8	98.0	98.0	98.0	97.8	97.4	96.9	96.3	95.7	95.1	94.6	94.0	93.4	92.8	92.2	91.6	90.9
35	93.9	96.0	96.9	97.3	97.5	97.6	97.7	97.4	97.1	96.6	96.0	95.5	94.9	94.4	93.9	93.3	92.7	92.2	91.6	90.9
40	93.1	95.4	96.3	96.8	97.1	97.2	97.2	97.1	96.7	96.2	95.7	95.2	94.7	94.3	93.7	93.2	92.7	92.1	91.5	90.9
45	92.4	94.7	95.7	96.3	96.6	96.8	96.8	96.6	96.2	95.8	95.4	95.0	94.5	94.1	93.6	93.1	92.6	92.1	91.5	90.9
50	91.6	94.0	95.2	95.8	96.1	96.3	96.2	96.0	95.8	95.4	95.1	94.7	94.3	93.9	93.4	93.0	92.5	92.0	91.5	90.9
55	91.0	93.4	94.6	95.2	95.6	95.7	95.6	95.4	95.2	94.9	94.6	94.3	94.0	93.6	93.3	92.8	92.4	91.9	91.4	90.9
60	90.4	92.7	93.9	94.6	94.8	94.9	94.9	94.8	94.6	94.4	94.2	93.9	93.7	93.4	93.0	92.7	92.3	91.9	91.4	90.9
65	89.8	92.0	93.0	93.6	93.9	94.1	94.2	94.1	94.0	93.9	93.7	93.5	93.3	93.1	92.8	92.5	92.1	91.8	91.4	90.9
70	89.0	90.9	91.9	92.6	93.0	93.2	93.3	93.4	93.4	93.3	93.2	93.1	92.9	92.8	92.5	92.2	92.0	91.6	91.3	90.9
75	88.0	89.7	90.8	91.6	92.0	92.3	92.5	92.6	92.7	92.7	92.7	92.6	92.5	92.4	92.2	92.0	91.8	91.5	91.2	90.9
80	87.3	88.8	89.8	90.5	91.0	91.4	91.7	91.8	92.0	92.0	92.1	92.1	92.1	92.0	91.8	91.7	91.6	91.4	91.2	90.9
85	87.0	88.1	89.0	89.7	90.1	90.5	90.8	91.1	91.3	91.4	91.5	91.5	91.5	91.5	91.5	91.4	91.3	91.2	91.1	90.9
90	87.2	88.0	88.6	89.1	89.5	89.9	90.2	90.4	90.6	90.7	90.8	90.9	91.0	91.0	91.1	91.1	91.1	91.0	91.0	90.9
95	88.3	88.7	88.9	89.2	89.4	89.6	89.8	90.0	90.1	90.2	90.4	90.5	90.6	90.7	90.7	90.8	90.8	90.9	90.9	90.9
98	89.7	89.8	89.9	90.0	90.1	90.2	90.3	90.3	90.4	90.5	90.5	90.6	90.6	90.7	90.7	90.8	90.8	90.9	90.9	90.9

Mean Annual Mass Removal Efficiencies for 3.25-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	95.2	96.9	97.5	97.9	98.1	98.2	98.2	98.1	97.8	97.5	96.9	96.4	95.8	95.3	94.7	94.2	93.7	93.1	92.6	92.0
35	94.1	96.2	97.0	97.5	97.7	97.8	97.9	97.8	97.5	97.2	96.7	96.2	95.6	95.1	94.6	94.1	93.6	93.1	92.5	92.0
40	93.4	95.6	96.6	97.0	97.3	97.5	97.5	97.4	97.2	96.8	96.4	95.9	95.4	95.0	94.5	94.0	93.5	93.0	92.5	92.0
45	92.8	95.0	96.0	96.6	96.9	97.1	97.1	97.1	96.8	96.5	96.1	95.7	95.2	94.8	94.4	93.9	93.5	93.0	92.5	92.0
50	92.1	94.4	95.5	96.1	96.5	96.7	96.7	96.6	96.3	96.1	95.7	95.4	95.0	94.6	94.2	93.8	93.4	92.9	92.5	92.0
55	91.5	93.8	95.0	95.6	96.0	96.2	96.2	96.0	95.9	95.6	95.3	95.0	94.7	94.4	94.0	93.7	93.3	92.9	92.4	92.0
60	91.1	93.3	94.4	95.1	95.5	95.6	95.5	95.5	95.3	95.1	94.9	94.7	94.4	94.1	93.8	93.5	93.2	92.8	92.4	92.0
65	90.7	92.7	93.8	94.4	94.7	94.8	94.9	94.9	94.8	94.6	94.5	94.3	94.0	93.8	93.6	93.3	93.0	92.7	92.4	92.0
70	90.3	92.0	92.9	93.4	93.8	94.0	94.2	94.2	94.1	94.1	94.0	93.8	93.7	93.5	93.4	93.1	92.9	92.6	92.3	92.0
75	89.4	90.9	91.8	92.5	93.0	93.2	93.4	93.5	93.5	93.5	93.4	93.4	93.3	93.2	93.1	92.9	92.7	92.5	92.2	92.0
80	88.7	90.1	91.0	91.6	92.0	92.3	92.6	92.7	92.8	92.9	92.9	92.9	92.9	92.9	92.8	92.6	92.5	92.3	92.2	92.0
85	88.4	89.4	90.2	90.7	91.2	91.5	91.8	92.0	92.1	92.3	92.4	92.4	92.5	92.5	92.4	92.4	92.3	92.2	92.1	92.0
90	88.5	89.2	89.7	90.2	90.6	90.9	91.2	91.4	91.6	91.7	91.9	91.9	92.0	92.0	92.0	92.1	92.1	92.1	92.0	92.0
95	89.6	89.9	90.1	90.4	90.6	90.8	90.9	91.1	91.2	91.3	91.4	91.5	91.6	91.7	91.8	91.8	91.9	91.9	92.0	92.0
98	90.8	90.9	91.0	91.1	91.2	91.2	91.3	91.4	91.4	91.5	91.6	91.6	91.7	91.7	91.8	91.8	91.9	91.9	92.0	92.0

Mean Annual Mass Removal Efficiencies for 3.50-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	95.5	97.0	97.6	98.0	98.2	98.3	98.3	98.3	98.1	97.9	97.5	96.9	96.4	95.9	95.4	94.9	94.4	93.9	93.4	92.9
35	94.4	96.3	97.2	97.6	97.9	98.0	98.0	98.0	97.9	97.6	97.2	96.7	96.3	95.8	95.3	94.8	94.4	93.9	93.4	92.9
40	93.6	95.8	96.8	97.2	97.5	97.6	97.7	97.7	97.6	97.3	96.9	96.5	96.1	95.6	95.2	94.7	94.3	93.8	93.4	92.9
45	93.2	95.3	96.3	96.8	97.1	97.3	97.4	97.4	97.3	97.0	96.6	96.3	95.9	95.4	95.0	94.6	94.2	93.8	93.3	92.9
50	92.6	94.7	95.8	96.4	96.7	97.0	97.1	97.0	96.9	96.6	96.3	96.0	95.6	95.2	94.9	94.5	94.1	93.7	93.3	92.9
55	92.1	94.2	95.3	96.0	96.4	96.6	96.7	96.6	96.4	96.2	95.9	95.6	95.3	95.0	94.7	94.4	94.0	93.7	93.3	92.9
60	91.7	93.8	94.9	95.5	95.9	96.1	96.1	96.0	95.9	95.8	95.5	95.3	95.0	94.8	94.5	94.2	93.9	93.6	93.2	92.9
65	91.4	93.3	94.4	95.0	95.4	95.5	95.5	95.5	95.4	95.3	95.1	94.9	94.7	94.5	94.3	94.0	93.8	93.5	93.2	92.9
70	91.2	92.9	93.8	94.3	94.5	94.7	94.8	94.9	94.8	94.8	94.7	94.5	94.4	94.2	94.0	93.9	93.7	93.4	93.1	92.9
75	90.7	92.0	92.8	93.3	93.7	94.0	94.1	94.2	94.2	94.2	94.2	94.1	94.0	93.9	93.8	93.7	93.5	93.3	93.1	92.9
80	89.9	91.1	91.9	92.5	92.9	93.2	93.4	93.5	93.6	93.6	93.7	93.6	93.6	93.6	93.5	93.4	93.3	93.2	93.0	92.9
85	89.7	90.5	91.2	91.7	92.1	92.4	92.7	92.8	93.0	93.0	93.1	93.2	93.2	93.2	93.2	93.2	93.1	93.1	93.0	92.9
90	89.7	90.3	90.8	91.2	91.5	91.8	92.0	92.2	92.4	92.5	92.7	92.8	92.8	92.9	92.9	92.9	92.9	92.9	92.9	92.9
95	90.6	90.9	91.1	91.3	91.5	91.7	91.9	92.0	92.2	92.3	92.4	92.4	92.5	92.6	92.7	92.7	92.8	92.8	92.8	92.9
98	91.8	91.9	92.0	92.0	92.1	92.2	92.2	92.3	92.4	92.4	92.5	92.5	92.6	92.6	92.7	92.7	92.8	92.8	92.8	92.9

Mean Annual Mass Removal Efficiencies for 3.75-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	95.8	97.2	97.8	98.1	98.2	98.4	98.4	98.4	98.3	98.2	97.9	97.5	97.0	96.5	96.0	95.5	95.0	94.6	94.1	93.6
35	94.7	96.5	97.3	97.7	98.0	98.1	98.2	98.2	98.1	97.9	97.7	97.3	96.8	96.3	95.9	95.4	95.0	94.5	94.1	93.6
40	93.9	95.9	96.9	97.4	97.7	97.8	97.9	97.9	97.9	97.7	97.4	97.0	96.6	96.2	95.8	95.3	94.9	94.5	94.1	93.6
45	93.4	95.5	96.5	97.0	97.3	97.5	97.6	97.7	97.6	97.4	97.1	96.8	96.4	96.0	95.6	95.2	94.8	94.5	94.1	93.6
50	93.1	95.1	96.0	96.6	97.0	97.2	97.3	97.4	97.3	97.1	96.8	96.5	96.2	95.8	95.5	95.1	94.8	94.4	94.0	93.6
55	92.5	94.6	95.6	96.2	96.6	96.9	97.0	97.0	96.9	96.7	96.5	96.2	95.9	95.6	95.3	95.0	94.7	94.3	94.0	93.6
60	92.2	94.1	95.2	95.9	96.3	96.5	96.6	96.6	96.4	96.3	96.1	95.9	95.6	95.4	95.1	94.8	94.6	94.3	94.0	93.6
65	92.0	93.8	94.8	95.5	95.9	96.1	96.1	96.0	96.0	95.9	95.7	95.5	95.3	95.1	94.9	94.7	94.4	94.2	93.9	93.6
70	91.9	93.5	94.4	95.0	95.3	95.4	95.4	95.5	95.5	95.4	95.3	95.2	95.0	94.8	94.7	94.5	94.3	94.1	93.9	93.6
75	91.8	93.0	93.7	94.1	94.4	94.7	94.8	94.9	94.9	94.9	94.8	94.7	94.7	94.5	94.4	94.3	94.2	94.0	93.8	93.6
80	91.1	92.1	92.8	93.3	93.7	94.0	94.1	94.2	94.3	94.3	94.3	94.3	94.3	94.2	94.2	94.1	94.0	93.9	93.8	93.6
85	90.7	91.6	92.2	92.6	93.0	93.2	93.4	93.6	93.7	93.8	93.8	93.9	93.9	93.9	93.9	93.9	93.8	93.8	93.7	93.6
90	90.8	91.3	91.8	92.1	92.4	92.7	92.9	93.0	93.2	93.3	93.4	93.5	93.5	93.6	93.6	93.7	93.7	93.7	93.7	93.6
95	91.5	91.7	92.0	92.2	92.3	92.5	92.7	92.8	92.9	93.0	93.1	93.2	93.3	93.4	93.4	93.5	93.5	93.6	93.6	93.6
98	92.6	92.7	92.8	92.9	92.9	93.0	93.1	93.1	93.2	93.2	93.3	93.3	93.4	93.4	93.4	93.5	93.5	93.6	93.6	93.6

Mean Annual Mass Removal Efficiencies for 4.00-inches of Retention for Zone 3 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	96.1	97.4	97.9	98.1	98.3	98.4	98.5	98.5	98.5	98.4	98.2	97.9	97.4	97.0	96.5	96.1	95.6	95.2	94.7	94.3
35	95.0	96.7	97.4	97.8	98.0	98.2	98.3	98.3	98.3	98.2	98.0	97.7	97.3	96.9	96.4	96.0	95.5	95.1	94.7	94.3
40	94.1	96.1	97.0	97.5	97.8	97.9	98.0	98.1	98.1	98.0	97.8	97.5	97.1	96.7	96.3	95.9	95.5	95.1	94.7	94.3
45	93.6	95.7	96.7	97.2	97.5	97.7	97.8	97.8	97.8	97.7	97.5	97.3	96.9	96.5	96.2	95.8	95.4	95.0	94.7	94.3
50	93.3	95.4	96.3	96.8	97.1	97.4	97.5	97.6	97.6	97.5	97.3	97.0	96.7	96.4	96.0	95.7	95.3	95.0	94.6	94.3
55	93.0	94.9	95.9	96.4	96.8	97.1	97.3	97.3	97.3	97.1	96.9	96.7	96.4	96.1	95.9	95.5	95.2	94.9	94.6	94.3
60	92.7	94.5	95.5	96.1	96.5	96.8	97.0	97.0	96.9	96.8	96.6	96.4	96.2	95.9	95.7	95.4	95.1	94.9	94.6	94.3
65	92.4	94.2	95.2	95.8	96.2	96.5	96.6	96.6	96.5	96.4	96.2	96.1	95.9	95.7	95.5	95.2	95.0	94.8	94.6	94.3
70	92.5	94.0	94.9	95.5	95.8	96.0	96.0	96.0	96.0	95.9	95.8	95.7	95.6	95.4	95.2	95.1	94.9	94.7	94.5	94.3
75	92.5	93.7	94.5	94.9	95.1	95.3	95.4	95.5	95.5	95.5	95.4	95.3	95.3	95.1	95.0	94.9	94.8	94.6	94.5	94.3
80	92.2	93.1	93.7	94.1	94.4	94.6	94.8	94.9	94.9	95.0	95.0	94.9	94.9	94.8	94.8	94.7	94.6	94.5	94.4	94.3
85	91.7	92.5	93.0	93.4	93.7	94.0	94.1	94.3	94.4	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.4	94.4	94.3
90	91.7	92.2	92.6	92.9	93.2	93.4	93.6	93.7	93.9	94.0	94.0	94.1	94.2	94.2	94.3	94.3	94.3	94.3	94.3	94.3
95	92.4	92.6	92.8	92.9	93.1	93.2	93.4	93.5	93.6	93.7	93.8	93.9	93.9	94.0	94.1	94.1	94.2	94.2	94.3	94.3
98	93.3	93.4	93.5	93.6	93.6	93.7	93.7	93.8	93.8	93.9	93.9	94.0	94.0	94.1	94.1	94.2	94.2	94.2	94.3	94.3

Mean Annual Mass Removal Efficiencies for 0.25-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	90.1	86.6	79.2	71.4	64.5	58.6	53.5	49.2	45.5	42.3	39.5	37.1	34.9	33.0	31.3	29.7	28.3	27.1	25.9	24.8
35	86.2	84.3	77.8	70.5	63.9	58.2	53.2	49.0	45.3	42.2	39.4	37.0	34.9	33.0	31.2	29.7	28.3	27.0	25.9	24.8
40	81.6	81.5	75.9	69.3	63.1	57.6	52.8	48.7	45.1	42.0	39.3	36.9	34.8	32.9	31.2	29.7	28.3	27.0	25.9	24.8
45	76.5	78.1	73.7	67.8	62.0	56.8	52.2	48.2	44.8	41.8	39.1	36.8	34.7	32.8	31.1	29.6	28.3	27.0	25.9	24.8
50	71.0	74.2	71.0	65.9	60.7	55.8	51.5	47.7	44.4	41.4	38.9	36.6	34.5	32.7	31.1	29.6	28.2	27.0	25.9	24.8
55	65.3	69.9	67.9	63.7	59.1	54.7	50.6	47.0	43.8	41.1	38.5	36.3	34.4	32.6	31.0	29.5	28.2	27.0	25.8	24.8
60	59.7	65.2	64.4	61.2	57.2	53.2	49.6	46.2	43.2	40.6	38.2	36.1	34.1	32.4	30.8	29.4	28.1	26.9	25.8	24.8
65	54.2	60.2	60.5	58.2	55.0	51.5	48.2	45.2	42.4	39.9	37.7	35.7	33.8	32.2	30.7	29.3	28.0	26.9	25.8	24.8
70	49.1	54.9	56.1	54.7	52.3	49.4	46.6	43.9	41.4	39.2	37.1	35.2	33.5	31.9	30.5	29.1	27.9	26.8	25.8	24.8
75	44.3	49.4	51.1	50.7	49.1	46.9	44.6	42.3	40.1	38.1	36.3	34.6	33.0	31.5	30.2	28.9	27.8	26.7	25.7	24.8
80	40.0	44.1	45.8	46.0	45.2	43.7	42.0	40.2	38.5	36.8	35.2	33.7	32.3	31.0	29.8	28.7	27.6	26.6	25.7	24.8
85	36.2	38.9	40.4	40.8	40.6	39.8	38.8	37.5	36.3	35.0	33.7	32.5	31.4	30.2	29.2	28.2	27.3	26.4	25.6	24.8
90	32.8	34.2	35.0	35.4	35.4	35.1	34.6	33.9	33.2	32.4	31.6	30.8	29.9	29.1	28.3	27.6	26.9	26.1	25.5	24.8
95	29.3	29.7	29.9	30.0	29.9	29.8	29.7	29.4	29.1	28.8	28.5	28.1	27.7	27.3	26.9	26.5	26.1	25.6	25.2	24.8
98	27.2	27.2	27.2	27.1	27.0	27.0	26.8	26.7	26.6	26.5	26.3	26.2	26.0	25.9	25.7	25.5	25.4	25.2	25.0	24.8

