A WETLANDS STUDY OF SEMINOLE COUNTY

Identification, Evaluation, and Preparation of Development Standards and Guidelines

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The focus of this study is on wetlands; it does not intend to imply that wetland communities are the only environmentally sensitive areas in Seminole County. There are many other communities and areas within the county that may well be worthy of protection; however, the development of guidelines and standards for these areas is beyond the scope of this study.

CONTENTS

I
ABSTRACT

Literature on the structural and functional aspects of freshwater wetland ecosystems was reviewed. Methods were developed for evaluating wetland ecosystems found in Seminole County and for determining the compatibility of possible development activities with each wetland ecosystem. Both the Comprehensive Plan and Land Development Code for Seminole County were reviewed and made consistent with this concern for wetlands protection. A review of local, state, and federal wetlands policy and protection measures was made. Recent literature on wetlands case law was also reviewed. Based on all reviews, the means for regulating development in wetland areas and areas adjacent to wetlands were developed. A model Wetlands Development Ordinance for Seminole County was drafted as the final task.

II
INTRODUCTION

Background

In February 1982, the Center for Wetlands and the Department of Urban and Regional Planning at the University of Florida, Gainesville, Florida, entered into a contract with the Board of County Commissioners of Seminole County, Florida, to "Identify, Evaluate, and Prepare Development Standards and Guidelines for the Wetlands of Seminole County."

Financial support for the project was obtained from the Florida Department of Community Affairs as a grant under the Local Government Comprehensive Planning Assistance Program.

The bulk of the research and writing was performed from the first of March through the end of June 1982. During this time approximately ten and a half person months were required to complete the project. Project personnel included faculty and students from the Department of Urban and Regional Planning and scientists and students from the Center for Wetlands.

From the outset of the project, an approach to wetlands protection was desired that would be scientifically defendable, would not severely restrict development in and around wetlands and thus draw unnecessary criticism, and would be an approach that was based on functional values of wetland communities instead of ranking wetlands from most to least desirable in terms of protection. The system that has been developed for the protection of wetlands evaluates nine (9) functional parameters of wetland communities and determines the impact of an array of development activities upon each parameter. From this determination, compatibility of each development activity and each wetland type is determined. Some activities, because of the degree of impact, are incompatible with some wetlands. Some activities, having nominal impact, are compatible; and some activities, because of the potential for adverse impact, are compatible subject to the issuance of a wetlands development permit and must conform to performance standards. A detailed set of performance standards has

been written for all activities that are determined to be compatible subject to the issuance of a wetlands development permit.

Organization of the Report

In Chapter III, a review of wetland classification systems used by local, state, and federal agencies is presented, and a classification scheme is developed for the wetlands of Seminole County. A simple field guide to the identification of wetlands is included to facilitate the identification of wetland types by developers and county staff. Also, a glossary of the more technical terms used throughout the report is included.

Chapter IV presents a detailed explanation of the methodology used to determine value of wetland parameters, impact of development activities, and compatibility of development activities with wetlands. A "second level" evaluation system is developed that enables the county staff to evaluate each wetland on a case-by-case basis for special significance.

A review of wetland policy and regulation is included in Chapter V. A review of federal and other agencies that regulate wetlands and Florida statutues concerning wetlands is presented, as well as wetland policy and regulatory functions in other states. Next, a review of wetland protection implementation measures is presented and, finally, a thorough review of wetland and floodplain case law.

In Chapter VI suggested amendments to the goals and objectives of the Seminole County Comprehensive Plan are given. A model ordinance entitled, "The Wetlands Development Ordinance of Seminole County, Florida," is given for inclusion in the Seminole County Land Development Code. Also included in Chapter VI is a diagram and explanation of the wetlands development permitting process.

Two appendices are included in the report. The first lists wildlife associated with wetland types found in Seminole County and includes a list of threatened and endangered species, and the second is a soil association and wetlands cross reference.

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No acknowledgment for a report of this type would be complete without acknowledging the work of countless people who have tread the path of wetland policy and regulation before us and whose work provided much of the inspiration for this document. We have 'borrowed' ideas liberally, and we thank you.

Finally, we wish to thank Shawn Tomlinson, Departmental Secretary in Urban and Regional Planning, and Janie Haulena, part-time Secretary at the Center for Wetlands, for their very capable typing; and Jenny Cox Carter, Word-Processing Operator at the Center for Wetlands, for her patience and endurance through drafts, rewrites, and almost final drafts and for her organization and ability to finally get this report done under a nearly impossible deadline.

III
WETLANDS CLASSIFICATION

Introduction

The difficulty of any task of classification is inversely related to the ease of defining the boundary around the subject of interest. Wetlands are a nightmare for anyone uncomfortable with ambiguity because, broadly stated, wetlands usually are the boundary between more readily recognized systems: terrestrial and aquatic. Sudden and dramatic transitions from dry land to water, such as steep embankments or cliffs, are not as common in the southeastern United States as are very gentle inclines. Along such inclines one usually finds a very gradual and smooth continuum of changing moisture conditions and floristic species. The task of wetlands classification thus hinges on the reliability with which, in a subtle transition from dry to wet, one can detect changes that are significantly related to the generally accepted definition of wetlands. The practicality of such an ability rests on the rigor with which one can defend one's definition of the wetlands transition zone and the significance of one's criteria. Within the last century, various definitions of wetlands have proven acceptable at various times with no precedence set for an overriding standard definition for each type of wetland. This section will try to serve the purpose of wetlands classification by giving a broad background of wetlands definitions, classifications, and supporting criteria that have proven functional at various times.

Wetland Definitions

The Wetland Protection Guidebook for Local Governments prepared by the Environmental Law Institute (Kussler, 1979) lists practically the full spectrum of approaches to wetlands definition. Such definitions can be based on: (1) tidal action, (2) inundation by surface waters or flood-

waters, (3) vegetation, (4) soils, and (5) horizontal distance from the high water mark. Since the tidal influence on coastal wetlands is not pertinent to this study the focus shall be on the criteria of water fluctuation and vegetation. It should be noted that while the matching of soil to wetland type is still extensively used, it has not proven completely reliable. Soils are laid down over centuries and can quite accurately reflect the existence of a wetland that has remained such for a considerable amount of time. However, should changes in climate, geological shifts, or any other mechanism change the water regime in an area to the extent that it becomes a wetland in form and function, such rapid changes may not be evident in the underlying soils. Hence, soils may be regarded as indicators of limited usefulness.

The following are some definitions of wetlands that rely heavily on the criteria of water regime and hydroperiod.

> A wetland is recognized as a site where the water table is near, at, or above the surface of the ground for at least some portion of the year.
>
> (Goodwin and Niering, 1975)

> ...wetlands as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support—and that under normal circumstances do support—a prevalence of vegetation typically adapted for life in saturated soil conditions.
>
> (President Carter, Executive Order, May 1977, as per U.S. Army Corps of Engineers)

A 1978 interagency report, coordinated by The Council on Environmental Quality (Horwitz, 1978), defined a wetland as "land in which water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface."

> A wetland means areas that are inundated by surface or ground water with frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas such as sloughs, potholes, wet

> meadows, river overflows, mud flats and natural ponds.
>
> (Draft Form as yet unapproved by the St. Johns Water Mgmt. District)

> ...a wetland...(is described as)...land where water is the dominant factor determining the nature of the development and the types of plant and animal communities living in the soil and on its surface.... the single feature that wetlands share is soil that, at least periodically, is saturated with water.
>
> (Cowardin et al., 1977)

> Wetlands are defined as those areas...where there is seasonal or intermittent inundation and saturation with periods of dry exposed soil and which is predominantly vegetated.
>
> (Proposed revisions to Florida State Statutes Chap. 17-3,4 and 6, 3/7/80)

> ...a term used to designate areas where water permanently covers the land or saturates the soil sufficiently to encourage the growth of moist-soil vegetation. These include marshes, sloughs, swamps, bogs, wet meadows, potholes, ponds, lakes, reservoirs, streams and overflow lands.
>
> (Hopper, 1968)

It should be noted that the inclusion of the terms "ponds, lakes, reservoirs" in the final citation would not be accepted in most definitions.

Another approach to wetlands is to describe them as biotic communities, which are defined as follows:

> A community is a naturally occurring, mutually sustaining, and interacting assemblage of plants and animals living in the same environment and fixing, utilizing, and transferring energy in some manner.
>
> (Smith, 1980)

Whereas such abiotic factors as hydroperiod may be crucial in the interaction of the constituent species of the community, these abiotic factors are used in classification at a higher level, namely, ecosystems. Communities are classified based on biotic or species composition, though the variation in species composition as one proceeds from the aquatic

environment to the terrestrial environment may be just as subtle as the changes in soil moisture saturation; both may form near parallel continua. Within the biotic component, plants are far more predictable than animals in the way that their habitat conforms to the contour of a wetland community, and it is the shared characteristics of flora that are decisive in creating the abstract classes by which wetlands are recognized.

While he notes that there is no single correct way to classify a community type, Whittaker (1975) does list some of the criteria that have been used in the classification of communities: (1) Growth-Form Dominance, (2) Species Dominance, (3) Spatial Structure, and (4) Species Composition.

One of the earliest approaches developed (Humboldt, 1805; Grisebach, 1838; Warming, 1888; Whittaker, 1962) was the "physiognomic" approach. A community is classified on the basis of which growth form is dominant and either occupies the highest level or stratum in the community or covers the greatest area with its structure. Examples of growth forms used may be leaf shape, plant size, plant structure, and evergreenness. This effort to characterize without referring to a specific species type is an attempt to emphasize what are believed to be the more fundamental structural and functional processes that may be obscured by the sometimes awesome numbers and mixtures of species types, which can lead to subjective errors as to which plant species are important. To be more objective in this light, quantitative and numerical techniques such as the measuring of the relative distributional similarity of species or the relative similarity of samples have been developed. The usefulness of the latter techniques and their tendency to require arbitrary choices is still open to debate.

Another approach to community classification is the "floristic composition" approach, developed in part by Braun-Blanquet (1951). This scheme utilizes the formal classification of the entire plant species component of a community as well as species distribution in order to determine units of classification, which, thereby, express their relationship to the environment. The underlying assumption is that some species in a community are more sensitive indicators of plant-soil relationships that are significant than others. These "diagnostic" species are used to organize communities into a hierarchical classification that is parallel

in form to schemes used for the taxonomic classification of individual organisms (Whittaker, 1975).

Another avenue employed in community classification is to examine the dominant species at each stratum in the community not merely the uppermost. Community types defined by stratal dominance are termed "sociations." This "synusial" method classifies each stratum or life-form separately from the others. Life forms, normally considered as trees, shrubs, or emergents, can also be characterizations of plants based on the position and protection of the buds. Raunkiere (1935) divided plants into five groups: (1) phanerophytes (trees, shrubs) where the buds are least protected and are at least 25 cm from the ground, (2) camaephytes (grasses, sedges) buds are 0—25 cm from the ground, (3) hemecryptophytes, where the buds are just beneath the soil, (4) geophytes, where the buds are deeply buried, and (5) therophytes, which depend only on seeds and are thus best protected from cold, heat, and other environmental extremes.

One initially plausible and widely used approach is the classification of communities by their dominant species. However, the many varieties of species that may dominate in but a few segments of a community make the decision as to which species is dominant quite subjective and, perhaps, not very meaningful unless dominance is clearly shown.

Overall one could say that the concept of wetlands embraces the following characteristics:

> (1) Elevation of the water table with respect to the ground surface;
>
> (2) Duration of surface water (inundation);
>
> (3) Soil types that form under permanently or temporarily saturated conditions;
>
> (4) Various kinds of plants and animals that have adapted to life in a "wet" environment.
>
> (Cowardin et al., 1977)

Wetland Classification Schemes

National Level

The Fish and Wildlife Service of the U.S. Department of the Interior has developed a hierarchial classification scheme that provides a chain of ever narrower characteristics for the identification and description of any one particular wetland, which should fall into one on the following five categories:

(1) areas with hydrophytes and hydric soils, such as those commonly known as marshes, swamps, and bogs;

(2) areas without hydrophytes but with hydric soils—for example, flats where drastic fluctuation in water level, wave action, turbidity or high concentration of salts may prevent the growth of hydrophytes;

(3) areas with hydrophytes but nonhydric soils, such as the margins of impoundments or excavations where hydrophytes have become established but hydric soils have not yet developed;

(4) areas without soils but with hydrophytes such as the seaweed-covered portion of rocky shores; and

(5) wetlands without soil and without hydrophytes, such as gravel beaches or rocky shores without vegetation.

(Cowardin et al., 1979)

From broad to narrow the elements of the hierarchial chain are Systems, Subsystems, Classes, Subclasses, Dominance Types, and Modifiers.

Systems are defined as a complex of wetlands and deep water habitats that share the influence of similar hydrologic, geomorphologic, chemical or biological factors. Five systems are used: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The boundaries of said systems are still controversial, and it is safest to assume that in any particular case the boundary of the system is defined by the practical need of the situation.

The Marine system consists of the open ocean overlying the continental shelf and its associated high-energy coastline. The Estuarine system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semienclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The Riverine system

includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens; and (2) habitats with water containing ocean-derived salts in excess of 0.5 parts/thousand. The Lacustrine system includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; and (3) total area exceeds 8 ha (20 acres). The Palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 50 parts/thousand (Cowardin, 1979).

Subsystems are subdivisions of wetlands based usually on some characteristic of water level fluctuation in the area. Both the Marine and Estuarine systems are divided into tidal and nontidal subsystems, and the Lacustrine system is divided into littoral and limnetic subsystems.

The next lower taxonomic unit, the Class, describes the general appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate (features recognized without the aid of detailed environmental measurements). If the vegetation covers less than 30% of the substrate area, then physiography and substrate composition are the principal features used to distinguish classes. If vegetation covers 30% or more of the substrate then the class is distinguished on the basis of life form of the plants that constitute the uppermost layer. Life forms (trees, shrubs, emergents, emergent mosses, and lichens) are used because they are relatively easy to distinguish.

Finer differences of life form are distinguished at the Subclass level. For example, five kinds of forested wetland might be recognized (1) broad-leaved deciduous, (2) needle-leaved deciduous, (3) broad-leaved evergreen, (4) needle-leaved evergreen, and (5) dead.

The Dominance Type is found further down this taxonomic key and is determined on the basis of (1) the dominant plant species, (2) the dominant sedentary or sessile animal species, and (3) dominant plant and animal species. The choice among these options is directed by the basis of the Subclass level. If the Subclass is based on life form, the Dominance Type is named after the dominant species or the mix of codominant species in

the same layer of vegetation used to determine the Subclass. Specifically, an Emergent Wetland (Subclass = emergent) with approximately equal areal cover of Typha latifolia and Scirpus acutus would be called a Typha latifolia-Scirpus acutus Dominance Type. The designation for a Dominance Type comes from the predominant plant or the predominant sedentary or sessile macroinvertebrate species (regardless of life form) when the subclass is based on the substrate material.

A full description of a wetland or deepwater habitat usually requires the use of a Modifier at the Class level or lower in the classification hierarchy. A water regime modifier can be used to describe the timing and duration of flooding. An inland wetland, for example can have the following types of flooding: "permanently," "semipermanently," "seasonally," "temporarily," "intermittently," and "artificially." "Saturated" is another water modifier used. Water chemistry modifiers may also be applied on the basis of salinity or pH. Soil modifiers are used to distinguish "mineral" and "organic" soils that are further broken down using the soil taxonomy criteria developed by the Soil Survey Staff of the U.S. Soil Conservation Service (1975).

The U.S Fish and Wildlife classification scheme had the kind of wide ranging and unifying purpose one would expect from a federal institution. As the document's abstract states:

> This classification, to be used in a new inventory of wetlands and deepwater habitats of the United States, is intended to describe ecological taxa, arrange them in a system useful to resource managers, furnish units for mapping, and provide uniformity of concepts and terms.

Another attempt at a national classification scheme was developed by the United States Geological Survey (USGS) for the most part as a mapping tool to supplement and aid ground based identification of wetlands. First published in 1972, this system relied on remote-sensor data and characterized wetlands either as "vegetated non-forested" or "bare non-forested"; forested wetlands were subsumed under the category of forest lands. The revision of this system in 1976 recognized both forested and non-forested wetlands on the basis of dominance of woody plants or the dominance of herbaceous vegetation, respectively. Nonvegetated wetlands fell into the latter category.

State Level

Several classification schemes have been developed for use in Florida. Monk (1968) classified communities by forest vegetation types. He states, "seven major forest vegetation types exist in North Central Florida: (1) Climax Southern Mixed Hardwood; (2) Sand Pine Scrub; (3) Sand Hills; (4) Pine Flatwoods; (5) Cypress Swamps; (6) Bayheads; and (7) Mixed Hardwood Swamps." Of these, three are used for wetlands classification--Mixed Hardwood Swamps, Bayheads, and Cypress Swamps.

In a classification scheme developed by Craig (1981), wetland areas were broken down into 11 categories. These include (1) Sloughs; (2) Freshwater Marsh and Ponds; (3) Pitcher Plant Bogs; (4) Shrub Bogs; (5) Swamp Hardwoods; (6) Cypress Swamps; (7) Cabbage Palm Hammocks; (8) Wetland Hardwood Hammocks; (9) Cutthroat Seeps; (10) Cabbage Palm Flatwoods; and (11) Bottomland Hardwoods.

Laessle (1942) used associations for classifying vegetation types. He defines association as, "a characteristic combination of plant species which is repeated in numerous stands with but little if any change in the vigor and proportions of its principle components."

Laessle's classification scheme for wetlands included:

I. Hydric Communities Dominated by Trees
    1. Bayhead (Gordonia-Tamala pubeslens-Magnolia virginiana Association)
    2. River Swamp (Taxodium distichum-Nyssa biflora Association)

II. Herbaceous Aquatic Communities Bordering the River and Its Tidal Tributaries
    1. Submerged Associations (Naias-Ceratophyllum Association and Vallisneria Association)
    2. Floating Associations (Piaropus Association and Pistia-Salvina Association)
    3. Emergent Vegetation

A report developed in part by the Northeast Regional Planning Council classifies several communities associated with wetland areas. These include Swamp Hammock, Hardwood Swamp, Riverine Cypress, Cypress Pond, Bayhead and Bog, Wet Prairie, Freshwater Marsh (shallow and deep), and Tidal Flat (Jacksonville Area Planning Board, 1977).

Under the aegis of the Florida Department of Administration, the State Division of Planning, and the Bureau of Comprehensive Planning a committee was created to increase the efficiency of land use planning by coordinating the collection, interpretation, and other use of land resource data. The result was the Florida Land Use and Cover Classification System (1976). Inventory of state land resources would be achieved through the coordination of remote-sensing techniques (including aerial photography) and ground-based observations. Computer storage of such vast quantities of information could permit organization of the data in a variety of ways that would expedite management decisions. Within this scheme, information from various sensors is organized into various levels of classification ranging from Level I to Level IV. The levels are summarized as follows in the technical report describing the classification system:

Level I classification uses satellite imagery with very little supplemental information. The mapping is usually at a ratio of 1:1,000,000. At this ratio only a general classification based on major differences in land cover can be made.

Level II classifications are based on high altitude and satellite imagery combined with topographic maps. The mapping is normally at a ratio of 1:100,000 and transferable to a 1:24,000 ratio.

Level III classifications are based on medium altitude remote sensing at a scale of less than 1:24,000 combined with detailed topographic maps and substantial amounts of supplemental information, i.e., field observation.

Level IV uses low altitude imagery with most of the information being derived from supplemental sources. (This level is not included within this document.)

600 Wetlands: (Level I)

Forested wetlands are areas that are subject to permanent or prolonged periods of inundation or saturation and/or exhibit vegetative communities characteristic of this hydroperiod.

610 WETLAND-CONIFEROUS FOREST: (Level II). These wetlands have a tree-crown areal density of 10% or more (crown closure requirement), have a dominant tree crown of the coniferous species, and are a result of natural seeding.

611 Cypress: (Level III)

These forested areas are dominated by a crown closure in either bald cypress or pond cypress. Principal associates are tupelo, gum, and maple.

612 Pond Pine: (Level III)

These are forested areas dominated by a crown closure in pond pine. Pond pine dominates wetter flats with low pH, often associated with the inland reaches of marshes or muck swamps.

620 WETLAND-HARDWOOD FOREST: (Level II). These wetlands have a dominant tree crown of the hardwood species meeting the crown closure requirement and are a result of natural seeding.

621 Freshwater Swamps: (Level III)

River, creek, and lake overflow areas. These communities will have predominantly one or more of the following species:

Pond cypress, Taxodium ascendens
River cypress, Taxodium distichum
Red Maple, Acer rubrum
River birch, Betula nigra
Black willow, Salix nigra
Coastal plain willow, Salix caroliniana
Blackgum, Nyssa biflora
Ogeechee tupelo, Nyssa ogeeche
Water hickory, Carya aquatica
Water ash, Fraxinus caroliniana
Buttonbush, Cephalanthus occidentalis

Bogs and bayheads. These communities will have predominantly one or more of the following species:

Pond pine, Pinus serotina
Loblolly bay, Gordonia lasianthus
Sweet bay, Magnolia virginiana
Swampbay, Persea palustris
Titi, Cyrilla racemiflora
Sphagnum moss, Sphagnum sp.

Inland ponds and sloughs. These communities will have predominantly one or more of the following species:

Pond cypress, Taxodium ascendens
Black gum, Nyssa biflora
Water tupelo, Nyssa aquatica
Titi, Cyrilla racemiflora, C. parviflora
Black titi, Cliftonia monophylla
Willow, Salix sp.
Primrose willow, Ludwigia peruviana
Pond apple, Annona glabra

630 WETLAND-MIXED FOREST: (Level II). Includes all wet forest areas in which neither coniferous nor hardwood species dominate. When more than one-third intermixture of either species occurs, the specified

classification is changed to mixed. Where the intermixture is less than one-third, it is classified as the dominant type, whether wetland coniferous or wetland hardwood.

631 Mixed Forest: (Level III)

These forested areas are a mixture of coniferous and hardwood wetlands where neither tree type dominates. When more than one-third intermixture occurs, the mixed classification should apply.

Vegetative Communities for Vegetated Non-Forested Wetlands

640 WETLAND-VEGETATED NON-FORESTED: (Level II). These lands are found in seasonally flooded basins, meadows, and marshes. Wetlands are usually confined to relatively level areas. When forest crown cover is less than the threshold for wetland forest or is non-woody, it will be included in this category. Sawgrass, Cattail, and Wet Prairie are predominant communities in freshwater marshes, while Spartina and Needlerush are the predominant salt marsh communities.

641 Freshwater Marsh: (Level III)

These communities will have predominantly one or more of the following species:

Sawgrass Marsh

Sawgrass, Cladium jamaicensis
Arrowhead, Sagittaria sp.
Maidencane, Panicum hemitomon
Cattail, Typha domingensis, T. latifolia, T. angustifolia
Pickerel weed, Pontederia lanceolata, P. cordata
Buttonbush, Cephalanthus occidentalis
Spartina, Spartina bakeri
Switchgrass, Panicum virgatum

Cattail-Bulrush-Maidencane Marsh. These communities have predominantly one or more of the following species:

Cattail, Typha latifolia, T. domingensis, T. angustifolia
Bulrush, Scirpus americanus, S. validus, S. robustus
Maidencane, Panicum hemitomon
Spartina, Spartina bakeri
Pickerel weed, Pontederia lanceolata, P. cordata
Water Lily, Nymphaea sp.
Spatterdock, Nuphar sp.
Buttonbush, Cephalanthus occidentalis
Bladderwort, Utricularia sp.
Needlerush, Juncus effusus
Common reed, Phragmites communis (australis)

Wet Prairies. These communities will have predominantly one or more of the following species:

Maidencane, Panicum hemitomon
Cordgrasses, Spartina bakeri, S. patens
Spikerushes, Eleocharis sp.
Beak rushes, Rhynchospora sp.
St. Johns wort, Hypericum sp.
Spiderlily, Hymenocallis palmeri
Swamplily, Crinum americanum
Yellow-eyed grass, Xeris ambigua
Whitetop sedge, Dichromena colorata

A wetlands classification scheme was developed by the U.S. Army Corps on Engineers (USACOE) primarily to help dilineate the boundaries of wetlands subject to federal jurisdiction. Specifically a series of eight preliminary guides to major regions of wetland communities and dominant plant associations was produced to aid USACOE regulatory personnel to recognize the critical boundaries of wetlands subject to dredge and fill permit regulation under Section 404 of Public Law 92-500 (Federal Water Pollution Control Act Amendments of 1972).

One particular guidebook, Preliminary Guide to Wetlands of Peninsular Florida, serves as a classification key for wetlands south of St. Augustine. In addition to the key, each of eight wetland types (Saltwater Aquatic, Saltwater Coastal Flat, Saltwater Marsh, Saltwater Swamp, Freshwater Aquatic, Freshwater Flat, Freshwater Marsh and Freshwater Swamp) are dealt with in detail. A brief description of each of the four freshwater wetlands follows:

a. Freshwater aquatic. Wetlands that are usually dominated by free-floating or rooted aquatic herbs and are semipermanently or permanently flooded by fresh water (e.g., floating duckweed mats).

b. Freshwater flat. Wetlands that have 25% or less vegetative cover and are occasionally or regularly flooded by fresh water (e.g., mudflats).

c. Freshwater marsh. Wetlands that have more than 25% vegetative cover of herbaceous plants but 40% or less cover by woody plants that are occasionally or regularly flooded by fresh water (e.g., cattail marsh).

d. Freshwater swamp. Wetlands that have more than 40% cover by woody plants and are occasionally or regularly flooded by fresh water (e.g., cypress swamps).

In addition to a short general description of each wetland based on vegetative cover and water regime the abundance and normal locations of the wetland within the region are described. Growth forms and physiognomy are

described briefly and then shown pictorially in a simplified floristic profile that contrasts the distribution of "typical" species (those which generally occur as dominants) and the distribution of "transitional" species (those generally associated with transition zones). "Associated" species (those which commonly occur but not in sufficient abundance to be considered dominants) are also listed (both scientific and common names) as well as described in their relationships with dominant species. Environmental conditions, usually the characteristics of the substrate, hydroperiod, water regime, and water pH, are described in order to highlight the cluster of conditions that are critical to the distribution of dominant species.

Classification of Wetlands of Seminole County

It is important to note that there are any number of wetlands classification schemes being used by different agencies of government and individuals. Many are very broad systems of classification that were designed for the purpose of classifying all types of wetlands within the continental United States and thus have little value when applied to a local area. many are designed to classify wetlands by using only one parameter such as hydroperiod, and thus are lacking when many different vegetative communities having the same hydroperiod are classified.

The following set of wetland descriptions represents a compilation of descriptions and characteristics from several sources including U.S. Fish and Wildlife, Army Corps of Engineers, the Florida Land Use and Cover Classification System, and the Soil Conservation Service. The classification of wetland communities is not an exact science and consequently the compilation of definitions corresponding to the classes of wetlands listed in this document are derived from a number of classification systems. Several field trips served to refine the descriptions, especially by dominant species, of the wetland communities found in Seminole County.

The classification system reflects the availability of data on parameters of community structure and function. Since those physical and biological functions of each wetland form the basis for the ranking of wetlands and determination of compatibility of development activity in and adjacent to wetlands, it is imperative that the classification scheme be

tailored to measured parameters of community structure and function. Thus, while it is possible to develop a classification scheme that may have as many as 30 wetland types, the data on measured parameters for each of the 30 wetlands does not exist; consequently, such a refined scheme has little utility.

It should be emphasized that the descriptions refer to fairly broad classes that include a variety of specific wetlands sharing general characteristics such as soil type, hydroperiod, storage capacity, and life form richness. Cabbage Palm Hammocks are included in the class of Hydric Hammocks; Bottomland Hardwood Associations, Cypress Swamps (strands), and Swamp Hardwoods are included in the Mixed Hardwood Swamp category. Bogs, Shrub Bogs, and Shrub Swamps are varieties of Bayheads. The Shallow Marsh is comprised of no less than eight marshes and slough types dependent on dominant species. In addition, most wetland areas are vegetative mosaics due to the small variations in elevation and soil type found in any region. Hence it is not unlikely to find combinations and patches of wetlands of one type interspersed with wetlands of other types, i.e., Bayheads and Cypress Domes scattered throughout a larger Wet Prairie.

The classification scheme that follows is derived from schemes developed at the Center for Wetlands for mapping of vegetative communities of Florida and was later adopted by the State of Florida (with some minor modifications). It is based upon dominant species, hydroperiod, soils, and water regime, thus making it a true representation of the structure and function of each community rather than a description of one or two characteristics. Following the name of each community type, a number in parentheses (XXX) is given. This number relates to the State of Florida Classification Scheme (see the Florida Land use and Cover Classification System [1976]).

Deep Marsh (641)

Deep marshes are wetlands that are usually dominated by free-floating or rooted aquatic herbs, are usually permanently flooded by fresh water, and are found along rivers, lakes, and water courses.

The deep marshes and ponds serve as a filter system for rivers and lakes. This protects the rivers and lakes from eutrophication and provides the marsh with nutrients that are used in the vegetative growth.

Marshes will retain water during drought, and large marshes also help slow down water flows at flood times.

Soils commonly associated with this community are nearly level and very poorly drained with coarse-textured or organic surfaces underlain by clay or sand. The soil is covered with 3–6 ft of water during the growing season. No Sphagnum is present, instead substratum is soft muck, rich in decaying organic matter mixed with mineral soil and often silty from inland (river) deposits.

Plants characterizing this community include:

Grasses and Grasslike: Cutgrass, Leersia hexandra; Watergrass, Echinochloa sp.; Maidencane, Panicum hemitomon; Cattail, Typha sp.; Bulrushes, Scirpus sp.; Rush, Juncus sp.

Rooted Aquatic Herbs: Tape grass, Vallisneria americana; Waterlilies, Nymphaea odorata; Golden Club, Orontium aquaticum; Spatterdock, Nuphar luteum; Coontail, Ceratophyllum demersum; Hydrilla, Hydrilla verticullata; Water milfoil, Myriophyllum sp.

Free-Floating Herbs: Water hyacinth, Eichhornia crassipes; Water-lettuce, Pistia stratioides; Frog's-bit, Limnobium spongia; Duckweeds, Lemna sp. and Spirodela sp.

Deep marshes and ponds provide excellent habitats for many wildlife species. Numerous birds and waterfowl use this community for wintering or year-round. Animals that commonly occur in this community are

Mammals: Otter, raccoon, marsh rabbit, white-tailed deer, Florida water rat, feral hog.

Birds: Herons, egrets, bitterns, ibis, sandhill cranes, rails, limpkins, gallinules, snipe, killdeer, Florida duck, red-winged blackbirds, marsh hawk, red-shouldered hawk, swallow-tailed kite.

Reptiles: Turtles (mud turtle, red-bellied turtle, snapping turtle, chicken turtle), snakes (mud, water, swamp, brown, cottonmouth, ribbon), alligator.

Amphibians: Sirens, frogs (cricket, pig, leopard).

Shallow Marsh (641)

The shallow freshwater marsh is a herbaceous community adapted to prolonged periods of flooding. Many shallow marshes are dominated by one or several species. The shallow marsh appears as an open expanse of grasses, sedges, and rushes, and other herbaceous plants in an area where the soil is usually saturated or covered with surface water for 2 or more months during the year.