Mean Annual Mass Removal Efficiencies for 0.50-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	94.0	94.2	92.1	88.8	84.8	80.5	76.3	72.4	68.6	65.2	62.0	59.1	56.4	53.9	51.7	49.5	47.6	45.8	44.1	42.6
35	91.1	92.3	90.7	87.7	84.0	79.9	75.9	72.0	68.4	65.0	61.9	59.0	56.3	53.9	51.6	49.5	47.6	45.8	44.1	42.6
40	87.8	90.0	88.9	86.4	82.9	79.1	75.3	71.5	68.0	64.7	61.6	58.8	56.2	53.8	51.5	49.4	47.5	45.7	44.1	42.6
45	84.0	87.2	86.8	84.7	81.6	78.1	74.5	70.9	67.5	64.3	61.3	58.6	56.0	53.6	51.4	49.4	47.5	45.7	44.1	42.6
50	79.9	84.0	84.3	82.7	80.1	76.9	73.5	70.2	66.9	63.9	61.0	58.3	55.8	53.5	51.3	49.3	47.4	45.7	44.1	42.6
55	75.6	80.4	81.4	80.4	78.2	75.4	72.3	69.2	66.2	63.3	60.5	57.9	55.5	53.2	51.1	49.2	47.3	45.6	44.0	42.6
60	71.3	76.5	78.1	77.6	75.9	73.6	70.9	68.0	65.2	62.5	59.9	57.4	55.1	53.0	50.9	49.0	47.2	45.6	44.0	42.6
65	67.1	72.4	74.4	74.5	73.3	71.4	69.1	66.6	64.1	61.6	59.2	56.9	54.7	52.6	50.6	48.8	47.1	45.5	44.0	42.6
70	63.0	68.1	70.3	70.8	70.2	68.9	67.0	64.9	62.7	60.5	58.3	56.1	54.1	52.1	50.3	48.6	46.9	45.4	43.9	42.6
75	59.2	63.7	65.9	66.7	66.6	65.7	64.4	62.7	60.9	59.0	57.1	55.2	53.3	51.5	49.8	48.2	46.7	45.2	43.8	42.6
80	55.8	59.4	61.4	62.3	62.4	61.9	61.1	59.9	58.6	57.1	55.5	53.9	52.3	50.7	49.2	47.8	46.4	45.0	43.8	42.6
85	52.7	55.2	56.7	57.5	57.7	57.6	57.1	56.4	55.5	54.5	53.3	52.1	50.8	49.6	48.3	47.1	45.9	44.7	43.6	42.6
90	49.7	51.1	52.0	52.5	52.8	52.8	52.6	52.2	51.7	51.1	50.3	49.6	48.7	47.9	47.0	46.1	45.2	44.3	43.4	42.6
95	46.7	47.1	47.4	47.5	47.6	47.6	47.5	47.3	47.1	46.8	46.5	46.2	45.8	45.4	44.9	44.5	44.0	43.5	43.0	42.6
98	44.9	44.9	44.8	44.8	44.7	44.7	44.6	44.5	44.3	44.2	44.1	44.0	43.8	43.6	43.5	43.3	43.1	42.9	42.7	42.6

Mean Annual Mass Removal Efficiencies for 0.75-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	95.6	96.4	95.6	94.1	92.1	89.6	86.8	83.9	81.0	78.1	75.3	72.7	70.1	67.7	65.4	63.3	61.2	59.3	57.4	55.7
35	93.5	94.9	94.5	93.2	91.3	89.0	86.3	83.5	80.7	77.9	75.1	72.5	70.0	67.6	65.4	63.2	61.2	59.3	57.4	55.7
40	91.0	93.1	93.0	92.0	90.3	88.1	85.7	83.0	80.2	77.5	74.9	72.3	69.8	67.5	65.3	63.1	61.1	59.2	57.4	55.7
45	88.1	90.9	91.3	90.5	89.1	87.1	84.8	82.3	79.7	77.1	74.5	72.0	69.6	67.3	65.1	63.0	61.1	59.2	57.4	55.7
50	85.0	88.4	89.2	88.8	87.6	85.9	83.8	81.5	79.0	76.5	74.1	71.7	69.3	67.1	65.0	62.9	61.0	59.1	57.4	55.7
55	81.7	85.7	86.8	86.8	85.9	84.5	82.6	80.5	78.2	75.9	73.5	71.2	69.0	66.8	64.8	62.8	60.9	59.1	57.4	55.7
60	78.4	82.6	84.1	84.4	83.9	82.7	81.1	79.2	77.2	75.0	72.8	70.7	68.6	66.5	64.5	62.6	60.8	59.0	57.3	55.7
65	75.0	79.3	81.1	81.7	81.5	80.7	79.4	77.8	76.0	74.0	72.0	70.0	68.0	66.1	64.2	62.3	60.6	58.9	57.3	55.7
70	71.7	75.9	77.9	78.7	78.7	78.2	77.3	76.0	74.4	72.7	71.0	69.1	67.3	65.5	63.8	62.0	60.4	58.8	57.2	55.7
75	68.7	72.5	74.4	75.4	75.6	75.3	74.7	73.7	72.5	71.1	69.6	68.0	66.4	64.8	63.2	61.6	60.1	58.6	57.1	55.7
80	65.9	69.0	70.8	71.7	72.1	72.1	71.7	71.0	70.1	69.0	67.8	66.6	65.2	63.9	62.5	61.1	59.7	58.3	57.0	55.7
85	63.5	65.7	67.1	67.9	68.3	68.3	68.1	67.7	67.1	66.4	65.5	64.6	63.6	62.5	61.4	60.3	59.1	58.0	56.8	55.7
90	61.2	62.4	63.2	63.8	64.1	64.2	64.1	63.9	63.6	63.2	62.7	62.1	61.4	60.7	59.9	59.1	58.3	57.4	56.6	55.7
95	58.7	59.1	59.4	59.6	59.7	59.7	59.7	59.7	59.5	59.4	59.1	58.9	58.6	58.2	57.9	57.5	57.1	56.6	56.2	55.7
98	57.5	57.5	57.5	57.5	57.5	57.4	57.4	57.3	57.2	57.1	57.0	56.9	56.8	56.6	56.5	56.4	56.2	56.0	55.9	55.7

Mean Annual Mass Removal Efficiencies for 1.00-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	96.6	97.5	97.2	96.4	95.2	93.7	91.9	90.0	87.9	85.7	83.5	81.2	79.0	76.9	74.8	72.8	70.9	69.1	67.3	65.6
35	95.0	96.3	96.2	95.6	94.5	93.1	91.4	89.6	87.5	85.4	83.2	81.1	78.9	76.8	74.8	72.8	70.9	69.0	67.2	65.6
40	93.0	94.9	95.1	94.6	93.6	92.4	90.8	89.0	87.1	85.1	82.9	80.8	78.7	76.7	74.7	72.7	70.8	69.0	67.2	65.6
45	90.8	93.1	93.6	93.4	92.6	91.5	90.0	88.4	86.5	84.6	82.6	80.5	78.5	76.5	74.5	72.6	70.7	68.9	67.2	65.6
50	88.3	91.1	92.0	91.9	91.4	90.4	89.1	87.6	85.9	84.0	82.1	80.1	78.2	76.2	74.3	72.5	70.6	68.9	67.2	65.6
55	85.7	89.0	90.1	90.2	89.9	89.1	88.0	86.6	85.1	83.4	81.5	79.7	77.8	75.9	74.1	72.3	70.5	68.8	67.1	65.6
60	83.1	86.6	87.9	88.3	88.1	87.6	86.7	85.5	84.1	82.5	80.8	79.1	77.3	75.6	73.8	72.1	70.4	68.7	67.1	65.6
65	80.4	83.9	85.5	86.1	86.1	85.8	85.1	84.1	82.9	81.5	80.0	78.4	76.8	75.1	73.5	71.8	70.2	68.6	67.1	65.6
70	77.7	81.2	82.8	83.6	83.9	83.7	83.2	82.4	81.4	80.3	78.9	77.5	76.0	74.5	73.0	71.5	70.0	68.5	67.0	65.6
75	75.2	78.4	80.1	81.0	81.3	81.3	81.0	80.4	79.6	78.7	77.6	76.4	75.1	73.8	72.4	71.0	69.6	68.3	66.9	65.6
80	73.0	75.6	77.2	78.1	78.5	78.6	78.4	78.1	77.5	76.8	75.9	74.9	73.9	72.8	71.6	70.4	69.2	68.0	66.8	65.6
85	71.1	73.0	74.2	75.0	75.4	75.6	75.5	75.3	74.9	74.4	73.8	73.1	72.3	71.4	70.5	69.6	68.6	67.6	66.6	65.6
90	69.4	70.5	71.2	71.7	72.0	72.2	72.2	72.1	71.9	71.6	71.2	70.8	70.3	69.7	69.1	68.5	67.8	67.1	66.3	65.6
95	67.6	67.9	68.1	68.3	68.4	68.5	68.5	68.5	68.4	68.3	68.2	68.0	67.8	67.6	67.3	67.0	66.7	66.3	65.9	65.6
98	66.7	66.8	66.8	66.8	66.8	66.7	66.7	66.7	66.6	66.6	66.5	66.4	66.3	66.3	66.1	66.0	65.9	65.8	65.7	65.6

Mean Annual Mass Removal Efficiencies for 1.25-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	97.3	98.0	98.0	97.5	96.8	95.8	94.6	93.3	91.8	90.2	88.5	86.8	85.0	83.2	81.4	79.6	77.9	76.2	74.5	72.9
35	95.9	97.2	97.3	96.9	96.2	95.3	94.2	92.9	91.5	89.9	88.3	86.6	84.8	83.0	81.3	79.5	77.8	76.2	74.5	72.9
40	94.5	96.0	96.3	96.1	95.5	94.6	93.6	92.4	91.1	89.6	88.0	86.3	84.6	82.9	81.2	79.5	77.8	76.1	74.5	72.9
45	92.7	94.6	95.1	95.0	94.6	93.9	93.0	91.8	90.6	89.1	87.6	86.0	84.4	82.7	81.0	79.3	77.7	76.1	74.5	72.9
50	90.7	93.1	93.8	93.8	93.6	93.0	92.1	91.1	89.9	88.6	87.2	85.7	84.1	82.4	80.8	79.2	77.6	76.0	74.5	72.9
55	88.6	91.3	92.2	92.5	92.3	91.9	91.2	90.3	89.2	88.0	86.6	85.2	83.7	82.1	80.6	79.0	77.5	75.9	74.4	72.9
60	86.4	89.3	90.5	90.9	90.9	90.6	90.0	89.2	88.3	87.2	86.0	84.6	83.2	81.8	80.3	78.8	77.3	75.8	74.4	72.9
65	84.3	87.2	88.5	89.1	89.2	89.0	88.6	88.0	87.2	86.3	85.2	84.0	82.7	81.3	79.9	78.5	77.1	75.7	74.3	72.9
70	82.1	85.0	86.4	87.1	87.4	87.3	87.0	86.6	85.9	85.1	84.2	83.1	82.0	80.7	79.5	78.2	76.9	75.6	74.3	72.9
75	80.1	82.7	84.1	84.9	85.3	85.4	85.2	84.9	84.4	83.7	82.9	82.0	81.1	80.0	78.9	77.7	76.6	75.4	74.2	72.9
80	78.2	80.4	81.7	82.5	83.0	83.2	83.1	82.9	82.5	82.0	81.4	80.7	79.9	79.1	78.1	77.1	76.1	75.1	74.0	72.9
85	76.7	78.3	79.3	80.1	80.5	80.7	80.7	80.6	80.4	80.1	79.6	79.1	78.5	77.8	77.1	76.4	75.5	74.7	73.8	72.9
90	75.4	76.3	77.0	77.5	77.8	78.0	78.1	78.0	77.9	77.7	77.5	77.1	76.8	76.3	75.9	75.3	74.8	74.2	73.6	72.9
95	74.2	74.5	74.7	74.9	75.0	75.1	75.1	75.1	75.1	75.0	74.9	74.8	74.6	74.5	74.3	74.0	73.8	73.5	73.3	72.9
98	73.7	73.7	73.7	73.7	73.7	73.7	73.7	73.7	73.7	73.6	73.6	73.6	73.5	73.4	73.4	73.3	73.2	73.1	73.0	72.9

Mean Annual Mass Removal Efficiencies for 1.50-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	97.8	98.4	98.5	98.2	97.7	97.1	96.2	95.3	94.2	93.0	91.7	90.4	89.0	87.5	86.0	84.5	83.0	81.5	80.0	78.5
35	96.7	97.7	97.9	97.7	97.3	96.6	95.8	94.9	93.9	92.8	91.5	90.2	88.8	87.4	85.9	84.4	82.9	81.4	80.0	78.5
40	95.5	96.8	97.1	97.0	96.6	96.1	95.4	94.5	93.5	92.4	91.2	89.9	88.6	87.2	85.8	84.3	82.9	81.4	80.0	78.5
45	94.1	95.7	96.2	96.2	95.9	95.4	94.8	94.0	93.1	92.0	90.9	89.7	88.4	87.0	85.6	84.2	82.8	81.3	79.9	78.5
50	92.5	94.4	95.1	95.2	95.0	94.6	94.1	93.3	92.5	91.5	90.5	89.3	88.1	86.8	85.4	84.1	82.7	81.3	79.9	78.5
55	90.8	93.0	93.8	94.0	94.0	93.7	93.2	92.6	91.8	91.0	90.0	88.9	87.7	86.5	85.2	83.9	82.5	81.2	79.9	78.5
60	88.9	91.3	92.3	92.7	92.8	92.6	92.2	91.7	91.0	90.3	89.4	88.4	87.3	86.1	84.9	83.7	82.4	81.1	79.8	78.5
65	87.1	89.6	90.7	91.3	91.4	91.3	91.1	90.6	90.1	89.4	88.6	87.7	86.8	85.7	84.6	83.4	82.2	81.0	79.8	78.5
70	85.4	87.8	89.0	89.6	89.9	89.9	89.7	89.4	89.0	88.4	87.7	87.0	86.1	85.1	84.1	83.1	82.0	80.8	79.7	78.5
75	83.8	85.9	87.1	87.8	88.2	88.3	88.2	88.0	87.7	87.2	86.7	86.0	85.3	84.4	83.6	82.6	81.6	80.6	79.6	78.5
80	82.2	84.0	85.2	85.9	86.3	86.4	86.5	86.4	86.2	85.8	85.4	84.9	84.3	83.6	82.9	82.1	81.2	80.4	79.5	78.5
85	81.0	82.3	83.2	83.8	84.2	84.4	84.5	84.5	84.4	84.2	83.9	83.5	83.0	82.5	82.0	81.4	80.7	80.0	79.3	78.5
90	80.0	80.7	81.3	81.8	82.1	82.3	82.4	82.4	82.4	82.2	82.1	81.8	81.6	81.2	80.9	80.5	80.0	79.6	79.1	78.5
95	79.1	79.4	79.6	79.8	79.9	80.0	80.1	80.1	80.1	80.1	80.0	79.9	79.8	79.7	79.6	79.4	79.2	79.0	78.8	78.5
98	79.0	79.0	79.0	79.1	79.1	79.1	79.1	79.1	79.0	79.0	79.0	79.0	78.9	78.9	78.8	78.8	78.7	78.7	78.6	78.5

Mean Annual Mass Removal Efficiencies for 1.75-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.2	98.7	98.8	98.7	98.4	97.9	97.3	96.5	95.7	94.8	93.8	92.8	91.7	90.5	89.3	88.0	86.7	85.4	84.1	82.8
35	97.3	98.1	98.3	98.2	97.9	97.5	96.9	96.2	95.5	94.6	93.6	92.6	91.5	90.4	89.2	87.9	86.7	85.4	84.1	82.8
40	96.2	97.4	97.7	97.7	97.4	97.0	96.5	95.9	95.1	94.3	93.4	92.4	91.3	90.2	89.0	87.8	86.6	85.4	84.1	82.8
45	95.1	96.5	96.9	97.0	96.8	96.5	96.0	95.4	94.7	93.9	93.1	92.1	91.1	90.0	88.9	87.7	86.5	85.3	84.1	82.8
50	93.9	95.5	96.0	96.1	96.0	95.8	95.4	94.8	94.2	93.5	92.7	91.8	90.8	89.8	88.7	87.6	86.4	85.2	84.0	82.8
55	92.4	94.3	95.0	95.2	95.2	95.0	94.6	94.2	93.6	93.0	92.2	91.4	90.5	89.5	88.5	87.4	86.3	85.2	84.0	82.8
60	90.9	92.9	93.7	94.1	94.2	94.0	93.8	93.4	92.9	92.4	91.7	90.9	90.1	89.2	88.2	87.2	86.2	85.1	83.9	82.8
65	89.4	91.4	92.4	92.9	93.0	93.0	92.8	92.5	92.1	91.6	91.0	90.4	89.6	88.8	87.9	87.0	86.0	84.9	83.9	82.8
70	87.9	89.9	90.9	91.5	91.7	91.8	91.7	91.5	91.2	90.7	90.3	89.7	89.0	88.3	87.5	86.6	85.7	84.8	83.8	82.8
75	86.5	88.4	89.4	90.0	90.3	90.5	90.4	90.3	90.1	89.7	89.3	88.9	88.3	87.7	87.0	86.2	85.4	84.6	83.7	82.8
80	85.3	86.8	87.8	88.4	88.8	88.9	89.0	88.9	88.8	88.6	88.3	87.9	87.4	86.9	86.4	85.7	85.1	84.4	83.6	82.8
85	84.3	85.4	86.2	86.7	87.1	87.3	87.4	87.4	87.3	87.2	87.0	86.7	86.4	86.0	85.6	85.1	84.6	84.0	83.4	82.8
90	83.5	84.1	84.7	85.0	85.3	85.5	85.7	85.7	85.7	85.6	85.5	85.4	85.2	84.9	84.7	84.4	84.0	83.7	83.3	82.8
95	82.9	83.2	83.4	83.6	83.7	83.8	83.9	83.9	83.9	83.9	83.9	83.8	83.8	83.7	83.6	83.5	83.3	83.2	83.0	82.8
98	83.0	83.1	83.1	83.1	83.1	83.1	83.2	83.2	83.2	83.1	83.1	83.1	83.1	83.1	83.0	83.0	83.0	82.9	82.9	82.8

Mean Annual Mass Removal Efficiencies for 2.00-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.5	99.0	99.1	99.0	98.7	98.4	98.0	97.4	96.8	96.1	95.3	94.5	93.6	92.6	91.6	90.6	89.5	88.4	87.3	86.1
35	97.8	98.5	98.6	98.6	98.4	98.1	97.7	97.1	96.5	95.9	95.1	94.3	93.4	92.5	91.5	90.5	89.4	88.4	87.3	86.1
40	96.9	97.8	98.1	98.1	98.0	97.7	97.3	96.8	96.2	95.6	94.9	94.1	93.3	92.4	91.4	90.4	89.4	88.3	87.2	86.1
45	95.9	97.1	97.5	97.6	97.5	97.2	96.8	96.4	95.9	95.3	94.6	93.8	93.0	92.2	91.3	90.3	89.3	88.3	87.2	86.1
50	94.9	96.3	96.7	96.9	96.8	96.6	96.3	95.9	95.4	94.9	94.2	93.6	92.8	92.0	91.1	90.2	89.2	88.2	87.2	86.1
55	93.7	95.3	95.9	96.1	96.1	95.9	95.7	95.3	94.9	94.4	93.8	93.2	92.5	91.7	90.9	90.0	89.1	88.1	87.1	86.1
60	92.5	94.1	94.9	95.1	95.2	95.1	95.0	94.7	94.3	93.9	93.4	92.8	92.1	91.4	90.6	89.8	88.9	88.0	87.1	86.1
65	91.2	92.9	93.7	94.1	94.3	94.3	94.1	93.9	93.6	93.2	92.8	92.3	91.7	91.0	90.3	89.6	88.8	87.9	87.1	86.1
70	89.9	91.6	92.5	92.9	93.2	93.2	93.2	93.0	92.8	92.5	92.1	91.7	91.2	90.6	90.0	89.3	88.6	87.8	87.0	86.1
75	88.7	90.2	91.2	91.7	92.0	92.1	92.1	92.0	91.9	91.6	91.3	91.0	90.5	90.1	89.5	88.9	88.3	87.6	86.9	86.1
80	87.7	89.0	89.8	90.3	90.7	90.9	90.9	90.9	90.8	90.6	90.4	90.1	89.8	89.4	89.0	88.5	88.0	87.4	86.8	86.1
85	86.9	87.8	88.5	89.0	89.3	89.5	89.6	89.6	89.6	89.5	89.4	89.2	88.9	88.7	88.3	88.0	87.6	87.1	86.6	86.1
90	86.3	86.8	87.3	87.6	87.9	88.0	88.2	88.2	88.3	88.2	88.2	88.1	87.9	87.8	87.6	87.3	87.1	86.8	86.5	86.1
95	85.9	86.1	86.3	86.5	86.6	86.7	86.8	86.8	86.8	86.9	86.9	86.8	86.8	86.8	86.7	86.6	86.5	86.4	86.3	86.1
98	86.1	86.2	86.2	86.2	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.2	86.2	86.2	86.2	86.1

Mean Annual Mass Removal Efficiencies for 2.25-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.8	99.2	99.2	99.2	99.0	98.8	98.4	98.0	97.5	97.0	96.3	95.7	94.9	94.2	93.3	92.5	91.6	90.6	89.7	88.7
35	98.1	98.7	98.9	98.8	98.7	98.5	98.2	97.8	97.3	96.8	96.2	95.5	94.8	94.0	93.2	92.4	91.5	90.6	89.7	88.7
40	97.4	98.2	98.4	98.5	98.4	98.2	97.9	97.5	97.0	96.5	96.0	95.3	94.6	93.9	93.1	92.3	91.5	90.6	89.6	88.7
45	96.5	97.6	97.9	98.0	97.9	97.8	97.5	97.1	96.7	96.2	95.7	95.1	94.4	93.7	93.0	92.2	91.4	90.5	89.6	88.7
50	95.7	96.9	97.3	97.4	97.4	97.3	97.0	96.7	96.3	95.9	95.4	94.8	94.2	93.6	92.8	92.1	91.3	90.5	89.6	88.7
55	94.8	96.1	96.6	96.8	96.8	96.7	96.5	96.2	95.9	95.5	95.0	94.5	94.0	93.3	92.7	91.9	91.2	90.4	89.6	88.7
60	93.7	95.1	95.7	96.0	96.0	96.0	95.9	95.6	95.4	95.0	94.6	94.1	93.6	93.1	92.4	91.8	91.1	90.3	89.5	88.7
65	92.6	94.1	94.8	95.1	95.2	95.2	95.2	95.0	94.7	94.4	94.1	93.7	93.2	92.7	92.2	91.6	90.9	90.2	89.5	88.7
70	91.5	92.9	93.7	94.1	94.3	94.4	94.3	94.2	94.0	93.8	93.5	93.2	92.8	92.3	91.8	91.3	90.7	90.1	89.4	88.7
75	90.5	91.8	92.6	93.0	93.3	93.4	93.4	93.4	93.3	93.1	92.8	92.6	92.2	91.9	91.4	91.0	90.5	89.9	89.3	88.7
80	89.6	90.7	91.4	91.9	92.2	92.3	92.4	92.4	92.4	92.3	92.1	91.9	91.6	91.3	91.0	90.6	90.2	89.7	89.2	88.7
85	88.9	89.7	90.3	90.7	91.0	91.2	91.3	91.4	91.4	91.3	91.2	91.1	90.9	90.7	90.4	90.1	89.8	89.5	89.1	88.7
90	88.4	89.0	89.3	89.6	89.9	90.0	90.1	90.2	90.2	90.2	90.2	90.1	90.1	89.9	89.8	89.6	89.4	89.2	89.0	88.7
95	88.2	88.4	88.6	88.7	88.9	89.0	89.0	89.1	89.1	89.2	89.2	89.2	89.1	89.1	89.1	89.0	89.0	88.9	88.8	88.7
98	88.6	88.6	88.6	88.7	88.7	88.7	88.7	88.8	88.8	88.8	88.8	88.8	88.8	88.8	88.8	88.8	88.8	88.7	88.7	88.7

Mean Annual Mass Removal Efficiencies for 2.50-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.0	99.3	99.4	99.3	99.2	99.0	98.8	98.5	98.1	97.6	97.1	96.6	95.9	95.3	94.6	93.9	93.1	92.4	91.5	90.7
35	98.4	98.9	99.1	99.1	99.0	98.8	98.6	98.3	97.9	97.4	96.9	96.4	95.8	95.2	94.5	93.8	93.1	92.3	91.5	90.7
40	97.8	98.5	98.7	98.7	98.7	98.5	98.3	98.0	97.6	97.2	96.8	96.2	95.7	95.1	94.4	93.8	93.0	92.3	91.5	90.7
45	97.1	98.0	98.2	98.3	98.3	98.2	98.0	97.7	97.4	97.0	96.5	96.0	95.5	94.9	94.3	93.7	93.0	92.2	91.5	90.7
50	96.3	97.4	97.8	97.9	97.9	97.8	97.6	97.3	97.0	96.7	96.3	95.8	95.3	94.7	94.2	93.5	92.9	92.2	91.4	90.7
55	95.6	96.7	97.2	97.3	97.3	97.3	97.1	96.9	96.6	96.3	95.9	95.5	95.0	94.5	94.0	93.4	92.8	92.1	91.4	90.7
60	94.7	95.9	96.4	96.7	96.7	96.7	96.6	96.4	96.2	95.9	95.5	95.2	94.8	94.3	93.8	93.2	92.7	92.0	91.4	90.7
65	93.8	95.0	95.6	95.9	96.0	96.0	95.9	95.8	95.6	95.4	95.1	94.8	94.4	94.0	93.5	93.0	92.5	91.9	91.3	90.7
70	92.8	94.0	94.7	95.0	95.2	95.3	95.3	95.2	95.0	94.8	94.6	94.3	94.0	93.7	93.3	92.8	92.3	91.8	91.3	90.7
75	91.9	93.1	93.7	94.1	94.3	94.5	94.5	94.4	94.3	94.2	94.0	93.8	93.5	93.2	92.9	92.5	92.1	91.7	91.2	90.7
80	91.2	92.1	92.7	93.1	93.4	93.5	93.6	93.6	93.6	93.5	93.4	93.2	93.0	92.8	92.5	92.2	91.9	91.5	91.1	90.7
85	90.6	91.3	91.8	92.2	92.4	92.6	92.7	92.7	92.7	92.7	92.6	92.5	92.4	92.2	92.0	91.8	91.6	91.3	91.0	90.7
90	90.2	90.6	91.0	91.2	91.4	91.6	91.7	91.8	91.8	91.8	91.8	91.8	91.7	91.6	91.5	91.4	91.2	91.1	90.9	90.7
95	90.1	90.3	90.4	90.6	90.7	90.7	90.8	90.9	90.9	91.0	91.0	91.0	91.0	91.0	90.9	90.9	90.9	90.8	90.8	90.7
98	90.5	90.5	90.5	90.6	90.6	90.6	90.6	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7	90.7

Mean Annual Mass Removal Efficiencies for 2.75-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.1	99.4	99.5	99.5	99.4	99.2	99.0	98.8	98.5	98.1	97.7	97.2	96.7	96.2	95.6	95.0	94.3	93.7	93.0	92.3
35	98.7	99.1	99.2	99.2	99.2	99.0	98.9	98.6	98.3	98.0	97.5	97.1	96.6	96.1	95.5	94.9	94.3	93.6	93.0	92.3
40	98.1	98.7	98.9	98.9	98.9	98.8	98.6	98.4	98.1	97.8	97.4	96.9	96.5	96.0	95.4	94.9	94.2	93.6	92.9	92.3
45	97.6	98.3	98.5	98.6	98.6	98.5	98.3	98.1	97.9	97.5	97.2	96.8	96.3	95.8	95.3	94.8	94.2	93.6	92.9	92.3
50	96.9	97.8	98.1	98.2	98.2	98.1	98.0	97.8	97.6	97.3	96.9	96.6	96.1	95.7	95.2	94.7	94.1	93.5	92.9	92.3
55	96.2	97.2	97.6	97.7	97.8	97.7	97.6	97.4	97.2	96.9	96.6	96.3	95.9	95.5	95.0	94.5	94.0	93.5	92.9	92.3
60	95.5	96.6	97.0	97.2	97.3	97.2	97.1	97.0	96.8	96.6	96.3	96.0	95.6	95.3	94.8	94.4	93.9	93.4	92.8	92.3
65	94.7	95.8	96.3	96.5	96.6	96.7	96.6	96.5	96.3	96.1	95.9	95.6	95.3	95.0	94.6	94.2	93.8	93.3	92.8	92.3
70	93.9	95.0	95.5	95.8	96.0	96.0	96.0	95.9	95.8	95.7	95.5	95.2	95.0	94.7	94.4	94.0	93.6	93.2	92.7	92.3
75	93.1	94.1	94.7	95.0	95.2	95.3	95.3	95.3	95.2	95.1	95.0	94.8	94.6	94.3	94.1	93.8	93.4	93.1	92.7	92.3
80	92.5	93.3	93.8	94.1	94.4	94.5	94.6	94.6	94.6	94.5	94.4	94.3	94.1	93.9	93.7	93.5	93.2	92.9	92.6	92.3
85	91.9	92.6	93.0	93.3	93.5	93.7	93.8	93.8	93.8	93.8	93.8	93.7	93.6	93.5	93.3	93.2	93.0	92.7	92.5	92.3
90	91.6	92.0	92.3	92.5	92.7	92.9	93.0	93.0	93.1	93.1	93.1	93.1	93.0	93.0	92.9	92.8	92.7	92.6	92.4	92.3
95	91.6	91.8	91.9	92.0	92.1	92.2	92.3	92.3	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.3	92.3	92.3
98	92.0	92.0	92.1	92.1	92.1	92.1	92.2	92.2	92.2	92.2	92.2	92.2	92.2	92.3	92.3	92.3	92.3	92.3	92.3	92.3

Mean Annual Mass Removal Efficiencies for 3.00-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.3	99.5	99.6	99.6	99.5	99.4	99.2	99.0	98.8	98.5	98.1	97.7	97.3	96.9	96.4	95.9	95.3	94.7	94.1	93.5
35	98.9	99.2	99.4	99.4	99.3	99.2	99.1	98.9	98.6	98.3	98.0	97.6	97.2	96.8	96.3	95.8	95.3	94.7	94.1	93.5
40	98.4	98.9	99.1	99.1	99.1	99.0	98.9	98.7	98.5	98.2	97.9	97.5	97.1	96.7	96.2	95.7	95.2	94.7	94.1	93.5
45	97.9	98.5	98.8	98.8	98.8	98.7	98.6	98.5	98.3	98.0	97.7	97.3	97.0	96.6	96.1	95.6	95.1	94.6	94.1	93.5
50	97.4	98.1	98.4	98.5	98.5	98.4	98.3	98.2	98.0	97.7	97.5	97.1	96.8	96.4	96.0	95.5	95.1	94.6	94.0	93.5
55	96.7	97.6	97.9	98.1	98.1	98.1	98.0	97.9	97.7	97.4	97.2	96.9	96.6	96.2	95.9	95.4	95.0	94.5	94.0	93.5
60	96.2	97.1	97.5	97.6	97.7	97.7	97.6	97.5	97.3	97.1	96.9	96.6	96.4	96.0	95.7	95.3	94.9	94.5	94.0	93.5
65	95.5	96.4	96.9	97.1	97.2	97.2	97.1	97.0	96.9	96.7	96.6	96.3	96.1	95.8	95.5	95.1	94.8	94.4	93.9	93.5
70	94.9	95.7	96.2	96.4	96.6	96.6	96.6	96.5	96.5	96.3	96.2	96.0	95.8	95.5	95.2	94.9	94.6	94.3	93.9	93.5
75	94.2	95.0	95.4	95.7	95.9	96.0	96.0	96.0	95.9	95.9	95.7	95.6	95.4	95.2	95.0	94.7	94.5	94.2	93.8	93.5
80	93.5	94.2	94.7	95.0	95.2	95.3	95.4	95.4	95.4	95.3	95.3	95.1	95.0	94.9	94.7	94.5	94.3	94.0	93.8	93.5
85	93.1	93.6	94.0	94.3	94.5	94.6	94.7	94.7	94.8	94.7	94.7	94.6	94.6	94.5	94.4	94.2	94.1	93.9	93.7	93.5
90	92.8	93.1	93.4	93.6	93.8	93.9	94.0	94.1	94.1	94.1	94.1	94.1	94.1	94.0	94.0	93.9	93.8	93.7	93.6	93.5
95	92.8	93.0	93.1	93.2	93.3	93.3	93.4	93.5	93.5	93.5	93.6	93.6	93.6	93.6	93.6	93.6	93.6	93.6	93.5	93.5
98	93.2	93.2	93.3	93.3	93.3	93.3	93.4	93.4	93.4	93.4	93.4	93.4	93.5	93.5	93.5	93.5	93.5	93.5	93.5	93.5