The freshwater marshes serve as filter systems for rivers and lakes. This protects the rivers and lakes from eutrophication and provides the marsh with nutrients that are used in the vegetative growth. Marshes will retain water during drought. Large marshes also help slow down water flow at flood times. Fire and water level fluctuation are the major factors affecting these wetland areas. Variations in the water patterns in a marsh will change the plant diversity and productivity. Marsh systems will eventually move to a woody community with exclusion of fire or permanent and lower water level changes.

Soils commonly associated with this community are nearly level and very poorly drained with coarse-textured or organic surfaces underlain by clay or sand. The soil is usually saturated during the growing season, and is often covered with 6 inches or more of water. No Sphagnum is present. Substratum is soft muck, rich in decaying organic matter mixed with mineral soil and often silty from inland (river) deposits.

Within Florida, eight major different types of freshwater marshes have been described. Any one marsh may be composed of sections of different major types. There is also intergrading of these types. The types are

> Flag marshes dominated by pickerelweed, Sawgrass marshes, Arrowhead marshes, Fire flag and other non-grass herbs marsh, Cattail marsh, Spike-rush marsh, Bulrush marsh, and Maidencane marsh.

Plants that characterize this community (depending on type of marsh) include:

> Grasses and Grasslikes: Blue maidencane, Amphicarpum muhlenbergianum; Bottlebrush threeawn, Aristida spiciformis; Cutgrass, Leersia hexandra; Maidencane, Panicum hemitomon; Wild millet, Echinocloa spp.; Common reed, Phragmites spp.; Cordgrass, Spartina bakeri;

Carex sedges, Carex spp.; Sawgrass, Cladium jamaicense; Flat sedge, Cyperus spp.; Umbrella grass, Fuirena spp.; Bulrushes, Scirpus spp.; Rush, Juncus spp.; Spike rushes, Eleocharis spp.; Beak rushes, Rhychospora spp.; Cattail, Typha spp.

Herbaceous Plants: Arrowhead, Saggitaria spp.; Blue flag, Iris savannarum; Fire flag, Thalia geniculata; Pickerelweed, Pontederia cordata; Smartweed, Polygonum spp.; Pennywort, Hydrocotle spp.

The freshwater marshes provide excellent habitats for many wildlife species. Numerous birds and waterfowl use this community for wintering or year-round. Animals that commonly occur in this community are

Mammals: Raccoon, marsh rabbit, white-tailed deer, Florida water rat.

Birds: Herons, egrets, bitterns, ibis, sandhill cranes, rails, limpkins, gallinules, snipe, killdeer, mottled duck, red-winged blackbirds, marsh hawk, red-shouldered hawk, swallow-tailed kite.

Reptiles: Turtles (Eastern box turtle, red-bellied turtle, chicken turtle), snakes (black racer, eastern diamond back, Florida cottonmouth).

Amphibians: Frogs (leopard, littlegrass, green tree frog), toads.

Wet Prairies (641)

The wet prairie, sometimes called freshwater meadow, appears as an open expanse of grasses, sedges, rushes, and herbs in varying proportions, and may also contain scattered shrubs and small trees. The general appearance of the prairie is that of an overgrown field. The wet prairie occurs in areas of low topographic relief and receives water from rainfall and from runoff from higher, nearby areas. It is regularly flooded by freshwater from 0.5 to 2 feet and remains wet to moist throughout much of the year.

Soils are commonly mineral and organic alluvial and are nearly level and poorly drained with coarse-textured surfaces underlain by clay or sand. There is often a thick organic layer that has high water-holding capacity. The soil helps slow down water flows, and thereby increases water quantity and improves water quality. Fire and artificial water

level fluctuations are the major factors affecting these areas. Variations in the natural sequence of either event will change the slough's diversity and productivity. With the exclusion of fire or permanent water level reduction, the plant succession will be to a wooded community.

Grasses are the most common plants found in sloughs. Sedges and rushes also occur with scattered shrubs in some locations. Plants that characterize this community are

Shrubs: St. John's wort, Hypericum fasciculatum; Primrose willow, Ludwigia spp.; Elderberry, Sambucus simpsonii.

Grasses and Grasslikes: Blue maidencane, Amphicarpum muhlenbergianum; Bluejoint panicum, Panicum tenerum; Forked panicum, Panicum dichotomum; Low panicum, Panicum, spp.; Sand cordgrass, Spartina bakeri; Beak rushes, Rhynchospora; Soft rush, Juncus effusus; Sloughgrass, Scleria spp.; spike rush, Eleocharis cellulosa; sedge, Cyperus spp.

Herbaceous: Pickerelweed, Pontederia cordata; Sundew, Drosera spp.; Marsh pink, Sabatia spp.; Meadowbeauty, Rhexia spp.; Milkwort, Polygala spp.; Yellow-eyed grass, Xyris spp.; spiderlily, Hymenocallis spp.; swamplily, Crinum americanum.

This community is productive in regards to food for bobwhite quail, deer, and wading birds. Its low growing vegetative growth provides poor cover for most wildlife species, but this is often offset by the "edge effect" of this community when it is located with flatwoods and hammocks.

Mammals: Bobcat, deer, gray fox, marsh rabbit, opossum, cotton rat, raccoon.

Birds: Bobwhite quail, cranes, egrets, herons, ibis, meadowlark, red-shouldered hawks, snipe.

Reptiles: Cottonmouth moccasin, eastern diamondback rattlesnake, pigmy rattlesnake, ringneck snake, yellow rat snake.

Amphibians: Narrow-mouthed toad, green tree frog, greater and lesser sirens.

Cypress Domes (621)

The cypress dome (sometimes called cypress head) is a still-water wetland forest occurring in areas where water is present for much of the

year. This community generally occurs in depressions in upland areas of little topographic relief such as the pine flatwoods. It seldom occurs in the floodplains. The dominant specie is pond cypress (Taxodium ascendens), with swamp blackgum (Nyssa sylvatica var. biflora) also often found. The largest cypress trees generally occupy the zone flooded most often. Trees become progressively smaller with distance from this zone. In shallower areas around the edges, competition with other species occurs, the likelihood of fire is greater, and there are a large number of seedlings. Smaller cypress ponds tend to be more regular in shape; larger ponds tend to be asymmetrical and may occur in strands.

This community is poorly drained and water is at or above ground level a good portion of the year. Cypress domes provide water storage areas by holding excess water and slowly releasing it into the water table. Water quality is enhanced by the community, which functions as a waste treatment plant by absorbing nutrients from the water. Fire is a stress factor, primarily on the drier portions, but water is important in all areas. Water enters the cypress dome directly from rainfall or run-off. The water level is highest in summer and peak productivity occurs in early spring. Standing water will result in slow tree growth especially if it occurs during the growing season. Natural regeneration of cypress requires fluctuation of the water. Flooding during the dry season will prevent the cypress trees from reproducing. Water must be available to germinate the seeds because it provides natural stratification. However, when the seedling starts to grow, its top must be maintained above water. Both drastic changes in the water level and a stabilized water level may change the plant community. If the water level is lowered the cypress-gum swamp can succeed to bay forest.

Soils commonly associated with this community are nearly level or depressional, poorly drained and have loamy subsoils and sandy surfaces. Taxodium ascendens is found in acidic soils.

Plants that characterize this community are

Trees: Pond cypress, Taxodium ascendens; Swamp blackgum, Nyssa sylvatica var. biflora.

Shrubs: Common buttonbush, Cephalanthus occidentalis; Southern wax-myrtle, Myrica cerifera.

Vines: Laurel greenbrier, Smilax laurifolia.

Grasses and Grasslikes: Maidencane, Panicum hemitomon; Sawgrass, Cladium jamaicense.

Herbaceous: Cinnamon fern, Osmunda cinnamomea; Fall-flowering ixia, Nemastylis floridana; Pickerel weed, Pontederia cordata; Royal fern, Osmunda regalis; Spanish moss, Tillandsia usneoides; Stiff-leafed wild pine, Tillandsia utriculata; Sphagnum moss, Sphagnum spp.

This community is very important for wildlife refuge areas and as a turkey roosting area. It is well suited for waterfowl and wading birds, and aquatic animals may be found in large numbers. The permanent residents of cypress domes are relatively few, but much of the wildlife of the flatwoods is dependent on these ponds for breeding purposes. Animals frequently found in cypress domes include:

Mammals: Cotton mice, raccoons, opposum, bats.

Birds: Woodpeckers, towhees, catbirds, yellow-throats, Carolina wrens, Cardinals, kingbrokers, bitterns, herons, ibises, wood-storks, common egrets, warblers and sparrows.

Reptiles: Green anole, Florida cottonmouth.

Amphibians: Lesser siren, frogs (green tree frog, squirrel tree frog, Southern chorus, leopard).

Hydric Hammocks (630)

Areas dominated by broad-leaved trees (mixed deciduous and evergreen) growing on soils that are poorly drained, but not subject to seasonal or considered hydric or low hammocks. Such hammocks are generally restricted to areas between the river swamp and the edge of the flatwoods. Hydric hammocks often occupy soils that are nearly saturated with moisture due to seepage of groundwater from higher areas. Topography is low and nearly level. These hammocks are not flooded for as long a period of time as are associated mixed hardwood swamps. The mixed hardwood swamp community is found within depressional areas of the hydric hammock.

Cabbage palm hammocks are included in this category because of hydroperiod and soil similarities. This community occurs on nearly level land. Water movement is very gradual to and through the natural drainageways, swamps, ponds, and marshes associated with this community. During the rainy season, usually June through September, the water table is on or

near the soil surface. The natural vegetation of cabbage palm hammocks is typically scattered pine and cabbage palm with an understory of palmetto and grasses.

Numerous soil types occur within hydric hammocks. The soils are most often nearly level, poorly to somewhat poorly drained, and coarse textured to fine textured in the subsoil. Some parts of the subsoil are calcareous or neutral to moderately alkaline. The surface and subsurface layers are coarse textured. The soil is rich in organic matter and consequently has greater water-holding capacity than the soil of the xeric hammocks. Soils receive, in addition to direct rainfall, seepage and runoff from higher areas and have a very high water table.

This community supports a luxuriant growth of vegetation with a diversity of species. Although supporting plants that are found in both drier and wetter sites, this community has definite flora characteristics. Slight differences in plant composition occur depending upon water relationships. The slightly wetter sites contain a higher percentage of grasses and herbaceous plants. Although these differences are recognized, they are not significant enough to delineate as separate communities. Plants that characterize this community are

Trees: Cabbage palm, Sabal palmetto; Popash, Fraxinus caroliniana; Laurel oak, Quercus laurifolia; Live oak, Quercus virginiana; Red bay, Persea borbonia; Red cedar, Juniperus siliciola; Red maple, Acer rubrum; Sweetbay, Magnolia virginiana; Tulip-poplar, Liriodendron tulipifera; Sweetgum, Liquidambar styraciflua; Water oak, Quercus nigra; Southern magnolia, Magnolia grandiflora; Slash pine, Pinus elliottii; Bluebeech, Carpinus caroliniana.

Shrubs: Wax-myrtle, Myrica cerifera; Sawpalmetto, Serenoa repens; Gallberry, Ilex glabra.

Vines: Poison ivy, Rhus radicans; Virginia creeper, Parthenocissus quinquefolia; Wild grape, Vitis spp.; Yellow jassamine, Gelsemium sempervirens; Smilax laurifolia; Trampet creeper, Campsis radicans.

Grasses and Grasslike: Panicum spp.

Herbaceous Plants: Cinnamon fern, Osmunda cinnamomea; Royal fern, Osmunda regalis; Spanish moss, Tillandsia usneoides.

Hydric hammocks are one of the most productive and diverse wildlife habitats. This community is good for reptiles and amphibians, being moist most of the year. Cabbage palm hammocks offer good food and cover to many species of wildlife. Food value comes from palm and palmetto, fruit, pine mast, and acorns from associated oaks. Legumes and grasses furnish good food sources to quail and other small birds. Wildlife species include:

Mammals: Bobcat, deer, black bear, oppossum, gray squirrel and various species of mice and rats.

Birds: Hawks, turkey, owls, woodpeckers and numerous songbirds.

Reptiles: Green anole, Southeastern Five-line skink, Florida cottonmouth, Dusky pigmy rattlesnake, Eastern coral snake, and other snakes.

Amphibians: Several species of salamanders, frogs, and toads.

Bayhead (621)

The term "bayhead" designates an association dominated by broad-leaved evergreen trees that grow in very acid, saturated soils that are subject to periodic flooding. Bayheads characteristically occur in depressions in the flatwoods or as marginal growths about flatwoods ponds that are not subject to excessive variations in water level. This community occurs on nearly level to gently sloping land or hillsides or in depressed areas. The shrubs have many stems and thick foliage and often appear impenetrable. It is common to find this type associated with swamps bordering streams. They are peat-forming communities.

Bayheads are usually maintained by seepage from higher land. Drainage of the bog or immediately upslope will strongly modify or destroy these environments. Seepage water keeps them almost constantly wet, and they protect adjoining swamps from fire during dry periods. They act as small reservoirs by receiving seepage water and metering it out in a small but steady supply. Where a wide fluctuation of water level occurs, fire becomes a limiting factor by killing the bayhead type of vegetation during periods of low water. It is suspected that only small amounts of water are evaporated or transpired from this community. During dry periods lightning may start fires that will consume peat to the depth of the water table.

Soils commonly associated with this community are nearly level to gently sloping, acid, somewhat poorly to very poorly drained, sandy or loamy soil adjacent to drainageways that are fed by seepage water. The soil is nearly always moist, with the water table at or near the surface. Soil moisture during nonstorm periods is provided by groundwater seepage, usually from higher areas.

Plants that characterize this community are

Trees: Redbay, Persea borbonia; Sweetbay, Magnolia virginiana; loblolly bay, Gordonia lasianthus; blackgum, Nyssa sylvatica var. biflora; Pond cypress, Taxodium ascendens; red maple, Acer rubrum; and pond and slash pine, Pinus serotina and P. elliottii.

Shrubs: Hollies, Ilex spp.; fetterbush, Lyonia lucida; waxmyrtle, Myrica cerifera; Virginia willow, Itea virginica.

Vines: Muscadine grape, Vitis rotundifolia; bamboo-vine, Smilax laurifolia.

Grasses and Grasslikes: Panicum spp.; Carex spp.; Cyperus spp.

Herbaceous Plants: Cinnamon fern, Osmunda cinnamomea; Sphagnum moss, Sphagnum spp.; Virginia chain fern, Woodwardia virginica.

Animal species include:

Mammals: Oppossum, armadillo, cotton mouse, bobcat.

Birds: Red-shouldered hawk, barred owl, tree swallow, Carolina wren, robin, hermit thrush, warblers, sparrows, cardinal.

Reptiles: Snakes (Peninsula ribbon, Eastern mud, King).

Amphibians: Narrow-mouthed toad.

Mixed Hardwood Swamp (621)

The mixed hardwood swamp ecological community borders rivers and basins that are either submerged or saturated part of the year, is dominated by deciduous hardwood trees, and is found in strands along many drainageways and watercourses and areas influenced by seasonal flooding. Included in this category is the river swamp located extensively along the St. Johns River, Wekiva River, and associated water bodies. The river swamp is subject to periodic fluctuations in water level as a result of

seasonal rainfall patterns. Although these mixed hardwood swamps are characterized by a preponderance of deciduous tree species, they are generally not dominated by any one species. Such hardwood swamps are variable, with species types dependent upon the size of the waterway, its flow rate, water quality, and silt-turbidity characteristics. Periodic flooding is essential to maintain this ecosystem and is the dominant factor for providing needed nutrients. If the system is drained or flooded for an extended length of time, a new community will result. Water level fluctuation of the system within normal yearly extremes is about 2.5 ft, but can be as much as 5.0 ft.

Hardwood swamp areas are of great value for maintaining good water quality and quantity and for wildlife and wilderness values. Water quality is enhanced through the actions of sedimentation and uptake of nutrients by vegetation. During flood times, when waters reach their highest elevations, the swamp fringe of lakes and rivers help to reduce suspended nutrients and organic matter and slow water flows due to the friction of many trunks, stems, and roots. As waters recede to dry season elevations, much nutrients and organic matter are effectively "trapped" behind the natural levee between the swamp fringe and the open water. Water plays an important part in this community. If the water cycle is maintained, the community will tolerate disturbance, but if the water table is lowered or periodic water is not available, the system will change. The community is highly endangered due to its sensitivity to changes in the water cycle. Practices such as improper channelization, drainage, and impoundment are especially damaging. Mixed hardwood swamp forests are natural storage areas for floodwater. They slow the flow of water, improve water quality and gradually feed water to the rivers. These areas also assimilate inorganic and organic waste and reduce pollution levels. Oxygen diffusion is great in the swamp forest because of the large air-to-water surface area. The slow movement of the rivers and obstructions also help with the diffusion. Downstream systems, including estuaries, receive energy through detritus from this system.

Soils associated with this community are nearly level, very poorly drained, dark colored, and have coarse- to medium-textured surfaces underlain by finer textured material or are organic. The mixed hardwood system, unlike the bayhead, produces little or no peat.

The transition from river swamp to hydric hammock is often broad and ill defined where the topographic changes are very gradual. Rather extensive areas intermediate between the two associations occur where the periodic flooding is of brief duration.

Plants of the mixed-hardwood swamp include:

Trees: Bald cypress, Taxodium distichum; swamp black gum, Nyssa sylvatica var. biflora; water locust, Gleditsia aquatica, water ash, Fraxinus caroliniana; red maple, Acer rubrum; water hickory, Carya aquatica; cabbage palm, Sabal palmetto; and sweetgum, Liquidambar styraciflua.

Shrubs: Buttonbush, Cephalanthus occidentalis; willow, Salix caroliniana; bluestem palmetto, Sabal minor; waxmyrtle, Myrica cerifera.

Vines: Mikania, Mikania scandens; pepper-vine, Ampelopsis arborea; poison ivy, Rhus radicans.

Grasses and Grasslikes: Sawgrass, Cladium jamaicensis; marsh grass, Spartina bakeri.

Herbaceous Plants: Royal fern, Osmunda regalis; cinnamon fern, O. cinnamomea.

A mixed-hardwood swamp hosts a large variety of wildlife. It is especially well suited for waterfowl, reptiles, amphibians, and mammals. Animals found in this community must withstand the flooding that occurs periodically. Animal species include:

Mammals: Oppossum, gray and southeastern flying squirrel, red fox, raccoon and bobcat.

Birds: Green heron, egrets, red-shouldered hawk, turkey, chickadees, titmice, yellow-billed cuckoo, wood duck, limpkin, owls, warblers, cedar waxwing, woodpecker, and wren.

Reptiles: Green anole, ground skink, black racer.

Amphibians: Lesser siren, narrow-mouthed and southern toads, green and squirrel tree frogs, greenhouse and leopard frogs.

The various species of hardwood vegetation provide good food and cover for these wildlife species.

Guide to the Identification of Wetlands

The following key is meant to be an elementary field guide, using easily identifiable characteristics, to the wetland types found in Seminole County and described previously. Consideration has been made for averaged (expected) conditions for each wetland. Atypical climate (heavy rains or drought) or recent disturbances (fire or drainage) may render the key inaccurate. Determination of species present (whenever possible) will provide a clearer definition of wetland type when compared with the descriptions of wetland vegetation given in the Classification Scheme above.

To use the guide, start with item 1 and make choices until a type is found.

1. Is the community seasonally inundated and/or is the soil primarily organic peat or muck?
   a) Yes, go to 2.
   b) No, not defined as a wetland.
      2. What season it it?
         a) Summer (May to October), go to 3.
         b) Winter (October to May), go to 10.
            3. Are trees dominant life form?
               a) Yes, go to 4.
               b) No, go to 8.
                  4. Is the system adjacent to a river or lake?
                     a) Yes, go to 7.
                     b) No, go to 5.
                        5. Is there standing water?
                           a) Yes, go to 6.
                           b) No, Hydric Hammock.
                              6. Are the dominant trees cypress?
                                 a) Yes, Cypress Dome.
                                 b) No, Bayhead.
                        7. Is there standing water other than puddles?
                           a) Yes, Mixed Hardwood Swamp.
                           b) No, Hydric Hammock.
                  8. Is the wetland adjacent to a river or lake?
                     a) Yes, Deep Marsh.
                     b) No, go to 9.

9. Are there scattered trees or shrubs?
   a) Yes, Wet Prairie.
   b) No, Shallow Marsh.

10. Are trees the dominant life form?
   a) Yes, go to 11.
   b) No, go to 15.

11. Is the system adjacent to a river or lake?
   a) Yes, go to 14.
   b) No, go to 12.

12. Are the majority of trees evergreen?
   a) Yes, Bayhead.
   b) No, go to 13.

13. Do many of the trees exhibit buttresses and is there a significant number of cypress knees?
   a) Yes, Cypress Dome.
   b) No, Hydric Hammock.

14. Is the community found on a gentle slope with little to no standing water?
   a) Yes, Hydric Hammock.
   b) No, Mixed Hardwood Swamp.

15. Is the community adjacent to a river or lake?
   a) Yes, Deep Marsh.
   b) No, go to 16.

16. Are there scattered shrubs or trees?
   a) Yes, Wet Prairie.
   b) No, Shallow Marsh.

Glossary of Terms

Any word followed by an asterisk (*) represents a definition that has been changed from the definition found in the Seminole County Land Development Code.

Adjacent Area—In the absence of sufficient information to delineate the transition zone between wetlands and upland communities the adjacent area is defined as contiguous lands within 300 feet of the border (or

ecotone) or edge of standing water between wetland and upland communities and is measured from the border (or ecotone) or edge of standing water toward the upland community.

Aquaculture—Fish farming. Raising of fish under controlled circumstances for human consumption.

Berm—(Berming) Any structure (usually earthen) constructed for the purposes of impounding or impeding surface water flow. See Bulkhead.

Biological (biotic) Parameters/Functions (of wetlands)—Wetland functions performed by or referring to living organisms. Wildlife utilization, life form richness, and gross primary production.

Bulkhead—(Bulkheading) Any structure, partition, retaining wall, or earthen mound that interrupts, resists, directs, or shuts off the natural flow of surface water.

Catwalk—An aboveground structure constructed to allow travel in areas that are often marshy or under water for extended periods. Often used for nature trails or field experiments in wetlands.

Clear-cutting—A silvicultural system in which all merchantable trees are harvested over a specified area in one operation.

Community (ecological)—A group of interacting plants and animals inhabiting a given area. Refers to the living components of a (wetland) system.

Connectedness (of a wetland)—Degree to which a wetland borders terrestrial, aquatic, or other wetland systems. The greater the extent to which this bordering occurs (in numbers or linear distance), the greater the connectedness.

Cultivation—To foster the growth of...improve by labor or care the growth of selected plants.

Development—§380.04, Florida Statutes: "the carrying out of any building or mining operation or the making of any material change in the use or appearance of any structure or land and the dividing of land into three or more parcels."

Discharge—Outflow of water from a project site, aquifer, drainage basin, or facility.

Drainage—Control of surface flow of water by man-made facilities, such as canals, ditches, culverts, dikes, or storm sewers. Usually refers to the artificial lowering of groundwaters.

Dredge and Fill—See "Dredging" and "Fill."

Dredging*—Process of draining, pumping, pushing, removing, displacing, digging, gathering or pulling out soil, organic matter, peat, or muck

from the ground surface or below the ground surface, within a wetland or adjacent area.

Easement—Any strip of land created for public or other private utilities, drainage, sanitation, or other specified uses having limitations, the title to which shall remain in the name of the property owner, subject to the right of use designated in the reservation of the servitude.

Ecosystem—Shortened term for "ecological system." The total interaction of all the living and non-living components of a well-defined region.

Emergent Vegetation—Plants that are rooted under water with structured parts growing above the water's surface.

Environmental Impact Statement (EIS)—Assessment of proposed legislative and "other major federal actions significantly affecting the quality of the human environment," required of federal agencies by the National Environmental Policy Act (NEPA) of 1970.

Erosion—The process by which soil surface is worn away through the actions of wind and water.

Evapotranspiration (ET)—The combined loss of moisture by evaporation from land and water surfaces and by transpiration by plants.

Filling*—Deposition, dumping, moving, or relocating of soil, rock, riprap, organic matter, or any other material that results in raising the ground surface elevation.

Flood Abatement—Refers to the ability of a wetland to reduce flooding intensity by such inherent characteristics as vegetative cover, landscape, soil, etc.

Flooding Frequency—The regularity by which an area is prone to flooding. Referred to in terms such as "one in five year flood", "one in one hundred year flood," etc.

Flooding Tolerance (of life forms)—Degree to which plant life can survive the excess water—both in depth and duration—associated with flooding.

Floodplain (floodway)—Broad, flat land area bordering a river, stream, or surface water body, and subject to inundation by the normal fluctuation of water level associated with the given body of water.

Floristic Composition—Types and amount of vegetation found in a given area.

Flow-through System—A wetland system in which water is usually moving, though often very slowly. River swamps, sloughs, and strands are examples of wetland flow-through systems.

Food Chain—Movement of energy and nutrients from one feeding group (trophic level) of organisms to another in a series that begins with plants and ends with carnivores.

Gross Primary Production (GPP)—Total photosynthetic (plant) production, in which solar energy is converted into organic substances used as food material.

Groundwater—Water beneath the surface of the ground whether or not flowing through known and definite channels.

Hazardous Material—A material that may cause or significantly contribute to serious illness or death or that poses a substantial threat to human health or the environment when improperly managed. It is a hazardous material, typically, if it is highly flammable, corrosive of standard materials, reactive, explosive, or poisonous. The State of Florida exempts power plant ashes, phosphate wastes, and agricultural wastes.

Hydroperiod (of a wetland community)—A measure of the time (usually in days per year) that water is at or above the soil surface.

Impervious Surface—A layer of material through which water cannot penetrate or can pass through only very slowly.

Impound(ment)—An artificial storage that collects and confines water as in man-made ponds or reservoirs.

Improved Area—Residential or commercial area with significant amounts of streets, sidewalks, sanitary or storm sewers, parking lots, landscaping, or other "improvements."

Infiltration—Downward movement of water through the soil.

Intermittent Flooding—Periodic inundation (of a wetland) associated with rainfall.

Landscape Diversity—A measure of the degree to which an area is rich or lacking in a variety of living organisms and non-living land forms.

Leachfield—Drainage field associated with septic tank systems that receive liquid overflow from the tank to be absorbed into the subsoil surrounding the system of pipes or conduit.

Life Form—Designation of the five types of vegetative growth: (1) trees, (2) shrubs, (3) floating plants, (4) emergent plants, and (5) submergent plants.

Life Form Richness—Degree of presence of varying types of life forms.

Maximum Water Level—Water level attained when a wetland has reached its maximum storage capacity.

Mean High Water—Average annual high water level.

Mean Low Water—Average annual low water level.

Mosquito Control (Drainage) Ditch—Drainage performed for the expressed purpose of removing surface waters and thus eliminating mosquito breeding areas.

Nutrient Loading—Measure of the nutrient concentrations (often expressed as phosphorous and/or nitrogen) passing into or through a wetland, either naturally (rainfall, surface flow) or through addition of sewage or storm water runoff.

Ordinary High Water—Highest level to which a wetland is normally inundated, given normal year-to-year water level fluctuations.

Outfall—Specific point of discharge of waters from a project, site aquifer, drainage basin, or facility.

Permeability—Measure of a soil's ability to let water pass through (infiltraton), often expressed in units of inches/hour.

Physical (Abiotic) Parameters/Functions (of wetlands)—Wetland functions not associated with living organisms. Water quality enhancement, storage capacities, recharge potential, and flood abatement are examples of physical functions.

Potable Water—Water that is satisfactory for drinking, culinary, and domestic purposes and that meets the quality standards of the Florida Department of Environmental Regulation, Chapter 17-22, F.A.C.

Rare and Endangered Species—Plant and/or animal species whose existence is in such limited numbers as to require special protection to avoid total extinction from the area of designation, as defined by U.S. Fish and Wildlife Service, Florida Committee on Rare and Endangered Plants, State Legislation.

Recharge (of Groundwater)*—The infiltration of surface water to the groundwater supply.

Riprap—1) Aggregate placed on potentially erodable sites to reduce the impact of rain or surface runoff on these areas. 2) A foundation or sustaining wall of stones thrown together without order.

Runoff—Overland water flow, which is a function of amount and intensity of precipitation and snow and ice melt.

Sedimentation—Deposition of soil particles to one area from another through the process of water erosion.

Seepage Wetland—A wetland where the main inflows of water are usually rainfall and groundwater seepage from uplands.

Selective Harvesting—Timber harvesting method in which only a portion of the tree stand is removed, leaving some vegetative cover and aiding in erosion reduction. Removal of mature timber, usually the oldest

or largest trees, either as single individuals or in small groups, in order to encourage continuous reproduction and uneven aged stands.

Septic Tank—Sewage disposal system in which effluent is flushed into an underground tank and allowed to slowly be absorbed into the surrounding soil.

Slough—An open expanse of grasses, sedges, and rushes in an area where the soil is saturated during the rainy season and that is relatively long and narrow and slightly lower in elevation than the surrounding landscape. Most serve as drainage ways for water during periods of heavy and prolonged rainfall.

Storage Capacity (storm storage capacity)—A measure (in volume) of a wetland's capacity to store water during a storm event, and thus help abate flooding.

Structure—Anything constructed, installed or portable, the use of which requires a location on a parcel of land. It includes a moveable structure while it is located on land which can be used for housing, business, commercial, agricultural, or office purposes either temporarily or permanently. Structure also includes fences, billboards, swimming pools, poles, pipelines, transmission lines, tracks, and advertising signs.

Submergent Vegetation—Vegetation that is rooted under water and whose structural parts are also under water.

Succession—Ecological process in which components and structural arrangement of an ecosystem undergo readily recognizable change or transformation.

Surface Water—Water located above ground. Can be still or flowing.

Superficial Groundwater—Sometimes called groundwater, water table aquifer, or superficial groundwater. Water that exists in the interstices of soil in which the soil is completely saturated, but where there is no confining layer or aquaclude above the zone of saturation.

Swale—A gently sloping channel designed to transport intermittent runoff from storm events.

Temporary Blinds—Artificial camouflage area created by hunters.

Transfer of Development Rights (TDR)—A land use management tool involving the designation of development rights to land, and then the authoriz-

ation to sell or transfer these rights from an area of development restriction to a "permitted" or "transfer" area.

Upland—Dry terrestrial system found upslope from aquatic, wetland, or other terrestrial systems.

Utilities—Electrical transmission lines, sewage lines, storm water lines, and potable water supply lines, and associated access roads necessary for maintenance.

Water Quality Enhancement—Those attributes of a wetland that contribute to the purification of water. Nutrients and pollutants can be removed from water via uptake by plants or absorption into the soil.

Watershed—Total area that can contribute over-land waterflow to a given discharge point, water body, or wetland.

Water Table—The upper level of the groundwater.

Weir—An overflow structure built across an open channel for the purpose of controlling water flow.

Wetland—Areas inundated or saturated by surface water or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands can often be a transition zone between aquatic and terrestrial communities.