Mean Annual Mass Removal Efficiencies for 3.25-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.4	99.6	99.6	99.6	99.6	99.5	99.4	99.2	99.0	98.8	98.5	98.2	97.8	97.4	97.0	96.5	96.1	95.6	95.0	94.5
35	99.1	99.4	99.5	99.5	99.4	99.4	99.2	99.1	98.9	98.7	98.4	98.1	97.7	97.3	96.9	96.5	96.0	95.5	95.0	94.5
40	98.7	99.1	99.2	99.3	99.2	99.2	99.1	98.9	98.7	98.5	98.2	97.9	97.6	97.2	96.8	96.4	96.0	95.5	95.0	94.5
45	98.2	98.8	98.9	99.0	99.0	98.9	98.8	98.7	98.5	98.3	98.1	97.8	97.5	97.1	96.8	96.3	95.9	95.5	95.0	94.5
50	97.7	98.4	98.6	98.7	98.7	98.7	98.6	98.5	98.3	98.1	97.9	97.6	97.3	97.0	96.6	96.3	95.9	95.4	95.0	94.5
55	97.2	98.0	98.2	98.4	98.4	98.4	98.3	98.2	98.1	97.9	97.6	97.4	97.1	96.8	96.5	96.2	95.8	95.4	94.9	94.5
60	96.7	97.5	97.8	98.0	98.0	98.0	98.0	97.9	97.7	97.6	97.4	97.2	96.9	96.7	96.4	96.0	95.7	95.3	94.9	94.5
65	96.2	96.9	97.3	97.5	97.6	97.6	97.6	97.5	97.4	97.2	97.1	96.9	96.7	96.4	96.2	95.9	95.6	95.2	94.9	94.5
70	95.6	96.4	96.8	97.0	97.1	97.1	97.1	97.1	97.0	96.9	96.7	96.6	96.4	96.2	96.0	95.7	95.4	95.1	94.8	94.5
75	95.0	95.7	96.1	96.4	96.5	96.6	96.6	96.6	96.5	96.5	96.4	96.2	96.1	95.9	95.7	95.5	95.3	95.0	94.8	94.5
80	94.5	95.1	95.5	95.7	95.9	96.0	96.0	96.1	96.0	96.0	95.9	95.9	95.8	95.6	95.5	95.3	95.1	94.9	94.7	94.5
85	94.0	94.5	94.8	95.1	95.2	95.4	95.4	95.5	95.5	95.5	95.5	95.4	95.4	95.3	95.2	95.1	94.9	94.8	94.7	94.5
90	93.8	94.1	94.3	94.5	94.6	94.8	94.8	94.9	94.9	95.0	95.0	95.0	94.9	94.9	94.9	94.8	94.7	94.7	94.6	94.5
95	93.8	94.0	94.1	94.2	94.2	94.3	94.4	94.4	94.4	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5
98	94.2	94.2	94.2	94.3	94.3	94.3	94.3	94.4	94.4	94.4	94.4	94.4	94.4	94.5	94.5	94.5	94.5	94.5	94.5	94.5

Mean Annual Mass Removal Efficiencies for 3.50-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.5	99.7	99.7	99.7	99.7	99.6	99.5	99.4	99.2	99.0	98.8	98.5	98.2	97.8	97.5	97.1	96.7	96.2	95.8	95.3
35	99.2	99.5	99.5	99.6	99.5	99.5	99.4	99.2	99.1	98.9	98.7	98.4	98.1	97.8	97.4	97.0	96.6	96.2	95.8	95.3
40	98.9	99.2	99.4	99.4	99.4	99.3	99.2	99.1	98.9	98.8	98.5	98.3	98.0	97.7	97.3	97.0	96.6	96.2	95.7	95.3
45	98.5	98.9	99.1	99.2	99.2	99.1	99.0	98.9	98.8	98.6	98.4	98.2	97.9	97.6	97.3	96.9	96.5	96.2	95.7	95.3
50	98.0	98.6	98.8	98.9	98.9	98.9	98.8	98.7	98.6	98.4	98.2	98.0	97.7	97.5	97.2	96.8	96.5	96.1	95.7	95.3
55	97.6	98.3	98.5	98.6	98.6	98.6	98.6	98.5	98.4	98.2	98.0	97.8	97.6	97.3	97.0	96.7	96.4	96.1	95.7	95.3
60	97.2	97.8	98.1	98.3	98.3	98.3	98.3	98.2	98.1	98.0	97.8	97.6	97.4	97.2	96.9	96.6	96.3	96.0	95.7	95.3
65	96.7	97.4	97.7	97.9	97.9	98.0	97.9	97.9	97.8	97.7	97.5	97.4	97.2	97.0	96.7	96.5	96.2	95.9	95.6	95.3
70	96.2	96.9	97.2	97.4	97.5	97.6	97.5	97.5	97.4	97.3	97.2	97.1	96.9	96.8	96.6	96.3	96.1	95.9	95.6	95.3
75	95.7	96.3	96.7	96.9	97.0	97.1	97.1	97.1	97.0	97.0	96.9	96.8	96.7	96.5	96.4	96.2	96.0	95.8	95.5	95.3
80	95.3	95.8	96.1	96.3	96.5	96.5	96.6	96.6	96.6	96.6	96.5	96.4	96.4	96.3	96.1	96.0	95.8	95.7	95.5	95.3
85	94.8	95.2	95.5	95.7	95.9	96.0	96.1	96.1	96.1	96.1	96.1	96.1	96.0	96.0	95.9	95.8	95.7	95.6	95.4	95.3
90	94.6	94.9	95.1	95.2	95.4	95.5	95.5	95.6	95.6	95.7	95.7	95.7	95.7	95.6	95.6	95.6	95.5	95.4	95.4	95.3
95	94.7	94.8	94.9	95.0	95.0	95.1	95.2	95.2	95.2	95.3	95.3	95.3	95.3	95.3	95.3	95.3	95.3	95.3	95.3	95.3
98	95.0	95.0	95.1	95.1	95.1	95.1	95.2	95.2	95.2	95.2	95.2	95.2	95.2	95.3	95.3	95.3	95.3	95.3	95.3	95.3

Mean Annual Mass Removal Efficiencies for 3.75-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.7	99.7	99.7	99.7	99.7	99.7	99.6	99.5	99.3	99.2	99.0	98.7	98.5	98.2	97.9	97.5	97.2	96.8	96.4	96.0
35	99.3	99.5	99.6	99.6	99.6	99.6	99.5	99.4	99.2	99.1	98.9	98.7	98.4	98.1	97.8	97.5	97.1	96.8	96.4	96.0
40	99.0	99.3	99.4	99.5	99.5	99.4	99.3	99.2	99.1	99.0	98.8	98.6	98.3	98.1	97.8	97.4	97.1	96.7	96.4	96.0
45	98.7	99.1	99.2	99.3	99.3	99.3	99.2	99.1	99.0	98.8	98.7	98.4	98.2	98.0	97.7	97.4	97.1	96.7	96.4	96.0
50	98.3	98.8	99.0	99.1	99.1	99.0	99.0	98.9	98.8	98.7	98.5	98.3	98.1	97.8	97.6	97.3	97.0	96.7	96.3	96.0
55	98.0	98.5	98.7	98.8	98.8	98.8	98.8	98.7	98.6	98.5	98.3	98.1	97.9	97.7	97.5	97.2	96.9	96.6	96.3	96.0
60	97.6	98.1	98.4	98.5	98.5	98.5	98.5	98.5	98.4	98.3	98.1	98.0	97.8	97.6	97.4	97.1	96.9	96.6	96.3	96.0
65	97.1	97.7	98.0	98.2	98.2	98.2	98.2	98.2	98.1	98.0	97.9	97.7	97.6	97.4	97.2	97.0	96.8	96.5	96.3	96.0
70	96.7	97.3	97.6	97.8	97.9	97.9	97.9	97.9	97.8	97.7	97.6	97.5	97.4	97.2	97.1	96.9	96.7	96.5	96.2	96.0
75	96.3	96.8	97.1	97.3	97.4	97.5	97.5	97.5	97.5	97.4	97.3	97.2	97.1	97.0	96.9	96.7	96.6	96.4	96.2	96.0
80	95.9	96.4	96.6	96.8	97.0	97.0	97.1	97.1	97.1	97.0	97.0	96.9	96.9	96.8	96.7	96.6	96.4	96.3	96.1	96.0
85	95.6	95.9	96.1	96.3	96.4	96.5	96.6	96.6	96.7	96.7	96.6	96.6	96.6	96.5	96.5	96.4	96.3	96.2	96.1	96.0
90	95.3	95.6	95.7	95.9	96.0	96.1	96.1	96.2	96.2	96.3	96.3	96.3	96.3	96.2	96.2	96.2	96.1	96.1	96.0	96.0
95	95.4	95.5	95.6	95.6	95.7	95.8	95.8	95.8	95.9	95.9	95.9	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0	96.0
98	95.7	95.7	95.7	95.8	95.8	95.8	95.8	95.8	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	96.0	96.0	96.0

Mean Annual Mass Removal Efficiencies for 4.00-inches of Retention for Zone 4 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.7	99.8	99.8	99.8	99.8	99.8	99.7	99.6	99.5	99.3	99.1	99.0	98.7	98.5	98.2	97.9	97.6	97.3	96.9	96.5
35	99.5	99.6	99.7	99.7	99.7	99.7	99.6	99.5	99.4	99.2	99.1	98.9	98.7	98.4	98.2	97.9	97.6	97.2	96.9	96.5
40	99.2	99.4	99.5	99.6	99.6	99.5	99.5	99.4	99.3	99.1	99.0	98.8	98.6	98.4	98.1	97.8	97.5	97.2	96.9	96.5
45	98.9	99.2	99.4	99.4	99.4	99.4	99.3	99.2	99.1	99.0	98.9	98.7	98.5	98.3	98.0	97.8	97.5	97.2	96.9	96.5
50	98.6	99.0	99.1	99.2	99.2	99.2	99.1	99.1	99.0	98.9	98.7	98.6	98.4	98.2	97.9	97.7	97.4	97.1	96.8	96.5
55	98.2	98.7	98.9	99.0	99.0	99.0	98.9	98.9	98.8	98.7	98.6	98.4	98.2	98.1	97.8	97.6	97.4	97.1	96.8	96.5
60	97.9	98.4	98.6	98.7	98.8	98.8	98.7	98.7	98.6	98.5	98.4	98.3	98.1	97.9	97.7	97.5	97.3	97.1	96.8	96.5
65	97.6	98.0	98.3	98.4	98.5	98.5	98.5	98.4	98.4	98.3	98.2	98.1	97.9	97.8	97.6	97.4	97.2	97.0	96.8	96.5
70	97.1	97.6	97.9	98.1	98.1	98.2	98.2	98.2	98.1	98.1	98.0	97.9	97.7	97.6	97.5	97.3	97.1	96.9	96.7	96.5
75	96.8	97.2	97.5	97.7	97.8	97.8	97.9	97.8	97.8	97.8	97.7	97.6	97.5	97.4	97.3	97.2	97.0	96.9	96.7	96.5
80	96.4	96.8	97.1	97.3	97.4	97.4	97.5	97.5	97.5	97.4	97.4	97.3	97.3	97.2	97.1	97.0	96.9	96.8	96.7	96.5
85	96.2	96.5	96.7	96.8	96.9	97.0	97.0	97.1	97.1	97.1	97.1	97.1	97.0	97.0	96.9	96.9	96.8	96.7	96.6	96.5
90	95.9	96.1	96.3	96.4	96.5	96.6	96.6	96.7	96.7	96.7	96.8	96.8	96.8	96.7	96.7	96.7	96.7	96.6	96.6	96.5
95	96.0	96.1	96.1	96.2	96.3	96.3	96.4	96.4	96.4	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5

Mean Annual Mass Removal Efficiencies for 0.25-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	83.0	80.8	74.1	67.0	60.7	55.3	50.7	46.8	43.4	40.4	37.8	35.5	33.5	31.7	30.1	28.6	27.3	26.1	25.0	24.0
35	77.3	77.4	72.0	65.6	59.8	54.7	50.2	46.4	43.1	40.2	37.6	35.4	33.4	31.6	30.0	28.6	27.3	26.1	25.0	24.0
40	71.3	73.5	69.4	63.9	58.6	53.8	49.6	45.9	42.7	39.9	37.4	35.2	33.3	31.5	30.0	28.5	27.3	26.1	25.0	24.0
45	65.3	69.3	66.5	61.9	57.2	52.8	48.8	45.3	42.3	39.6	37.1	35.0	33.1	31.4	29.9	28.5	27.2	26.0	25.0	24.0
50	59.6	64.8	63.4	59.6	55.5	51.6	47.9	44.7	41.7	39.2	36.8	34.8	32.9	31.3	29.8	28.4	27.2	26.0	25.0	24.0
55	54.0	60.2	59.9	57.1	53.7	50.2	46.9	43.9	41.1	38.7	36.5	34.5	32.7	31.1	29.6	28.3	27.1	26.0	24.9	24.0
60	49.0	55.7	56.3	54.4	51.6	48.6	45.6	42.9	40.4	38.1	36.0	34.1	32.4	30.9	29.5	28.2	27.0	25.9	24.9	24.0
65	44.5	51.0	52.5	51.4	49.3	46.8	44.2	41.8	39.5	37.4	35.5	33.7	32.1	30.6	29.3	28.1	26.9	25.9	24.9	24.0
70	40.5	46.5	48.5	48.1	46.6	44.7	42.6	40.5	38.4	36.6	34.8	33.2	31.7	30.3	29.1	27.9	26.8	25.8	24.9	24.0
75	37.0	42.0	44.2	44.5	43.7	42.2	40.6	38.9	37.2	35.5	34.0	32.5	31.2	29.9	28.8	27.7	26.7	25.7	24.8	24.0
80	33.9	37.8	39.8	40.5	40.2	39.4	38.2	36.9	35.6	34.2	32.9	31.7	30.5	29.4	28.4	27.4	26.5	25.6	24.8	24.0
85	31.1	33.8	35.4	36.1	36.3	35.9	35.3	34.5	33.5	32.5	31.5	30.5	29.6	28.7	27.8	27.0	26.2	25.4	24.7	24.0
90	28.7	30.2	31.2	31.8	32.0	32.0	31.7	31.3	30.8	30.2	29.6	29.0	28.3	27.6	27.0	26.4	25.7	25.1	24.6	24.0
95	26.6	27.0	27.4	27.6	27.7	27.7	27.7	27.6	27.4	27.2	26.9	26.6	26.3	26.0	25.7	25.4	25.0	24.7	24.3	24.0
98	25.7	25.7	25.7	25.7	25.7	25.6	25.6	25.5	25.4	25.3	25.2	25.1	25.0	24.8	24.7	24.6	24.4	24.3	24.1	24.0

Mean Annual Mass Removal Efficiencies for 0.50-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	88.6	89.9	87.9	84.5	80.5	76.4	72.3	68.5	65.1	61.9	58.9	56.2	53.7	51.4	49.3	47.3	45.5	43.8	42.2	40.8
35	84.1	86.8	85.6	82.8	79.3	75.4	71.6	68.0	64.6	61.5	58.7	56.0	53.6	51.3	49.2	47.3	45.5	43.8	42.2	40.8
40	79.3	83.3	82.9	80.8	77.8	74.3	70.7	67.3	64.1	61.1	58.3	55.8	53.4	51.1	49.1	47.2	45.4	43.8	42.2	40.8
45	74.4	79.5	80.0	78.5	76.0	72.9	69.6	66.5	63.4	60.6	57.9	55.4	53.1	51.0	48.9	47.1	45.3	43.7	42.2	40.8
50	69.7	75.5	76.8	76.0	73.9	71.3	68.4	65.5	62.6	60.0	57.4	55.0	52.8	50.7	48.8	47.0	45.3	43.7	42.2	40.8
55	65.2	71.4	73.4	73.1	71.7	69.5	66.9	64.3	61.7	59.2	56.9	54.6	52.5	50.4	48.6	46.8	45.2	43.6	42.1	40.8
60	61.0	67.2	69.7	70.1	69.2	67.4	65.3	63.0	60.6	58.4	56.2	54.0	52.0	50.1	48.3	46.6	45.0	43.5	42.1	40.8
65	57.1	63.1	65.9	66.8	66.4	65.1	63.3	61.4	59.4	57.3	55.3	53.4	51.5	49.7	48.0	46.4	44.9	43.4	42.1	40.8
70	53.6	59.2	62.0	63.2	63.3	62.5	61.2	59.6	57.9	56.1	54.3	52.6	50.9	49.2	47.6	46.1	44.7	43.3	42.0	40.8
75	50.7	55.5	58.1	59.5	59.8	59.4	58.6	57.4	56.1	54.6	53.1	51.6	50.1	48.6	47.1	45.8	44.4	43.2	41.9	40.8
80	48.3	52.0	54.3	55.5	56.0	56.0	55.6	54.8	53.9	52.8	51.6	50.3	49.0	47.8	46.5	45.3	44.1	43.0	41.8	40.8
85	46.2	48.7	50.5	51.5	52.0	52.2	52.1	51.7	51.1	50.4	49.6	48.6	47.6	46.7	45.6	44.6	43.7	42.7	41.7	40.8
90	44.2	45.6	46.7	47.4	47.9	48.1	48.2	48.1	47.8	47.4	46.9	46.4	45.7	45.1	44.4	43.7	43.0	42.2	41.5	40.8
95	42.5	43.0	43.4	43.7	43.9	44.0	44.1	44.1	44.0	43.9	43.7	43.5	43.2	43.0	42.7	42.3	42.0	41.6	41.2	40.8
98	42.1	42.2	42.2	42.2	42.2	42.2	42.2	42.1	42.1	42.0	41.9	41.8	41.7	41.6	41.5	41.4	41.2	41.1	40.9	40.8

Mean Annual Mass Removal Efficiencies for 0.75-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	91.4	93.0	92.4	90.8	88.5	85.9	83.0	80.1	77.2	74.4	71.6	69.1	66.7	64.4	62.3	60.2	58.3	56.5	54.8	53.2
35	87.7	90.5	90.4	89.2	87.2	84.8	82.2	79.5	76.7	73.9	71.3	68.8	66.5	64.2	62.1	60.2	58.3	56.5	54.8	53.2
40	83.8	87.6	88.1	87.2	85.7	83.6	81.2	78.7	76.0	73.4	70.9	68.5	66.2	64.1	62.0	60.0	58.2	56.4	54.8	53.2
45	80.0	84.4	85.6	85.1	83.9	82.2	80.0	77.7	75.3	72.8	70.4	68.1	65.9	63.8	61.8	59.9	58.1	56.4	54.7	53.2
50	76.0	81.1	82.7	82.8	82.0	80.5	78.7	76.6	74.4	72.1	69.8	67.7	65.6	63.5	61.6	59.8	58.0	56.3	54.7	53.2
55	72.3	77.7	79.7	80.2	79.8	78.7	77.2	75.3	73.3	71.2	69.2	67.1	65.1	63.2	61.3	59.6	57.9	56.2	54.7	53.2
60	68.9	74.2	76.5	77.4	77.4	76.6	75.4	73.9	72.1	70.2	68.3	66.4	64.6	62.8	61.0	59.3	57.7	56.1	54.6	53.2
65	65.5	70.7	73.3	74.5	74.7	74.4	73.5	72.2	70.7	69.1	67.4	65.7	64.0	62.3	60.7	59.1	57.5	56.0	54.6	53.2
70	62.6	67.4	70.0	71.3	71.9	71.8	71.2	70.3	69.1	67.7	66.3	64.7	63.2	61.7	60.2	58.7	57.3	55.9	54.5	53.2
75	60.1	64.2	66.7	68.1	68.8	68.9	68.7	68.0	67.1	66.1	64.9	63.6	62.3	60.9	59.6	58.3	57.0	55.7	54.4	53.2
80	58.0	61.3	63.5	64.8	65.5	65.9	65.8	65.4	64.8	64.0	63.1	62.1	61.1	60.0	58.9	57.7	56.6	55.4	54.3	53.2
85	56.4	58.8	60.4	61.5	62.2	62.5	62.6	62.4	62.0	61.6	61.0	60.3	59.5	58.7	57.9	57.0	56.0	55.1	54.1	53.2
90	55.1	56.4	57.4	58.1	58.6	58.9	59.0	59.0	58.9	58.7	58.4	58.0	57.6	57.1	56.5	55.9	55.3	54.6	53.9	53.2
95	53.7	54.2	54.6	54.9	55.2	55.4	55.5	55.6	55.6	55.5	55.5	55.3	55.2	55.0	54.7	54.5	54.2	53.9	53.5	53.2
98	53.9	54.0	54.0	54.1	54.1	54.1	54.1	54.1	54.1	54.0	54.0	53.9	53.9	53.8	53.7	53.6	53.5	53.4	53.3	53.2

Mean Annual Mass Removal Efficiencies for 1.00-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	93.5	94.8	94.6	93.7	92.3	90.6	88.7	86.5	84.3	82.1	79.8	77.6	75.4	73.3	71.3	69.4	67.5	65.8	64.1	62.5
35	90.2	92.6	92.9	92.3	91.1	89.6	87.8	85.9	83.8	81.6	79.5	77.3	75.2	73.1	71.2	69.3	67.5	65.7	64.0	62.5
40	87.0	90.2	91.0	90.7	89.7	88.4	86.8	85.0	83.1	81.1	79.0	77.0	74.9	72.9	71.0	69.1	67.4	65.7	64.0	62.5
45	83.7	87.6	88.8	88.8	88.1	87.1	85.7	84.1	82.3	80.4	78.5	76.5	74.6	72.7	70.8	69.0	67.3	65.6	64.0	62.5
50	80.5	84.8	86.4	86.8	86.4	85.5	84.4	83.0	81.4	79.7	77.9	76.0	74.2	72.3	70.5	68.8	67.1	65.5	64.0	62.5
55	77.3	82.0	83.9	84.5	84.4	83.9	83.0	81.8	80.3	78.8	77.1	75.4	73.7	72.0	70.3	68.6	67.0	65.4	63.9	62.5
60	74.4	79.1	81.1	82.0	82.2	82.0	81.3	80.3	79.2	77.8	76.3	74.7	73.1	71.5	69.9	68.3	66.8	65.3	63.9	62.5
65	71.8	76.1	78.3	79.5	79.9	79.9	79.5	78.7	77.8	76.6	75.3	73.9	72.4	71.0	69.5	68.0	66.6	65.2	63.8	62.5
70	69.2	73.2	75.5	76.8	77.4	77.6	77.4	76.9	76.2	75.3	74.2	72.9	71.6	70.3	69.0	67.7	66.3	65.0	63.7	62.5
75	67.0	70.6	72.8	74.1	74.8	75.1	75.1	74.8	74.3	73.6	72.7	71.7	70.7	69.5	68.4	67.2	66.0	64.8	63.6	62.5
80	65.3	68.1	70.0	71.3	72.1	72.5	72.6	72.5	72.2	71.7	71.0	70.3	69.4	68.5	67.6	66.6	65.6	64.5	63.5	62.5
85	63.9	66.0	67.5	68.6	69.3	69.7	69.9	69.9	69.8	69.5	69.0	68.5	67.9	67.2	66.5	65.8	65.0	64.2	63.3	62.5
90	63.0	64.3	65.2	65.9	66.4	66.8	67.0	67.1	67.0	66.9	66.7	66.4	66.1	65.7	65.2	64.7	64.2	63.6	63.1	62.5
95	62.3	62.8	63.1	63.4	63.6	63.8	63.9	64.0	64.1	64.1	64.1	64.0	63.9	63.8	63.6	63.4	63.2	63.0	62.7	62.5
98	62.6	62.7	62.8	62.8	62.9	62.9	62.9	62.9	62.9	62.9	62.9	62.9	62.9	62.8	62.8	62.7	62.7	62.6	62.5	62.5

Mean Annual Mass Removal Efficiencies for 1.25-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	95.1	96.1	96.0	95.4	94.5	93.3	91.9	90.4	88.7	86.9	85.1	83.3	81.5	79.7	77.8	76.1	74.4	72.7	71.1	69.5
35	92.3	94.2	94.5	94.2	93.4	92.4	91.1	89.7	88.2	86.5	84.8	83.0	81.2	79.5	77.7	76.0	74.3	72.6	71.1	69.5
40	89.3	92.0	92.8	92.8	92.2	91.3	90.2	88.9	87.5	85.9	84.3	82.6	80.9	79.2	77.5	75.8	74.2	72.6	71.0	69.5
45	86.5	89.8	90.9	91.2	90.9	90.1	89.2	88.0	86.7	85.3	83.8	82.2	80.6	78.9	77.3	75.7	74.1	72.5	71.0	69.5
50	83.8	87.5	88.9	89.5	89.3	88.8	88.0	87.0	85.8	84.5	83.1	81.7	80.2	78.6	77.0	75.5	73.9	72.4	71.0	69.5
55	81.2	85.1	86.8	87.5	87.5	87.2	86.6	85.8	84.8	83.7	82.4	81.1	79.7	78.2	76.7	75.3	73.8	72.3	70.9	69.5
60	78.6	82.7	84.6	85.4	85.6	85.5	85.1	84.5	83.7	82.7	81.6	80.4	79.1	77.8	76.4	75.0	73.6	72.2	70.9	69.5
65	76.4	80.3	82.2	83.1	83.6	83.7	83.5	83.1	82.4	81.6	80.7	79.6	78.5	77.2	76.0	74.7	73.4	72.1	70.8	69.5
70	74.3	77.7	79.7	80.8	81.5	81.7	81.7	81.4	80.9	80.3	79.5	78.7	77.7	76.6	75.4	74.3	73.1	71.9	70.7	69.5
75	72.4	75.4	77.3	78.5	79.2	79.6	79.7	79.6	79.3	78.8	78.2	77.5	76.7	75.8	74.8	73.8	72.7	71.7	70.6	69.5
80	70.8	73.3	75.1	76.2	76.9	77.4	77.6	77.6	77.4	77.1	76.7	76.2	75.5	74.8	74.0	73.2	72.3	71.4	70.5	69.5
85	69.8	71.6	72.9	73.9	74.6	75.0	75.3	75.4	75.4	75.2	75.0	74.6	74.1	73.6	73.0	72.4	71.7	71.0	70.3	69.5
90	69.2	70.3	71.1	71.8	72.3	72.6	72.9	73.0	73.1	73.1	72.9	72.7	72.5	72.2	71.8	71.4	71.0	70.5	70.0	69.5
95	68.9	69.3	69.7	70.0	70.2	70.4	70.5	70.6	70.7	70.7	70.7	70.7	70.6	70.5	70.4	70.3	70.1	69.9	69.7	69.5
98	69.4	69.5	69.6	69.6	69.7	69.7	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.8	69.7	69.7	69.7	69.6	69.6	69.5

Mean Annual Mass Removal Efficiencies for 1.50-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	96.3	97.1	97.0	96.5	95.9	95.0	93.9	92.8	91.5	90.2	88.7	87.2	85.7	84.1	82.6	81.1	79.5	78.0	76.5	75.1
35	93.9	95.4	95.6	95.4	95.0	94.2	93.2	92.2	91.0	89.7	88.3	86.9	85.4	83.9	82.4	81.0	79.5	78.0	76.5	75.1
40	91.3	93.5	94.1	94.2	93.9	93.3	92.4	91.5	90.4	89.2	87.9	86.5	85.1	83.7	82.3	80.8	79.4	77.9	76.5	75.1
45	88.8	91.5	92.5	92.8	92.7	92.2	91.5	90.6	89.6	88.6	87.4	86.1	84.8	83.4	82.0	80.6	79.2	77.8	76.4	75.1
50	86.4	89.6	90.8	91.3	91.4	91.0	90.4	89.7	88.8	87.9	86.8	85.6	84.4	83.1	81.8	80.4	79.1	77.7	76.4	75.1
55	84.2	87.5	89.0	89.7	89.8	89.6	89.2	88.6	87.9	87.1	86.1	85.0	83.9	82.7	81.5	80.2	78.9	77.6	76.3	75.1
60	81.9	85.4	87.1	87.9	88.2	88.1	87.9	87.4	86.9	86.2	85.3	84.4	83.3	82.2	81.1	79.9	78.7	77.5	76.3	75.1
65	80.0	83.4	85.1	86.0	86.4	86.5	86.4	86.1	85.7	85.1	84.4	83.6	82.7	81.7	80.7	79.6	78.5	77.4	76.2	75.1
70	78.3	81.3	83.0	84.0	84.5	84.8	84.8	84.7	84.4	83.9	83.4	82.7	81.9	81.1	80.2	79.3	78.2	77.2	76.1	75.1
75	76.6	79.3	80.9	81.9	82.6	83.0	83.1	83.1	82.9	82.6	82.2	81.6	81.0	80.4	79.6	78.8	77.9	77.0	76.0	75.1
80	75.3	77.4	78.9	79.9	80.6	81.1	81.3	81.4	81.3	81.1	80.8	80.4	80.0	79.5	78.9	78.2	77.5	76.7	75.9	75.1
85	74.4	76.0	77.2	78.0	78.7	79.1	79.4	79.5	79.5	79.5	79.3	79.1	78.8	78.4	78.0	77.5	76.9	76.3	75.7	75.1
90	73.9	74.9	75.7	76.3	76.8	77.1	77.4	77.6	77.7	77.7	77.7	77.6	77.4	77.2	76.9	76.6	76.3	75.9	75.5	75.1
95	74.0	74.4	74.7	75.0	75.2	75.4	75.6	75.7	75.8	75.9	75.9	75.9	75.9	75.8	75.7	75.6	75.5	75.4	75.2	75.1
98	74.8	74.9	75.0	75.0	75.1	75.1	75.1	75.2	75.2	75.2	75.2	75.2	75.2	75.2	75.2	75.2	75.2	75.1	75.1	75.1

Mean Annual Mass Removal Efficiencies for 1.75-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	97.2	97.7	97.7	97.4	96.8	96.2	95.4	94.4	93.5	92.4	91.2	90.0	88.7	87.4	86.1	84.8	83.4	82.1	80.8	79.4
35	95.1	96.3	96.6	96.4	96.0	95.5	94.7	93.9	93.0	91.9	90.8	89.7	88.5	87.2	85.9	84.6	83.3	82.0	80.7	79.4
40	92.9	94.7	95.2	95.2	95.0	94.6	94.0	93.2	92.4	91.4	90.4	89.3	88.2	87.0	85.7	84.5	83.2	82.0	80.7	79.4
45	90.7	93.0	93.7	94.0	94.0	93.7	93.2	92.5	91.7	90.9	89.9	88.9	87.8	86.7	85.5	84.3	83.1	81.9	80.7	79.4
50	88.5	91.2	92.2	92.7	92.8	92.6	92.2	91.7	91.0	90.2	89.4	88.4	87.4	86.4	85.3	84.1	83.0	81.8	80.6	79.4
55	86.5	89.4	90.7	91.3	91.5	91.5	91.2	90.7	90.2	89.5	88.7	87.9	87.0	86.0	85.0	83.9	82.8	81.7	80.6	79.4
60	84.6	87.5	89.0	89.8	90.2	90.2	90.0	89.6	89.2	88.6	88.0	87.3	86.4	85.6	84.6	83.6	82.6	81.6	80.5	79.4
65	82.9	85.8	87.4	88.3	88.6	88.7	88.7	88.5	88.1	87.7	87.2	86.6	85.8	85.1	84.2	83.3	82.4	81.4	80.5	79.4
70	81.4	84.1	85.6	86.5	87.0	87.2	87.2	87.2	87.0	86.6	86.2	85.7	85.1	84.5	83.7	83.0	82.1	81.3	80.4	79.4
75	80.2	82.4	83.8	84.7	85.2	85.6	85.8	85.8	85.7	85.5	85.2	84.8	84.3	83.8	83.2	82.5	81.8	81.1	80.3	79.4
80	78.9	80.8	82.0	82.9	83.5	84.0	84.2	84.3	84.3	84.2	84.0	83.7	83.4	83.0	82.5	82.0	81.4	80.8	80.1	79.4
85	78.1	79.5	80.5	81.3	81.9	82.3	82.6	82.8	82.8	82.8	82.7	82.5	82.3	82.1	81.7	81.4	81.0	80.5	80.0	79.4
90	77.8	78.6	79.3	79.9	80.4	80.7	80.9	81.1	81.2	81.3	81.3	81.2	81.1	81.0	80.9	80.6	80.4	80.1	79.8	79.4
95	78.0	78.4	78.7	78.9	79.1	79.3	79.5	79.6	79.7	79.8	79.9	79.9	79.9	79.9	79.9	79.8	79.8	79.7	79.6	79.4
98	79.0	79.0	79.1	79.2	79.2	79.3	79.3	79.4	79.4	79.4	79.5	79.5	79.5	79.5	79.5	79.5	79.5	79.5	79.5	79.4

Mean Annual Mass Removal Efficiencies for 2.00-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	97.8	98.3	98.3	98.0	97.5	97.0	96.4	95.6	94.8	93.9	93.0	92.0	91.0	89.9	88.7	87.6	86.4	85.2	84.0	82.9
35	96.2	97.1	97.3	97.1	96.8	96.3	95.8	95.1	94.4	93.6	92.7	91.7	90.7	89.7	88.6	87.4	86.3	85.2	84.0	82.9
40	94.3	95.7	96.1	96.1	95.9	95.6	95.2	94.5	93.8	93.1	92.3	91.4	90.4	89.4	88.4	87.3	86.2	85.1	84.0	82.9
45	92.3	94.2	94.8	95.0	94.9	94.8	94.4	93.9	93.3	92.6	91.8	91.0	90.1	89.2	88.2	87.1	86.1	85.0	83.9	82.9
50	90.3	92.5	93.4	93.8	93.9	93.8	93.6	93.1	92.6	92.0	91.3	90.5	89.7	88.8	87.9	87.0	86.0	84.9	83.9	82.9
55	88.4	90.9	92.0	92.6	92.8	92.8	92.6	92.3	91.8	91.3	90.7	90.0	89.3	88.5	87.6	86.7	85.8	84.8	83.9	82.9
60	86.8	89.3	90.6	91.3	91.6	91.7	91.6	91.3	91.0	90.6	90.0	89.4	88.8	88.1	87.3	86.5	85.6	84.7	83.8	82.9
65	85.3	87.7	89.1	90.0	90.4	90.5	90.5	90.3	90.0	89.7	89.3	88.8	88.2	87.6	86.9	86.2	85.4	84.6	83.7	82.9
70	83.9	86.3	87.7	88.5	88.9	89.2	89.2	89.1	89.0	88.8	88.4	88.0	87.6	87.1	86.5	85.8	85.1	84.4	83.7	82.9
75	82.9	84.9	86.2	87.0	87.4	87.7	87.9	87.9	87.9	87.7	87.5	87.2	86.9	86.4	86.0	85.4	84.8	84.2	83.6	82.9
80	81.9	83.5	84.6	85.4	85.9	86.3	86.5	86.7	86.7	86.6	86.5	86.3	86.1	85.7	85.4	84.9	84.5	84.0	83.4	82.9
85	81.1	82.3	83.3	84.0	84.5	84.9	85.1	85.3	85.4	85.4	85.4	85.3	85.1	84.9	84.7	84.4	84.1	83.7	83.3	82.9
90	80.9	81.7	82.3	82.8	83.2	83.5	83.8	84.0	84.1	84.2	84.2	84.2	84.1	84.0	83.9	83.8	83.6	83.4	83.1	82.9
95	81.3	81.6	81.9	82.1	82.3	82.5	82.6	82.8	82.9	83.0	83.0	83.1	83.1	83.1	83.1	83.1	83.1	83.0	82.9	82.9
98	82.3	82.3	82.4	82.5	82.5	82.6	82.6	82.7	82.7	82.7	82.8	82.8	82.8	82.8	82.9	82.9	82.9	82.9	82.9	82.9