IV
CHARACTERISTICS AND VALUES OF WETLANDS

IV-1 Evaluation and Ranking of Wetlands

The evaluation of wetlands has been organized into two levels. The first level is the evaluation of development impacts on parameters of general wetland types that occur in the county. This system lists various wetland parameters with regards to general overall characteristic structure and function and evaluates impacts of development activities upon each parameter. When impacts on all parameters are summed, an overall compatibility of the development activity with each wetland type is determined.

The second level evaluation is designed for the evaluation of specific wetland communities and is to be performed by Seminole County staff directly related to the review of a proposed development in or around wetland communities. (See Section IV-2 for a discussion of the Second Level Evaluation).

First Level Evaluation of Wetland Parameters

In the first level evaluation, nine wetland parameters are evaluated and ranked within two functional areas. These two areas pertain to Physical and Biological functions that have significant value and that should be protected.

The discussion that follows lists the nine parameters and gives the basis for rating of High, Medium, and Low values associated with any specific wetland and its characteristic parameter.

Physical functions. Of importance in this category are the functions that wetlands perform with regards to water quality enhancement, flood protection, water storage, and potential for recharge of potable water. Specifically, the parameters to be ranked are as follows:

1. Water Quality Enhancement—This parameter is measured as the assimulative capacity or nutrient uptake capacity for nitrogen and phosphorus of the wetlands, expressed as potential percent reduction in nutrient concentration between input and output waters. Values are expressed as percent removal under ideal conditions where secondary treated effluent is recycled through wetlands. It is important to note that data given are the potential percent removal under ideal conditions where effluent volume and velocity do not exceed conditions necessary for efficient uptake. Data are given in terms of potential percent removal instead of in pounds per acre since there are many variables that may significantly effect any particular wetland's ability to immobilize nitrogen and phosphorus; the most important of which are size of wetland and quantity and quality of effluent. By utilizing potential percent removal as a means of ranking wetlands, it is felt that there is less confusion and less chance of misinterruption of data. The ratings are as follows:

   High Value (90–100%);
   Medium Value (60–89%); and
   Low Value (less than 59%).

2. Hydroperiod—Related to water quality enhancement, hydroperiod is the period of inundation of a wetland. Wetland communities are adapted to varying depths and periods (length of time) of inundation; some have standing water nearly the entire year, while others have standing water for only a few months during the wettest time of the year. Those wetlands that have long hydroperiods are generally more evergreen, while those adapted to shorter hydroperiods tend to have a dormant season that corresponds to dry times of the year. Communities that are adapted to long hydroperiods are more suitable as interface systems that may receive wastes and runoff from urban lands, since they have greater potential for year-round nutrient uptake. The ratings are as follows:

   Long hydroperiod (300–365 days) = High Value;
   Moderate hydroperiod (200–299 days) = Medium Value; and
   Short hydroperiod (100–199 days) = Low Value.

3. Evapotranspiration—A major attribute of most wetlands is their ability to store water and slowly recharge groundwater. Wetlands,

through shading of surface waters and the blocking of evaporative breezes, reduce potential evaporation from surface water stored within. Thus wetlands that have lower evapotranspiration conserve water and allow for greater groundwater recharge. The rate of evapotranspiration directly affects the availability of surface water and thus groundwater recharge. Wetlands with high evapotranspiration leave less water available as surface water to recharge superficial groundwaters and to contribute to surface water flow within a water basin, and their value for water conservation is low. Wetlands with low evaporation rates conserve water, making it available for longer periods of time into the dry season and increasing the potential for groundwater recharge; their value for water conservation is high. The ratings (mm H_2O day^{-1}) are as follows:

Low evapotranspiration rate (<4.0) = High Value;
Moderate evapotranspiration rate (4.0–5.6) = Medium Value; and
High evapotranspiration rate (>5.6) = Low Value.

4. Water Storage Capacity—The capacity for surface water storage is related to two parameters of importance. The first is the normal storage capacity during wet season when waters accumulate and are stored, providing for potential recharge and holding water tables higher. The second is storm water storage, providing flood protection. Thus this function has two aspects.

   4a. Normal water storage capacity is the depth of normal water during average rainfall years. The ratings are as follows:

   High storage capacity (>0.5 m depth) = High Value;
   Moderate storage capacity (0.2–0.5 m depth) = Medium Value; and
   Low storage capacity (<0.2 m depth) = Low Value.

   4b. Storm water storage. For short periods, much deeper inundation is possible for the purposes of storm water storage for short duration. The depth and duration of storm water storage are different for each type of wetland, depending on tolerance of vegetation to flooding. The ratings are as follows:

   High inundation potential (≥2.0 m depth) = High Value;
   Moderate inundation potential (1.0–1.9 m) = Medium Value; and
   Low inundation potential (<1 m depth) = Low Value.

5. Recharge Potential—The potential for recharge of deep aquifiers from wetland communities is relatively small; however, it is believed that recharge is an important function of wetlands as they store water during the wet season and slowly recharge the superficial groundwater systems during dryer periods. Thus, they conserve water and through their slow recharge functions maintain higher superficial groundwater levels than would be possible without the presence of wetland communities as an integral part of the landscape mosaic. The ratings ($m^3 \cdot m^{-2} \cdot yr^{-1}$) are as follows:

   High recharge potential (>0.7) = High Value;
   Moderate recharge potential (0.3–0.7) = Medium Value; and
   Low recharge potential (<0.3) = Low Value.

Biological functions. Biological functions are those functions that contribute to wildlife values either directly as in the case of food chain support and habitat or indirectly as in the case of life form richness. There are three such functions or values of importance for the ranking of wetlands.

1. Wildlife Utilization—Utilization is measured as the species richness of wildlife that is characteristic of each community. It is the summation of the number of amphibians, reptiles, mammals, and birds commonly found in each wetland community. The ratings are as follows:

   High species richness (>80 species) = High Value;
   Moderate species richness (50–79 species) = Medium Value; and
   Low species richness (<50 species) = Low Value.

2. Life Form Richness—Life form is the physical structure or growth habit of a plant. Height, branching pattern, and leaf shape are major features contributing to form. Five life forms and 18 subforms are recognized. The forms represent obvious divisions of vegetation: trees, shrubs, emergents, surface plants, and submergents (see Figure IV-1). Many studies have shown that differences in life form are more important than differences in plant species when analyzing wildlife habitat. Each wildlife species is adapted primarily to one or a complex of life forms and, as a result, wildlife diversity in an area is closely related to life form diversity. The ratings are as follows:

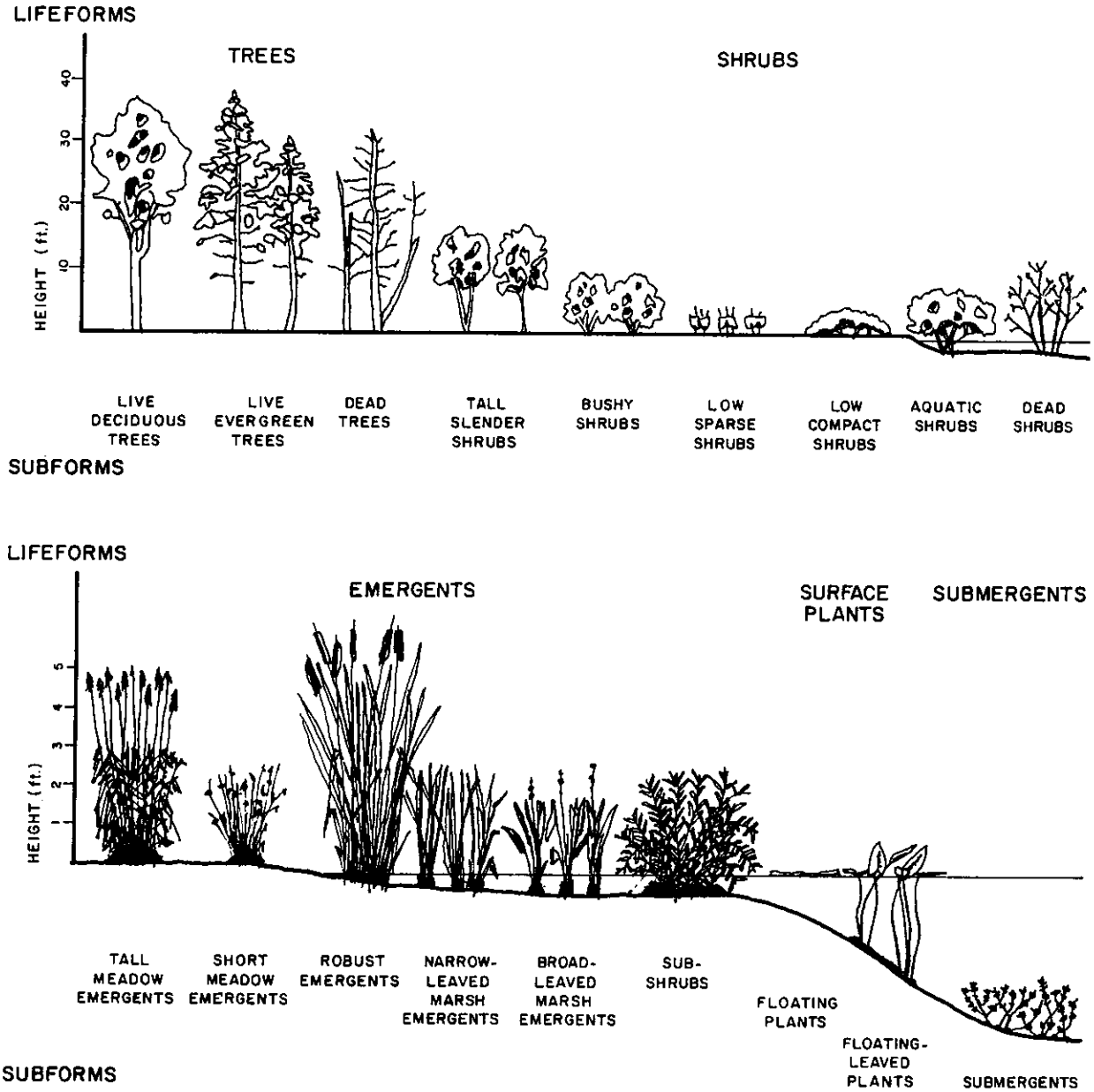

Figure IV-1. Illustration of wetland plant lifeforms and subforms. The five lifeforms are: trees, shrubs, emergents, surface plants, and submergents. Generally, the more lifeforms present in a community the more suitable the community as habitat for wildlife (from Gelet, F. C. 1981. Wildlife wetland evaluation model. In J. S. Larson (ed.) A guide to important characteristics and values of freshwater wetlands in the Northeast. Water Resources Research Center, University of Mass. at Amherst. Publication #32, reprint).

High life form richness (4–5 forms) = High Value;
Moderate life form richness (3 forms) = Medium Value; and
Low life form richness (2 forms) = Low Value.

3. Gross Primary Production—The gross primary production of a community is a measure of the total sunlight "fixed" as plant matter during the growing season that may become food for consumers of all types. Since gross production is the first step in the food chain, higher gross production leads to longer and more complex the food chains. The ratings (grams organic matter/$m^2 \cdot day^{-1}$) are as follows:

   High gross production (>50.0) = High Value;
   Moderate gross production (21–49) = Medium Value; and
   Low gross production ($\leq$20) = Low Value.

Wetland Values

Given in Table IV-1 are data for the various parameters (functions) associated with each wetland type. The basis for determination of high, medium, and low values as given previously is the range of values for each parameter given in Table IV-1. In other words, wetland values are derived using data for wetland systems only and do not include values from other ecological systems. The parameters chosen for the determination of value are characteristic functions of wetland communities, and, as such, the ranges used for the determination of high, medium, and low values should reflect only the range of values that are characteristic of wetland communities.

The data given in Table IV-1 is derived from a review of pertinent literature. While much is known about some wetland and their characteristic structure and function, there is still much to be learned about others. The values given in Table IV-1 reflect the state of the knowledge concerning wetland ecosystems. In the absence of measured values for some parameters, estimates are given based on a qualitative understanding of the structure and function of wetland communities. The notes to Table IV-1 indicate which values are estimates and the basis for each.

Wetlands Ranking

Since the overall ranking of wetlands may or may not give sufficient detail as to which aspects of each wetland type are critical or which

Table IV-1. Characteristic values for parameters of importance.

	Hydric Hammock	Mixed Hardwood Swamp	Cypress Dome	Bayhead	Wet Prairie	Shallow Marsh	Deep Marsh
Water Quality Enhancement, % Removal							
Phorphorus	40 [1]	90 [2]	98 [3]	85 [4]	40 [5]	98 [6]	30 [7]
Nitrogen	40	98	92	85	60	97	30
Evapotranspiration (mm/day)	4.8 [8]	5.8 [9]	3.8 [9]	3.0 [10]	5.4 [11]	5.6 [11]	5.6 [11]
Hydroperiod (days)[12]	100–150	200–250	250–300	200–250	150–200	365	365
High Water (m)[13]	0.10	0.60	0.50	0.30	0.50	0.70	1.00
Low Water (m)[14]	0	0	0	0	0	0	0.20
Maximum Level (m)[15]	0.30	1.50	1.50	1.00	1.50	2.00	2.00
Recharge Potential ($m^3/m^2/yr$)	0.1 [16]	0.1 [17]	0.84 [18]	0.6 [19]	0.37 [20]	0.68 [21]	0.1 [22]
Peat Depth (m)[23]	0–0.2	0–0.5	0–0.5	0.5–3.0	0–1.5	0.5–3.0	0–1.0
Life Form Richness [24]	3	4–5	4–5	4–5	2	3	3
Wildlife Utilization [25]	86	71	56	32	74	84	84
Gross Primary Productivity (g organic matter/m^2/day) during growing season [26]	60	52.1	25.3	20.0	23.9	19.6	54.5

[1]Low value assigned (in comparison to mixed hardwood swamp) since by comparison to mixed hardwood swamp this community has little to no peat, shorter hydroperiod, and occurs along slopes.
[2]From Boyt (1976), p. 60.
[3]From Dierberg (1980), p. 244.
[4]A value slightly lower than cypress domes and hardwood swamp assigned to bayheads even though it is a deep peat wetland, the hydroperiod and mean water depth could potentially reduce loading rate of effluent.
[5]Potential for water quality enhancement reduced by short hydroperiod and lack of significant depths of peat.
[6]From Zoltek et al. (1979), p. 249.
[7]Potential for water quality enhancement limited by riverine situation.
[8]Evapotranspiration in hydric hammock assumed to be greater than that in cypress dome, but less than that in hardwood swamp.
[9]From Brown (1981), Table 13.
[10]Evapotranspiration in bayheads assumed to be less than that in cypress domes due to high reflectance of incoming solar radiation by vegetation.
[11]Based on evapotranspiration values from Dolan (1978) (Table 9, p. 56) for freshwater marsh in central Florida. It is assumed that all three nonforested wetlands would have similar evapotranspiration rates.
[12]Data for hydroperiod derived from information in Wharton et al. (1977) on average hydroperiods for Florida wetland ecosystems. Ranges were established by the flooding tolerances of selected species normally found in each wetland type (Taskey et al. 1977).
[13]Mean high water levels are based on community descriptions (see section III) and on field observations made in Seminole County. Hydric hammocks tend to be saturated, sloped systems with standing water only during intense storm events. Domes and bayheads will have water depths typically only as deep as the depressions they occupy. Bayheads, being deep peat wetlands, are less deeply flooded than domes and the woody species in bayheads are less tolerant of deep flooding. Hardwood swamps will have high water marks associated with stream and river overflows onto the floodplain.
[14]Mean low water levels are zero for each system except for the deep marsh which will always have standing water (by definition) except during extreme drought. Shallow marshes tend to drawdown to saturation while each of the other systems may experience dry surface conditions during the year.
[15]Storm storage capacity ceiling of 2 meters was used because this depth is used to define the limit of wetland habitat with depths greater than 2 meters considered aquatic (Cowardin et al. 1979). Capacity is limited to short-term storage, i.e., storm surge abatement, with an implied duration of up to 3 days. While domes and hardwood swamps can handle high water for extended periods (impoundments) the intention here is to describe the high water mark for 10-year storm events. Hammocks tend to be on slopes and at higher elevations and less likely to be under sheet water. Hydric hammock species also have lower flood tolerances. The values for domes, swamp, and bayheads are based on field experience. It is assumed that marshes and prairies can receive the maximum quantity of water without irreversible system impact.
[16]Hydric hammocks occur along slopes in zones of groundwater discharge, hence, have a low potential for recharge.
[17]From Boyt (1976), Fig. 12, p. 55.
[18]From Brown et al. (1975), Vol. IV, Table F.2.7.

[19]Recharge potential in bayheads reduced (relative to cypress domes) because typically receive some inflow of groundwater, hydroperiod is shorter than in cypress domes (83% of cypress domes).

[20]Hydroperiod in wet prairie is only 55% of that in marsh. An approximation to recharge then is 0.55 x marsh recharge (0.68 $m^3/m^2 \cdot yr$) x 0.55) = 0.37 $m^3/m^2 \cdot yr$.

[21]From Brown et al. (1975), Vol. IV, p. F-86.

[22]Deep marshes in Seminole County are primarily associated with rivers and streams. Riverine systems are more often groundwater discharge areas than groundwater recharge areas.

[23]Peat depths based on Table 11-19 and discussions (pp. 86–96) in Davis (1946).

[24]Life form richness based on community descriptions and field observations in Seminole County.

[25]Wildlife utilization based on information compiled in Appendix A.

[26]All figures derived from Brinson et al. (1981; Table 1). Deep marsh was presumed to be the same as "riverine marsh." Shallow marsh was taken as an average of value given for "littoral pond" and "mixed species marsh." Bayheads have low evapotranspiration, which correlates with gross primary productivity in terrestrial systems and therefore was labeled with the lowest likely productivity. Hydric hammocks have the greatest range of life forms and species which has a known correlation with gross primary productivity hence the highest likely figure. Bayheads have the lowest range of species utilization and also the lowest evapotranspiration of wooded systems and therefore was given the lowest likely figure for wooded systems.

require special procedures for their protection, the ranking of each parameter allows for designing protective measures for attributes rather than general wetland types. In this way, development activities can be tailored to each wetland community by assessing the impacts of each activity on each parameter. Adverse impacts on parameters with high value may cause severe disruption of valuable wetland functions, while the same impact on parameters with moderate or low values may not be of great concern.

Combining the data for all parameters of each wetland with the ranges discussed in the previous section, Table IV-2 is derived. The ranking given in Table IV-2 ranks each wetland parameter on the basis of high (H), medium (M), or low (L) value.

Impacts of Development Activities

The ranking of wetlands by physical and biological characteristics allows for the comparison of one wetland with others and for the comparison of individual functional characteristics between wetland communities, as in Table IV-2. Basing the overall value of a particular wetland type on its "score" derived from Table IV-2 may not reflect special values for individual functions that are important in maintaining a diverse high-quality landscape mosaic or reflect functions that are of special importance because of the potential "services" performed.

Instead of ranking wetlands from most desirable to least desirable with respect to preservation, the ranking can be used to indicate which characteristics (functions) for each wetland are important and thus which functions should be protected. In this manner, functions are protected no matter what overall "value" the wetland may have. By listing potential development activities and the parameters affected by such activities, Table IV-3 is produced. Table IV-3 shows the impacts of development activities on the nine biological and physical parameters of importance and whether they have adverse effects (A), moderate effects (M), or nominal effects (N). In addition, the impacts of activities in areas immediately adjacent to wetlands are also given.

The impacts of activities in areas adjacent to wetland communities are of importance. Because of the nature of wetland communities as runoff and seepage basins, and because water levels within wetlands can be nega-

Table IV-2. Correlation matrix of physical and biological functions with wetland type.

	Hydric Hammock	Mixed Hardwood Swamp	Cypress Dome	Bayhead	Wet Prairie	Shallow Marsh	Deep Marsh
PHYSICAL FUNCTIONS							
Water Quality Enhancement	L	H	H	M	L	H	L
Hydroperiod	L	M	M	M	L	H	H
Evapotranspiration	M	L	H	H	M	M	M
Normal Water Storage	L	M	M	M	M	H	H
Storm Storage Capacity	L	M	M	M	M	H	H
Recharge Potential	L	L	H	M	M	M	L
BIOLOGICAL FUNCTIONS							
Wildlife Utilization	H	M	M	L	M	H	H
Life Form Richness	M	H	H	H	L	M	M
Gross Primary Productivity	H	H	M	L	M	L	H

H = High Value
M = Medium Value
L = Low Value

Table IV-3. Correlation matrix of activities with parameters.

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agricultural or horticultural crops	A	M	A	M	A	N	A	N	A	N	M	N	A	M	A	N	A	N
Harvesting of timber and wood products	M	M	M	M	M	N	N	N	N	N	N	N	A	M	A	N	A	N
Cultivating naturally occurring agric. or hort. products	M	N	M	N	N	N	N	N	M	N	N	N	M	N	M	N	M	N
Scenic, historic, wildlife, or scientific preserves	N	N	N	N	N	N	N	N	M	N	N	N	M	N	N	N	N	N
Maintenance (minor) or emergency repair to existing structures or improved areas	N	N	N	N	N	N	N	N	N	N	N	N	M	N	N	N	N	N
Removing natural products of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and creation and maint. of temporary blinds	N	N	N	N	N	N	N	N	N	N	N	N	M	N	N	N	N	N
Cleared walking trails having no structural components	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Timber catwalks and docks <4 ft wide	N	N	N	N	N	N	N	N	N	N	N	N	M	N	M	N	M	N
Timber catwalks and docks >4 ft wide	M	N	N	N	M	N	N	N	N	N	M	N	M	N	M	N	M	N
Establishing plantings	M	N	M	N	M	N	M	N	M	N	N	N	M	N	M	N	M	N
Substantial restoration or reconstruction or mod. of existing structures	M	N	M	M	M	N	M	N	M	N	M	N	M	N	M	N	M	N

Table IV-3. (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotranspiration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	A	M	A	M	A	N	A	M	A	M	A	M	A	M	M	N	A	N
Operation of motorized vehicles including airboats	M	N	N	N	N	N	N	N	N	N	N	N	A	M	N	N	N	N
Expansion of existing structures or improved areas	M	M	M	M	M	N	M	N	M	M	M	N	M	M	M	N	M	N
Dredging of any kind other than for mosquito control or drainage ditches	A	M	A	M	A	M	A	M	A	M	A	M	A	M	A	M	A	M
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	M	N	M	N	N	N	M	N	M	N	M	N	M	N	M	N	M	N
Bulkheading	A	M	A	A	M	N	A	A	A	A	M	M	M	M	M	M	M	M
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	A	M	A	M	M	M	A	M	A	M	A	M	A	N	A	N	A	N
Use of any pesticide or herbicide	A	M	N	N	A	M	N	N	N	N	A	M	A	M	A	M	A	M
Installation of utilities	A	N	A	N	M	N	A	N	A	N	M	N	M	N	M	N	M	N
Filling ≤10% of wetland within property in conjunction with the construction of permitted structures	M	M	M	M	M	M	M	M	M	M	M	M	M	N	M	N	M	N
Clearing of vegetation in conjunction with construction of permitted structures	M	M	M	M	M	M	M	M	M	M	M	M	M	N	M	N	M	N

Table IV-3. (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	M	N	M	N	M	N	M	N	M	N	M	N	M	N	M	N	M	N
Installation of septic tanks	A	M	M	M	N	N	M	N	M	N	M	N	M	N	M	N	M	N
Installation of storm water retention basin	A	M	A	M	A	N	A	M	A	M	A	N	A	N	A	N	A	N
Storage, use, or disposal of any hazardous material	A	A	N	N	N	N	N	N	N	N	A	A	A	A	M	M	A	M
Solid waste disposal	A	A	A	A	A	N	A	M	A	M	A	M	A	M	A	N	A	N

A = Adverse impact;
M = moderate impact;
N = nominal impact.

tively affected through drainage of surrounding areas, it is important to establish a buffer zone around wetlands where development activities can be controlled to insure that negative impacts are minimized. As an example of the possible effects that activites in areas adjacent to wetland communities can have, Wang (1978), in studies of the effects of drainage canals on wetlands, has shown that drainage canals can lower surface water levels at a distance of up to 1 mile in the surrounding landscape.

There are three classes of activities in adjacent areas to wetlands that are of concern. The first class is activities that cause a lowering of groundwater levels such as drainage canals and other deep excavations. The second class is activities that alter surface water flows either by impeding flows or by increasing the quantity of surface water flow. Included in this class of activities are bulkheading, deposition of fill or spoil, and paving that increases runoff. The third class is activities that alter the quality of runoff waters. Included in this class are the use of pesticides, herbicides, and other toxic chemicals, and land uses that have the potential to significantly alter the quality of surface runoff, such as industrial land uses.

The area adjacent to a wetland community (or transition zone from wetland to upland) where development activities need to be controlled is variable. It depends on the magnitude of the activity, the topography, the type of wetland community affected, and on the particular set of surface water and groundwater conditions present. The determination of areas surrounding wetlands that should have some controls, by all rights, should be on a case-by-case basis where extensive field measurements and surveys are conducted. In the absence of sufficient information to delineate the transition zone between wetland and upland the adjacent area will be defined as the contiguous lands within 300 feet of the border (or ecotone) or edge of standing water between wetland and upland communities and is measured from the border (or ecotone) toward the upland community.

An explanation of each of the activities listed in Table IV-3 and the associated impacts on each parameter follows.

Production of agricultural or horticultural crops. The production of many agricultural crops within wetlands requires the alteration of water levels and the removal of naturally occurring vegetation. In most cases, water levels must be held at levels below the soil surface to facilitate

the growth of plants that are not accustomed to the wetland conditions. In some cases, soils, because of their high organic matter content, are most suitable for cultivation but oxidize away when exposed to air; further drawdown of water levels is usually required.

The production of many agricultural crops within wetlands affects all wetland parameters adversely except recharge potential. The ability for water quality enhancement is lost since waters no longer flow through vegetation with subsequent uptake and removal of nutrients. The hydroperiod is adversely affected when wetlands are drained. With the loss of vegetative cover, the drawdown of water, and the planting of agricultural crops that have higher evapotranspiration rates, evapotranspiration is increased. Normal and storm water storage capacity is adversely affected, since water levels must be held artificially low to accommodate agricultural crops. With lowered water tables and loss of storage capacity, recharge potential can be moderately reduced. All three biological parameters are adversely affected with the loss of naturally occurring vegetation. Wildlife that depend on the vegetation for food and cover must seek these elsewhere. Both life form richness and gross primary production are lost with the removal of vegetation.

The production of agricultural or horticultural crops in areas adjacent to wetlands has moderate effects upon water quality enhancement, since runoff from agricultural areas may carry high nutrient loads; hydroperiod, since drainage in adjacent areas can both decrease and increase normal and storm water runoff flows; and wildlife utilization because of loss of habitat, noise, and alterations of hydroperiod associated with drainage in surrounding lands.

Harvesting of timber and wood products. The harvesting of timber from wetland communities usually has only moderate effects on parameters of importance. Generally, adverse effects of machinery are relatively temporary, unless major drainage and the building of tramways or elevated roadways are done within the wetland. Wherever possible, the harvesting of timber should be carried out with a minimum amount of heavy machinery, and no drainage of the wetland should be allowed prior to harvesting. The only communities that have enough commercially viable timber are cypress wetlands, some hydric hammocks, and some mixed hardwood swamps. If selec-

tive harvesting is done within these systems, then enough vegetation remains after harvesting to carry on important functions.

If clear-cutting of timber is done, effects are more adverse and total disruption of functions is possible. Thus the effects in Table IV-3 are given for selective harvesting. Since selective harvesting leaves much vegetation to carry out important functions, and since the disruptions during the harvesting activity are only temporary, moderate effects result for water quality enhancement, hydroperiod, and evapotranspiration; other parameters show nominal impacts. Wildlife utilization is adversely affected as wildlife for the most part leave the area after harvesting. Life form richness is adversely affected with the cutting of dominant tree species and the "trampling" of understory vegetation. Gross primary production is adversely affected, since some vegetation is harvested and much is trampled.

The harvesting of timber and wood products in areas adjacent to wetlands has moderate impacts on water quality enhancement, since vegetative cover is removed and runoff is increased, carrying higher loads of sediments, organic matter, and nutrients; on hydroperiod, due in part to increased runoff; and on wildlife utilization, since the removal of vegetation surrounding a wetland may cause disruption of feeding, breeding, and other activities of wildlife that may utilize these adjacent areas.

Of particular importance when harvesting in adjacent areas is the practice of pushing the debris left after clear-cutting into "windrows" or piles that surround the wetland. These windrows or piles, when pushed up so as to surround wetland, inhibit surface water flows, altering hydroperiods and water storage, potential for recharge, and biological parameters.

Cultivating naturally occurring agricultural or horticultural products. The cultivation of naturally occurring vegetation requires that most wetland parameters remain in an unaltered condition, since the vegetation to be cultivated is native to these conditions. However, water quality enhancement may be moderately affected, as are hydroperiods, since cultivation within wetlands by necessity may limit these two parameters. Normal storage capacity is generally little affected, but storm storage capacity may be limited, since the storage of storm water runoff may conflict with cultivation in wetlands. Soil matrix is generally unchanged; thus, recharge potential is little affected. Evapotranspiration rates are

not affected. Wildlife utilization, richness of life forms, and gross primary production are moderately affected, since some vegetation is removed and frequent presence of people may interfere with wildlife use.

There are only nominal impacts associated with cultivating naturally occurring agricultural or horticultural products in areas adjacent to wetland communities.

Scenic, historic, wildlife, or scientific preserves. The use of wetland communities for preserves has no adverse effects on parameters of importance. However, there may be some moderate effects concerning storm water storage capacity, since high water levels associated with storm water storage may conflict with intended use as a preserve. Wildlife utilization may be moderately affected due to the continual presence of people or high volumes of people that are associated with scenic and historic preserves.

Maintenance (minor) or emergency repair to existing structures or improved areas. The presence of existing structures or improved areas within a wetland community may have had adverse impacts, but these previous impacts are not considered here. However, any repairs or additions to existing structures and their associated impacts are considered.

Minor repairs and/or emergency repairs are activities where use of structures does not change and/or there is no addition to the structure or improved area. Such activities will have little adverse impact beyond those impacts already experienced due to the presence of the structure. No effects are predicted with exception of the possible impact on wildlife utilization. Wildlife use may be moderately affected if repairs require construction equipment, since the noise levels associated with construction activity may result in wildlife leaving the area.

Removing natural products of wetlands in the process of recreational or commercial fishing, aquaculture, hunting or trapping, and creation and maintenace of temporary blinds. The use of wetland communities for the above is regulated by other agencies of the federal, state, and local governments, and, as such, generally has very little adverse impacts on the parameters of importance. An exception is the use of the wetland community by desirable wildlife. Since these activities generally create conditions that are not conducive to the long-term utilization of the community by wildlife, and since some wildlife are hunted, trapped, or

caught, communities that have very high wildlife values should be considered for protection, thus the wildlife utilization parameter has a moderate impact associated with it.

Cleared walking trails having no structural components. Cleared walking trails have a nominal impact on all parameters of wetland communities, since the area of cleared vegetation is minor when compared to the total area of the wetland community. If filling, bulkheading, or the construction of catwalks is necessary as part of a walking trail system, one should reference these activities separately.

Timber catwalks and docks less than or equal to 4 feet wide. Most of the impact associated with catwalks is a result of construction activities disrupting wetland structure and function. The trampling of vegetation and the disruption of normal wildlife activities are the most serious impacts during construction. Once construction is complete, small catwalks have only nominal impact on overall structure and function. Moderate impacts are shown for all three biological parameters, since construction activities may have impact causing wildlife to leave, altering life forms present and reducing gross primary production through trampling and shading.

Timber catwalks and docks greater than 4 feet wide. The potential for negative impact increases as the size of catwalks increases. The larger a catwalk or dock the greater the construction activity. More equipment, bigger foundation systems, heavier timbers, etc. all have the potential for greater disruption not only during the construction phase but after. Thus large catwalks and docks impede water flow, having moderate impact on water quality enhancement and evapotranspiration. The foundation systems required to carry large catwalks and docks have greater potential to impact recharge, since they must spread over greater area to achieve bearing or have driven pilings, either of which will have negative impact. Biological functions may be moderatley impacted from both construction activities and the long-term presence of a large structure within the habitat.

Establishing plantings. The planting of non-native wetland species requires that most wetland parameters be changed to accommodate plant species that cannot tolerate wet and/or submerged conditions. Thus, such plantings have the potential to moderately affect all physical parameters

except recharge potential. In most cases, the planting of non-wetland species is accomplished by depositing fill material so that root systems are above water levels. If the plantings are to be wetland species, then the degree of impact is related to the areal extent of planting. Biological parameters show moderate impact, since the activity may cause wildlife to leave, alter life form richness, and change gross primary production. One is referred to The Production of Agricultural or Horticultural Crops for associated impacts when areal extent of plantings is large.

Substantial restoration or reconstruction or modification of existing structures. The presence of existing structures of improved areas within a wetland community may have had adverse impacts in the past, but these previous impacts are not considered here. However, any major repairs or modifications to existing structures and their associated impacts are considered.

Major repair, modification, or restoration is defined as a change in use, or modifications, repairs, etc., that cost at least 10% of the physical value of the structure and do not increase the area of structure or improved area. Such activities may have adverse impact beyond those already experienced due to the presence of the existing structure. Since the magnitude of impact is related to the degree of modification, restoration, repair, or reconstruction and the eventual use of the structure, the magnitude of impact on all parameters is designated as moderate. One is directed to all specific activities associated with restoration, reconstruction, or modification and the use or intended use for the determination of specific impacts.

Construction or modification of mosquito control or "drainage" ditches. The construction of mosquito control and drainage ditches is specifically intended to lower water levels within wetland systems. Whether ditches are constructed within the wetland community or adjacent to the wetland, the net result is the same but may differ in magnitude—all physical parameters are adversely affected as is wildlife utilization and gross primary production. Life form richness is moderately affected, since drainage may result in succession to a more terrestrial community with subsequent changes in types of life forms and gross primary production.

A recent study (Odum and Brown 1976) suggests that the construction of networks of ditches to drain wetlands and thus control mosquitoes may in reality do just the opposite. Drainage does lower water tables, but usually only during dryer times. Sufficient waters still accumulate in adequate quantities to breed mosquitoes, but without high waters to insure the survival of predator fish, populations of mosquitoes are larger. Not only will drainage have the likely effect of increasing mosquito populations, but it will disrupt other valuable functions of wetlands as well. The drainage of wetlands for any reason should be discouraged.

Drainage ditches constructed in areas adjacent to wetlands alter quantity and quality of surface water flows, thus all physical parameters except evapotranspiration are moderately affected. In addition wildlife utilization may be moderately affected, since the presence of heavy equipment and extensive alterations of physical parameters may drive wildlife from the area.

Operation of motorized vehicles including airboats. The operation of motorized vehicles within wetlands can have a major impact on wildlife, depending on the frequency of occurrence. Continual disturbance caused by high noise levels may drive wildlife from the area and interfere with normal breeding, feeding, and other activities. Even in areas adjacent to wetlands, if noise generated by motorized vehicles is sufficient, wildlife can be adversely affected. Oil contamination of waters from exhaust of motorized boats can be significant, causing a degradation of water quality (the potential for moderate effect) and stress to water fowl.

The airboat is a special threat to marsh structure and function as is the all terrain vehicle (ATV) to all wetlands. Since airboats can traverse many marsh wetlands, the effects on wildlife, life form richness, and gross primary production can be severe in high traffic areas, and ATV's driven within wetlands can have major impacts on biological parameters. However, the permitting of recreational activities may be especially difficult for local governments, and since the population of airboats and ATV's has not reached such critical levels as to represent a substantial threat to wetlands, the effects on life form richness and gross primary production remain nominal in the activity impact matrix.

The operation of motorized vehicles in areas adjacent to wetlands can have moderate impact on wildlife, since high noise levels in these adja-

cent areas can interfere with normal breeding, feeding, and other activities.

Expansion of existing structures or improved areas. The presence of existing structures may have had adverse impacts in the past, but these previous impacts are not considered here. However, any expansion of existing structures or improved areas is considered to be new construction having present and possible future impacts, and thus those impacts are considered here.

Expansion of existing structures is defined as any addition to structure that represents an increase in total enclosed floor space, roofed floor space, uncovered decks, or slabs in excess of 10% of the existing floor space or that cost a total of at least 10% of the physical value of the existing structure, whichever is lower. The expansion of improved areas is defined as any activity such as the deposition of fill material, new road work, dredging, impounding, or the clearing of vegetation that represents an increase in area of "improvement" of at least 10% of the area presently in the "improved state."

Such activities may have adverse impact beyond those already experienced because of the presence of the existing structure or improved area. Since the magnitude of the impact is related to the present and intended use of the structure or improved area and specific construction activities, the magnitude of impact is designated as moderate, and one is directed to the specific activity and/or intended use for the determination of specific impacts.

Dredging of any kind other than for mosquito control or drainage ditches. Dredging is defined as: to dig, gather, or pull out soil, organic mattter, peat, or muck from the ground surface or below the ground surface within a wetland or adjacent area. As already discussed under "construction of mosquito control or drainage ditches," dredging of material from a wetland community has an overall adverse impact on all parameters by lowering water tables, interrupting surface water flows, reducing potential recharge, and altering hydroperiod. In addition, depending on the degree of dredging, wildlife, life form richness, and gross primary production are adversely affected.

Dredging in areas adjacent to wetlands has moderate impact on all parameters, the degree of impact depending on the magnitude of the dredging activity, topography, and groundwater conditions present.

Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land. The discharge of sewage effluent into wetland communities has been tried on an experimental basis for approximately 7 years. Generally, the test results of this means of wastewater disposal are favorable. However, the discharge of effluents into wetland communities is still considered to be experimental by the Florida Department of Environmental Regulation, and special permits from DER are required (see section IV-3 of Implementation Strategies). Further, it is felt that any discharges of sewage effluent should be permitted by the local government agency as well, since there are moderate impacts associated with such actions. All physical parameters except evapotranspiration are affected with the increase of water levels due to the quantity of water released and the increased nutrient load. Biological parameters are also affected, since increased nutrient loading generally increases gross primary production, changes types of life forms present, increases the utilization by wildlife, and may change species of wildlife attracted to the wetland.

The discharge of wastes in areas adjacent to wetland has nominal impact upon all parameters, unless the discharge requires extensive alteration of the area in which case, one is directed to all associated activities for the determination of specific impacts.

Bulkheading. Bulkheading is defined as the construction of any structure, partition, retaining wall, or earthen mound that interrupts, resists, directs, or shuts off the natural flow of surface water. Bulkheads can be used to accomplish either of two tasks, impound water or restrict the flow of water, and either task has an adverse impact on most physical parameters of importance. The net result of bulkheading is an alteration of the quantity of water flow and water storage, thus adversely affecting water quality enhancement, hydroperiod, and storage capacities. Impoundment results in too much water, lengthening hydroperiod, reducing potential water quality enhancement, and affecting evapotranspiration. Deeper water and longer hydroperiods will severely stress some wetland vegetation not adapted to such conditions because each wetland community

type has very specific water depth requirements and hydroperiods. All biological parameters are moderately impacted, since bulkheading will not necessarily kill the community completely but only cause shifts in floristic and wildlife species.

Bulkheads in areas adjacent to wetlands can reduce the total volume of surface water flow received, having an adverse effect on hydroperiod and storage capacity with moderate effects on water quality enhancement and potential recharge. In the same manner, biological parameters are moderately affected, since reduced surface water flows will cause shifts in species composition to species that are more tolerant to the drier conditions.

Filling other than in conjunction with construction of permitted structures or improved areas and/or greater than 10% of wetland area within property boundary. Filling is defined as the deposition of soil, rock, riprap, organic matter, or any other material that results in raising the ground surface elevation. The net result of filling wetlands is the alteration of hydrologic conditions to such an extent as to create upland conditions (i.e., dry land) where wetland conditions prevailed. Thus the impact is adverse on most physical parameters. Water quality enhancement, hydroperiod, storage capacity, and recharge potential are adversely affected, since ground levels are raised and wetland vegetation is eliminated. Moderate effects are shown for evapotranspiration, since in some cases evapotranspiration may be increased due to changes in vegetation. Adverse effects are shown for all biological parameters, since vegetation is eliminated and most physical parameters have been changed.

Filling in areas adjacent to wetlands has moderate impact on all physical parameters, since quality and quantity of surface water flows may be altered. The impacts associated with filling in adjacent areas on biological parameters are shown to be nominal, since this activity may have only indirect effects on these parameters.

Use of any pesticide or herbicide. Pesticides and herbicides have negative impact on the biological components of wetland communities. Wildlife is adversely affected from the actions of pesticides, and life form richness and gross primary production are adversely affected from the actions of herbicides. With the adverse effects of herbicides on plant life, there is a corresponding adverse effect on evapotranspiration and

water quality enhancement. An adverse impact is shown for recharge potential, since the recharge of waters contaminated with pesticides and herbicides represents a serious threat to health safety. Other parameters show only nominal impacts.

The use of pesticides and herbicides in areas adjacent to wetlands may have adverse to moderate impacts depending on the runoff characteristics of these surrounding areas, thus impacts for water quality enhancement, evapotranspiration, and biological parameters are given as moderate.

Installation of utilities. Utilities used in this context refer to electrical transmission lines, sewage lines, storm water lines, potable water supply lines, and associated access roads necessary for maintenance. Generally, such utility systems in themselves cause moderate impact to wetland communities. Transmission lines have minor structures that touch the ground thus impact is relatively small. Other utility systems that are below ground have impact during construction since there is much digging; however, once in place and vegetation and original contours reestablished, little long-term impact is realized. The major problem with utility systems traversing wetland communities is the access road that must accompany the system. Usually fill material is dug directly from either the wetland site or an adjacent site and deposited to develop a roadbed. The digging and filling can cause major impact in itself and have long-term impact through impeding surface water flows, impounding waters, and altering hydroperiods. In this respect, the roads are much like bulkheads.

Water quality enhancement is adversely impacted, as is hydroperiod and storage capacity. Evapotranspiration and recharge potential are moderately affected, since vegetation is not severely altered, and the wetland can still act as a dry season recharge system.

All biological parameters are moderately impacted, since the roads are like bulkheads, not killing the community completely, but causing shifts in the floristic and wildlife composition of the wetland.

The roads that accompany utility systems and the system itself, when constructed in areas adjacent to wetland communities, generally do not impede surface water flows, thus have nominal impact. For the most part, roads on these dryer lands do not act as bulkheads, since they are not constructed specifically to surround a wetland community, and can be

designed and constructed with culverts of sufficient size and quantity to insure that waters are not impounded or impeded.

Filling less than or equal to 10% of wetland area within property boundary. Filling is defined as the deposition of soil, rock, riprap, organic matter, or any other material that results in raising the ground surface elevation.

If the area of fill is kept at 10% of the area of wetland, if every precaution is taken to minimize disturbance of surrounding unaltered areas, and if roads and filled areas are designed so as not to impede, interrupt, or otherwise negatively affect surface water flows, impacts associated with filling are moderate. The stress associated with a 10% reduction in wetland community area will be moderate concerning all parameters as long as secondary impacts are minimized and great care is taken to insure that there is no long-term degradation of a larger area of the wetland.

Filling in areas adjacent to wetlands has moderate impact on all physical parameters, since quality and quantity of surface water flows may be altered. The impacts associated with filling in adjacent areas on biological parameters are nominal, since this activity may have only indirect effects on these parameters.

Clearing of vegetation in conjunction with the construction of permitted structures. The clearing of vegetation within wetland communities where the area of clearing is not greater than 10% of the wetland within the property boundaries will have moderate impacts on all parameters for the community as a whole. A loss of 10% of the structure of any community will have some impact on physical and biological parameters, but in the long run the associated stress will not be of sufficient magnitude to disrupt functional values completely. It is imperative, however, that the area of clearing not be greater than 10% and that the sum of all disturbed land, whether filled, cleared, or otherwise altered, not be greater than 10% of the wetland area within the property boundary.

Great care must be taken to insure that disruption of surrounding unaltered vegetation be minimized and that the clearing operations do not leave debris spoil or other matter that will negatively impact surface water flows in surrounding areas of the wetland community.

Clearing in areas adjacent to wetlands will have moderate impact on physical parameters, since the quality and quantity of surface water flows may be altered. The impacts associated with clearing in adjacent areas are nominal, since this activity may have only indirect effects on these parameters.

Construction of permitted structures. Permitted structures are those outlined in the Seminole County Land Development Code (SCLDC) and include all structures listed as permitted uses under the following zoning classifications:

	Art. # SCLDC
AC Agricultural Development & Conservation District	V
A-1 Agricultural	VI
RC-1 Country Homes District	VII
R-1, R-1B, and R-1BB Single-Family Dwelling District	VIII
R-1AAA, R-1AA, and R-1A Single-Family Dwelling District	IX
R-2 One- and Two-Family Dwelling Districts	X
R-3 and R-3A Multiple-Family Dwelling District	XI
R-4 Multiple-Family Dwelling District	XII
RM-1 Single-Family Mobile Home Residential District	XIII
RM-2 Single-Family Mobile Home Park District	XIV
RM-3 Travel Trailer Park and Campsites	XV
PUD Planned Unit Development	XVIII
UC University Community District	XIX
PLI Public Lands and Institutions	XX
RP Residential Professional	XXI
OP Office District	XXII
CN Restricted Neighborhood Commercial District	XXIII
C-1 Retail Commercial District	XXIV
C-2 Retail Commercial District	XXV
C-3 General Commercial and Wholesale District	XXVI
CS Convenience Commercial District	XXVII
M-1A Very Light Industrial District	XXVIII

The zoning classification M-1, Industrial District (Art XXIX, SCLDC), is a conflicting use because of the magnitude of construction activity, building and improved area size, and potential long-term adverse impacts

associated with the types of industrial operations permitted under this zoning classification.

The construction of permitted structures will have moderate impact on all parameters, depending on the magnitude of construction activity. Impacts may be greatly reduced if structures are elevated on pilings rather than situated on filled lands. Associated improved areas that must be filled are the main source of negative impact. Long-term impact as a result of the maintenance of improved areas and runoff from lawns and parking lots can be minimized if filled areas are kept to a minimum. At no time should the area of filled roads, access drives, docks, catwalks, decks, and all other disturbed areas be greater than 10% of the wetlands within the property boundary.

The construction of permitted structures in areas adjacent to wetlands has nominal impact on all parameters. However, all other development activities associated with construction may have moderate to adverse impact, and each development activity should be consulted separately.

Installation of septic tanks. The use of septic tanks in wetlands can have adverse impact on the ability of the wetland to enhance water quality if concentrations of sewage are too large or if the vegetation and drainage characteristics of the wetlands are altered to such an extent that vegetation can no longer serve the function of nutrient uptake. This can occur either by vegetation removal or by channelization of water flow through the wetland. Other parameters are moderately affected, with the degree of impact related to the size and density of septic tank.

Septic tanks in adjacent areas to wetlands have only nominal impact upon wetland parameters, with the exception of water quality enhancement and hydroperiod, which may be moderately affected because of increased nutrient loads and water inputs.

Installation of storm water retention basins. Because of the increased volume of water, and because of the loss of vegetation and the dredging necessary to install such systems within wetlands, there is an adverse impact on all parameters. Most wetland communities act as "natural" storm water retention areas and filters, but these functions can be severely impaired if altered through dredging and/or channelization to "improve" water holding capacity or flow.

The most advantageous system is to construct retention basins adjacent to wetlands to collect runoff waters and then release them slowly to the receiving wetland. The impacts associated with the installation of such storm water systems in adjacent lands are for the most part nominal if runoff waters are not seriously degraded in quality such as those that may come from some industrial and commercial land uses. Water quality enhancement and hydroperiod are moderately affected with the increased quantity of water and accompanying nutrients and other pollutants.

Storage, use, or disposal of any hazardous material. Because of the nature of wetlands as interface systems between uplands and both surface water and groundwater, the potential for serious impact resulting from hazardous materials use, storage, or disposal within wetlands is very great. Adverse impacts are shown for water quality enhancement, potential recharge, wildlife, and gross primary production. Nominal effects are shown for other physical parameters, since these activities do not impact them directly. Life form richness is shown as moderately affected, since such activities may cause loss of vegetation depending on the specific activity and material involved.

The use, storage, and/or disposal of hazardous materials in areas adjacent to wetlands is shown to have the same impacts as these same activities within the wetland, since hazardous materials tend to have long life and great mobility when released in the environment.

Solid waste disposal. The use of wetland communities and adjacent areas for the disposal of solid wastes can have obvious adverse effects on the structure and function of these communities. The deposition of potential hazardous material within or adjacent to wetlands, as discussed in the previous activity, can have severe impact upon surface water and groundwater systems. In addition, dredging for landfill purposes destroys all wetland functions when done within the wetland, and can have adverse impacts on physical parameters when done in adjacent areas. Lowered water levels, loss of surface water supplies (in some cases), and increases in surface water runoff (in other cases) all contribute to adverse impacts.

Since the materials deposited in solid waste disposal areas are not entirely made up of hazardous materials, the impacts associated with the use of adjacent areas as waste disposal sites are not as severe as mentioned concerning the disposal of hazardous materials; as a consequence,

moderate impacts are shown for recharge potential and wildlife utilization. Moderate impacts are shown for normal and storm water storage capacity, as the activities of dredging and filling in adjacent areas may increase surface water runoff and/or decrease groundwater flows.

Development Activities and Wetland Compatibility

The compatibility matrices given in Tables IV-4a through IV-4g are for each wetland community and indicate potential development activities and whether they are compatible, incompatible, or compatible subject to restrictions (compatible with permit) for each wetland parameter. This information is drawn from the ranking matrix (Table IV-2) and based on the likely impact of each development activity on the various functions as given in Table IV-3.

In addition to effects associated with activities within wetlands, the compatibility matrix (Tables IV-4a through IV-4g) lists the compatibility of activities in immediately adjacent or surrounding areas for each wetland. Compatibility associated with adjacent areas rests with the secondary effect an activity in these areas may have on the functions of each wetland. For instance, dredging in areas adjacent to seepage wetlands like hydric hammocks or bayheads can negatively impact the amount and quality of groundwater available, thus having a deleterious effect. On the other hand, dredging in proximity to wetlands that receive little groundwater inflow or surface sheet flow may not have such a negative effect.

To determine which development activities are incompatible, compatible, or compatible with restrictions, the values associated with each wetland function affected are determined from the ranking matrix (Table IV-2) and compared with effects in Table IV-3. High values that are adversely affected are associated with incompatible uses, median values are associated with compatible uses subject to restrictions, and low values are associated with compatible uses.

There are nine combinations of values (high, moderate, and low) with potential development impact (adverse, moderate, and nominal). The determination of compatibility with each of the biological and physical parameters is as follows:

Table IV-4a. Compatibility matrix: DEEP MARSH.

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agricultural or horticultural crops	CP	C	I	CP	CP	C	I	C	I	C	C	C	I	CP	CP	C	I	C
Harvesting of timber and wood products	C	C	CP	CP	CP	C	C	C	C	C	C	C	I	CP	CP	C	I	C
Cultivating naturally occurring agric. or hort. products	C	C	CP	C	C	C	C	C	CP	C	C	C	CP	C	CP	C	CP	C
Scenic, historic, wildlife, or scientific preserves	C	C	C	C	C	C	C	C	CP	C	C	C	CP	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Removing natural products of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and creation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Timber catwalks and docks >4 ft wide	C	C	C	C	CP	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Establishing plantings	C	C	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C
Substantial restoration or reconstruction or mod. of existing structures	C	C	CP	CP	CP	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C

Table IV-4a. Compatibility matrix: DEEP MARSH (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	CP	C	I	CP	I	C	I	CP	I	CP	CP	C	I	CP	CP	C	I	C
Operation of motorized vehicles including airboats	C	C	C	C	C	C	C	C	C	C	C	C	I	CP	C	C	C	C
Expansion of existing structures or improved areas	C	C	CP	CP	CP	C	CP	C	CP	CP	C	C	CP	CP	CP	C	CP	C
Dredging of any kind other than for mosquito control or drainage ditches	CP	C	I	P	CP	CP	I	CP	I	CP	CP	C	I	CP	CP	CP	I	CP
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	C	C	CP	C	C	C	C	C	CP	C	C	C	CP	C	CP	C	CP	C
Bulkheading	CP	C	I	I	CP	C	I	I	I	I	C	C	CP	CP	CP	CP	CP	CP
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	CP	C	I	CP	CP	CP	I	CP	I	CP	CP	C	I	CP	CP	C	I	C
Use of any pesticide or herbicide	CP	C	C	C	CP	CP	C	C	C	C	CP	C	I	CP	CP	CP	I	CP
Installation of utilities	CP	C	I	C	CP	C	I	C	I	C	C	C	CP	C	CP	C	CP	C
Filling ≤10% of wetland within property in conjunction with the construction of permitted structures	C	C	CP	CP	CP	CP	CP	CP	CP	CP	C	C	CP	C	CP	C	CP	C
Clearing of vegetation in conjunction with construction of permitted structures	C	C	CP	CP	CP	CP	CP	CP	CP	CP	C	C	CP	C	CP	C	CP	C

Table IV-4a. Compatibility matrix: DEEP MARSH (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	C	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C
Installation of septic tanks	CP	C	CP	CP	C	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C
Installation of storm water retention basin	CP	C	I	CP	CP	C	I	CP	I	CP	CP	C	I	C	CP	C	I	C
Storage, use, or disposal of any hazardous material	CP	CP	C	C	C	C	C	C	C	C	CP	CP	I	I	CP	CP	I	CP
Solid waste disposal	CP	CP	I	I	CP	C	I	CP	I	CP	CP	C	I	CP	CP	C	I	C

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Table IV-4b. Compatibility matrix: HARDWOOD SWAMP.

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agricultural or horticultural crops	I	CP	CP	CP	CP	C	CP	C	CP	C	C	C	CP	CP	I	C	I	C
Harvesting of timber and wood products	CP	CP	CP	CP	CP	C	C	C	C	C	C	C	CP	CP	I	C	I	C
Cultivating naturally occurring agric. or hort. products	CP	C	CP	C	C	C	C	C	CP	C	C	C	CP	C	CP	C	CP	C
Scenic, historic, wildlife, or scientific preserves	C	C	C	C	C	C	C	C	CP	C	C	C	CP	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Removing natural products of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and creation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Timber catwalks and docks >4 ft wide	CP	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Establishing plantings	CP	C	CP	C	C	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C
Substantial restoration or reconstruction or mod. of existing structures	CP	C	CP	CP	C	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C

Table IV-4b. Compatibility matrix: HARDWOOD SWAMP (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	I	CP	CP	CP	CP	C	CP	CP	CP	CP	CP	C	CP	CP	CP	C	I	C
Operation of motorized vehicles including airboats	CP	C	C	C	C	C	C	C	C	C	C	C	CP	CP	C	C	C	C
Expansion of existing structures or improved areas	CP	CP	CP	CP	C	C	CP	C	CP	CP	C	C	CP	CP	CP	C	CP	C
Dredging of any kind other than for mosquito control or drainage ditches	I	CP	CP	CP	CP	C	CP	CP	CP	CP	CP	C	CP	CP	I	CP	I	CP
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	CP	C	CP	C	C	C	C	C	CP	C	C	C	CP	C	CP	C	CP	C
Bulkheading	I	CP	CP	CP	C	C	CP	CP	CP	CP	C	C	CP	CP	CP	CP	CP	CP
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	I	CP	CP	CP	C	C	CP	CP	CP	CP	C	C	CP	CP	CP	CP	CP	CP
Use of any pesticide or herbicide	I	CP	C	C	CP	C	C	C	C	C	C	C	CP	CP	I	CP	I	CP
Installation of utilities	I	C	CP	C	C	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C
Filling $\leq$10% of wetland within property in conjunction with the construction of permitted structures	CP	CP	CP	CP	C	C	CP	CP	CP	CP	C	C	CP	C	CP	C	CP	C
Clearing of vegetation in conjunction with construction of permitted structures	CP	CP	CP	CP	C	C	CP	CP	CP	CP	C	C	CP	C	CP	C	CP	C

Table IV-4b. Compatibility matrix: HARDWOOD SWAMP (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	CP	C	CP	C	C	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C
Installation of septic tanks	I	CP	CP	CP	C	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C
Installation of storm water retention basin	I	CP	CP	CP	C	C	CP	CP	CP	CP	C	C	CP	C	I	C	I	C
Storage, use, or disposal of any hazardous material	I	I	C	C	C	C	C	C	C	C	CP	CP	CP	CP	CP	CP	I	CP
Solid waste disposal	I	I	CP	CP	CP	C	CP	CP	CP	CP	CP	C	CP	CP	I	C	I	C

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Table IV-4c. Compatibility matrix: CYPRESS DOME.

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agri-cultural or horti-cultural crops	I	CP	CP	CP	I	C	CP	C	CP	C	CP	C	CP	CP	I	C	CP	C
Harvesting of timber and wood products	CP	CP	CP	CP	CP	C	C	C	C	C	C	C	CP	CP	I	C	CP	C
Cultivating naturally occurring agric. or hort. products	CP	C	CP	C	C	C	C	C	CP	C	C	C	CP	C	CP	C	CP	C
Scenic, historic, wild-life, or scientific preserves	C	C	C	C	C	C	C	C	CP	C	C	C	CP	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Removing natural products of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and creation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Timber catwalks and docks >4 ft wide	CP	C	C	C	CP	C	C	C	C	C	CP	C	CP	C	CP	C	CP	C
Establishing plantings	CP	C	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C	CP	C
Substantial restoration or reconstruction or mod. of existing structures	CP	C	CP	CP	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C

Table IV-4c. Compatibility matrix: CYPRESS DOME (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	I	CP	CP	CP	I	C	CP	CP	CP	CP	I	CP	CP	CP	CP	C	CP	C
Operation of motorized vehicles including airboats	CP	C	C	C	C	C	C	C	C	C	C	C	CP	CP	C	C	C	C
Expansion of existing structures or improved areas	CP	CP	CP	CP	CP	C	CP	C	CP	CP	CP	C	CP	CP	CP	C	CP	C
Dredging of any kind other than for mosquito control or drainage ditches	I	CP	CP	CP	I	CP	CP	CP	CP	CP	I	CP	CP	CP	I	CP	CP	CP
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	CP	C	CP	C	C	C	C	C	CP	C	CP	C	CP	C	CP	C	CP	C
Bulkheading	I	CP	CP	CP	CP	C	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	I	CP	CP	CP	CP	CP	CP	CP	CP	CP	I	CP	CP	C	I	C	CP	C
Use of any pesticide or herbicide	I	CP	C	C	I	CP	C	C	C	C	I	CP	CP	CP	I	CP	CP	CP
Installation of utilities	I	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C
Filling $\leq$10% of wetland within property in conjunction with the construction of permitted structures	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	C	CP	C
Clearing of vegetation in conjunction with construction of permitted structures	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	C	CP	C

Table IV-4c. Compatibility matrix: CYPRESS DOME (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotranspiration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C
Installation of septic tanks	I	CP	CP	CP	C	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C
Installation of storm water retention basin	I	CP	CP	CP	I	C	CP	CP	CP	CP	I	C	CP	C	I	C	CP	C
Storage, use, or disposal of any hazardous material	I	I	C	C	C	C	C	C	C	C	I	I	CP	CP	CP	CP	CP	CP
Solid waste disposal	I	I	CP	CP	I	C	CP	CP	CP	CP	I	CP	CP	CP	I	C	CP	C

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Table IV-4d. Compatibility matrix: BAYHEAD.

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agricultural or horticultural crops	CP	CP	CP	CP	I	C	CP	C	CP	C	CP	C	CP	C	I	C	CP	C
Harvesting of timber and wood products	CP	CP	CP	CP	CP	C	C	C	C	C	C	C	CP	C	I	C	CP	C
Cultivating naturally occurring agric. or hort. products	CP	C	CP	C	C	C	C	C	CP	C	C	C	C	C	CP	C	C	C
Scenic, historic, wildlife, or scientific preserves	C	C	C	C	C	C	C	C	CP	C	C	C	C	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Removing natural products of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and creation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C
Timber catwalks and docks >4 ft wide	CP	C	C	C	CP	C	C	C	C	C	CP	C	C	C	CP	C	C	C
Establishing plantings	CP	C	CP	C	CP	C	CP	C	CP	C	C	C	C	C	CP	C	C	C
Substantial restoration or reconstruction or mod. of existing structures	CP	C	CP	CP	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	C	C

Table IV-4d. Compatibility matrix: BAYHEAD (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	CP	CP	CP	CP	I	C	CP	CP	CP	CP	CP	CP	CP	C	CP	C	CP	C
Operation of motorized vehicles including airboats	CP	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Expansion of existing structures or improved areas	CP	CP	CP	CP	CP	C	CP	C	CP	CP	CP	C	C	C	CP	C	C	C
Dredging of any kind other than for mosquito control or drainage ditches	CP	CP	CP	CP	I	CP	CP	CP	CP	CP	CP	CP	CP	C	I	CP	CP	C
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	CP	C	CP	C	C	C	C	C	CP	C	CP	C	C	C	CP	C	C	C
Bulkheading	CP	CP	CP	CP	CP	C	CP	CP	CP	CP	CP	CP	C	C	CP	CP	C	C
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	I	C	CP	C
Use of any pesticide or herbicide	CP	CP	C	C	I	CP	C	C	C	C	CP	CP	CP	C	I	CP	CP	C
Installation of utilities	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	C	C
Filling $\leq$10% of wetland within property in conjunction with the construction of permitted structures	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	C	CP	C
Clearing of vegetation in conjunction with construction of permitted structures	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	C	CP	C

Table IV-4d. Compatibility matrix: BAYHEAD (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotranspiration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C
Installation of septic tanks	CP	CP	CP	CP	C	C	CP	C	CP	C	CP	C	C	C	CP	C	C	C
Installation of storm water retention basin	CP	CP	CP	CP	I	C	CP	CP	CP	CP	CP	C	CP	C	I	C	CP	C
Storage, use, or disposal of any hazardous material	CP	CP	C	C	C	C	C	C	C	C	CP	CP	CP	CP	CP	CP	CP	C
Solid waste disposal	CP	CP	CP	CP	I	C	CP	CP	CP	CP	CP	CP	CP	C	I	C	CP	C

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Table IV-4e. Compatibility matrix: HYDRIC HAMMOCK.