Mean Annual Mass Removal Efficiencies for 2.25-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.2	98.7	98.6	98.5	98.1	97.6	97.1	96.5	95.9	95.1	94.3	93.5	92.6	91.7	90.7	89.7	88.7	87.7	86.6	85.6
35	97.0	97.7	97.8	97.7	97.5	97.0	96.6	96.1	95.4	94.7	94.0	93.2	92.4	91.5	90.6	89.6	88.6	87.6	86.6	85.6
40	95.3	96.5	96.9	96.8	96.6	96.3	96.0	95.5	95.0	94.3	93.6	92.9	92.1	91.3	90.4	89.5	88.5	87.6	86.6	85.6
45	93.6	95.2	95.7	95.8	95.7	95.6	95.3	94.9	94.4	93.9	93.2	92.6	91.8	91.0	90.2	89.3	88.4	87.5	86.5	85.6
50	91.9	93.7	94.5	94.7	94.8	94.8	94.6	94.3	93.8	93.3	92.8	92.1	91.5	90.7	90.0	89.1	88.3	87.4	86.5	85.6
55	90.1	92.2	93.2	93.6	93.8	93.9	93.8	93.5	93.2	92.7	92.2	91.7	91.1	90.4	89.7	88.9	88.1	87.3	86.5	85.6
60	88.6	90.8	91.9	92.5	92.8	92.9	92.9	92.7	92.4	92.0	91.6	91.1	90.6	90.0	89.4	88.7	88.0	87.2	86.4	85.6
65	87.2	89.4	90.6	91.3	91.7	91.9	91.9	91.8	91.6	91.3	90.9	90.6	90.1	89.6	89.0	88.4	87.8	87.1	86.3	85.6
70	86.0	88.1	89.3	90.1	90.6	90.8	90.8	90.8	90.6	90.4	90.2	89.9	89.5	89.1	88.6	88.1	87.5	86.9	86.3	85.6
75	85.1	87.0	88.1	88.8	89.3	89.5	89.6	89.7	89.6	89.6	89.4	89.1	88.9	88.5	88.2	87.7	87.2	86.7	86.2	85.6
80	84.5	85.8	86.8	87.5	87.9	88.2	88.4	88.6	88.6	88.6	88.5	88.3	88.1	87.9	87.6	87.3	86.9	86.5	86.1	85.6
85	83.8	84.8	85.6	86.1	86.6	87.0	87.2	87.4	87.5	87.5	87.5	87.5	87.4	87.2	87.0	86.8	86.5	86.3	85.9	85.6
90	83.5	84.2	84.7	85.2	85.6	85.8	86.1	86.2	86.4	86.5	86.5	86.5	86.5	86.5	86.4	86.3	86.1	86.0	85.8	85.6
95	83.9	84.2	84.5	84.7	84.9	85.1	85.2	85.3	85.4	85.5	85.6	85.6	85.7	85.7	85.7	85.7	85.7	85.7	85.6	85.6
98	84.9	85.0	85.1	85.1	85.2	85.2	85.3	85.3	85.4	85.4	85.4	85.5	85.5	85.5	85.5	85.5	85.6	85.6	85.6	85.6

Mean Annual Mass Removal Efficiencies for 2.50-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.6	98.9	98.9	98.8	98.6	98.2	97.7	97.2	96.7	96.0	95.3	94.6	93.9	93.1	92.3	91.4	90.6	89.6	88.7	87.8
35	97.6	98.1	98.3	98.2	98.0	97.6	97.2	96.8	96.3	95.7	95.0	94.4	93.7	92.9	92.1	91.3	90.5	89.6	88.7	87.8
40	96.2	97.1	97.4	97.4	97.3	97.0	96.7	96.3	95.9	95.3	94.7	94.1	93.4	92.7	92.0	91.2	90.4	89.5	88.7	87.8
45	94.7	96.0	96.5	96.5	96.5	96.3	96.0	95.8	95.4	94.9	94.3	93.8	93.2	92.5	91.8	91.0	90.3	89.5	88.6	87.8
50	93.2	94.8	95.3	95.6	95.6	95.5	95.4	95.2	94.8	94.4	93.9	93.4	92.8	92.2	91.6	90.9	90.1	89.4	88.6	87.8
55	91.6	93.4	94.2	94.5	94.7	94.7	94.7	94.5	94.2	93.9	93.4	93.0	92.5	91.9	91.3	90.7	90.0	89.3	88.5	87.8
60	90.1	92.0	93.0	93.5	93.8	93.9	93.9	93.8	93.5	93.2	92.9	92.5	92.0	91.6	91.0	90.4	89.8	89.2	88.5	87.8
65	88.9	90.8	91.8	92.4	92.8	93.0	93.1	93.0	92.8	92.6	92.3	92.0	91.6	91.2	90.7	90.2	89.6	89.1	88.4	87.8
70	87.8	89.6	90.7	91.4	91.8	92.1	92.1	92.1	92.0	91.8	91.6	91.4	91.1	90.7	90.3	89.9	89.4	88.9	88.4	87.8
75	86.9	88.6	89.6	90.3	90.8	91.0	91.1	91.1	91.1	91.0	90.9	90.7	90.5	90.2	89.9	89.5	89.2	88.7	88.3	87.8
80	86.4	87.7	88.6	89.2	89.6	89.9	90.0	90.1	90.2	90.2	90.1	90.0	89.8	89.7	89.4	89.2	88.9	88.5	88.2	87.8
85	85.9	86.9	87.5	88.0	88.4	88.7	88.9	89.1	89.2	89.3	89.3	89.2	89.2	89.1	88.9	88.8	88.6	88.3	88.1	87.8
90	85.6	86.2	86.7	87.1	87.5	87.8	88.0	88.1	88.3	88.4	88.4	88.4	88.4	88.4	88.4	88.3	88.2	88.1	87.9	87.8
95	86.1	86.4	86.6	86.8	87.0	87.1	87.3	87.4	87.5	87.6	87.7	87.7	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8
98	87.1	87.2	87.2	87.3	87.3	87.4	87.4	87.5	87.5	87.6	87.6	87.6	87.7	87.7	87.7	87.7	87.7	87.8	87.8	87.8

Mean Annual Mass Removal Efficiencies for 2.75-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	98.9	99.1	99.1	99.1	98.9	98.6	98.2	97.8	97.3	96.7	96.2	95.5	94.9	94.2	93.5	92.8	92.0	91.2	90.4	89.6
35	98.1	98.5	98.6	98.6	98.4	98.1	97.7	97.4	96.9	96.4	95.9	95.3	94.7	94.1	93.4	92.7	91.9	91.2	90.4	89.6
40	97.0	97.7	97.9	97.9	97.8	97.5	97.2	96.9	96.5	96.1	95.6	95.0	94.5	93.9	93.2	92.5	91.8	91.1	90.3	89.6
45	95.6	96.7	97.1	97.1	97.1	96.9	96.6	96.4	96.1	95.7	95.2	94.7	94.2	93.6	93.0	92.4	91.7	91.0	90.3	89.6
50	94.3	95.6	96.1	96.3	96.3	96.2	96.0	95.8	95.6	95.3	94.9	94.4	93.9	93.4	92.8	92.2	91.6	91.0	90.3	89.6
55	92.9	94.4	95.0	95.3	95.4	95.4	95.4	95.3	95.1	94.8	94.4	94.0	93.6	93.1	92.6	92.1	91.5	90.9	90.2	89.6
60	91.6	93.2	93.9	94.3	94.6	94.7	94.7	94.6	94.5	94.2	93.9	93.6	93.2	92.8	92.3	91.8	91.3	90.8	90.2	89.6
65	90.3	92.0	92.8	93.4	93.7	93.9	94.0	93.9	93.8	93.6	93.4	93.1	92.8	92.4	92.0	91.6	91.1	90.6	90.1	89.6
70	89.3	90.9	91.8	92.4	92.8	93.1	93.2	93.2	93.1	93.0	92.8	92.6	92.3	92.0	91.7	91.3	90.9	90.5	90.1	89.6
75	88.5	89.9	90.9	91.5	91.9	92.2	92.3	92.4	92.3	92.2	92.1	92.0	91.8	91.6	91.3	91.0	90.7	90.4	90.0	89.6
80	88.1	89.2	90.0	90.6	91.0	91.2	91.4	91.5	91.5	91.5	91.4	91.4	91.3	91.1	90.9	90.7	90.5	90.2	89.9	89.6
85	87.8	88.6	89.2	89.6	90.0	90.2	90.4	90.5	90.6	90.7	90.7	90.7	90.7	90.6	90.5	90.3	90.2	90.0	89.8	89.6
90	87.5	88.0	88.4	88.8	89.1	89.3	89.5	89.7	89.8	89.9	90.0	90.0	90.0	90.0	90.0	89.9	89.9	89.8	89.7	89.6
95	87.9	88.2	88.4	88.6	88.7	88.9	89.0	89.1	89.2	89.3	89.4	89.4	89.5	89.5	89.5	89.6	89.6	89.6	89.6	89.6
98	88.9	88.9	89.0	89.0	89.1	89.1	89.2	89.2	89.3	89.3	89.4	89.4	89.4	89.5	89.5	89.5	89.5	89.5	89.6	89.6

Mean Annual Mass Removal Efficiencies for 3.00-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.1	99.3	99.3	99.2	99.1	98.9	98.6	98.2	97.8	97.3	96.8	96.3	95.7	95.1	94.5	93.8	93.2	92.5	91.8	91.0
35	98.4	98.8	98.9	98.8	98.7	98.5	98.2	97.8	97.5	97.0	96.6	96.1	95.5	94.9	94.4	93.7	93.1	92.4	91.7	91.0
40	97.5	98.1	98.3	98.3	98.2	98.0	97.7	97.4	97.1	96.7	96.3	95.8	95.3	94.8	94.2	93.6	93.0	92.4	91.7	91.0
45	96.4	97.3	97.6	97.6	97.6	97.4	97.2	96.9	96.7	96.4	96.0	95.5	95.1	94.6	94.0	93.5	92.9	92.3	91.7	91.0
50	95.2	96.3	96.7	96.9	96.9	96.8	96.6	96.4	96.2	96.0	95.6	95.2	94.8	94.3	93.9	93.4	92.8	92.2	91.6	91.0
55	94.0	95.3	95.8	96.0	96.1	96.1	96.0	95.9	95.7	95.5	95.2	94.9	94.5	94.1	93.6	93.2	92.7	92.2	91.6	91.0
60	92.8	94.1	94.8	95.1	95.3	95.4	95.4	95.3	95.2	95.0	94.8	94.5	94.1	93.8	93.4	93.0	92.5	92.1	91.6	91.0
65	91.7	93.0	93.8	94.2	94.5	94.6	94.7	94.7	94.6	94.5	94.3	94.0	93.8	93.5	93.1	92.8	92.4	91.9	91.5	91.0
70	90.7	92.0	92.8	93.3	93.7	93.9	94.0	94.1	94.0	93.9	93.8	93.6	93.3	93.1	92.8	92.5	92.2	91.8	91.4	91.0
75	89.9	91.1	91.9	92.5	92.9	93.2	93.3	93.3	93.3	93.3	93.2	93.0	92.9	92.7	92.5	92.3	92.0	91.7	91.4	91.0
80	89.4	90.5	91.2	91.7	92.1	92.3	92.5	92.6	92.6	92.6	92.5	92.5	92.4	92.3	92.1	92.0	91.8	91.5	91.3	91.0
85	89.3	90.0	90.5	90.9	91.3	91.5	91.6	91.8	91.8	91.9	91.9	91.9	91.9	91.8	91.7	91.6	91.5	91.4	91.2	91.0
90	89.1	89.6	89.9	90.2	90.5	90.7	90.9	91.0	91.1	91.2	91.3	91.3	91.3	91.4	91.3	91.3	91.3	91.2	91.1	91.0
95	89.5	89.7	89.9	90.0	90.2	90.3	90.4	90.5	90.6	90.7	90.8	90.8	90.9	90.9	91.0	91.0	91.0	91.0	91.0	91.0
98	90.3	90.4	90.5	90.5	90.6	90.6	90.6	90.7	90.7	90.8	90.8	90.8	90.9	90.9	90.9	90.9	91.0	91.0	91.0	91.0

Mean Annual Mass Removal Efficiencies for 3.25-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.3	99.4	99.5	99.4	99.3	99.1	98.9	98.6	98.2	97.8	97.4	96.9	96.4	95.8	95.3	94.7	94.1	93.5	92.9	92.2
35	98.7	99.0	99.1	99.0	99.0	98.8	98.5	98.2	97.9	97.5	97.1	96.7	96.2	95.7	95.2	94.6	94.1	93.5	92.9	92.2
40	98.0	98.4	98.6	98.6	98.5	98.4	98.1	97.8	97.5	97.2	96.9	96.5	96.0	95.5	95.0	94.5	94.0	93.4	92.8	92.2
45	97.0	97.7	98.0	98.0	98.0	97.8	97.7	97.4	97.1	96.9	96.6	96.2	95.8	95.3	94.9	94.4	93.9	93.4	92.8	92.2
50	96.0	96.9	97.3	97.4	97.4	97.3	97.1	96.9	96.7	96.5	96.3	95.9	95.5	95.1	94.7	94.3	93.8	93.3	92.8	92.2
55	94.9	96.0	96.4	96.6	96.7	96.7	96.6	96.4	96.3	96.1	95.9	95.6	95.3	94.9	94.5	94.1	93.7	93.2	92.7	92.2
60	93.9	95.0	95.5	95.8	96.0	96.0	96.0	95.9	95.8	95.7	95.5	95.2	94.9	94.6	94.3	93.9	93.5	93.1	92.7	92.2
65	92.8	94.0	94.6	95.0	95.2	95.3	95.4	95.4	95.3	95.2	95.0	94.8	94.6	94.3	94.0	93.7	93.4	93.0	92.6	92.2
70	91.9	93.0	93.7	94.1	94.4	94.6	94.8	94.8	94.8	94.7	94.6	94.4	94.2	94.0	93.8	93.5	93.2	92.9	92.6	92.2
75	91.1	92.2	92.9	93.4	93.7	94.0	94.1	94.2	94.2	94.1	94.1	94.0	93.8	93.6	93.5	93.3	93.0	92.8	92.5	92.2
80	90.6	91.5	92.2	92.7	93.0	93.3	93.4	93.5	93.5	93.6	93.5	93.4	93.4	93.3	93.2	93.0	92.8	92.6	92.4	92.2
85	90.5	91.2	91.7	92.0	92.3	92.5	92.7	92.8	92.9	92.9	92.9	92.9	92.9	92.9	92.8	92.7	92.6	92.5	92.4	92.2
90	90.5	90.9	91.2	91.5	91.7	91.9	92.0	92.1	92.2	92.3	92.4	92.4	92.4	92.5	92.4	92.4	92.4	92.3	92.3	92.2
95	90.7	90.9	91.1	91.2	91.4	91.5	91.6	91.7	91.8	91.9	92.0	92.0	92.1	92.1	92.1	92.2	92.2	92.2	92.2	92.2
98	91.6	91.6	91.7	91.7	91.8	91.8	91.8	91.9	91.9	92.0	92.0	92.0	92.1	92.1	92.1	92.1	92.2	92.2	92.2	92.2

Mean Annual Mass Removal Efficiencies for 3.50-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.5	99.6	99.6	99.5	99.4	99.3	99.1	98.9	98.5	98.2	97.8	97.4	96.9	96.5	96.0	95.4	94.9	94.4	93.8	93.2
35	98.9	99.2	99.2	99.2	99.1	99.0	98.8	98.6	98.3	97.9	97.6	97.2	96.8	96.3	95.8	95.4	94.9	94.3	93.8	93.2
40	98.3	98.7	98.8	98.8	98.8	98.7	98.5	98.2	97.9	97.6	97.3	97.0	96.6	96.2	95.7	95.3	94.8	94.3	93.8	93.2
45	97.5	98.1	98.3	98.4	98.3	98.2	98.0	97.8	97.6	97.3	97.1	96.8	96.4	96.0	95.6	95.1	94.7	94.2	93.7	93.2
50	96.6	97.4	97.7	97.8	97.8	97.7	97.6	97.4	97.2	97.0	96.7	96.5	96.1	95.8	95.4	95.0	94.6	94.2	93.7	93.2
55	95.7	96.6	97.0	97.2	97.2	97.2	97.1	96.9	96.8	96.6	96.4	96.2	95.9	95.6	95.2	94.9	94.5	94.1	93.7	93.2
60	94.8	95.8	96.2	96.4	96.5	96.5	96.5	96.4	96.3	96.2	96.1	95.9	95.6	95.3	95.0	94.7	94.4	94.0	93.6	93.2
65	93.8	94.8	95.4	95.7	95.8	95.9	95.9	95.9	95.9	95.8	95.7	95.5	95.3	95.1	94.8	94.5	94.2	93.9	93.6	93.2
70	93.0	94.0	94.5	94.9	95.1	95.3	95.4	95.4	95.4	95.4	95.3	95.1	95.0	94.8	94.5	94.3	94.1	93.8	93.5	93.2
75	92.2	93.1	93.7	94.1	94.4	94.7	94.8	94.9	94.9	94.9	94.8	94.7	94.6	94.4	94.3	94.1	93.9	93.7	93.5	93.2
80	91.7	92.5	93.1	93.5	93.8	94.1	94.2	94.3	94.3	94.3	94.3	94.3	94.2	94.1	94.0	93.9	93.7	93.6	93.4	93.2
85	91.5	92.1	92.6	93.0	93.2	93.4	93.6	93.7	93.7	93.8	93.8	93.8	93.8	93.7	93.7	93.6	93.6	93.5	93.3	93.2
90	91.6	91.9	92.2	92.5	92.7	92.9	93.0	93.1	93.2	93.2	93.3	93.3	93.4	93.4	93.4	93.4	93.4	93.3	93.3	93.2
95	91.9	92.0	92.2	92.3	92.4	92.5	92.6	92.7	92.8	92.9	92.9	93.0	93.1	93.1	93.1	93.2	93.2	93.2	93.2	93.2
98	92.6	92.6	92.7	92.7	92.8	92.8	92.9	92.9	92.9	93.0	93.0	93.0	93.1	93.1	93.1	93.1	93.2	93.2	93.2	93.2