Activity	Water Quality Enhancement		Hydroperiod		Evapotranspiration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agricultural or horticultural crops	CP	C	CP	C	CP	C	CP	C	CP	C	C	C	I	CP	CP	C	I	C
Harvesting of timber and wood products	C	C	C	C	CP	C	C	C	C	C	C	C	I	CP	CP	C	I	C
Cultivating naturally occurring agric. or hort. products	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Scenic, historic, wildlife, or scientific preserves	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Removing natural products of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and creation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Timber catwalks and docks >4 ft wide	C	C	C	C	CP	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Establishing plantings	C	C	C	C	CP	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Substantial restoration or reconstruction or mod. of existing structures	C	C	C	C	CP	C	C	C	C	C	C	C	CP	C	CP	C	CP	C

Table IV-4e. Compatibility matrix: HYDRIC HAMMOCK (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	I	CP	CP	C	I	C
Operation of motorized vehicles including airboats	C	C	C	C	C	C	C	C	C	C	C	C	I	CP	C	C	C	C
Expansion of existing structures or improved areas	C	C	C	C	CP	C	C	C	C	C	C	C	CP	CP	CP	C	CP	C
Dredging of any kind other than for mosquito control or drainage ditches	CP	C	CP	C	CP	CP	CP	C	CP	C	CP	C	I	CP	CP	CP	I	CP
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	CP	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Bulkheading	CP	C	CP	CP	CP	C	CP	CP	CP	CP	C	C	CP	CP	CP	CP	CP	CP
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	CP	C	CP	C	CP	CP	C	C	CP	C	CP	C	I	C	CP	C	I	C
Use of any pesticide or herbicide	CP	C	C	C	CP	CP	CP	C	C	C	C	C	I	CP	CP	CP	I	CP
Installation of utilities	CP	C	CP	C	CP	C	C	C	CP	C	C	C	CP	C	CP	C	CP	C
Filling $\leq$10% of wetland within property in conjunction with the construction of permitted structures	C	C	C	C	CP	CP	C	C	C	C	C	C	CP	C	CP	C	CP	C
Clearing of vegetation in conjunction with construction of permitted structures	C	C	C	C	CP	CP	C	C	C	C	C	C	CP	C	CP	C	CP	C

Table IV-4e. Compatibility matrix: HYDRIC HAMMOCK (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	C	C	C	C	CP	C	C	C	C	C	C	C	CP	CP	CP	C	CP	C
Installation of septic tanks	CP	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C
Installation of storm water retention basin	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	I	C	CP	C	I	C
Storage, use, or disposal of any hazardous material	CP	CP	C	C	C	C	C	C	C	C	CP	CP	I	I	CP	CP	I	CP
Solid waste disposal	CP	CP	CP	CP	CP	C	CP	C	CP	C	CP	C	I	CP	CP	C	I	C

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Table IV-4f. Compatibility matrix: SHALLOW MARSH.

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agri-cultural or horti-cultural crops	I	CP	I	CP	CP	C	I	C	I	C	CP	C	I	CP	CP	C	CP	C
Harvesting of timber and wood products	CP	CP	CP	CP	CP	C	C	C	C	C	C	C	I	CP	CP	C	CP	C
Cultivating naturally occurring agric. or hort. products	CP	C	CP	C	C	C	C	C	CP	C	C	C	CP	C	CP	C	C	C
Scenic, historic, wild-life, or scientific preserves	C	C	C	C	C	C	C	C	CP	C	C	C	CP	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Removing natural prod-ucts of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and cre-ation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	CP	C	C	C
Timber catwalks and docks >4 ft wide	CP	C	C	C	CP	C	C	C	C	C	CP	C	CP	C	CP	C	C	C
Establishing plantings	CP	C	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C	C	C
Substantial restoration or reconstruction or mod. of existing structures	CP	C	CP	CP	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	C	C

Table IV-4f. Compatibility matrix: SHALLOW MARSH (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	I	CP	I	CP	CP	C	I	CP	I	CP	CP	CP	I	CP	CP	C	CP	C
Operation of motorized vehicles including airboats	CP	C	C	C	C	C	C	C	C	C	C	C	I	CP	C	C	C	C
Expansion of existing structures or improved areas	CP	CP	CP	CP	CP	C	CP	C	CP	CP	CP	C	CP	CP	CP	C	C	C
Dredging of any kind other than for mosquito control or drainage ditches	I	CP	I	CP	CP	CP	I	CP	I	CP	CP	CP	I	CP	CP	CP	CP	C
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	CP	C	CP	C	C	C	C	C	CP	C	CP	C	CP	C	CP	C	C	C
Bulkheading	I	CP	I	I	CP	C	I	I	I	I	CP	CP	CP	CP	CP	CP	C	C
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	I	CP	I	CP	CP	CP	I	CP	I	CP	CP	CP	I	C	CP	C	CP	C
Use of any pesticide or herbicide	I	CP	C	C	CP	CP	C	C	C	C	CP	CP	I	CP	CP	CP	CP	C
Installation of utilities	I	C	I	C	CP	C	I	C	I	C	CP	C	CP	C	CP	C	C	C
Filling ≤10% of wetland within property in conjunction with the construction of permitted structures	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	C	C	C
Clearing of vegetation in conjunction with construction of permitted structures	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	C	C	C

Table IV-4f. Compatibility matrix: SHALLOW MARSH (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C
Installation of septic tanks	I	CP	CP	CP	C	C	CP	C	CP	C	CP	C	CP	C	CP	C	C	C
Installation of storm water retention basin	I	CP	I	CP	CP	C	I	CP	I	CP	CP	C	I	C	CP	C	CP	C
Storage, use, or disposal of any hazardous material	I	I	C	C	C	C	C	C	C	C	CP	CP	I	I	CP	CP	CP	CP
Solid waste disposal	I	I	I	I	CP	C	I	CP	I	CP	CP	CP	I	CP	CP	C	CP	C

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Table IV-4g. Compatibility matrix: WET PRAIRIE.

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agri-cultural or horti-cultural crops	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	CP	CP	C	CP	C
Harvesting of timber and wood products	C	C	C	C	CP	C	C	C	C	C	C	C	NA	CP	CP	C	CP	C
Cultivating naturally occurring agric. or hort. products	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	CP	C
Scenic, historic, wild-life, or scientific preserves	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Removing natural prod-ucts of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and cre-ation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	CP	C	C	C	CP	C
Timber catwalks and docks >4 ft wide	C	C	C	C	CP	C	C	C	C	C	CP	C	CP	C	C	C	CP	C
Establishing plantings	C	C	C	C	CP	C	CP	C	CP	C	C	C	CP	C	C	C	CP	C
Substantial restoration or reconstruction or mod. of existing structures	C	C	C	C	CP	C	CP	C	CP	C	CP	C	CP	C	C	C	CP	C

Table IV-4g. Compatibility matrix: WET PRAIRIE (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	CP	C	CP	C	CP	C	CP	CP	CP	CP	CP	CP	CP	CP	C	C	CP	C
Operation of motorized vehicles including airboats	C	C	C	C	C	C	C	C	C	C	C	C	CP	CP	C	C	C	C
Expansion of existing structures or improved areas	C	C	C	C	CP	C	CP	C	CP	CP	CP	C	CP	CP	C	C	CP	C
Dredging of any kind other than for mosquito control or drainage ditches	CP	C	CP	C	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	CP
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	C	C	C	C	C	C	C	C	CP	C	CP	C	CP	C	C	C	CP	C
Bulkheading	CP	C	CP	CP	CP	C	CP	CP	CP	CP	CP	CP	CP	CP	C	C	CP	CP
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	CP	C	CP	C	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	C	CP	C
Use of any pesticide or herbicide	CP	C	C	C	CP	CP	C	C	C	C	CP	CP	CP	CP	CP	C	CP	CP
Installation of utilities	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	C	C	CP	C
Filling $\leq$10% of wetland within property in conjunction with the construction of permitted structures	C	C	C	C	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	C	C	CP	C
Clearing of vegetation in conjunction with construction of permitted structures	C	C	C	C	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	C	C	CP	C

Table IV-4g. Compatibility matrix: WET PRAIRIE (continued).

Activity	Water Quality Enhancement		Hydroperiod		Evapotrans-piration		Normal Storage Capacity		Storm Storage Capacity		Recharge Potential		Wildlife Utilization		Life Form Richness		Gross Primary Production	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	C	C	C	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C	CP	C
Installation of septic tanks	CP	C	C	C	C	C	CP	C	CP	C	CP	C	CP	C	C	C	CP	C
Installation of storm water retention basin	CP	C	CP	C	CP	C	CP	CP	CP	CP	CP	C	CP	C	CP	C	CP	C
Storage, use, or disposal of any hazardous material	CP	CP	C	C	C	C	C	C	C	C	CP	CP	CP	CP	CP	CP	CP	CP
Solid waste disposal	CP	CP	CP	CP	CP	C	CP	CP	CP	CP	CP	CP	CP	CP	CP	C	CP	C

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Value of Parameter (Found in Table IV-2)	Potential Impact (Found in Table IV-3)	Compatibility (Found in Table IV-4)
High	Adverse	Incompatible (I)
	Moderate	Compatible with Permit (CP)
	Nominal	Compatible (C)
Moderate	Adverse	Compatible with Permit (CP)
	Moderate	Compatible with Permit (CP)
	Nominal	Compatible (C)
Low	Adverse	Compatible with Permit (CP)
	Moderate	Compatible (C)
	Nominal	Compatible (C)

Use Guideline Matrix: Determination of Activity/Parameter Compatibility

The Use Guideline Matrix (Table IV-5) lists the compatibility of potential development activities with respect to each wetland type. The table represents a summation of the compatibilities of activities with each wetland parameter from Tables IV-4a through IV-4g for activities that occur within wetlands and activities that occur adjacent to wetlands.

The determination of compatibility of development activities within wetland types is based on the summation of compatibilities for parameters for each wetland and is as follows:

1. Incompatible Activity (I)—At least two activities/parameters designated as incompatible.
2. Compatible with Permit (CP)—One incompatible activity or a majority of activities/parameters having compatible with permit (CP) designation. (Since there are nine parameters, a majority will constitute at least five parameters.)
3. Compatible Activity (C)—A majority of activities/parameters having a compatible designation and no incompatible activities/parameters.

The determination of compatibility of development activities in areas adjacent to wetlands is based on the summation of compatibilities for parameters affected by activities in adjacent areas and is as follows:

Table IV-5. Use guideline matrix.

Activity	Deep Marsh		Mixed Hardwood Swamp		Cypress Domes		Bayheads		Hydric Hammock		Shallow Marsh		Wet Prairie	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agricultural or horticultural crops	I	C	I	C	I	C	I	C	I	C	I	C	CP	C
Harvesting of timber and wood products	NA	C	I	C	CP	C	CP	C	I	C	NA	C	NA	C
Cultivating naturally occurring agric. or hort. products	CP	C	CP	C	CP	C	C	C	C	C	CP	C	C	C
Scenic, historic, wildlife, or scientific preserves	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Removing natural products of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and creation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks >4 ft wide	C	C	C	C	CP	C	C	C	C	C	CP	C	C	C
Establishing plantings	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Substantial restoration or reconstruction or mod. of existing structures and improved areas	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C

Table IV-5. Use guideline matrix (continued).

Activity	Deep Marsh		Mixed Hardwood Swamp		Cypress Domes		Bayheads		Hydric Hammock		Shallow Marsh		Wet Prairie	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	I	CP	I	CP	I	CP	CP	CP	I	C	I	CP	CP	C
Operation of motorized vehicles including airboats	CP	C	C	C	C	C	C	C	CP	C	CP	C	C	C
Expansion of existing structures or improved areas	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Dredging of any kind other than for mosquito control or drainage ditches	I	CP	I	CP	I	CP	I	CP	I	C	I	CP	CP	CP
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	CP	C	CP	C	CP	C	CP	C	I*	C	CP	C	C	C
Bulkheading	I	I	CP	CP	CP	CP	CP	CP	CP	CP	I	I	CP	CP
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	I	CP	I	C	I	CP	CP	CP	I	C	I	CP	CP	C
Use of any pesticide or herbicide	I	CP	I	C	I	CP	I	C	I	C	I	CP	CP	C
Installation of utilities	I	C	CP	C	CP	C	CP	C	CP	C	I	C	CP	C
Filling $\leq$10% of wetland within property in conjunction with the construction of permitted structures	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Clearing of vegetation in conjunction with construction of permitted structures	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C

Table IV-5. Use guideline matrix (continued).

Activity	Deep Marsh		Mixed Hardwood Swamp		Cypress Domes		Bayheads		Hydric Hammock		Shallow Marsh		Wet Prairie	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Installation of septic tanks	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Installation of storm water retention basin	I	C	I	C	I	C	I	C	I	C	I	C	CP	C
Storage, use, or disposal of any hazardous material	I	I	I	I	I	I	CP	CP	I	CP	I	I	CP	CP
Solid waste disposal	I	CP	I	CP	I	CP	I	CP	I	C	I	I	CP	CP

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Criteria: ≥2 I:I; 1 I:CP; ≥5 CP:CP; ≥5 C:C (unless 1 or more I).

*I = Five of the six physical parameters for this wetland are "low" (see Table IV-2). The discharge of effluent or excess surface runoff requires that physical parameters be "moderate" or "high." With the large volume of water associated with the discharge of effluent, and high nutrient load, this wetland community would be under considerable stress. With low water quality enhancement potential, few nutrients are taken up, requiring a much greater area for "treatment." With low hydroperiod, storage capacity, and recharge potential, this community cannot effectively accept the large volume of water associated with waste discharge, or excess surface runoff.

1. Incompatible Activity—At least two activities/parameters designated as incompatible.
2. Compatible with Permit—One incompatible or a majority of activities/parameters having an incompatible or compatible with permit designation.
3. Compatible Activity—A majority of activities/parameters having a compatible designation.

The Use Guideline Matrix (Table IV-5) lists development activities and whether these activities are compatible, compatible with permit, or incompatible with each wetland type. Incompatible (I) uses are those uses that adversely affect at least two physical or biological functions. Such uses disrupt the normal functioning of wetland communities and can cause increased pollution of surface water and groundwater, increased flood risks, destruction of fish and wildlife habitat, and increased erosion and subsequent downstream sedimentation. Development activities that are designated as compatible (C) affect physical and biological functions in a nominal manner, and no permits are required. Those development activities that are designated as compatible with permit (CP) have the potential to affect physical and biological functions in an adverse manner if these activities are not subject to constraints that will limit their impact.

The Use Guideline Matrix should be consulted for <u>each</u> activity that is associated with a potential development. For instance, if a proposed development is to build a road through a wetland, material for the roadbed will be dredged from the wetland, and channels will be dug to facilitate storm water runoff, then "Dredging," "Filling," and "Drainage Ditches" should be consulted separately to determine the overall compatibility of the proposed road with the wetland affected.

If the designation for the proposed activity is incompatible (I), the activity should not occur within the wetland in question. If the designation is compatible (C), the proposed activity may proceed. If the designation is compatible with permit (CP), the proposed activity may proceed subject to the issuance of a wetlands development permit. The issuance of a wetlands development permit is subject to the proposed development meeting a set of performance criteria. Each activity that is designated as compatible with permit has a set of performance criteria that is designed to minimize potential adverse impacts upon the wetland in question.

The following discussion lists each permitted development activity and the constraints, or performance criteria, necessary to mitigate potential adverse impacts on physical and biological functions of importance.

Performance Criteria for Compatible With Permit Activities

Production of agricultural or horticultural crops. The production of agricultural or horticultural crops within wetlands is incompatible with all wetland types except wet prairies. This activity is compatible subject to the issuance of a wetlands development permit in wet prairies and must meet the following performance criteria:

Performance Criteria—

* Drainage ditches or channels shall not be any deeper than 3 feet.
* Water level control structures to maintain water levels at least mid-point of the water levels given in Table IV-1 during dry season are required at outfall points where surface waters exit property. The water level control structures shall be constructed as variable weirs, such that the height of the weir can be raised and lowered to facilitate control of water level in drainage ditches or channels.

The production of agricultural or horticultural crops in areas adjacent to wetlands is compatible with all wetland types. However, see "construction of drainage ditches," "use of pesticides and herbicides," and "filling" in areas adjacent to wetlands elsewhere in Table IV-5 for possible constraints that may affect agricultural or horticultural use of lands adjacent to particular wetland types.

Harvesting of timber and wood products. The harvesting of timber and wood products is incompatible with mixed hardwood swamps and hydric hammocks because of the adverse effects on biological functions. This activity is compatible subject to issuance of a wetlands development permit for cypress domes and bayheads and must meet the following performance criteria:

Performance Criteria—

* There shall be no drainage of the wetlands.
* Harvesting shall be carried out during the dry season (usually from October through May).

* The use of heavy equipment shall be discouraged.
* There shall be no construction of tramways nor roadways that require fill in cypress domes.
* Harvesting shall be carried out as selective cutting of timber rather than clear-cutting, where trees of 8 inches or greater dbh (diameter at breast height) are harvested.

The harvesting of timber and wood products in areas adjacent to wetlands is compatible with all wetland types. However, see "Dredging," "Bulkheading," "Filling," "Use of Pesticides and Herbicides," and "Construction of Drainage Ditches" in areas adjacent to wetlands for possible constraints that may affect timber and wood products harvesting in areas adjacent to particular wetland types.

Cultivating naturally occurring agricultural or horticultural products. The cultivation of naturally occurring vegetation is a compatible activity within bayheads, hydric hammocks, and wet prairies and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, and shallow marshes. The permitted activity must meet the following performance criteria:

Performance Criteria—

* There shall be no construction of drainage ditches, berms, or bulkheads nor filling of any kind.
* There shall be no diversion nor impoundment of water.
* There shall be no clear-cutting of vegetation—harvesting or cutting of vegetation, if necessary, should be done at a rate of 10% of the total wetland area per year, and those areas previously harvested shall be reseeded or revegetated and left untouched for a period of not less than 10 years.

The cultivation of naturally occurring vegetation in areas adjacent to wetlands is compatible with all wetland types. However, see "Dredging," "Bulkheading," "Filling," and "Construction of Drainage Ditches" in areas adjacent to wetlands for possible constraints that may affect cultivation of naturally occurring vegetation in areas adjacent to wetlands.

Scenic, historic, wildlife, or scientific preserves. The use of wetland communities and adjacent areas for scenic, historic, wildlife, or

scientific preserves is compatible with all wetland types. However, see all other appropriate development activities in Table IV-5 that are associated with the creation, maintenance, and operation of such preserves for possible constraints that may affect the use of particular wetland communities.

Maintenance (minor) or emergency repair to existing structures or improved areas. The maintenance or emergency repair of existing structures or improved areas within or in areas adjacent to wetland communities is compatible with all wetland types.

Removing natural products of wetlands in the process of recreational or commercial fishing, aquaculture, hunting or trapping, and creation and maintenance of temporary blinds. The above described activity is compatible within and in areas adjacent to all wetland communities. However, many of these activities are subject to regulations by other state, local, and federal agencies, and nothing in these regulations should be construed as to override, circumvent, or in any way affect the regulation and permitting of these activities by said agencies.

Cleared walking trails having no structural components. The establishment of cleared walking trails of 4 feet or less within and in areas adjacent to wetlands is compatible with all wetland types.

Timber catwalks and docks less than or equal to 4 feet wide. The construction of timber catwalks and docks less than or equal to 4 feet wide is compatible within and in areas adjacent to all wetland types. If compatibility changes because of wetland significance, use performance criteria for catwalks greater than 4 feet wide.

Timber catwalks and docks greater than 4 feet wide. The construction of timber catwalks and docks that are greater than 4 feet wide is compatible within deep marshes, mixed hardwood swamps, bayheads, hydric hammocks, and wet prairies and is compatible subject to the issuance of a wetlands development permit within cypress domes, and shallow marshes. The permitted activity must meet the following performance criteria:

Performance Criteria—

* The structure and foundation system of the catwalk or dock shall be designed so as not to impede, interrupt, or impound surface water flows.
* Construction shall take place only during the dry season (usually from October through May).

* The use of heavy equipment shall be minimized. Any clearing of vegetation shall be confined to the immediate right-of-way of the catwalk or dock and shall not exceed a width equal to the width of the catwalk or dock plus 5 feet to either side.
* There shall be no temporary filling of the wetland for construction or any other purposes except in those wetlands where filling is permitted.
* All pilings shall be driven to desired depth and shall not be jetted into the soil.

The construction of timber catwalks and docks in areas adjacent to wetlands is compatible with all wetland types. However, see all other activities listed in Table IV-5 that may relate to the construction of catwalks and docks for possible constraints.

Establishing plantings. The establishment of plantings within wetlands is compatible with hydric hammocks and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* The area of planting shall not exceed 10% of the area of each wetland or wetland area affected within the property boundary.
* There shall be no drainage of surface water or groundwater except in wet prairies where the construction of drainage ditches of not more than 3 feet depth is permitted.
* A buffer strip 100 feet wide of natural unaltered vegetation shall be left between the established planting and any surface water body or natural drainage system.

The establishment of plantings in areas adjacent to wetlands is compatible with all wetland types. However, see all other activites listed in Table IV-5 that may relate to associated activities with the establishment of plantings for possible constraints.

Substantial restoration or reconstruction or modification of existing structures and improved areas. The substantial restoration or reconstruction or modification of existing structures within wetlands is compatible subject to the issuance of a wetlands development permit with all wetland types except hydric hammock. In hydric hammocks this activity is compat-

ible; however, see all relevant activities listed in Table IV-5 for possible constraints that may affect the restoration, reconstruction, or modification of an existing structure within hydric hammocks.

The permitted activity in all other wetland types must conform to all specific relevant activities listed in Table IV-5 and the following performance criteria:

Performance Criteria—

* Any reconstruction, restoration or modification of filled roads or dikes must be designed such that natural surface water flows are not impounded. The installation of culverts in sufficient quantity and size so as not to impede surface waters are required.
* Total filled or improved area shall not exceed 10% of the wetland within the property boundary.
* The use of heavy equipment shall be minimized.
* In addition to the above criteria, applicable activities associated with the restoration, reconstruction, or modification of existing structures and improvied areas found elsewhere in Table IV-5 should be consulted for possible additional constraints.

The substantial restoration, reconstruction, or modification of existing structures or improved areas is compatible in areas adjacent to all wetland types. However, see specific activities as related for possible constraints.

Construction or modification of mosquito control or "drainage" ditches. The construction or modification of mosquito control or drainage ditches within deep marshes, mixed hardwood swamps, cypress domes, hydric hammocks, and shallow marshes is an incompatible activity. This activity is compatible subject to the issuance of a wetlands development permit within bayheads, and wet prairies and must meet the following performance criteria:

Performance Criteria—

* All drainage ditches or mosquito control ditches shall be no deeper than 3 feet measured from the ground surface.
* A surface water control structure or weir shall be constructed at the outfall point and/or the property line. Said structure shall have a variable height to facilitate water level control in drainage ditches and to maintain at least the mid-point of water levels given in Table IV-1.

* The discharge of waters from ditches into surface water bodies or open water streams shall be discouraged and minimized. Discharge into existing compatible wetlands whenever possible shall be encouraged.
* The use of herbicides for the removal of vegetation from drainage ditches is prohibited in bayheads and shall be discouraged in wet prairies; instead, mechanical harvesting should be used for vegetation removal.
* The use of pesticides is prohibited in bayheads and shall be discouraged in wet prairies.

The construction or modification of mosquito control or drainage ditches in areas adjacent to hydric hammocks and wet prairies is a compatible activity but compatible subject to the issuance of a wetlands development permit in areas adjacent to deep marshes, mixed hardwood swamps, cypress domes, bayheads, and shallow marshes. The permitted activity must meet the following performance criteria:

Performance Criteria—

* All drainage ditches or mosquito control ditches shall be no deeper than 3 feet, measured from the ground surface.
* Discharge from drainage or mosquito control ditches directly to surface water bodies or open water streams shall be discouraged and minimized. Discharge into existing compatible wetlands or constructed retention basins that have been seeded and/or vegetated with wetland plant species shall be encouraged.
* Drainage or mosquito control ditches shall be constructed as swales, with gently sloping sides not to exceed a 4:1 slope.
* The use of herbicides for the removal of vegetation in drainage or mosquito control ditches shall be prohibited in areas adjacent to deep marshes, cypress domes, and shallow marshes and discouraged in areas adjacent to all other wetland types; instead, mechanical harvesting should be used for vegetation removal.
* The use of pesticides in drainage or mosquito control ditches shall be prohibited in areas adjacent to deep marshes, cypress domes, and shallow marshes and shall be discouraged in areas adjacent to all other wetland types.

Operation of motorized vehicles including airboats. The operation of motorized vehicles within mixed hardwood swamps, cypress domes, bayheads, and wet prairies is a compatible activity, but compatible subject to the issuance of a wetlands development permit within deep marshes, hydric ham-

mocks, and shallow marshes and must meet the following performance criteria:

Performance Criteria—

* The operation of terrestrial vehicles such as jeeps, swamp buggies, all terrain vehicles (ATV), and the like shall be prohibited.
* The operation of airboats within deep and shallow marshes shall occur only during the normal high water period of the year (usually from May through October).

The operation of motorized vehicles in areas adjacent to wetlands is a compatible activity with all wetland types.

Expansion of existing structures or improved areas. The expansion of existing structures or improved areas within all wetland types is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

Performance Criteria—

* Total filled areas (including any existing filled areas and those proposed) shall not exceed 10% of the wetland within the property boundaries.
* Any filled roads or other improved areas shall not impede surface water flows within the wetland nor impound waters. Roads and other improved areas should be constructed with installed culverts of sufficient size and quantity so as not to impede, interrupt, or impound normal or storm surface water flows.
* The use of heavy equipment shall be minimized.
* All additions or new structures shall be designed to conform to flood-prone regulations, and in the absence of applicable flood-prone jurisdiction, shall be constructed so that the finished floor elevation of occupied spaces is at least 3 feet above established high water elevations or the distances given below for each wetland type.

  Deep marsh, 9 feet above natural ground surface;
  Mixed hardwood swamp, 8 feet above natural ground surface;
  Cypress domes, 7 feet above natural ground surface;
  Bayheads, 7 feet above natural ground surface;
  Hydric hammocks, 6 feet above natural ground surface;
  Shallow marshes, 8 feet above natural ground surface; and
  Wet prairies, 7 feet above natural ground surface.

* In addition to the above performance criteria, applicable activities associated with the expansion of structures

and improved areas found elsewhere in Table IV-5 should be consulted for possible additional constraints.

The expansion of existing structures or improved areas in areas adjacent to wetlands is compatible with all wetland types; however, all associated activities should be consulted separately for possible additional constraints.

Dredging of any kind other than for mosquito control or drainage ditches. Dredging for purposes other than drainage or mosquito control ditches (which is dealt with separately in Table IV-5) is incompatible with all wetland types except wet prairies, where it is a compatible activity subject to the issuance of a wetlands development permit and must meet the following performance criteria:

Performance Criteria—

* Dredged areas shall not exceed 10% of the wetland area within the property boundary.
* The deposition of the dredged material must conform to all performance criteria related to filling or bulkheading within or adjacent to wetlands.
* There shall be no direct surface water connection from dredged or excavated areas to surface water bodies or open water streams.
* If an outfall from the dredged or excavated area is necessary for the removal of excess storm waters, then a shallow retention basin shall be constructed and seeded or vegetated with wetland plant species to act as a filter for runoff. Said retention basin shall be considered as part of the 10% allowable area of dredging within the wetland or that portion of the wetland within the property boundary.

Dredging for purposes other than drainage or mosquito control ditches in areas adjacent to wetlands is compatible with hydric hammocks and is compatible subject to the issuance of a wetlands development permit in areas adjacent to deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies and must meet the following performance criteria:

Performance Criteria—

* The deposition of dredged material must conform to all performance criteria related to filling and/or bulkheading within or adjacent to wetlands.
* There shall be no direct surface water connection from dredged or excavated areas to surface water bodies or open water streams.
* If an outfall from the dredged or excavated area is necessary to remove excess storm waters, then the outfall shall either be routed through a compatible wetland or a shallow retention basin constructed and seeded or vegetated with wetland plant species to act as a filter for runoff.
* The dredged or excavated area shall not be so close to the adjacent wetland so as to cause the flow of surface waters from the wetland to the dredged or excavated area.
* Surface water flows and/or sheet flow runoff shall not be interrupted, impounded, or diverted away from receiving wetland communities as the result of the dredged or excavated area or the deposition of fill from the dredged or excavated area.

Discharge of domestic, agricultural, or industrial wastes (pursuant to DER permit) or the discharge of storm runoff waters from adjacent lands. The use of wetland communities for the recycling of treated wastes is considered an experimental use of wetland communities and has special exemptions by permit from the Florida Department of Environmental Regulation (see Chapter 17-4 of "Rules of the Department of Environmental Regulation," Florida Department of Environmental Regulation). If a DER permit is obtained, the use of wet prairies for discharge of treated wastes is compatible. The discharge of effluent is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, and shallow marshes.

The discharge of treated effluent into hydric hammocks is an incompatible activity. This is a special case, since the compatibility matrix indicates that this is a compatible activity. However, known data on the physical parameters of hydric hammocks indicate that considerable stress would be experienced by this type of community should the volumes of water associated with waste discharge be recycled through the system. In addition, the area of hydric hammock necessary to insure that the system is not overloaded with water causing flooding stress may make the use of hydric hammocks uneconomic.

The discharge of treated effluent from domestic, agricultural, and industrial sources into wetlands that are considered compatible with the issuance of a wetlands development permit must first be permitted by the Florida Department of Environmental Regulation and then meet the following performance criteria:

Performance Criteria—

* Wherever possible, the wetlands used for domestic and agricultural wastewater recycling shall be isolated wetlands and not wetlands that have direct hydraulic connection to surface waters.
* The discharge of industrial wastewater shall be to isolated wetlands only and not into wetlands that have any direct hydraulic connection to surface water bodies.
* The discharge of industrial wastewaters containing concentrations of heavy metals or toxic substances in excess of those concentrations of established state and federal guidelines into wetlands shall be prohibited.
* The discharge of agricultural wastewaters containing pesticides or herbicides in excess of concentrations established by state and federal guidelines shall be prohibited.
* A water budget shall be calculated and the volume of wastewater determined such that the capacity of the wetland is not exceeded. The volume of water to be released shall be determined such that a period of dry conditions within forested wetlands will prevail during the normal dry season (usually October through May) for at least a 3-month period and that will not cause a rise in the normal wet season (usually May through October) water levels of greater than 10%, whichever is less. The volume of water released to non-forested wetlands shall be determined such that it will not cause a rise in the normal wet season (usually May–October) levels of greater than 10%.
* If wetlands that have a direct hydraulic connection with surface waters are utilized for domestic and agricultural wastewater recycling, then the discharge point shall be located such that a minimum flow through (or residence) time is established to give sufficient treatment so as not to cause a degradation of the quality of the receiving surface water body.
* The discharge of wastewater and storm water runoff shall be constructed so as to avoid the channelization or establishment of a direct conduit such that wastewater flows through the wetland without sufficient residence time or exposure to vegetation.
* The discharge of excess storm water runoff shall not be excessive in volume or velocity. Where volume or velocity can be expected to be excessive after a rain fall event, retention ponds shall be constructed on uplands to

receive storm water runoff, allow some settling of sediments, and slowly release the waters to the wetland.

* The discharge of storm water runoff from industrial or commercial land uses shall first be to a retention basin (pond) constructed on uplands and seeded or vegetated with wetland species. Storm waters may then be released to wetlands.

The use of areas adjacent to wetlands for recycling wastewater and discharging storm water runoff is compatible with all wetland types.

Bulkheading. Bulkheading within deep marshes and shallow marshes is an incompatible activity.

Bulkheading within mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and wet prairies is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

Performance Criteria—

* Bulkheads shall be constructed for the purposes of protecting structures or improved areas from potential floodwaters only. All other purposes are deemed inappropriate.
* Bulkheads that impound waters, raising water levels within the wetland above normal storm water storage levels as determined by the County Engineer or given in Table IV-1 shall be prohibited.
* Bulkheads constructed for the purposes of diverting, impeding, or excluding natural surface water inflow to a wetland or outflow from a wetland shall be prohibited.
* Bulkheads shall not be constructed that will constrict the flow of water and thus increase flow velocity within wetlands.
* The use of heavy equipment during construction shall be minimized.

Bulkheading in areas adjacent to deep marshes and shallow marshes is incompatible. Bulkheading in areas adjacent to mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and wet prairies is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

Performance Criteria—

* Bulkheads constructed for the purposes of diverting, impeding, or excluding natural surface water runoff into a

wetland shall be prohibited, except for bulkheads constructed as part of a development drainage system, which shall be constructed so as to impede storm water runoff when necessary such that the outflow hydrograph from the drainage system approximates the hydrograph of conditions existing prior to development or redevelopment.

* Bulkheads constructed in areas adjacent to wetlands shall not result in the channelization of water flow into a wetland community.

Filling other than in conjunction with construction of permitted structures or improved areas and/or greater than 10% of wetland area within property. Filling of wetlands for purposes other than fill deposited in conjunction with the construction of permitted structures or improved areas is incompatible within deep marshes, mixed hardwood swamps, cypress domes, hydric hammocks, and shallow marshes and is compatible subject to the issuance of a wetlands development permit within bayheads and wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* The fill material shall be "clean fill" and not garbage, refuse, toxic or contaminated material, or any other material that through the actions of soil water leaching may cause a degradation of surface water and groundwater quality.
* The filled area shall not exceed 10% of the wetland area within the property boundary. In wet prairies, where dredging is a permitted activity, the filled area and dredged area combined shall not exceed 10% of the area of the wetland or that portion of the wetland within the property boundary.
* Any filled roads or improved areas shall neither impede surface water flows within wetlands nor impound waters. Roads and other improved areas shall be constructed with installed culverts of sufficient size and quantity so as to not impede, interrupt, or impound normal or storm surface water flows.
* Precautions shall be taken to minimize disruption of the surrounding wetland and surface water bodies. During construction, turbidity screens and any other means necessary to minimize siltation, sedimentation, and/or erosion shall be used at all times, and left in place for a period of time sufficient for stabilized conditions to develop on the filled area.
* A buffer strip 50 feet wide of natural undisturbed vegetation shall be maintained between filled areas and any surface water body.

Filling in areas adjacent to mixed hardwood swamps, hydric hammocks, and wet prairies is a compatible activity. Filling in areas adjacent to deep marshes, cypress domes, bayheads, and shallow marshes is compatible subject to the issuance of a wetlands development permit and must meet the following criteria:

Performance Criteria—

* The fill material shall be "clean fill" and not garbage, refuse, toxic or contaminated material, or any material that through the actions of soil water leaching may cause a degradation of surface water and groundwater quality.
* The filled area shall not divert, impede, or exclude natural surface water runoff into or out of a wetland.
* The filled area shall not result in the channelization of surface water flow into a wetland.
* Precautions shall be taken to insure that erosion and subsequent sedimentation of the fill material shall not occur within any wetland.
* A buffer strip 50 feet wide of natural undisturbed vegetation all be maintained between filled areas and any surface water body.

Use of any pesticides or herbicides. The use of any pesticide or herbicide is incompatible within deep marshes, mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and shallow marshes. The use of any pesticide or herbicide within wet prairies is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

Performance Criteria—

* Application of pesticides or herbicides shall occur only during the normal dry season (usually from October through May).
* Equipment for the application of the pesticide or herbicide shall be chosen so that it best directs the chemical to the target organism.
* Every care shall be taken to avoid direct contamination of surface water during application and during the mixing and preparation of the chemical.
* Aerial application or mist blowing of pesticides or herbicides shall be avoided whenever possible.

The use of any pesticide or herbicide in areas adjacent to mixed hardwood swamps, bayheads, hydric hammocks, and wet prairies is a compat-

ible activity. The use of any pesticide or herbicide in areas adjacent to deep marshes, cypress domes, and shallow marshes is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

Performance Criteria—

* Application of pesticides or herbicides shall occur only during the normal dry season (usually from October through May).
* Equipment for the application of the pesticide or herbicide shall be chosen so that it best directs the chemical to the target organism.
* Every precaution shall be taken to avoid the direct contamination of surface water during the application and during the the mixing and preparation of the chemical.
* Aerial application or mist blowing of pesticides or herbicides shall be avoided whenever possible.

Installation of utilities. The installation and construction of utility systems including roads is incompatible within deep marshes and shallow marshes and is compatible subject to the issuance of a wetlands development permit in mixed hardwood swamps, cypress domes, bayheads, hydric hammocks and wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* The installation of utilities including roads shall conform to all performance criteria given for specific activities that are associated with said installation.
* Where filling, dredging, and/or bulkheading are incompatible, utility systems and roads shall be constructed above ground on supports, piers, or bridging.
* Areas cleared as rights-of-way or easements shall not be greater than 10% of the wetland area within the property boundary.
* In wetlands where dredging, filling, or bulkheading is compatible subject to the issuance of a wetlands development permit, the utility system or road shall not impede, interrupt, or impound normal surface water flows. In these wetlands, utility systems and roads shall be constructed with installed culverts or bridging of sufficient size and quantity so as not to impede, interrupt, or impound normal or storm surface water flows.
* Every care shall be taken to minimize disruption of the surrounding wetland and surface water bodies. During construction, turbidity screens and any other means

necessary to minimize siltation, sedimentation, and/or erosion shall be used at all times, and left in place for a period of time sufficient for stabilized conditions to develop in the disturbed area.

The installation of utility systems or roads in areas adjacent to wetlands is compatible with all wetland types; however, see all related activities listed in Table IV-5 for possible constraints.

Filling less than or equal to 10% of wetland area within property in conjunction with the construction of permitted structures. Filling less than or equal to 10% of the wetland area within property is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies and is compatible within hydric hammocks. The permitted activity must meet the following performance criteria:

Performance Criteria—

* Filling shall be in conjunction with the construction of permitted structures and associated access roads, yards, and septic tanks only.
* The area of fill and all other improved areas, excavations, cleared areas, decks, catwalks, and area of structures shall not exceed 10% of the wetland within the property boundary.
* The fill material shall be "clean fill" and not garbage, refuse, toxic or contaminated material, or any other material that through the actions of soil water leaching may cause a degradation of surface water and groundwater quality.
* Any filled roads or improved areas shall neither impede surface water flows within wetlands nor impound waters. Roads and other improved areas shall be constructed with installed culverts of sufficient size and quantity so as to not impede, interrupt, or impound normal or storm surface water flows.
* Precautions shall be taken to minimize disruption of the surrounding wetland and surface water bodies. During construction, turbidity screens and any other means necessary to minimize siltation, sedimentation, and/or erosion shall be used at all times, and left in place for a period of time sufficient for stabilized conditions to develop on the filled area.
* A buffer strip 50 feet wide of natural undistrubed vegetation shall be maintained between filled areas and any surface water body.

Filling in conjunction with the construction of permitted structures in areas adjacent to wetlands is compatible with all wetland types.

Clearing of vegetation in conjunction with the construction of permitted structures. The clearing of vegetation in conjunction with the construction of permitted structures when clearing is less than or equal to 10% of the area of wetland within the property is compatible within hydric hammocks and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* The activity shall be carried out during the normal dry season (usually October through May) only.
* The area of clearing and all other areas of fill, access roads, docks, catwalks, structure, and improved areas shall not exceed 10% of the wetland within the property.
* All materials that are cleared from the wetland shall be removed from the site and not piled or windrowed within the wetland community.
* Precautions shall be taken to minimize impacts to surrounding vegetation. During clearing operations turbidity screens and any other means necessary to minimize siltation, sedimentation, and/or erosion shall be used at all times and left in place for a period of time sufficient for stabilized conditions to develop in the cleared area.
* A buffer strip 50 feet wide of natural undisturbed vegetation shall be maintained between cleared areas and any surface water body.
* Clearing shall be carried out only in conjunction with the construction of permitted structures.

Clearing in areas adjacent to all wetlands is a compatible activity provided that the activity is in conjunction with the construction of permitted structures and/or activities.

Construction of permitted structures. The construction of permitted structures is compatible within hydric hammocks and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies. Permitted structures are those outlined in the Seminole County Land Development Code (SCLDC) and include all structures listed as permitted uses under Article V through Article XXVIII of the code. Struc-

tures not permitted within wetlands are those given under Article XXIX (M-1 Industrial District) as permitted uses within this classification. The permitted activity must meet the following performance criteria:

Performance Criteria—

* All improved areas (including access roads, parking lots, docks, catwalks, area of structure, yards, cleared areas, retention basins, etc.) shall be no greater than 10% of the area of the wetland within the property boundaries.
* If the wetland is included in lands designated as "flood-prone area," all conditions, provisions and restrictions of the flood-prone classification ordinance shall apply in addition to the performance criteria contained herein, and the conditions, provisions, and restrictions of the flood-prone classification ordinance shall take precedence.
* In the absence of a flood-prone classification, all structures shall be constructed so that the finished floor elevation of occupied spaces is at least 3 feet above established high water elevations or the distances given below for each wetland type.

  Deep marsh, 9 feet above natural ground surface;
  Mixed hardwood swamp, 8 feet above natural ground surface;
  Cypress dome, 7 feet above natural ground surface;
  Bayhead, 7 feet above natural ground surface;
  Hydric hammock, 6 feet above natural ground surface;
  Shallow marsh, 8 feet above natural ground surface; and
  Wet prairie, 7 feet above natural ground surface.

* The use of heavy equipment during construction shall be minimized.
* The drainage system for the improved area shall comply with the conditions, restrictions, and provisions of the drainage system design standards for Subdivision Regulations as outlined in the Seminole County Land Development Code.
* Access roads and other improved areas shall be designed and located so as not to impede, interrupt, or impound normal and storm surface water flows, unless the impoundment is wholly within the improved area and used for the purposes of a storm water retention basin.
* All commercial and industrial uses within wetlands shall have retention basins for storm water runoff. Said retention basins shall be designed and constructed with sediment traps and litter or trash screens. All storm water runoff shall be routed through the retention basin, sediment trap, and litter or trash screens before release or outfall from the improved area. If the retention basin in constructed within the wetland, it is considered to be part of the improved area, and said area, including all roads, parking lots, structures, lawns, cleared areas,

etc., shall not exceed 10% of the wetland within the property.

* Any operation or activity that stores, uses, or produces toxic matter shall insure that the release as waterborne toxic matter beyond the boundary of improved area shall not exceed one-thirtieth (1/30) of the Threshold Limit Values (TLV) permitted of those toxic matters currently listed in the Threshold Limit Values adopted by the American Conference of Governmental Industrial Hygienists. If a toxic substance is not contained in this listing, the applicant shall satisfy the Department of Health that the proposed levels will be safe to the general population. The measurement of waterborne toxic matter shall be at the outfall from the improved area and shall be a composite of samples taken at 1-hour intervals after an incident or a composite of samples taken at 3-hour intervals for general runoff.

The construction of permitted structures in areas adjacent to wetlands is compatible with all wetland types. However, all activities associated with the construction of permitted structures should be consulted separatly.

Installation of septic tanks. The installation of septic tanks in conjunction with single family dwellings and mobile homes at densities of less than or equal to 1 unit per 5 acres is compatible within hydric hammocks and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* Septic tanks shall conform to all provisions of Seminole County Health Department Regulations 10D-6.
* Septic tanks shall either be elevated on filled areas such that the lowest point of the drain field is a minimum of 3 feet above the normal high water level in the wetland or be located on suitable upland soils having proper percolation rates, and wastes shall be pumped from a holding tank to this upland septic tank and drain field.
* The maximum number of septic tanks within wetland areas shall be 1 per 5 acres.

The installation of septic tanks in areas adjacent to wetland communities is compatible with all wetland types.

Installation of storm water retention basins. The construction of storm water retention basins within wetlands is incompatible with deep marshes, mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and shallow marshes and is compatible subject to the issuance of a wetlands development permit within wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* The size of the retention basin shall be limited to 10% of the wetland area or area of wetland within the property boundary.
* If the retention basin is part of a larger development area, the combined area of improved area, structures, roads, etc. and the retention basin shall be no larger than 10% of the wetland area or area of wetland within the property boundary.
* The retention basin shall not be dug any deeper than is necessary within the wetland, but rather constructed using a combination of excavation and berms. Deep excavations for the purposes of retention basins shall be discouraged.
* The discharge of waters from a retention basin into surface water bodies and open water streams shall be discouraged and minimized. Discharge into existing, compatible wetlands whenever possible shall be encouraged.
* The retention basin shall be vegetated, and the use of herbicides and/or pesticides within the retention basin for vegetation and insect control shall be discouraged. Instead, mechanical vegetation removal, when necessary, shall be used whenever possible.

The installation of storm water retention basins in areas adjacent to wetlands is compatible with all wetland types.

Storage, use, or disposal of any hazardous material. The storage, use, or disposal of any hazardous material within wetlands is incompatible with deep marshes, mixed hardwood swamps, cypress domes, hydric hammocks, and shallow marshes and is compatible subject to the issuance of a wetlands development permit in bayheads and wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* Every care shall be taken to insure that release of hazardous materials to the environment through the actions of winds, surface waters, or groundwaters shall not exceed one-thirtieth (1/30) of the Threshold Limit Values (TLV) permitted of those hazardous materials currently listed in the TLV adopted by the American Conference of Governmental Industrial Hygienists.
* The storage, use, or disposal of hazardous material shall not occur in any wetland having a direct hydraulic connection to surface water bodies.
* Tests shall be undertaken to determine the nature of groundwater flows in the immediate area, and based on the results of these tests, no solid waste disposal shall occur where seepage from the disposal site may threaten public health and safety, endanger wildlife, or potentially degrade potable water supplies.
* There shall be no dredging within wetlands where the storage, use, or disposal of hazardous materials is proposed or is being carried out, nor shall there be any activity that will disrupt the existing natural land contours. This includes, but is not limited to, use of heavy equipment, drilling of wells, excavations, jetting of pilings, or construction of any structure.
*The storage, use, or disposal of hazardous material in areas designated as "flood-prone areas" as described by the Seminole County Land Development Code flood-prone classification ordinance shall be prohibited.

The storage, use, or disposal of any hazardous material in areas adjacent to wetlands is incompatible with deep marshes, mixed hardwood swamps, cypress domes, and shallow marshes and is compatible subject to the issuance of a wetlands development permit with bayheads, hydric hammocks, and wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* The storage, use, or disposal of hazardous materials in areas adjacent to wetlands that have direct hydraulic connections to surface water bodies shall be prohibited.
* There shall be no storage, use, or disposal of hazardous materials in areas adjacent to wetlands that have been dredged or filled, that have had any structure constructed within, or that have had wells drilled, pilings jetted, or any excavations carried out within the adjacent wetland.
* Tests shall be undertaken to determine the nature of groundwater flows in the immediate area, and based on the

results of these tests, no solid waste disposal shall occur where seepage from the disposal site may threaten public health and safety, endanger wildlife, or potentially degrade potable water supplies.

* There shall be no drainage channels or ditches constructed in the adjacent area that will allow surface waters to enter any wetland.
* All retention basins constructed in conjunction with the storage, use, or disposal of hazardous materials shall have an impermeable lining and shall be of sufficient size as to store all anticipated storm water runoff from a 25-year rainfall event.
* The storage, use, or disposal of hazardous materials in areas designated as "flood-prone areas" as described by the Seminole County Land Development Code flood-prone classification ordinance shall be prohibited.

Solid waste disposal. The use of wetlands as a solid waste disposal site is incompatible with deep marshes, mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and shallow marshes and is compatible subject to the issuance of a wetlands development permit within wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* Solid waste disposal shall not occur in any wetland that has a direct hydraulic connection with any surface water body.
* Tests shall be undertaken to determine the nature of groundwater flows in the immediate area, and based on the results of these tests, no solid waste disposal shall occur where seepage from the disposal site may threaten public health and safety, endanger wildlife, or potentially degrade potable water supplies.
* Solid waste disposal within all wetlands designated as "flood-prone area" as described by the Seminole County Land Development Code flood-prone classification ordinance shall be prohibited.

The disposal of solid wastes in areas adjacent to wetlands is incompatible with deep marshes, mixed hardwood swamps, cypress domes, and shallow marshes and is compatible subject to the issuance of a wetlands development permit in areas adjacent to bayheads, hydric hammocks, and wet prairies. The permitted activity must meet the following performance criteria:

Performance Criteria—

* The disposal of solid wastes shall not occur in areas adjacent to wetlands that have a direct hydraulic connection to surface water bodies.
* There shall be no solid waste disposal in areas adjacent to wetlands that have been dredged or filled, that have had any structure constructed within, or that have had wells drilled, pilings jetted, or any excavations carried out within the adjacent wetland.
* There shall be no drainage channels or ditches constructed in the adjacent area that will allow surface waters to enter any wetland.
* Tests shall be undertaken to determine the nature of groundwater flows in the immediate area, and based on the results of these tests, no solid waste disposal shall occur where seepage from the disposal site may threaten public health and safety, endanger wildlife, or potentially degrade potable water supplies.
* The disposal of solid wastes in areas designated as "flood-prone areas" as described by the Seminole County Land Development Code flood-prone classification ordinance shall be prohibited.

IV-2 Second Level Evaluation: Evaluation of Special Significance

The second level evaluation scheme is designed to facilitate the evaluation of individual wetland communities by the staff of Seminole County on a wetland-by-wetland basis as is needed during the review process for proposed developments that occur in or around wetland communities. While the use guideline matrix gives compatibility of development activities with wetland types, the second level evaluation is designed in such a way that individual wetland communities may be ranked in a qualitative manner to ascertain their potential localized value, any special significance, and thus secondary need for preservation and/or development guidelines.

A point system is given for values pertaining to each of six parameters. By summation total points or an overall "score" is derived. Based on the score, additional constraints, guidelines, or regulations on development activity may be determined as necessary to protect these "special features" or a relaxation of constraints and guidelines may be determined if a low "score" is derived. There is no weighting of parameters; it is felt that each should have equal weight since this second level evaluation

is qualitative. However, a final parameter is included that has an overriding effect. This parameter relates to the presence of endangered species. If in the second level evaluation, it is determined that there is strong evidence for the presence of an endangered species, the development activity is considered an incompatible use unless it can be proven that the activity will in no way disrupt the breeding, feeding, or other activities of the species.

The aspects of the second level evaluation are related to size, the connectedness of a wetland to major water courses or water bodies, the diversity of the surrounding landscape, the quality of the surrounding landscape, the quality of the wetland measured as intactness (i.e., degree of alteration), the uniqueness of the wetland, and the presence of endangered species.

1. Size—The size of a wetland is important. While the values associated with a particular type of community on a unit area basis may be relatively low, when total area is taken into account the contribution of large wetlands of low value may be higher than small wetlands of high value. For example, contributions to food chains by very productive wetlands is high on a unit area basis. But a large area of a less productive wetland may contribute substantially to food chains even though the unit area productivity is lower. The ranking is as follows:

   Large (>50 acres), 3 pts.;
   Medium (10–50 acres), 2 pts.; and
   Small (0.5–9 acres), 1 pt.

2. Connectedness—The extent of connection to major wetland or aquatic systems is a factor that must be considered. The more extensive the connection, the greater potential for contributions to food chains, water quality enhancement, and flood protection. With less extensive connections the wetland community does not play as an important role in these functions. The connection may be determined by ground survey, aerial photos, or USGS maps. The ranking is as follows:

   Major connection (i.e., flowing water system or floodplain wetland forest), 3 pts.;

Minor connection (i.e., runoff wetland where waters flow through or during times of heavy rainfall tend to be areas of relatively low velocity flows), 2 pts.; and
Isolated (i.e., cypress domes or some shallow marshes and bayheads), 1 pt.

3. Landscape Diversity (edge effect)—The diversity of the surrounding landscape plays an important role in determining the value of any particular wetland. The greater diversity of communities that surround a given wetland community, the greater the potential for utilization of the community by wildlife. For example, a cypress dome surrounded by pine flatwoods is considered to be embedded in one community; a shallow marsh that borders a pine flatwood and a bayhead is considered to be embedded in two other communities; and a hydric hammock that borders a mixed hardwood swamp, a mesic hammock, and a pine flatwood is considered to be embedded in greater than two other communities. The ranking is determined using either a ground survey or aerial photographs to ascertain the type and numbers of different communities that surround the wetland in question:

   Embedded in greater than two other communities with clear transitions, 3 pts.;
   Embedded in two other communities, 2 pts.; and
   Embedded in one other community, 1 pt.

4. Quality of Surrounding Landscape—The overall quality or degree of alteration of the surrounding landscape is important since a particular wetland community may have higher potential for wildlife habitat, water quality enhancement, flood protection, etc., depending on the condition of the surroundings. The ranking is based on lowest values associated with most altered surrounding landscape and may be determined using ground survey or aerial photographs. A completely altered landscape is cleared of natural vegetation and has been converted to some use such as agriculture or urban development. A somewhat modified condition is altered to a lesser degree and may include drainage facilities and/or converted to silvicultural activities, or may be partially

cleared of understory vegetation. The ranking is as follows:

Undisturbed, 3 pts.;
Somewhat altered, 2 pts.; and
Completely altered, 1 pt.

5. Intactness—The condition of the wetland community is of importance. Some wetlands have had extensive alterations in water flow characteristics, vegetation, drainage, fire, etc. With such alteration, functions may be impaired and thus values lower. The ranking is based on the degree of alteration of the wetlands structures and functions, and may be determined by ground survey and in some cases from aerial photos. Examples of somewhat altered conditions include berming around wetlands (that will effect surface water flows), and adjacent drainage channels that do not effect surface water inflow or outflow, but do effect groundwater levels. Somewhat altered also includes selective harvesting of timber. Examples of major alteration include drainage channels cut through the wetland so as to alter hydroperiod and flow characteristics, clear-cutting of vegetation, major fire damage, and harvesting of peat. The ranking is as follows:

   Pristine, 3 pts.;
   Somewhat altered, 2 pts.; and
   Major alteration, 1 pt.

6. Uniqueness—The scarcity of a particular wetland within the county and surrounding counties is of importance. Of primary concern is the scarcity of the wetlands within regions of the county. Once wetland vegetation maps are completed for the county, a survey of the area under question pertaining to review of a potential development will reveal whether or not a particular wetland type is scarce in that region of the county. The ranking is as follows:

   Very Scarce, 3 pts.;
   Somewhat common, 2 pts.; and
   Common, 1 pt.

The Presence of Endangered Species

A final overriding aspect is included in the second level evaluation: the presence of endangered species. The review of an application for development should contain a detailed on-site inspection of the proposed development. If in the course of this ground survey, the presence of endangered species is found or if knowledge already exists that there is strong evidence of the presence of endangered species, the proposed development should be found incompatible. However, if it can be proven that the proposed development will in no way disrupt the feeding, breeding, or other activities of the endangered species, a compatible with permit determination may be made and the development may proceed. Given in Appendix I is a list of endangered species found in Seminole County.

Ranking the Evaluation of Special Significance

When the points for each parameter are summed, an overall "score" is obtained. Based on this score, the compatibility of the wetland in question with the proposed development may change.

If the overall score is less than 8 points, the wetland is considered of low or nominal value. If the overall score is equal to or greater than 12 points, the wetland is considered of high or significant value. Based on the score the compatibility for development activities in Table IV-5 may change. If the wetland is scored as having nominal value, all incompatible (I) activities are changed to compatible with permit (CP). If the wetland is cored as having significant value, all compatible (C) activities become compatible with permit (CP). Changes in compatibility effect activities both within wetlands and in areas adjacent to wetlands.

V
WETLAND POLICY AND REGULATION

Federal Wetlands Regulations

Currently, federal regulations control close to 60% of the country's wetlands (Houck 1977), while as recently as 15 years ago the federal government regulated almost no wetlands. This change was not as abrupt as it may seem, but was the result of gradual change over a 75-year period.

The following is a list of important federal policy changes in regard to wetlands regulations:

(1) The Rivers and Harbors Act of 1899. This Act prohibited the unauthorized obstruction or alteration of any navigable water of the United States. Section 10 of this Act prohibits the excavation of material from, or the deposition of material into, any navigable water of the United States without a permit or other authorization from the United States Army Corps of Engineers. The Act also restricts the accomplishment of any other work that would affect the location, course, capacity, or condition of such navigable waters. This Act was drafted with the intention of maintaining safe waterways for travel and commerce. Under this Act the Corps limited its jurisdiction to activity affecting the navigable capacity of waterways, reviewing permit applications on the basis of impact upon navigation (Federal Register, July 19, 1977).

(2) The 1899 Act did not actually define navigable waters, and the Corps was satisfied with a very narrow interpretation of navigable waters. However, case law became the primary means for determining whether activities in certain waters required authorization under the Act. The result was a collection of court decisions that defined navigable waters to include: (a) Waters that are navigable in fact where they are used or susceptible to being used in their ordinary condition as highways of commerce over which trade and travel are or may be conducted. (b) Waters that were used in the past as a highway or part of a highway of interstate

or foreign commerce. (c) Waters that could be made suitable for such use in the future with reasonable improvements (Notre Dame Lawyer 1977). These rulings all served to increase the scope of the Corps' authority under the 1899 Act, but the Corps has been satisfied with defining navigable waters as those waters that were navigable in their interpretation.

(3) In the 1960s and 1970s the country witnessed an increased focus upon environmental issues. There was increased pressure placed upon the Corps to broaden their scope to include more protection of the environment. There were many people who pressured the Corps to include wetlands in their review of dredge and fill permits. In 1968 the Corps published the following standard pursuant to its duties under the 1899 Act. "The decision as to whether a permit will be issued must rest on an evaluation of all relevant factors, including the effect of the proposed work on navigation, fish, wildlife, conservation, pollution, aesthetics, ecology, and the general public interest" (33 C.F.R.). The Corps expanded its scope of review for permitting and included other factors besides impact upon navigation. But still the Corps was only regulating water below the high water mark, and construction in wetlands was still not regulated by the Corps.

(4) In 1972 Congress passed the Fresh Water Pollution Control Act (FWPCA). This Act prohibited the discharge of pollutants into navigable waters without a permit, and Section 404 of this Act regulated the discharge of dredge and fill material. Section 404 of the FWPCA establishes a permit program, which is administered by the Secretary of the Army acting through the Chief of Engineers, to regulate the discharge of dredged material and those pollutants that comprise fill material into the waters of the United States. Applications for Section 404 permits are evaluated by guidelines developed by the Administrator of the Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army. The Chief of Engineers can make a decision to issue a permit that is inconsistent with those guidelines if required for navigation. Section 404(c) gives the Administrator, EPA, further authority, subject to certain procedures, to restrict or prohibit the discharge of any dredged or fill material that may cause an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas, wildlife, or recreational areas (Federal Register, July 19, 1977).

This Act defined "navigable waters" as all waters of the United States. The Corps, however, was unwilling to change its definition of "navigable waters" to enforce the 404 program and only changed its definition after being taken to court (N.R.D.C., V. Callaway). To comply with the court's order, the Corps redefined the term "navigable waters" to include not only traditional navigable waters but also artificially created channels connected to navigable waters, tributaries to navigable waters up to their headwaters, nonnavigable interstate waters up to their headwaters, intrastate waters up to their headwaters that are used for interstate commerce, and wetlands adjacent to such waters. Wetlands were defined as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands that are located above the mean high water mark but are adjacent to interstate waters or their tributaries are also subject to Section 404 regulations. Headwaters were defined as the point on the stream above which the flow is normally less than 5 cubic feet per second.

(5) 1977 Clean Water Act. This Act was the first federal act to address itself to wetlands. In this Act, dredge, fill, and discharge regulations included wetlands that are adjacent to United States waters. The terms "wetlands" and "adjacent" were then defined separately. The term "wetlands" was defined as those areas that are inundated or saturated by surfacewater or goundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalance or vegetation typically adapted for life in saturated soil condition. The term "adjacent" was defined as bordering, contiguous, or neighboring wetlands; wetlands separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes, and the like are "adjacent wetlands."

To regulate fill and dredge under the 404 Program, the Corps implemented a revised permit system. They developed two types of permits: a general or nationwide permit and individual permits. Activities that fall under the general permit are "permitted" and are not required to go through the application process. Activities authorized by general permits include:

a. seismic operations:
b. outfall structures and associated intakes where the effluent from the outfall has been permittted under section 402;
c. return water from upland dredge disposal if state certification under section 401 has been provided;
d. discharges associated with surface coal mining activities authorized under the Surface Mining Control and Reclamation Act of 1977;
e. discharges that do not exceed 5 cubic yards for a complete project; and
f. discharges undertaken or regulated in whole or part by another federal agency where the agency has determined that the discharge will not either individually or cumulatively have an adverse environmental effect and the Corps district office does not object (40 C.F.R.).

For all other dredge and fill operations individual permits are required. The standards used in the permit process were developed by both the EPA and the Corps. The twelve general policies for evaluating permit applications are

a. public interest review;
b. effects on wetlands;
c. fish and wildlife;
d. water quality;
e. historic, scenic, and recreational values;
f. effects on limits of the territorial seas;
g. interference with adjacent properties or water resource projects;
h. activities affecting coastal zones;
i. activities in marine sanctuaries;
j. other federal, state, or local requirements;
k. safety of impounding structures; and
l. floodplains.

In using the wetlands review, the Corps begins with the presumption that wetlands are vital areas that constitute a productive and valuable public resource, the unnecessary alteration of which should be discouraged as contrary to public interest. The Corps identifies those wetlands considered to perform functions important to public interest as:

a. wetlands that serve important natural biological functions, including food chain production and general habitat and nesting, spawning, rearing, and resting sites for aquatic or land species;
b. wetlands set aside for study of the aquatic environment or as sanctuaries or refuges;
c. wetlands the destruction or alteration of which would detrimentally affect natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics;
d. wetlands that are significant in shielding other areas from wave action, erosion, or storm damage;

e. wetlands that serve as valuable storage areas for storm water and floodwaters;
f. wetlands that are prime natural recharge areas. Prime recharge areas are locations where surfacewater and groundwater are directly interconnected; and
g. wetlands that through natural water filtration processes serve to purify water (Federal Register, July 19, 1977).