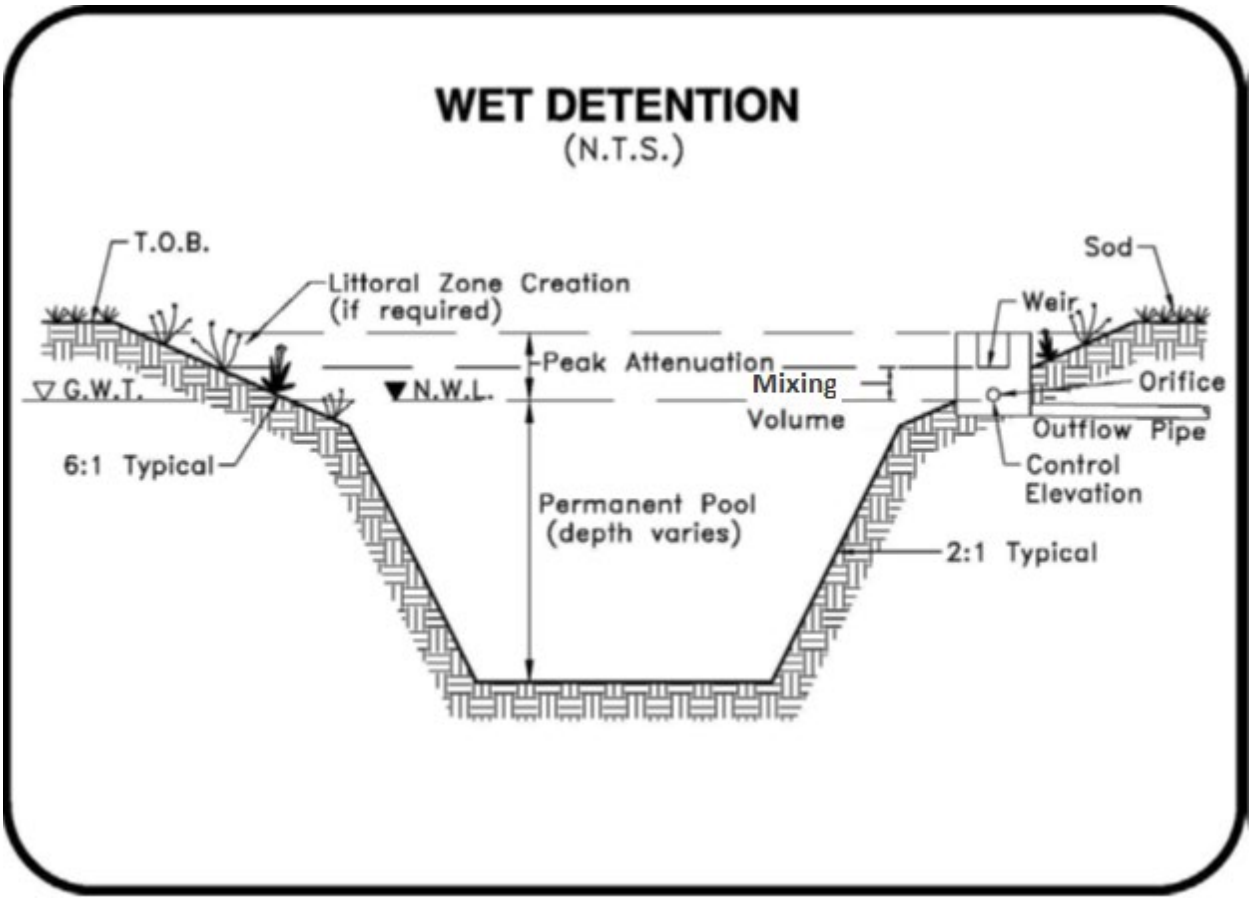
Mean Annual Mass Removal Efficiencies for 3.75-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.7	99.7	99.7	99.6	99.5	99.4	99.3	99.1	98.8	98.5	98.2	97.8	97.4	97.0	96.5	96.1	95.6	95.1	94.6	94.1
35	99.1	99.3	99.4	99.3	99.3	99.2	99.0	98.8	98.6	98.3	98.0	97.6	97.3	96.9	96.4	96.0	95.5	95.1	94.6	94.1
40	98.6	98.9	99.0	99.0	99.0	98.9	98.7	98.5	98.3	98.0	97.7	97.4	97.1	96.7	96.3	95.9	95.4	95.0	94.5	94.1
45	97.9	98.4	98.6	98.6	98.6	98.5	98.4	98.2	98.0	97.7	97.5	97.2	96.9	96.5	96.2	95.8	95.4	95.0	94.5	94.1
50	97.1	97.8	98.1	98.2	98.2	98.1	98.0	97.8	97.6	97.4	97.2	96.9	96.7	96.4	96.0	95.7	95.3	94.9	94.5	94.1
55	96.4	97.1	97.5	97.6	97.6	97.6	97.5	97.4	97.2	97.0	96.9	96.7	96.4	96.2	95.9	95.5	95.2	94.8	94.5	94.1
60	95.5	96.4	96.8	96.9	97.0	97.0	97.0	96.9	96.8	96.7	96.6	96.4	96.2	95.9	95.7	95.4	95.1	94.7	94.4	94.1
65	94.7	95.5	96.0	96.3	96.4	96.5	96.4	96.4	96.4	96.3	96.2	96.1	95.9	95.7	95.5	95.2	94.9	94.7	94.4	94.1
70	93.9	94.7	95.3	95.5	95.7	95.8	95.9	95.9	95.9	95.9	95.9	95.7	95.6	95.4	95.2	95.0	94.8	94.6	94.3	94.1
75	93.2	94.0	94.5	94.8	95.1	95.2	95.4	95.5	95.5	95.5	95.4	95.4	95.3	95.1	95.0	94.8	94.7	94.5	94.3	94.1
80	92.6	93.3	93.8	94.2	94.5	94.7	94.9	95.0	95.0	95.0	95.0	95.0	94.9	94.8	94.7	94.6	94.5	94.4	94.2	94.1
85	92.5	93.0	93.4	93.8	94.0	94.2	94.3	94.4	94.5	94.5	94.5	94.6	94.5	94.5	94.4	94.4	94.3	94.3	94.2	94.1
90	92.6	92.9	93.1	93.3	93.5	93.7	93.8	93.9	94.0	94.1	94.1	94.1	94.2	94.2	94.2	94.2	94.2	94.1	94.1	94.1
95	92.9	93.0	93.1	93.2	93.3	93.4	93.5	93.6	93.7	93.7	93.8	93.8	93.9	93.9	94.0	94.0	94.0	94.0	94.0	94.1
98	93.5	93.5	93.6	93.6	93.6	93.7	93.7	93.8	93.8	93.8	93.9	93.9	93.9	93.9	94.0	94.0	94.0	94.0	94.0	94.1

Mean Annual Mass Removal Efficiencies for 4.00-inches of Retention for Zone 5 by Percent DCIA

Non DCIA CN	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
30	99.8	99.8	99.7	99.7	99.6	99.5	99.4	99.2	99.0	98.8	98.5	98.1	97.8	97.4	97.0	96.6	96.2	95.7	95.2	94.8
35	99.3	99.5	99.5	99.5	99.4	99.3	99.2	99.0	98.8	98.6	98.3	98.0	97.7	97.3	96.9	96.5	96.1	95.7	95.2	94.8
40	98.8	99.1	99.2	99.2	99.1	99.1	99.0	98.8	98.6	98.3	98.1	97.8	97.5	97.2	96.8	96.4	96.0	95.6	95.2	94.8
45	98.3	98.6	98.8	98.8	98.8	98.8	98.6	98.5	98.3	98.1	97.8	97.6	97.3	97.0	96.7	96.3	96.0	95.6	95.2	94.8
50	97.6	98.1	98.4	98.4	98.5	98.4	98.3	98.1	98.0	97.8	97.5	97.3	97.1	96.8	96.5	96.2	95.9	95.5	95.1	94.8
55	96.9	97.6	97.8	98.0	98.0	97.9	97.9	97.7	97.6	97.4	97.3	97.1	96.9	96.7	96.4	96.1	95.8	95.4	95.1	94.8
60	96.2	96.9	97.2	97.4	97.5	97.5	97.4	97.3	97.2	97.1	97.0	96.8	96.7	96.4	96.2	96.0	95.7	95.4	95.1	94.8
65	95.5	96.2	96.6	96.8	96.9	96.9	96.9	96.9	96.8	96.8	96.7	96.6	96.4	96.2	96.0	95.8	95.6	95.3	95.0	94.8
70	94.7	95.4	95.9	96.2	96.3	96.4	96.4	96.4	96.4	96.4	96.3	96.3	96.1	96.0	95.8	95.6	95.4	95.2	95.0	94.8
75	94.1	94.8	95.2	95.5	95.7	95.8	95.9	96.0	96.0	96.0	96.0	95.9	95.8	95.7	95.6	95.5	95.3	95.1	95.0	94.8
80	93.5	94.1	94.5	94.9	95.1	95.3	95.4	95.5	95.6	95.6	95.6	95.6	95.5	95.4	95.4	95.3	95.1	95.0	94.9	94.8
85	93.3	93.8	94.1	94.4	94.7	94.8	95.0	95.1	95.1	95.2	95.2	95.2	95.2	95.2	95.1	95.1	95.0	94.9	94.9	94.8
90	93.4	93.7	93.9	94.1	94.3	94.4	94.5	94.6	94.7	94.8	94.8	94.8	94.8	94.9	94.9	94.9	94.8	94.8	94.8	94.8
95	93.7	93.8	93.9	94.0	94.1	94.2	94.3	94.3	94.4	94.5	94.5	94.6	94.6	94.6	94.7	94.7	94.7	94.7	94.8	94.8
98	94.2	94.3	94.3	94.3	94.4	94.4	94.4	94.5	94.5	94.5	94.6	94.6	94.6	94.6	94.7	94.7	94.7	94.7	94.8	94.8

Wet Detention



The most significant factor impacting the performance efficiency of a wet detention pond is the residence time within the system - specifically, the volume of the permanent pool with respect to the volume of runoff entering the pond. Since the specified treatment volumes are negligible in comparison to the permanent pool volume contained within the wet detention pond, the treatment volume criteria primarily regulates the drawdown characteristics of the wet detention pond and has little impact on the overall water quality performance efficiency of the system.

Residence time within a wet detention pond is determined by the relationship between the permanent pool volume and the annual runoff inputs, as follows:

$$Average\ Annual\ Detention\ Time, t_d(days) = \frac{PPV}{RO}\ x\ \frac{365\ days}{year}$$

where:

PPV = permanent pool volume (ac-ft)

RO = annual runoff inputs (ac-ft/yr)

For purposes of this calculation, the permanent pool volume is considered to include the total volume of water within the pond below the control elevation.

TP percent removal equation

$$Percent\ TP\ Removal\ =\ 40.13\ +\ 6.372 * ln(t_d) + 0.213 * (ln(t_d))^2$$

$$t_d = Average\ Annual\ Residence\ Time\ (days)$$

TN percent removal equation

$$Percent\ TN\ Removal\ =\ \frac{43.75 * t_d}{(4.38 + t_d)}$$

$$t_d = Average\ Annual\ Residence\ Time\ (days)$$

Limits to Average Annual Residence Time throughout the State

Maximum Average Annual Residence Time: 200 Days

Maximum Treatment Efficiency for TP at 200 days: 79.9

Maximum Treatment Efficiency for TN at 200 days: 42.8

Designers may use a longer maximum residence time if they provide evidence to support it.

Detention with Engineered Media and Filtration
The treatment efficiency for these systems is calculated based on the following equation:

$$Treatment\ efficiency\ for\ Detention\ Pond\ with\ Filtration = (Detention\ efficiency\ for\ Volume\ of\ the\ water\ Detained\ in\ the\ system) + (Volume\ of\ water\ filtered\ and\ not\ detained * Treatment\ Efficency\ of\ Media)$$

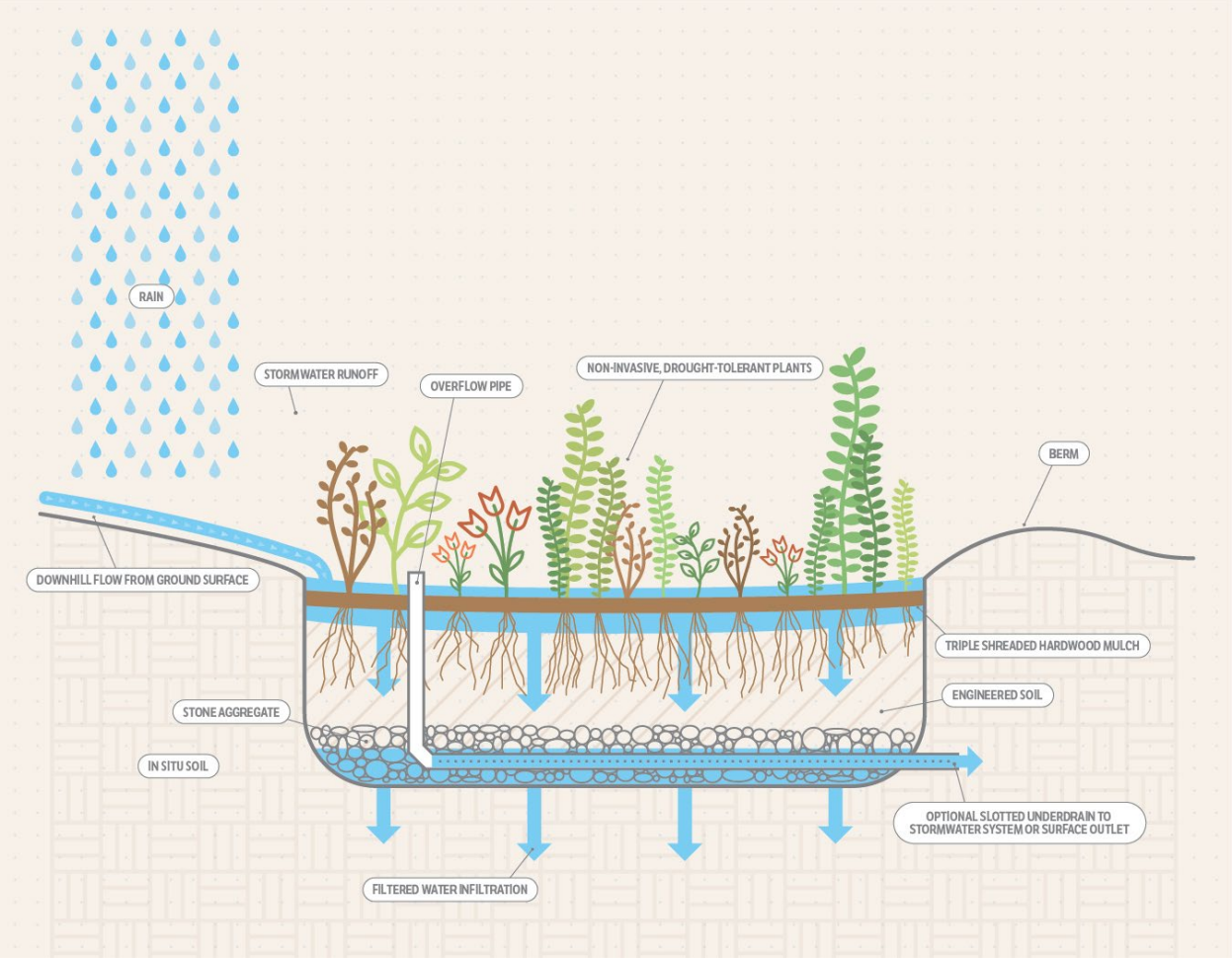
Green Stormwater Infrastructure
GSI and LID reduces pollution and treats stormwater by retaining rainfall near its source instead of directing it to a centralized pond or treatment system. When applied early in the design process, low impact design techniques can reduce stormwater runoff volume and pollutants generated from project sites. Thus, the use of GSI and LID may reduce stormwater treatment BMP size requirements. GSI and LID, depending on the technology, can also treat stormwater similar to a traditional BMP by treating TN and TP as a retention system.

Swale
Swales are defined in Chapter 403.803(14), Florida Statutes, as follows: "Swale means a manmade trench which:

1. Has a top width to depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or flatter than 3 feet horizontal to 1-foot vertical;
2. Contains contiguous areas of standing or flowing water only following a rainfall event;
3. Is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake; and
4. Is designed to take into account the soil erodibility, soil percolation, slope, slope length, and drainage area so as to prevent erosion and reduce pollutant concentration of any discharge."