Under the wetlands review, the alteration or destruction of a wetland will be considered unnecessary if the benefits of the proposed projects do not outweigh the damage to the wetlands or if the proposed alteration is not necessary to realize the alledged benefits. This latter determination requires consideration of whether the proposed alternative is "primarily dependent" on being located in or in close proximity to the aquatic environment and whether feasible alternative sites are available.

The 1977 Act exempts the discharge of dredged or fill material in connection with certain minor activities from all permit requirements provided that the discharge is not incidental to an activity intended to convert an area of navigable waters to a new use that involves impairment of flow or circulation of waters. The exemption covers the discharge of the following dredged or fill material:

a. from normal farming, silviculture, and ranching activities;
b. for the maintenance of currently serviceable structures;
c. for construction or maintenance of farm or stock ponds or irrigation ditches or the maintenance of drainage ditches;
d. for construction of temporary sedimentation basins on a construction site that does not involve a discharge to navigable waters;
e. for construction or maintenance of farm or forest roads or temporary roads for moving mining equipment; and
f. resulting from any activity covered by an approved state water quality management plan (Federal Register, July 1977).

Other Federal Agencies that Regulate Wetlands

Department of the Interior, Bureau of Outdoor Recreation, Land and Water Conservation Fund

Funds are made available on a matching basis (up to 50%) to aid state and local acquisition of recreation and open space areas. To qualify, a state must prepare a comprehensive outdoor recreation plan. The state establishes criteria for funding local projects; all 50 states participate in this program. Funds are allocated according to population. Fiscal

1977 appropriations were $17,516 million. Forty percent of these monies funded federal acquisition projects, the rest was allocated to state and local governments. States and localities have usually used the funds to acquire park and other recreation lands; however, funds have also been used to acquire wetlands, floodplains, and other open areas.

Fish and Wildlife Service, Federal Aid to Wildlife Restoration

Funds derived from federal taxes on the sale of firearms, shells, and cartridges are apportioned to states to cover up to 75% of the cost of projects for acquisition, restoration, and maintenance of wildlife areas and research into problems of wildlife management.

More than $800 million in tax revenues have been disbursed under this program since 1937, with more than 75% spent on wildlife restoration. Revenues in 1975 totaled $63 million. By 1975 states had acquired more than 3.45 million acres under this program.

Fish and Wildlife Service, Endangered Species Program

This program identifies endangered species and their habitats and takes action to restore them as viable components of their ecosystem. Part of the protection program may involve land acquisition through funds appropriated under the Land and Water Conservation Act of 1965. Over $13 million in Land and Water Conservation Act funds were spent from 1969 to 1978 to acquire habitats beneficial to endangered species. Since the Endangered Species Act was passed in 1973, the Fish and Wildlife Service has taken action to list, delist, or reclassify about 3440 plant and animal species.

Project funds and grants are available to state fish and wildlife agencies that have entered into a cooperative agreement concerning rare and endangered species with the Secretary of the Interior. Grants pay up to two-thirds of the costs to develop and implement programs to protect rare and endangered species. Grants are also available to purchase rare and endangered species' habitats.

Department of Agriculture, Wild and Scenic Rivers Act

This 1968 Act establishes general criteria for scenic, wild, and recreation rivers and specifically designated rivers. Congressional approval is required for the addition of new rivers except where a state legislature requests that a state scenic, wild, or recreation river be admitted directly to the system with the approval of the Department of the Interior. With such a procedure, acquisition funds may be available for state designated rivers through the Land and Water Conservation Fund.

Congress has added four new rivers to the system, and states have also added four. In addition, many state have adopted their own scenic, wild, and recreation river system acts. The use of water and adjacent shorelands is controlled through regulation, acquisition, or some combination.

Water Bank Program for Wetlands Protection

The Secretary of Agriculture is authorized to enter into 10-year, renewable agreements with landowners, who are paid an annual fee for not destroying inland freshwater wetlands that are important migratory water fowl and breeding areas. The Agriculture Stabilization and Conservation Service is authorized to select lands in cooperation with state and county committees that may qualify. In 1975 the program operated in 73 counties and 15 states; fiscal 1977 appropriation was $10 million.

The 1977 Clean Water Act indicates that the federal government's commitment to wetlands protection is strong, but with the new administration, the strong regulations under the 404 program could come under fire. In talking to members of the Corps, they believe that part of the administration's efforts to deregulate will address the regulations under the 404 program.

Florida Statutes Concerning Wetlands

How Wetlands are Perceived in Florida Law

"A marsh or a swamp which is not physically connected to a lake or stream by even occasional overflow is treated as surface water in spite of

its permanence" (Maloney 1971). Therefore, it is common to see wetlands characterized as "surface water" in the Florida Statutes, which administers authority to the various agencies. It is not until such agencies mandate specific actions that the actual term of "wetlands" is used.

Florida Statutes that Administer Wetland Authority

Chapter 380—The Florida Environmental Land and Water Management Act of 1972

Section 380.012—Purpose:

> It is the intent that, in order to protect natural resources and environment of this state as provided in s. 7, Art. II of the State Constitution, insure a water management system that will reverse the deterioration of water quality and provide optimum utilization of our limited water resources, facilitate orderly and well-planned development, and protect the health, welfare, safety, and quality of life of the residents of this state, it is necessary adequately to plan for and guide growth and development within this state. In order to accomplish these purposes, it is necessary that the state establish land and water management policies to guide and coordinate local decisions relating to growth and development; that such state land and water management policies should, to the extent maximum possible, be implemented by local governments through existing processes for the guidance of growth and development; and that all the existing rights of private property be preserved in accord with the constitutions of this state and of the United States.

Section 380.05—Areas of critical state concern

> (1)(a) The state land planning agency may from time to time recommend to the Administration Commission specific areas of critical state concern. In its recommendation, the agency shall include recommendations with respect to the purchase of lands situated within the boundaries of the proposed area as environmentally endangered lands and outdoor recreation lands under the Land Conservation Act of 1972. The agency also shall include any report or recommendation of a resource planning and management committee appointed pursuant to s. 380.045; the dangers that would result from uncontrolled or inadequate development of the area and the advantages that would be achieved from the development of the area in a coordinated manner; a detailed boundary description of the proposed area; specific principles for guiding developemnt within the area; and an inventory of lands owned by the state, federal, county, and municipal governments within the proposed area.
>
> (2) An area of critical state concern may be designated only for:

(a) An area containing, or having a significant impact upon, environmental or natural resources or regional or statewide importance, including, but not limited to, state or federal parks, forests, wildlife refuges, wilderness areas, aquatic preserves, major rivers and estuaries, state environmentally endangered lands, Outstanding Florida Waters, and aquifer recharge areas, the uncontrolled private or public development of which would cause substantial deterioration of such resources. Specific criteria which shall be considered in designating an area under this paragraph include:

1. Whether the economic value of the area, as determined by the type, variety, distribution, relative scarcity, and the condition of the environmental or natural resources within the area, is of substantial regional or statewide importance.

2. Whether the ecological value of the area, as determined by the physical and biological components of the environmental system, is of substantial regional or statewide importance.

3. Whether the area is a designated critical habitat of any state or federally designated threatened or endangered plant or animal species.

4. Whether the area is inherently susceptible to substantial development due to its geographic location or natural aesthetics.

5. Whether any existing or planned substantial development within the area will directly, significantly, and deleteriously affect any or all of the environmental or natural resources of the area which are of regional or statewide importance.

Chapter 259—Land Conservation Action of 1972

Section 259.04—Powers and duties of "Board":

Definition: "Board" means the governor and cabinet, sitting as the Board of Trustees of the Internal Improvement Trust Fund. [259.03(4)]

(1) For state capital projects for environmentally endangered lands:

(a) The board is given the responsibility, authority, and power to develop and execute a comprehensive plan to conserve and protect environmentally endangered lands in this state. This plan shall be kept current through continual reevaluation and revision.

Chapter 163—Local Government Comprehensive Plan Act of 1975

Section 163.3161—Intent and Purpose:

(1) This act shall be known and may be cited as the "Local Government Comprehensive Planning Act of 1975."

(2) In conformity with, and in furtherance of, the purpose of the Florida Environmental Land and Water Management Act of 1972, chapter 380, it is the purpose of this act to utilize and strengthen the existing role, processes, and powers of local

governments in the establishment and implementation of comprehensive planning programs to guide and control future development.

(3) It is the intent of this act that its adoption is necessary so that local governments can preserve and enhance present advantages; encourage the most appropriate use of land, water, and resources consistent with the public interest; overcome present handicaps; and deal effectively with future problems that may result from the use and development of land within their jurisdictions. Through the process of comprehensive planning, it is intended that units of local government can preserve, promote, protect, and improve the public health, safety, comfort, good order, appearance, convenience, law enforcement and fire prevention, and general welfare; prevent overcrowding of land and avoid undue concentration of population; facilitate the adequate and efficient provision of transportation, water, seweage, schools, parks, recreational facilities, housing, and other requirements and services; and conserve, develop, utilize, and protect natural resources within their jurisdiction.

Section 163.3177 (7) and (8)—Required and Optional Elements of Comprehensive Plan:

(7) Such other elements as may be peculiar to, and necessary for, the area concerned and as are added to the comprehensive plan by the governing body upon the recommendation of the local planning agency.

(8) All elements of the comprehensive plan, whether mandatory or optional, shall be based upon data appropriate to the element involved.

Chapter 581—Plant Industry

Section 581.185—Preservation of flora of Florida:

(1) PROHIBITIONS; PERMITS:

(a) With regard to any plant on the Endangered Plant List provided in subsection (2), it is unlawful for any person:

1. To willfully injure or destroy any such plant growing on the private land of another without first obtaining the written permission of the owner of the land or his legal representative.

2. To willfully injure or destroy any such plant growing on any public land or water without first obtaining the written permission of the superintendent or custodian of such land or water and a permit from the department as provided in this section.

4. To willfully harvest, collect, pick, or remove three or more individual plants of a given species listed on the Endangered Plant List from any native habitat without first obtaining the written permission of the owner of the land or his legal representative or, in the case of public land or water, the written permission of the superintendent or custodian of such

land or water, and a permit from the department as provided in this section.

(2) ENDANGERED PLANT LIST:

The following plants shall be included in the Endangered Plant List:

(a) Asimina pygmaea (pink pawpaw).
(b) Asimina tetramera (four-petal pawpaw).
(c) Asplenium auritum (auricled spleenwort)(fern).
(d) Blechnum occidentale (sinkhole fern).
(e) Campyloneurum angustifolium (narrow swamp fern).
(f) Cassia keyensis (Key cassia).
(g) Catesbaea parviflora (dune lily-thorn).
(h) Catopsis sp. (bromeliad).
(i) Cereus gracilis (prickly apple cactus).
(j) Cereus robinii (tree cactus).
(k) Chionanthus pygmaeus (fringe tree or granny-graybeard).
(l) Clusia rosea (balsam apple).
(m) Coccothrinax argentata (silver palm).
(n) Cucurbita okeechobeensis (Okeechobee gourd).
(o) Cupania glabra (cupania).
(p) Cyrtopodium punctatum (cowhorn or cigar orchid).
(q) Dennstaedtia bipinnata (cuplet fern).
(r) Encyclia boothiana (Epidendrum boothianum)(dollar orchid).
(s) Epigaea repens (trailing arbutus).
(t) Guaiacum sanctum (lignum vitae).
(u) Guzmania sp. (bromeliad).
(v) Ionopsis utricularioides (delicate ionopsis orchid).
(w) Magnolia ashei (Ashe magnolia).
(x) Magnolia pyramidata (pyramidal magnolia).
(y) Maxillaria crassifolia (orchid).
(z) Ophioglossum palmattum (hand fern).
(aa) Parnassia grandifolia (grass-of-Parnassus).
(bb) Polyrrhiza lindenii (ghost orchid).
(cc) Rhododendron austrinum (orange azalea).
(dd) Rhododendron chapmanii (Chapman's rhododendron).
(ee) Ribes echinellum (Miccosukee gooseberry).
(ff) Roystonea elata (Florida royal palm).
(gg) Sarracenia leucophylla and Sarracenia rubra (pitcher plants).
(hh) Scaevola plumieri (scaevola).
(ii) Strumpfia martima (pride-of-big-pine).
(jj) Suriana maritima (bay cedar).
(kk) Taxus floridana (Florida yew).
(ll) Tillandsia fasciculata (wild pine bromelaid)(included because of very high harvest rate).
(mm) Torreya taxifolia (Florida torreya).
(nn) Tournefortia gnaphalodes (sea lavender).
(oo) Trillium lancifolium (trillium).
(pp) Zephyranthes simpsonii (zephyr lily).

Chapter 403—Environmental Control

Section 403.021 declares that "the public policy of the state is to conserve the waters of the state to protect, maintain, and improve the quality thereof for public water supplies, for the propagaton of wildlife, fish and other aquatic life, and for domestic, agricultural, industrial, recreational, and other beneficial uses. It also prohibits the discharge of waste into Florida waters without treatment necessary to protect those beneficial uses of the waters."

Section 403.062 deals with pollution control; underground, surface, and coastal waters. "The Department of Environmental Regulation and its agents shall have general control and supervision over underground water, lakes, rivers, streams, canals, ditches, and coastal waters under the jurisdiction of the state insofar as their pollution may affect the public health or impair the interest of the public or persons lawfully using them."

Chapter 373—Florida Water Resources Act of 1972

Section 373.016 declares it to be the policy of the legislature:

> (a) To provide for the management of water and related land resources;
>
> (b) To promote the conservation, development, and proper utilization of surface groundwater;
>
> (d) To prevent damage from floods, soil erosion, and excessive drainage;
>
> (e) To preserve natural resources, fish and wildlife;
>
> (g) Otherwise to promote the health, safety, and general welfare of the people of this state.
>
> It is the intent of the Legislature to vest in the Department of Environmental Regulation or its successor agency the power and responsibility to accomplish the conservation, protection, management, and control of the waters of the state and with sufficient flexibility and discretion to accomplish these ends through delegation of appropriate powers to the various water management districts.

St. Johns River Water Management District:

Chapter 40C-4—(Florida Administrative Code, hereafter referred to as F.A.C.)—Management and Storage of Surface Water

Chapter 40C-4 is currently under extensive modification. It is recommended that, upon adoption by the St. Johns River Water Management

Board, Chapter 40C-4 be thoroughly reviewed by Seminole County Staff, and policy, goals and objectives, and ordinances made to conform.

Chapter 372—Game and Fresh Water Fish

Section 372.072—Endangered and Threatened Species Act of 1977:

> (2) Declaration of Policy—The Legislature recognizes that the State of Florida harbors a wide diversity of fish and wildlife and that it is the policy of this state to conserve and wisely manage these resources, with particular attention to those species defined by the Game and Fresh Water Fish Commission, the Department of Natural Resources or the U.S. Department of Interior, or successor agencies, as being endangered or threatened. As Florida has more endangered and threatened species than any other continental state, it is the intent of the Legislature to provide for research and management to conserve and protect these species as a natural resource.
>
> (4) Establishment of an Advisory Council—
>
> (a) The director of the Game and Fresh Water Fish Commission shall establish an Endangered and Threatened Species Advisory Council consisting of 10 members.

Case Law:

The Graham v. Estuary Properties Inc. (Fla. 399 So. 2d 1374) decision in Florida is the most progressive decision to date concerning the use of land use regulations as an effective means of protecting wetlands via development control.

Background:

In compliance with Florida Land and Water Management Act of 1972, Estuary Properties submitted an application for a development permit for their development of regional impact (DRI) to Lee County Board of County Commissioners. The permit was denied due to an 1800 acre black mangrove forest which would be destroyed and therefore cause an adverse environmental impact. The developers appeal to the Florida Land and Water Adjudicatory Commission was denied.

Estuary Properties contended that the Commission had improperly denied its application because the various impacts of the development had not been balanced nor had the Commission made suggestions concerning ways to correct the inadequacies of the DRI.

The developers also attacked the Commission's denial of the permit as an unconstitutional taking because the owner's right to use his property had been violated.

Folowing denial by the Floida Land and Water Adjudigatory Commission, the developer next turned to the Florida District Court of Appeals (Estuary Properties v. Askew [Fla. App. 381 So. 2d 1126]).

In December 1979, the Florida District Court of Appeals ruled (later to be overturned by the Florida Supreme Court) that a government agency that denies an application for development of regional impact in an environmentally sensitive area must prove that the project has an adverse affect on the environment and moreover, a local government cannot deny an owner of wetlands all reasonable use of property without paying compensation (Land Use Law & Zoning Digest, April 1980). The court reasoned that: benefits to the general public should not be borne by a few property owners, therefore, the development permit could not be denied unless compensation was administered.

The case pinpoints the judicial uneasiness over ad hoc regulations of particular geographic areas for the purpose of promoting public benefits but without recognition of the obligation to compensate the owner. The case underscores the need for government to establish balanced management programs—such as development rights transfers or bonuses and incentives to guide growth away from heavily restricted areas to desired areas—rather than requiring a single owner to suffer the cost of providing community benefits (Land Use Law & Zoning Digest, April 1980).

The constitutional question which arose from Estuary Properties v. Askew of "a taking" versus a valid exercise of the police power, with regard to the regulation of developemnt in wetlands, was further reviewed by the Florida Supreme Court in April of 1981 as Graham v. Estuary Properties, Inc. The Florida Supreme Court held that the permit denial in response to Estuary's DRI application was a valid exercise of the police power but the Land and Water Adjudicatory Commission must provide Estuary Properties with the changes which would make the development eligible for approval. Regarding balancing of public versus private interests (pretecting public health, safety, and welfare versus protection of private property interests), the court found that the adverse environmental impact and deviation from the policies of the planning

council could outweigh other more favorable findings in deciding a development approval.

The court also reasoned that:

> if the regulation preventing the destruction of the mangrove forest was necessary to avoid unreasonable pollution of the water thereby causing attendant harm to the public, the exercise of police power would be reasonable.

Since the Land and Water Adjudicatory Commission found that the development would cause pollution in the bays and effect the county's economy, the court ruled that:

> the regulation at issue here promotes the welfare of the public, prevents public harm and has not been arbitrarily applied.

In discussing the reasonableness of the regulation the court also relies on the "magnitude of Estuary's proposed development and the sensitive nature of the surrounding lands and water to be affected by it. In this situation it is not unreasonable to place some restrictions on the owner's use of the property." Furthermore the court found that Estuary did not have legitimate investment-backed expectations for use of the property but only "its own subjective expection that the land could be developed in the manner it now proposes."

In answer to the taking issue the court said that "Estuary purchased the property in question...with full knowledge that part of it was totally unsuitable for development." The court said that there was no evidence supporting the claim that Estuary could make no beneficial use of the land.

It seems that in the Estuary case the court did not agree that the property was rendered worthless by the exercise of police power. In addition it found that reduction of the development by half was a valid exercise of police power. "The owner of private property is not entitled to the highest and best use of his property if that use will create public harm." Further:

> We agree with the Wisconsin Supreme Court's observation in Just v. Marinette County, 56 Wis. 2d7, 201 N.W. 2d 761 (1972), where that court pointed out the involvement of exceptional circumstances because of the interrelationship of the wetlands, swamps and natural environment to the purity of the water and natural resources such as fishing. The court also noted the close proximity of the land in question to navigable waters which the state holds in trust for the public. Similar factors

> are present in the case at bar. We agree with the Wisconsin court that [a]n owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use if for a purpose for which it is unsuited in its natural state and which injures the rights of others, 56 Wis 2d at 17, 201 N.W. 2d at 768.

Wetland Policy and Regulatory Functions in Other States

Massachusetts:

Chapter 131

Section 131.40A—Protection of Inland Wetlands:

This section, known as the Hatch Act, has since 1965 required developers to apply for permits to alter inland wetlands (excluding agricultural lands). It also provides for the "issuance of protective orders for inland wetlands (also excluding agricultural lands), as well as 'meadows'—seasonally wet floodplain areas" (Bosselman 1972).

Weaknesses with this Act:

(1) "The Department of Natural Resources does not concern itself with a wetland area until a landowner is required to apply for a permit. The Department must thus rely on obtaining an application from the owner once he decides to begin filling or dredging. Since it does not have a program to inform owners of wetlands about the permit requirements, this can cause some difficulties because a landowner often will not have notice of statutory requirements."

(2) The permits do not prohibit development and thus preserve wetlands in their natural state but merely impose conditions upon development activity to minimize damage to the wetlands involved.

New York:

New York mentions wetlands in its Environmental Conservation Law.

Section 3-0301(1e):

The Department of State will provide for the protection and management of marine and coastal resources and of wetland, estuaries and shore-

lines. Article 25 explains further the specific provision, although it only deals with tidal wetlands.

Michigan:

Act 127—Protection Action of 1970 (M.E.P.A.):

Standards are designated in this law to limit permitted activities to those that are dependent on being in or in close proximity to water, to require that they be done in the least harmful manner possible and that their benefits outweigh their detriments.

Section 2(1):

"The attorney general, and political subdivision of the state, any instrumentality or agency of the state or of a political subdivision thereof, any person, partnership, corporation, association, organization or other legal entity may maintain an action...for the protection of air, water and other natural resources and the public trust therein from pollution, impairment or destruction."

Act 203 of Michigan Statutes—The Goemaere-Anderson Wetlands Protection Act:

Act 203 has several components. First, it establishes a state policy to protect the public against the loss of wetlands and makes explicit findings as to the benefits wetlands provide. Second, it establishes a permit program generally regulating activities in wetlands which are above the ordinary high water marks of lakes and streams. Other wetlands are protected by permits under previously enacted laws, Act 346 and Act 247, but the Act 203 policy still applies. Third, it explicity authorizes more stringent and boarder regulation of wetlands by local governments and sets up a cooperative process for the sharing of information and expertise between the DNR and local governments. Wetlands protection in Michigan, therefore, is dependent not just on Act 203 but on Acts 346 and 247, local regulations, the federal Section 404 and 10 programs, and other laws and policies. The basis for regulation is clear: no one has the unrestricted right to alter the natural character of wetlands if the alteration would pollute the water, increase flood risks, lower lake or well water levels, destroy fish and wildlife habitat or cause other nuisances or harms.

A permit under Act 203 is required only for dredging, filling, draining or developments that (1) are in a wetland as defined in the act; (2) not subject to a permit under Act 346, Act 247 or Section 404; and (3) not exempted in section 6 (2) of the act. Each of these require some elaboration.

The definition has two components. First, the main body limits its coverage to swamps, marshes and bogs and thus, it excludes such things as temporary wet spots in fields. It elaborates by requiring the presence of water (surface or subsurface should suffice) at a frequency and duration sufficient to support wetland vegetation, i.e. vegetation adapted to the severe physiological stress of a water environment. This part of the definition is substantially equivalent to the definition of a wetland used in the Section 404 and 10 programs. The particular plant species that are considered wetland vegetation are found in many works on wetlands. The DNR and Army Corps of Engineers maintain lists of wetland vegetation used by them as well.

Local Policy and Regulatory Functions

Florida contains approximately 20% of the total remaining wetlands in the United States. The destruction of wetlands, particularly as a result of dredging and filling, has been dramatic over the past 25 years. From the mid-fifties to the present roughly 600,000 acres of wetlands in the United States are lost each year. Pressures to convert wetlands to agricultural and/or urban uses are unrelenting. Real estate values rarely reflect the true worth of a wetland, and are one of the best explanations for this overwhelming rate of their destruction.

Local Approach

Local attempts to address this problem have changed over the last 20 years and have evolved to a much more effective approach. This evolution to the use of the police power as a basis for wetland regulations has been preceded systematically through increasingly more definitive regulations.

Acquisition Programs as a Means for Wetland Protection

Initially preservation of wetlands was attempted through acquisition programs. The Open Space Land Act adopted by Congress in 1961 provided funds for local governments to acquire open space. Many communities took advantage of this program to purchase wetland areas, including Madison, Wisconsin in 1963 and Hempstead, New York in 1965. Unfortunately there are three major drawbacks to these acquisition programs.

A first major drawback to these programs were the associated costs. Although wetlands themselves were not valued at their true worth, local communities attempting to purchase them often found themselves purchasing land for the price of developable land. A second drawback to the acquisition programs, which is closely related to the first, is the timing of the acquisition. It is usually necessary to phase the purchasing of land over several budget years and this allows for the price of the land to increase and therefore the total cost of acquisition. The fiscal impracticability if clear. The final problem of these programs is the ability to protect the adjacent land and associated watershed. The importance of protecting a wetland's adjacent land, through the provision of buffer zones, and controlling development, via the permitting process, on the watershed is vital to the effectiveness of wetland protection and is not accomplished if only specific sites are purchased.

The relative lack of acquisition programs to resolve the three caveats noted gives further strength to the concept of utilizing regulatory tools. Regulations in contrast to acquisition programs can be designed to be relatively inexpensive, address the timing concerns, and effectuate control in the protection of the watershed.

Trend Towards Public Acceptance of Wetlands as a Resource

The movement towards greater specificity in regulations has paralleled a shift in public policies, towards a recognition of wetlands as a valuable resource to be protected. The resource value of wetlands to the public lies in three natural functions; the ability to affect the quality of water, the ability to affect the quantity of water and the influential characteristics of a wetland on species diversity.

In addition to this emergence of public concern for wetland protection, seen in public policies and legislation, is a political acknowledg-

ment of the "public good" nature of these resource values. A public good's true value is rarely considered in the open market system and it is difficult to exclude anyone from the associated benefits or detriments. These characteristics put wetlands into a framework needing public regulation, and in the past ten years communities have developed regulatory policies and associated implementation measures. These measures are based on goals which reflect this concern. Communities where goals, regulations, and implementation approximate a reflection of a wetland's ecological nature, should be most effective in the preservation of these valuable resources. However, the ability of these adopted regulations to adequately control development in wetlands, the adjacent land and their associated watershed, has been weakened by case law.

Local Methods for Instituting Wetland Regulations

Local governments have several methods, which are often used concurrently, to provide local regulation of wetlands; subject ordinances with specific permitted and conditional uses for designated areas, wetland conservancy districts and a map designating wetlands under consideration. The prescription of use lists along with restrictions on dredge and fill activities have been a major thrust of adopted regulations (Thurow, Toner and Beley, 1975).

Wetland ordinances may be adopted as a part of the local zoning code, as a specific district, as a separate ordinance within the municipal code or as an element of the comprehensive or open space plan. Dartmouth, Massachusetts, and Richmond, California, have specific zoning districts which are created for the regulation of activities in designated wetlands. Dartmouth's Inland Wetlands and Watershed Protection District is superimposed over the other zoning districts in recognition of the special conditions which exist throughout the town. Richmond's has adopted a zoning district, which severely limits the dredging activity.

Smithtown and New Castle, New York, both have adopted in 1976 and 1979 respectively, their own local code concerning the protection and regulation of wetlands. Both of these municipalities focus particularly on the preservation aspect of wetlands, as stated in the purpose clause. The ordinances also state the intent to promote health, safety and welfare for the general public through their implementation. These two municipal

ordinances are examples of regulations utilizing the police power by providing the nexus between the public purpose and its associated controlling uses on designated wetlands.

The comprehensive nature of these ordinances can be seen in their contents which include; the purpose clause, definitions, regulated activities, permitted uses, special exceptions, application procedures, standards for granting permits, public hearings, fees, penalties for offenses, enforcement, review and appeal, severability and effective dates. These ordinances are excellent examples for other municipalities to follow due to their encompassing nature and approach.

Orono, Minnesota, has a local ordinance concerning wetlands, which was adopted as an amendment to the floodplain management section of the municipal code. The focus of Orono's regulation is to reduce and/or eliminate the possibility of future costs which might be incurred if pollution protection, flood control measures or adequate supplies of groundwater were needed as a result of wetland destruction. By utilizing the permitting process for uses by right and conditional status, officially adopted maps (of the floodway, general floodplain and flood fringe district) and a stated overlap with existing zoning districts the Orono ordinance provides for excellent protection of its wetlands. Their permitting procedure includes a prescription of standards for dredge and fill which are set up within the framework of permitted uses. Orono's restrictions on dredge and fill are some of the most stringent, the ordinance prohibits all dredge and fill activity.

An important part of every wetland ordinance is to specify penalties for violation of the regulations. The Smithtown and New Castle ordinances address this issue utilizing administrative and criminal sanctions. Administrative sanctions include civil penalties such as fines of a limited amount and power of the local governing agency to require violators to satisfactorily restore the affected freshwater wetland to its condition prior to the violation. Each day's continuance of noncompliance is usually considered a separate offense. The enforcement of the penalties for violations is an important component contributing to the overall effectiveness of the regulations and needs support from the courts when challenged if the regulations are to be effective.

Designation of a wetland conservancy district is another method for locally instituting wetland regulations. An excellent example of this

implementation tool has been initiated in Dade County, Florida. In order to protect the Everglades National Park and its estuarine areas and adjacent wetlands, maintain present water quality and to initiate the use of land use regulations and performance standards as a crucial component within the land and water management system, Dade County adopted a Critical Area Code. The area encompassed is the low-lying marsh contiguous to the Everglades National Park and Big Cypress Preserve.

Dade County divided the Area of Critical Environmental Concern into four subzones. These subzones are identifiable physiographic areas with specific characteristics. The designation of a critical area was a result of Dade County's policy makers' commitment to reducing the dangers of uncontrolled development. Objectives of the code include protection of: Biscayne Aquifer recharge areas, surface water supply to the Everglades, adequate flood storage capacity, water quality maintenance and wildlife habitats.

Through the use of development guidelines and performance criteria the county administers a site alteration permitting program. The development guidelines specifically address site alteration (structure placement and drainage), landscaping, and development phasing.

The map designation of wetland areas is almost always included as a part of the local ordinance or plan. This is not necessarily an easy accomplishment due to the nature of wetlands to fluctuate based on seasonal rainfall and natural or man-made disturbances. The importance of specifying definitive boundaries lies in the avoidance of serious administrative problems which accompany ambigous delineations. A prescription for a well documented boundary would include both a scientific and legal description of the wetlands based on the water table, flooding levels and definitive plant and animal species.

Strengthening Local Regulations

In an effort to strengthen local wetland programs, there are three possible areas for municipalities to focus their concern; the mechanics of a flexible approach to the permitted and conditional uses, areas adjacent to wetlands which function as buffer zones and controlling the associated watershed.

The mechanics of a flexible approach to permitted and conditional uses lies in a performance oriented approach with an emphasis on the development's compatibility with the wetlands' functions. Performance criteria should be stringent and the basis for local decisions.

Density transfers are another method of achieving flexibility in wetland land use regulation by providing developers the opportunity to shift their development rights from the entire piece of property to one part of it. This concept closely parallels that of the transfer of development right (TDR's) without the use of the open market. The local ordinance for Orono, Minnesota provides this measure of flexibility for the developer.

The effectiveness of wetland regulations lies in acknowledging the relationship of areas adjacent to wetlands and the attendent watershed to the wetland itself. Acknowledgement of this connection must be included in the regulations to insure a comprehensive approach to wetland protection. The key controls for these objectives include protection against the byproducts that accompany the increase in land use intensity associated with development in the buffer zone and the watershed areas. This specifically addresses; liquid waste, runoff, erosion and sedimentation. Methods of controlling these byproducts include extensive performance requirements and limitations on the percent of impervious surface.