1. Swales are online retention systems and their treatment effectiveness is directly related to the amount of the annual stormwater volume that is infiltrated. Swales designed for stormwater treatment can be classified into two categories:
    - Swales with swale blocks or raised driveway culverts
    - Swales without swale blocks or raised driveway culverts
2. The nutrient reduction capability of these systems can be calculated in the same way as Dry Retention System.

Raingarden/Bioretention Cell

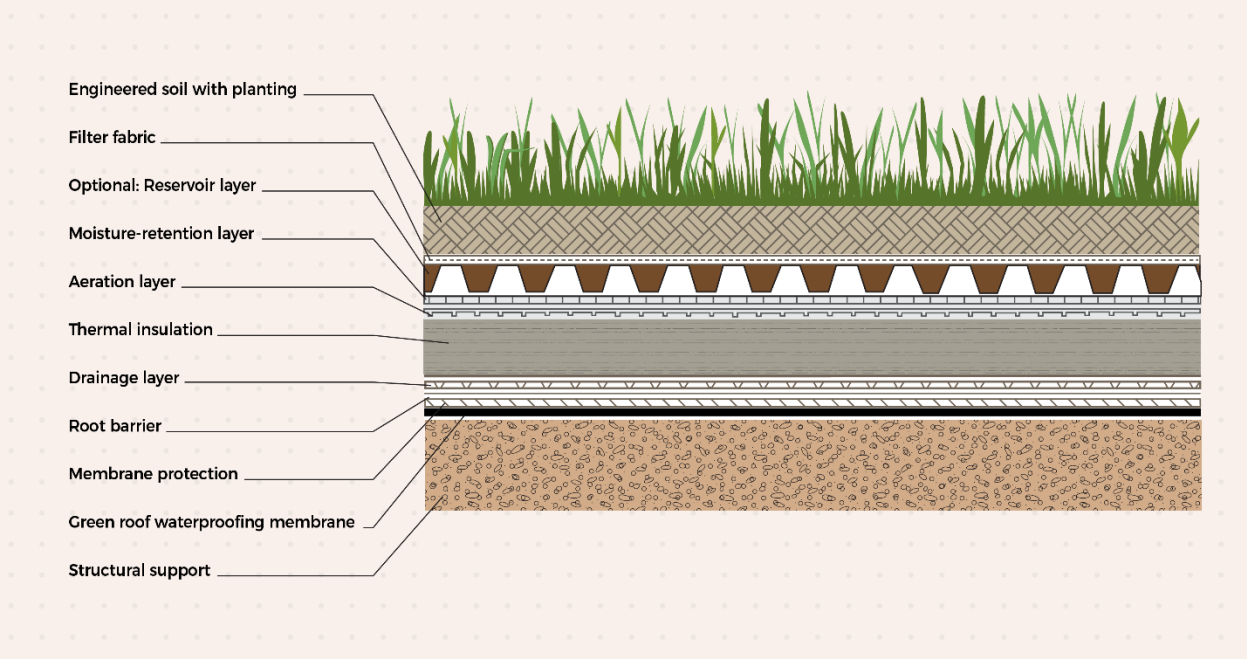


Bioretention cells, or commonly referred to as rain gardens, are shallow depressions with resilient plants that can handle temporary inundation/flooding and periods of drought. They allow stormwater to collect and soak directly into the soil.

Rain gardens vary in size and complexity. They can be planted to provide a food source for butterflies and other wildlife and can make a beautiful addition to the landscape.

The nutrient reduction capability of these systems can be calculated in the same way as Dry Retention System.

Green Roof

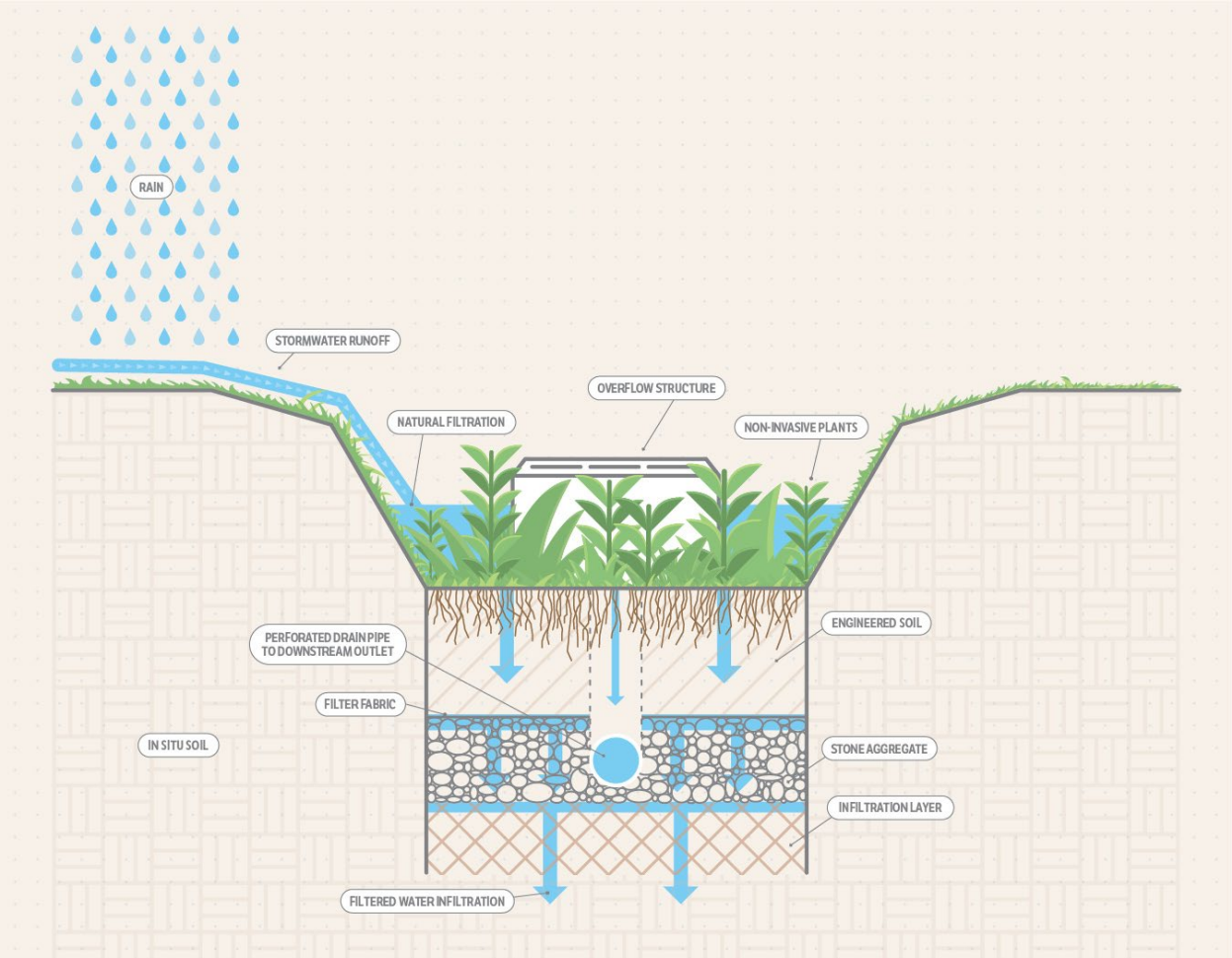


A green roof is a vegetated roof system where rainwater is taken up by plants and transpired into the air to reduce rainwater runoff from the roof. Green roofs provide an extra layer of insulation that reduces heating and cooling costs and are likely to extend the life of the roof by up to 10-20 years. Green roof vegetation enhances the building's appearance, improves air quality and reduces the urban heat island effect.

Well-designed green roofs include subsystems for drainage, plant nourishment and support, and protect underlying waterproofing systems. Green roofs maintain growing conditions and manage heavy rainfall without sustaining damage from high winds, erosion or pooling water. Green roof engineered soil meets specific requirements, including grain-size, air spaces and moisture retention to store rainfall and support plants that meet site-specific "right plant-right place" requirements.

The nutrient reduction capability of these systems can be calculated in the same way as Dry Retention System.

Bio Swale



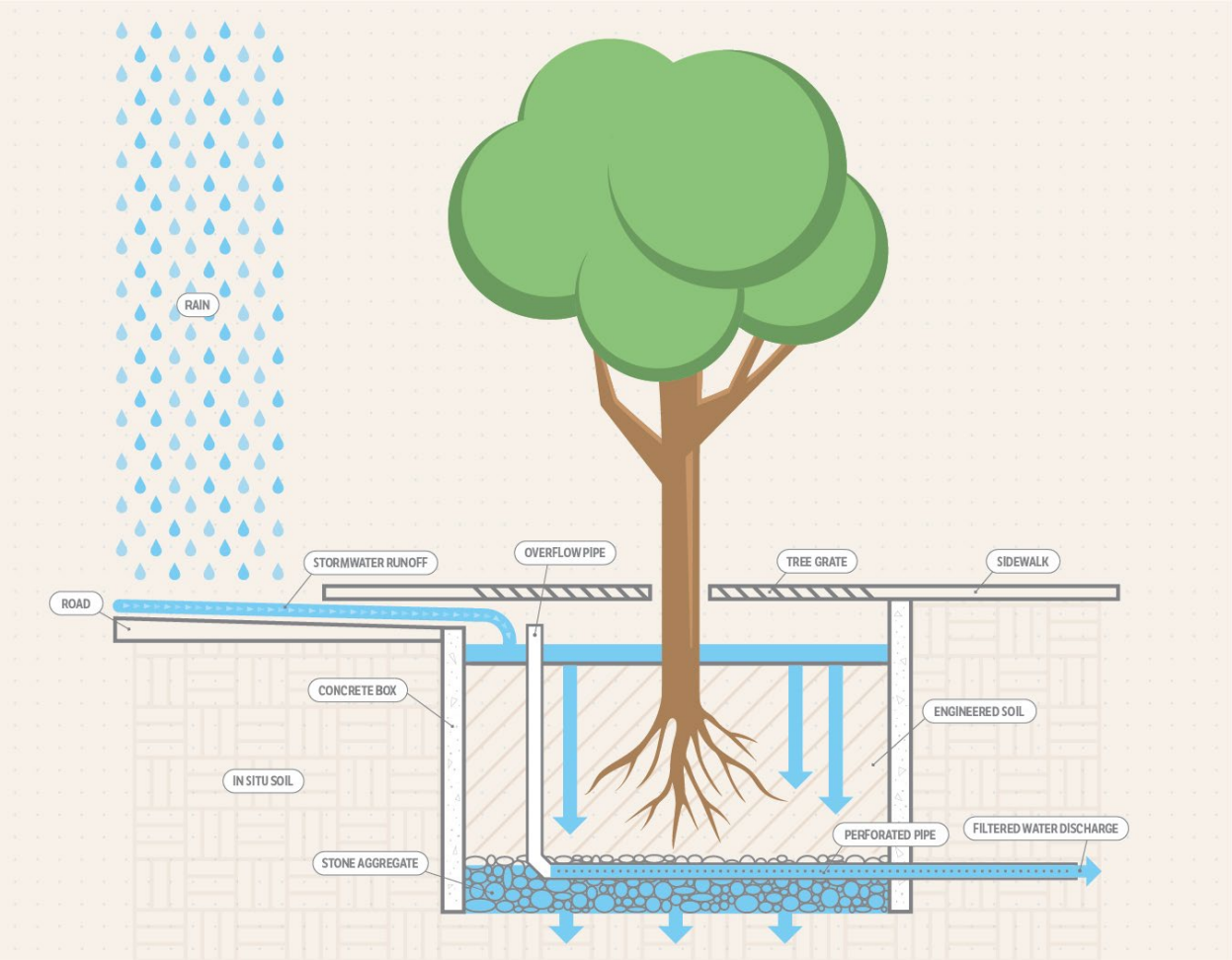
A Bioswale is an alternative to concrete gutters and storm sewers for directing stormwater away from roadways or structures. They use vegetated low-lying areas and specialized soil mixes to treat, absorb and convey lower volumes of stormwater runoff to larger treatment systems.

In many ways, bioswales imitate the function of small natural creeks or streams. Because they are linear, bioswales are effective when placed along streets and within parking lots. Essentially a shallow trench or ditch, bioswales can be cost-effective to implement and can help slow foot traffic near businesses.

Bioswales provide landscaping that, depending on the plant species chosen, may create habitats for birds, butterflies and local wildlife.

The nutrient reduction capability of these systems can be calculated in the same way as Dry Retention System.

Tree Well

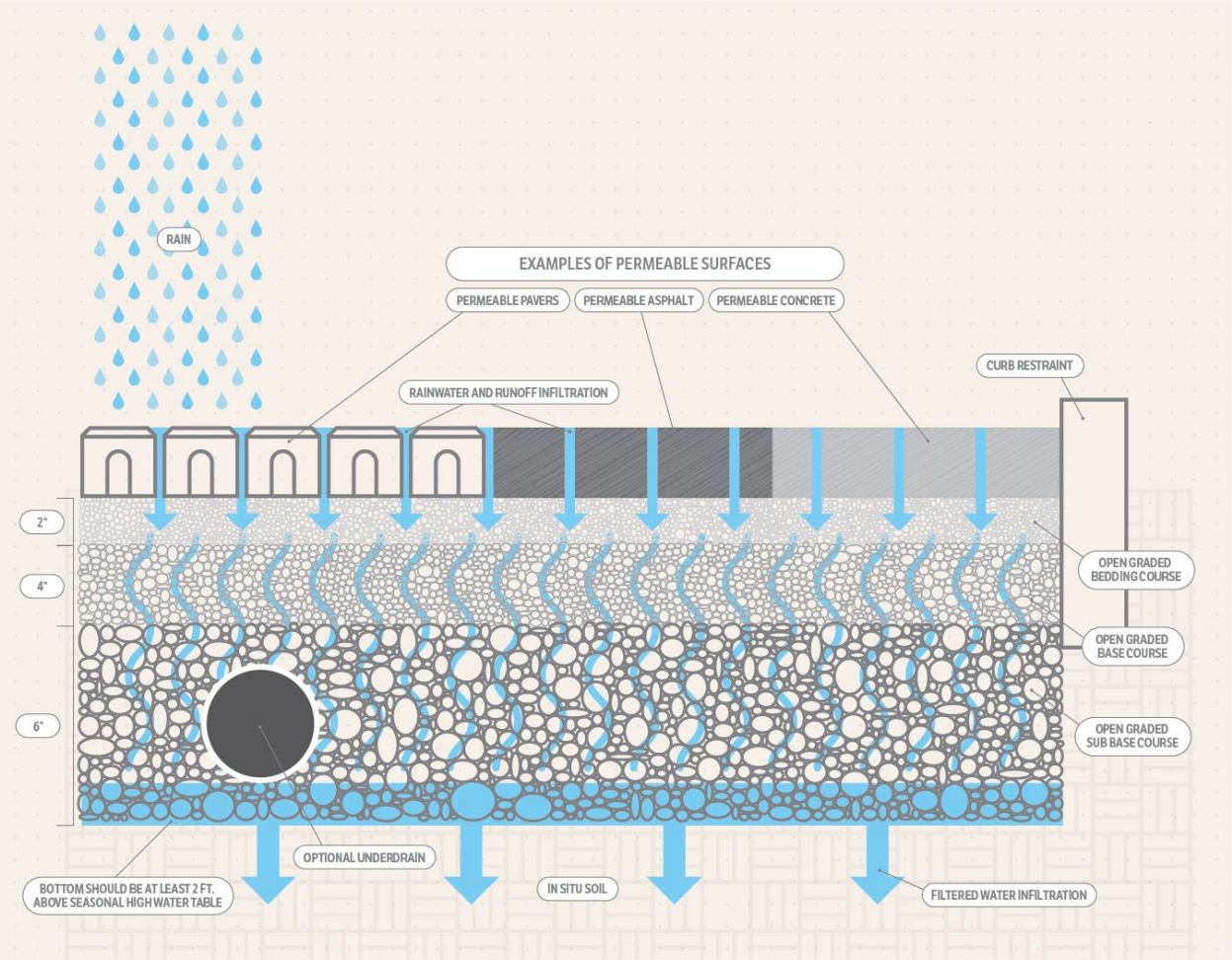


Tree boxes provide direct filtration of runoff while also intercepting rain as it falls onto the leaves and branches of the non-invasive plant life. Tree boxes also reduce the urban heat island effect, offer shady relief from the sun and draw foot traffic to nearby business based on their aesthetically pleasing nature.

The boxes are typically installed on the street side of sidewalks, with long, narrow storage volumes below the pavement. Runoff is eliminated through a combination of trees taking up water (and nutrients), percolating into the ground and discharging to stormwater systems. Pollutants are removed as they pass through the soil media in the “box” and as trees absorb and filter pollutants.

The nutrient reduction capability of these systems can be calculated in the same way as Dry Retention System.

Pervious pavement



Permeable pavement, which can be composed of pervious concrete, porous asphalt or interlocking pavers, quickly percolate rainwater where it falls as well as runoff from adjacent areas, allowing it to slowly soak into ground.

Parking lots, which make up a substantial portion of developed land areas, can be retrofitted or built with pervious surfaces from the start to significantly reduce runoff volumes.

Pervious pavement can be constructed to be similar in appearance to conventional asphalt surfacing, while pavers can be used to create intricate pavement designs. The implementation of pervious pavement of all types is often particularly cost-effective in places with high land values and recurrent nuisance flooding.

The nutrient reduction capability of these systems can be calculated in the same way as Dry Retention System.