Case Law and Judicial Response

Regulations concerned with wetland protection through development control have met with a variety of judicial responses over the past 20 years. The overview has begun to take a definite turn within the last ten years as a result of public conern, legislation and judicial opinions. The use of police power, with its validity lying in the nexus of policy and public purpose, as a basis for regulating designated wetlands has made great strides.

In 1964 the Massachusetts Supreme Judicial Court ruled against the use of police power, vis a vis the zoning enabling legislation, for preservation of private land for public benefit because it would violate the landowner's right to use his land for a practical purpose in MacGibbon v. Board of Appeals of Duxbury. The court ruled that denial of a permit to excavate and fill coastal wetlands was unconstitutional. This resulted in

an unprecedented amount of petitions submitted for rehearings. In response the court substantially revised its opinion but denied the various petitions. The following year Golden v. Board of Selection of Fallmouth another Massachusetts court upheld the validity of using a permit system under local zoning powers to protect the town's resources.

The judicial responses have varied considerably within state, as exemplified in Massachusetts, as well as from state to state. In 1978 in American Dredging Co. v. State Dept. of Environmental Protection, the Superior Court of New Jersey upheld the legitimacy of the police power for flood control and open space preservation benefits because the benefits accrue to the public which is a stated purpose of the wetlands act.

Review of Wetland Protection Implementation Measures

Implementation strategies for wetland protection can range from simple, single strategy approaches to complex conbinations of strategies. This section will single out and briefly describe some land use management tools which have been or may be applied to wetlands and which may have applicability in Seminole County. Each technique, of course, presents trade-offs between advantages and disadvantages and an attempt has been made to elucidate these "benefits" and "costs" in the discussions.

Selection of particular implementation techniques should consider a number of factors including: community preference, extent and characteristics of wetlands, statutory enabling authority, community finances, community expertise and the goals and policies of the municipality (Kusler, 1977).

Category 1: Acquisition

Public acquisition can be a very strong and effective tool for wetland protection. The advantages of public acquisition of full rights to land are several: the protection is relatively permanent, legal problems (for example, the issue of "taking" without compensation) are reduced and public access and control are essentially quaranteed.

A disadvantage of public acquisition is that lands turned over to the public sector are removed from the tax role. This is more of a consideration for wetlands near urban area which have higher price tags (and thus,

higher assessments) than for rural wetlands. Also, lands fully owned by the local government must be administered and maintained at public expense. Still public acquisition can be very advantageous for higher priority wetlands.

The local government may acquire wetlands in several ways, including:

a) Full purchase (fee simple interest) by the local government.
b) Purchase of partial rights (lesser interest) by the local government.
c) Gifts to the local government, including donations and dedications. (Gifts can be for either full or partial rights.)

Full purchase (fee simple interest). Full purchase is the most expensive and therefore its use is limited in most communities. Where used, this technique should be reserved for highest priority wetlands considering ranking category, development pressure, and need for heavy public use.

Purchase of partial rights. Less expensive is the purchase of partial interest, including easements and development rights. These may be more appropriate where heavy public usage is not expected. Also, it allows funds for public acquisition to be spread further. Some disadvantages of easements are the fact that many are only temporary and that they can be difficult to enforce (Kusler, 1977).

Public purchase can be politically unpopular because of large costs and often the use of eminant domain is involved.

Gifts. Gifts are acquisitions by the county but without the direct purchase costs. A local government may encourage donations by educating the public and land owners about tax advantages. Gifts may be required in the form of dedications by subdivision developers.

Acquisition by other levels of government. Local government can enlist the interest and support of federal, state and regional land acquisition programs concerning wetlands in their area of greater than local interest.

Acquisition by private organizations. There are several national organizations which have played a vital role in wetland and other sensitive area protection by direct acquisition or by contributions to other groups for land acquisition. The local government or local citizens may

contact these organizations concerning standards and criteria for wetland acquisition in their area. Often these lands must be of special interest in some way and meet certain size and type criteria. Nature Conservancy, the Audubon Society and the Trust for Public Lands are most active in direct acquisition. Organizations which channel funds and resources for public acquisition of lands are the Sierra Club and the National Wildlife Federation.

Category 2: Regulatory Powers

The purpose of land use regulations as applied to wetlands would be to decrease the threat of natural hazards to health and safety and to protect wetland values. The advantage of land use regulations is primarily its low cost relative to acquisition. Some of the disadvantages are discussed by Kusler:

> Although regulations have wide potential for wetland protection, they do not, in many instances, apply to existing uses, agricultural and public works due to statutory or case law exemptions. In addition, they require a relatively accurate data base, continuing political support and expertise in administration and enforcement.

Also regulations can be subject to change with changing political climate. Finally, land use regulation is subject to judicial scrutiny concerning the constitutional issue of "taking" of property without compensation (Kusler, 1977).

Marcus in his legal review of environmental preservation methods mentions some legal tests or criteria important in selecting and defending regulatory tools. First the landowner must be able to make reasonable beneficial use of the land. However, courts are recognizing that the activity of one parcel of land may have significant indirect impacts on other properties. Also, if land has an "ancient" and continuing history of use by the public, the right to preserve this use arises through the doctrine of custom. The public trust doctrine which has historically been used to restrict development in areas such as public water areas is now expanded to apply to other natural areas. Further, by adhering to the comprehensive plan an ordinance can be defended against the challenge of arbitrariness. If

> the municipality applies the regulation uniformly to all similarly situated properties, and if there is a discernible rational basis for the particular land use classification in the comprehensive plan, a court will uphold the regulation as a valid exercise of a municipality's police power" (Marcus 1980:39).

The documented importance of preserving resources must according to Marcus: 1) show that the mechanism will assure protection of the resources, 2) show that an arbitrary class of landowners will not have to "bear a disproportionate burden" and 3) show that the program excludes efforts not necessary to "effectuation of a substantial public purpose."

Kusler mentions two principal regulatory approaches for wetlands. One is a rather rigid prohibition of all fills and structural uses and permitting of open space uses. The second approach (also the one being examined for Seminole County) is "performance standards for wetland uses that require the evaluation of each proposed use and its merits through a special permit procedure" (Kusler, 1977).

Performance standards and special permits. Performance standards include the prohibition of those uses with "serious and unacceptable impact", (2) allowing of specified open space uses which have little or minimum impact, and (3) for the rest of the uses, establishment of permit requirements which will determine to what degree use is allowed depending on design and circumstances (Kusler, 1977).

Regulatory standards should reflect:

a) Special value and hazards found within wetlands.

b) Probable impacts of particular types, designs and densities of uses.

c) Threshold levels for acceptable impact and hazard reflecting (1) the sensitivity of the wetland and its flora and fauna to particular types of development, (2) resource management and preservation goals, (3) legal and political considerations (Kusler, 1977).

The standards should emphasize protection of health and safety and prevention of nuisances.

The special permit procedure involves each proposed use being evaluated on its merits to determine compliance. The advantages of this procedure are:

a) Increased landowner options.

b) Flexibility. Each use can be considered looking at specific design and characteristics of particular site in terms of wetland values and hazards.

c) Less chance of attack as a "taking."

The disadvantages have already been mentioned for regulatory measures in general. The requirements for employee expertise and time invested in administration and enforcement are even higher in this case by case approach.

As a part of the special permit process, Kusler suggests that: "All or a portion of the burden should be shifted to developers to prove no significant flood hazard, water pollution potential, structural bearing capacity problems, nuisance threat to adjacent land, or threat to wetlands values. Performance bonds should be required for most wetland development to insure that conditions are carried out as specified."

Kusler emphasizes that understanding and communication among all parties (particularly local government and landowners) is invaluable. To this end, he recommends that local government does what it can to insure fair treatment of landowners.

> Carefully stated statutory or ordinance standards encourage impartial review of permits. A sound data base, agency expertise and genuine consideration of landowner needs are also important. Procedural due process is encouraged through public hearings, careful permit review procedures and court or judicial appeals. Combined permit processing procedures can expedite permit review (Kusler, 1977:64).

Zoning. "Zoning is the most widespread sensitive area implementation technique at the local level" (Kusler, 1981). One disadvantage of strict zoning application compared to performance standards and special permits is the failure to take into account the unique features of each site. Zoning can be effectively combined with performance standards and special permits or other techniques.

Wetland protection ordinances. Separate wetland protection ordinances may be adopted by local governments under authority from the states. These authorizations include zoning enabling authority, special wetland regulatory enabling legislation, comprehensive planning legislation or possibly home role powers in general (Kusler, 1977).

An alternative to the freestanding ordinance is the incorporation of wetlands provisions into existing land use documents and adopting them as amendments.

Regulations not specifically intended for wetlands. Regulations not primarily intended for wetlands protection can still make a significant contribution in that area (Kusler, 1977). These regulations may be newly adopted, amended to apply to or include wetlands, or in some cases, just reinterpreted and enforced in wetlands without amendment.

An obvious example of this type of regulation is one that applies to flood plains. Flood plain regulations can be used in communities to reduce flood problems and, as an added benefit, protect wetlands (Kusler, 1977). Another is sanitary codes prohibiting on-site waste disposal in high ground water areas. Subdivision regulations could include stipulations such as prohibiting subdivision of flood prone lands (Kusler, 1977).

Other ordinances or sets of regulations which can augment wetland protection efforts are arbor, tree or landscape ordinances; building codes; pollution controls.

Administration and Enforcement. Adequate administration and enforcement is essential to the wetland protection program. The following factors are important for successful administration and enforcement of wetland use regulations:

a) adequate funding allotted for administration and enforcement;
b) adequate expertise;
c) granting of variances and special exceptions is not excessive or indiscriminate;
d) any amendment proposed for wetlands policy or implementation strategy is examined carefully for consistency with county objections;
e) adequate monitoring for violations;
f) adequate ability to enforce regulations in court when necessary.

A special advisory board or commission might be established which could aid in evaluating permits.

Category 3: Tax Incentive Measures

Taxes can be a very significant cost to the landowner and may influence his/her decision concerning the use to which land will be put.

Tax relief and incentives conditional upon land use can thus also influence use decisions. Where tax measures are in force, local government should inform and educate landowners about them. It is advised that a tax expert or attorney be consulted by individuals interested in taking advantage of these programs. The taxes which may affect wetland use are: real property, income, gift and estate (Kusler, 1977).

Real Property Tax. Property tax is an ad valorem tax, levied by local government as a percentage of the assessed value of the property. This is based on the fair market value. There is often a discrepancy between undeveloped land's value at its current use and its higher potential value for development. In areas where there is a demand for developable land, the fair market value will include the potential development value and property taxes will begin to go up. Added to the attractiveness of high selling prices, the higher taxes become an additional incentive to sell land (and thus usually change its use). To at least partially offset this trend, most states have enacted preferential tax assessment statutes applied to lands in agricultural, open space, forest or recreational uses. Many of these may be applied to wetlands.

Florida's Chapter 193 deals with real property tax assessment. Section 193.501 enables local government to designate areas as "environmentally endangered" and to offer differential assessment for land which is restricted to certain uses. "Qualified as environmentally endangered" means that the land has some unique ecological characteristics or has some rare or limited feature and which "if subject to a development moratorium or one or more conservation easements or development restrictions...would be consistent with the conservation, recreation and open space and if applicable, coastal protection elements of the comprehensive plan...." (FS 193.501 6(h)). Also, "land subject to regulation by the DER and defined as submerged lands in regulations adopted pursuant to Section 403.817" is included in the definition of "qualified as environmentally endangered." This section, then, provides for tax relief for those owners of lands subject to developemnt restrictions for environmental purposes or those who voluntarily put their land to "public outdoor recreational or park use."

The preservation tools utilized or authorized in Section 193.501 are: voluntary transfer of development rights to the county (or if the county so delegates to a municipality); covenant and conservation restrictions

(as provided in Chapter 704.06); differential assessment and deferred tax liability. The owner of any qualifying land (as outlined above) may a) convey the development rights of that land to the county (or in some cases, municipal) government or the Board of Trustees of the Internal Improvement Trust Fund or, b) may enter into a convenant with one of these bodies stating that the land will be subject to certain conservation restrictions or that it will only be used for "outdoor recreational or park purposes." The lands restricted in one of the above ways for a minimum period of ten years are then appraised only according to their current use, taking into account any restrictions on the land. Again, where development pressure exists, this omission of potential development value can amount to significant property tax savings for the landowners.

To discourage speculative advantage, there is a deferred tax liability rather than simply a preferential tax provision. That is, if the owner applies to be released from the restrictions or to obtain back the development rights, he/she is subject to pay back, within ninety days, the total difference between the preferred rate and the rate the land would normally have been assessed at each year plus six percent interest. Nevertheless, Kusler says that:

> ...experience to date indicates that deferred taxation, when applied to agricultural and open space lands, is often an insufficient penalty to prevent conversion of land in urbanizing areas. In addition, landowners are often unwilling to enter into permanent restrictive agreements in areas of intense development pressures because they do not want to forego options to sell or use the land for greater profit. Consequently experts on preferential taxing schemes advocate that use value assessment schemes supplement, but not replace, regulatory programs to protect open spaces and ecologically critical areas. One study contends that preferential assessment will be beneficial primarily in semi-rural areas where it can help 'buy time' prior to adoption of regulatory programs (Kusler, 1977:263).

A direct disadvantage to local government of differential taxation is the loss of tax revenue. Tax burden may then eventually be shifted to other property owners. New York and California state legislatures have provided for some partial state reimbursements for these losses to local government. Florida does not have such a provision.

Florida's law differs from that of Massachusetts in that these tax provisions are made only when the landowner enters into agreement with certain governmental bodies but not with charitable organizations (Kusler,

1977). Also there are no stated criteria which must be met before the landowner is released from his restrictions as there are in New Hampshire and California (Coughlin & Keene, 1981:58).

Income Tax. Income tax relief is provided for those who donate either full title or partial rights (such as easements or conservation restrictions) to a government or charitable organization. Section 170(b) of the Internal Revenue Code provides that the full value of capital gain property donated to government or charitable organizations can qualify as a charitable deduction for income tax purposes.

The Tax Reform Act of 1976 extended the deduction to leases, options to purchase or easements of at least thirty years. Also, an owner may take advantage of this deduction for a donation even if he/she retains the rights to enjoy the land for his/her lifetime (Kusler, 1977).

Estate Tax. Estate or inheritance taxes are also ad valorem, i.e. levied in proportion to the value of the property and are charged when property is passed on to heirs. Where land appreciated considerably in value during the lifetime of the owner, estate taxes sometimes imposed such a burden on the heirs that estates had to be divided and sold in order to pay the estate taxes. Thus, even where an individual protected sensitive areas, farmland or wetlands in his/her lifetime, there was no further guarantee. In some cases steep estate tax policies were actually encouraging sale, often resulting in more intensive uses.

This problem became most apparent in farmlands and specific amendments to federal tax law were passed, in response (Coughlin & Keene, 1981). Other revisions applicable to owners of wetlands and other sensitive areas provide that they can lessen the burden of estate taxes for their heirs by providing for bequest of some of the land or granting a temporary easement or restriction of at least thirty years to a charitable organization or government body. Since easements or restrictions lessen the value of the land, estate taxes charged are proportionable reduced. Longer lasting restrictions, are more likely to substantially reduce land value and thus provide the greatest estate tax benefit.

The Tax Reform Act, among other things, raised the threshold at which estates become taxable so that effectively only five percent of all estates inherited are subject to federal estate tax (Coughlin & Keene, 1981).

Gift Tax. Gift taxes are imposed when property transfers are made during the lifetime of the individual. A certain amount of gift transfer is allowed without being taxable; gifts made after that threshold is reached are taxable. Federal law provides exemptions from the gift tax for donations to charitable organizations and government, both of full interest to the land and partial interest (such as easements and restrictions) of at least thirty years duration.

States also impose estate taxes and in some caes, income taxes. Often they may have reforms in these areas similar to Federal reforms.

Category 4: Other Implementation Measures

Transfer of development rights. Unlike some other techniques which were general land management tools, transfer of development rights (TDR) has always been associated with preservation. Its use began with historic landmark preservation in New York City, but its applicability to preservation of sensitive lands, open space and farmland was quickly realized and the concept was adapted to these situations.

Transfer of development rights begins with the selection and designation of certain areas or sites to be preserved (and development restricted) and other areas or sites to accept more development than their current land use or zoning designation permits. The assumption is made that all the landowners involved have development rights associated with their property, usually in proportion to the assessed value of their property and related to the existing zoning. These rights are assigned to the owners and recorded. The next step involves the conceptual separation of the rights from the specific piece of land and the resulting ability to transfer these rights. Those land owners in the preservation district are prohibited from developing their property but, in order to compensate them for this loss they are permitted to transfer their development rights to sites where further development is permitted. Most TDR programs permit these rights to be sold to different owners and applied to non-adjacent development district sites. There are however, more restrictive variations such as permitting of off-site transfers but only within a single ownership or only permitting intrasite transfers within single ownership.

There is another way that TDR programs can vary. In most cases rights are transferred between owners via the open market system. There

are programs however, where rights are transferred to the local government or one of its agencies and it acts as an intermediary or bank for the buying and selling of rights.

TDR's were conceived to mitigate the "windfalls" and "wipeouts" normally associated with strict regulatory measures. Specifically it was instituted to compensate owners of regulated land. Another argument in favor of TDR is its relative lack of expense: Land can be preserved without expensive acquisition and the direct costs to the government are those of program administration only.

This brings us to the question of some considerations for local governments regarding TDR. One of the most important things to consider is whether the development rights will have value—that is, will there be a demand to develop in the designated "transfer" area. There was no question in New York's commercial district about values of development rights and TDR's have worked well there. Where demand is less intense or nonexistent TDR's are of low value and the whole program can thus be on very shaky ground. Marcus recommends that the local economy be carefully analyzed. As part of this analysis, care should be taken in selecting a transfer area which can support added development and where additional development is consistent with an established comprehensive plan (Marcus, 1980). In Dade County, for example, new transit stations were logical and defensible choices for higher densities permitted in transfer sites.

Local zoning should be very flexible to accomodate the transfers to non-contiguous areas. It is suggested that TDR's may be supported by reasoning similar to that of PUD's and special districts.

A further consideration is that of having adequate infrastructure and services to support the increased development in the transfer areas.

The acceptibility and legality of transfer of development rights in specific instances and in general has been debated since its inception. (See ASPO, 1975; Mandelker & Cunningham, 1979; Marcus, 1980). Marcus notes a trend, based on Just v. Marinette and similar cases, suggesting that TDR might be upheld in environmentally sensitive land if there are limited permitted uses and no "distinct investment backed expectations" could be shown at the time of acquisition. Taking these environmental decisions one step further he suggests that there may actually be no right to build on environmentally sensitive land making TDR extraneous in cer-

tain instances. For further detailed discussion on legal guidelines for certain preservation methods, see Marcus (1980).

There are serious problems with trading TDR's in the free market with respect to valuation, willingness to sell, and willingness to buy. Because of this, "courts have been reluctant to find that TDR provisions can assure preservation landowners a "reasonable return on their property" (Marcus, 1980). Marcus suggests that the problems and inhibition to trade are reduced when zoning and the comprehensive plan are flexible enough to accomodate the TDR's. As mentioned before, a careful economic analysis performed before TDR is implemented, may be critical to avoiding these problems.

One objection to TDR raised by Marcus is that "increased densities generated by T.D.R. may pose a threat to suburban or rural character far surpassing any threatened loss of an ecological treasure" (Marcus 1980). However, this seems to apply mostly if transfers take place within rural or suburban areas. Urban transfer sites may be more appropriate from this point of view.

One of the criticisms of designating a distant site is that the distant site owners must now pay for the right to additional development yet they are not accruing the benefits of being close to a natural preserved area while those properties adjacent to the preserved area get the benefits and do not have to pay.

It is thought that development rights transfers become less easily defensible economically and legally as one progresses from adjacent site transfers to off-site transfers within a single ownership to off-site transfers among different landowners.

> In addition to the administrative difficulties and tax consequences involved...any local government...would probably have to defend its scheme against the claim that establishing non-contiguous transfer districts will have arbitrary and therefore impermissible planning consequences. Opponents would argue that these transfer districts bear no reasonable relation to the benefits accruing from the preservation of the natural areas and that any such crosstown transfers are spot zoning deviations from the municipality's comprehensive plan" (Marcus 1980:13).

Challenges like these again can be partially answered by assuring that the actions are consistent with the comprehensive plan and that the plan is flexible enough to allow for such measures.

Finally, Marcus argues that TDR's really are expensive in terms of tax losses to the local government. Although Collier County (Florida) is hopeful that it will recoup this loss when development in transfer districts catches up with preservation land devaluation, it was losing $641,000 per year in taxes in 1979. This decrease means curtailment of services and Marcus argues that this could further lead to decreased demand for TDR's in transfer districts. He suggests that all transfers be done within a single tax district or jurisdiction so that losses can be directly offset by any tax gain in transfer areas (Marcus 1980).

Despite the many perceived problems, one expert feels that the debate over TDR's is just a natural stage in the progression of ideas and that resistance and challenges will yield to eventual acceptance of the need for such a technique.

Education. Community education may be utilized itself or in conjunction with other techniques to further wetland protection. According to Kusler (1977), workshops involving a broad selection of interested community people has been successful in many communities. Included in these education efforts might be: local government officials, community leaders and groups, land owners, others interested in wetlands and the general public. Some possible educational tools are:

a) Private discussions—land owners, community leaders, others.
b) Lectures and media presentations—schools, chamber of commerce, other community events.
c) Newspaper articles—public.
d) Letters to the editor—public.
e) Information materials—all.

It is desirable, Kusler says, to stress concrete community problems such as the possibility of flooding or loss of hunting and fishing areas when educating the public concerning wetland issues. To assure community participation and support, interested parties should be involved in the planning process and notified of activities concerning wetlands. (Parties who might be particularly interested in wetland preservation include members of hunting and outdoor clubs, members of conservation organizations, museum staff and members, science teachers, etc.)

The education process can be ongoing because not only can education be essential in adopting wetland policies and protection measures but con-

tinued public awareness and understanding is needed as these are implemented and enforced. Kusler recommends these education programs to particularly "gain land owner support and cooperation." He notes "Negotiations between public officials and land owners and subtle community pressures often accomplish more than court suits" (Kusler, 1977).

Consistency of capital improvements and other government actions. It is important to insure that any government action in the county such as siting or building of roads, schools, airports, etc., does not violate wetland policies or encourage private development in these areas.

Also government practices in the areas of waste disposal and treatment, water supply, mosquito control should be consistent with wetland policies.

Wetland Utilization. Another method for securing the continued existence of wetlands is to utilize them for various services and functions which benefit the landowner and/or the community. Unlike the implementation strategies outlined previously (which are applicable to many types of sensitive areas) the following utilization strategies are unique to wetlands.

It should be remembered that not all wetlands can be used for all functions; generally function must be matched to appropriate type.

One possible wetland use is sewage recycling. The process is still being studied and not all wetlands are suitable. Nevertheless, where applicable, it can save the community the considerable costs involved in tertiary treatment of sewage effluent. The Florida Department of Environmental Regulation has provided for such discharge into restricted areas of wetlands on a case by case basis. The following is an excerpt from Chapter 17-4 of the Florida Administrative Code—the DER rules concerning experimental use of wetlands:

Chapter 17-4.243

> 4. Exemptions to Provide for the Experimental Use of Wetlands for Low-Energy Water and Wastewater Recycling.
>
> (a) To encourage experiments which are designed to lead to the development of new information regarding low-energy approaches to the advanced treatment of domestic, agricultural, and industrial wastes and to encourage the conservation of wetlands and fresh waters, the Secretary may, upon petition of an affected person, and after public notice in the Florida Administrative Weekly and in a newspaper of general circulation in the

area of the waters affected, and after public hearing pursuant to Chapter 120, Florida Statutes, issue an order, for a period not to exceed five (5) years, specifically exempting certain sources of pollution which discharge into restricted areas of wetlands as approved by the Secretary, from the water quality criteria contained in Section 17-3.121. provided, that:

1. The discharger affirmatively demonstrates that the wetlands ecosystem may reasonably be expected to be assimilate the waste discharge without significant adverse impact on the biological community within the receiving water; and

2. granting the exemption is in the public interest and will not adversaly affect public health or the cost of public health or other related program; and

3. the public is restricted from access to the waters under consideration; and

4. the waters are not used for recreation; and

5. the applicant affirmatively demonstrates that presently specified criteria are unnecessary for the protection of potable water supplies or human health; and

6. the exemption will not interfere with the designated use of contiguous waters; and

7. scientifically valid experimental controls are provided by the applicant and approved by the Department to monitor the long-term ecological effects and waste recycling efficiency.

(b) The Petitioner shall affirmatively demonstrate those standards which the Petitioner believes more appropriately apply to the waters for which the exemption is sought.

(c) The Secretary shall specify, by Order, only those criteria which the Secretary determines to have been demonstrated by the preponderance of competent substantial evidence to be more appropriate.

(d) The Department shall modify the Petitioner's permit consistent with the Secretary's Order.

Wetlands can also serve to retain storm water for short periods of time and thus protect surrounding lands from flooding. Storm water storage capacities differ from wetland to wetland, marshes having the greatest potential. The savings involved in using naturally occurring wetlands as opposed to artificially constructed retention ponds and drainage ditches should be stressed.

Wetlands are also effective buffers between development activity and surface water systems. Even under natural conditions wetlands assimilate runoff containing erosional products and nutrients, and wetland vegetation filters these sediments, organic matter and chemicals (Kusler, 1977). The financial benefits of maintaining clean surface water supply via continued use these "natural filters" versus expensive after-the-fact pollution abatement procedures should also be stressed.

Finally, some wetlands may have good long-term recharge potential and their retention and use for this purpose may also be encouraged.

Septic Tank Ordinances. House siting and construction criteria often interact with wetlands classification and protection parameters when the question of suitability of a particular site for septic tank installation is raised. Construction on soils of high water saturation has been halted or highly modified based on the feasibility of septic tanks. Some counties in Florida (Palm Beach, Dade, Brevard, Duval, and Alachua among them) have exceeded the rigor of Chapter 10 D 6 of the Florida Administrative code in enforcing their ordinances or policies.

Two examples illustrate different successful approaches to extra-rigorous enforcement of septic tank codes. Palm Beach County passed in 1969–1970 lot size requirements related to septic tank usage which were more specific and rigorous than Chapter 10 D 6. In particular, private land containing a septic tank could not be under a quarter acre in size, and public land with the same usage was ascribed a half acre minimum lot size. Another example is Alachua County's septic tank policies, which, while not supported by any ordinance passed into law, have been successfully implemented without challenge. Alachua County found that simply following the letter of the law resulted in septic tank failures. Therefore, the Environmental Health Department adopted a policy of enforcing rules which were twenty-five percent stricter than Chapter 10 D 6 in all areas. The subsequent absence of septic tank failures has given them no reason to question this policy.

A legal precedence also exists for local governments to adopt ordinances stricter than the state's enabling statutes. In the case of Aaron v. Conservation Commission of the Town of Redding (No. 10165, Conn. Sup. Ct., Apr. 21, 1981) the Connecticut Supreme Court ruled that a local municipal agency did not exceed its authority in the adoption of regulation with greater stringency and scope than the Connecticut State Statutes. Specifically the court found that an ordinance requiring a mandatory set back of septic tanks from all wetlands does not conflict or exceed the local municipality's authority as granted by the state, but rather such an ordinance is a reasonable implementation of that authority.

Finally, and most significantly, the Florida State Department of Environmental Health is planning to revise Chapter 10 D 6 and will advertise for a public hearing sometime in June 1982. According to Gary Lady, the environmental health officer in charge of septic tanks for Alachua County, the revision should be passed within the next two months without serious opposition. The revision contains provisions which would allow local municipalities to enforce standards even more strict than specified by Chapter 10 D 6. Specifically, 10 D 6.49 of the proposed revision states, "Nothing in this Chapter shall be construed to prevent the adoption of local ordinances under Florida's Home Rule Provisions. Such ordinances shall provide for equal or higher standards than those found in this Chapter."

Even in the absence of such a revision the precedence set by other counties in Florida to adopt ordinances and policies more stringent than the current version of Chapter 10 D 6 plus the legal precedence of the cited Connecticut Supreme Court ruling should encourage any local government to adopt standards on septic tanks which are stringent as necessary to protect their natural resources.

Review of Wetlands and Floodplain Case Law

The following synopsis outlines and in certain portions is wholly derived from the work of Jon A. Kusler (1977), (1981). Further elaboration of any point can be gained by consulting these works.

A brief overview of the case law leading to a precise definition of federal jurisdiction in wetlands cases has been added because of the slight though limited relevance to the jurisdiction of local government. Local jurisdiction over wetlands issues has varied depending on what each local government has sought to control and could even overlap with areas covered by the Federal Government.

Wetland regulations raise the same constitutional issues faced by broader planning and regulation efforts. Wetland regulations are legislative acts adopted by state legislatures, local legislative bodies (city, county, or town councils) or Congress (e.g., the Corps "404" program). As legislative acts they depend upon the will of the legislators and ultimately the voting public. The question, then, is not simply what regula-

tions courts will uphold, but also the political acceptibility of particular types of wetland regulations with specific impacts on private landowners.

Often arguments are made that proposed or adopted regulations are unreasonable, discriminate, or "take" private property without payment or just compensation. Courts have found some wetland regulations invalid because they violate property rights protected by the federal constitution or state constitutions. But many regulations have been sustained. In other words, the spectre of legal challenge is often overdone. Nevertheless it is often useful in preparing and administering regulations to take into account judicial findings and attitudes in order to avoid serious legal pitfalls.

Outline: Floodplain Regulation & The Courts (1970–1981): Broad Overview of Cases in the '70s

I. Floodway Regulations

States and localities have received court support in using floodway area restrictions equal to or in excess of NFIP (National Flood Insurance Program) standards.

Ex. Krahl v. Nine Mile Creek Watershed District, 283 N.W. 538 (Minn., 1979)
The District's regulations requiring that encroachments not exceed 20% of floodplain area were designed to preserve flood storage and were sustained by the court.

Ex. Young Heating and Plumbing Co., et al. v. Iowa Natural Resources Council, 276 N.W. 2d 377 (Iowa, 1979)
Sustained state regulations requiring removal of structure and fill which would have raised flood heights by .3 - 1.7' in a 200' wide floodway.

For preserving lots and lands, the courts have ruled that a municipality may enforce regulations which are more stringent than the state's enabling statutes.

Ex. Aaron v. Conservation Comm. of Town of Redding, 10165 (Conn. Sup. Ct. April 21, 1981).

Courts generally require that regulations be adopted, amended, administered, and enforced in close compliance with statutory procedures, although courts sometimes ignore minor immissions that do not seriously prejudice landowners. They have also refused, in some instances, to strictly enforce vague or ambiguous statutory requirements such as prior comprehensive planning requirements found in many zoning enabling acts. Courts have often found comprehensive plans within the regulations themselves. No court has invalidated flood plain or wetland regulations for failure to prepare a prior comprehensive plan, although only a portion of present regulatory efforts are preceded by such planning.

II. Tight Control of Both Floodway and Fringe Areas

Virtual prohibition of floodplain development in entire floodplain by regulations exceeding NFIP standards upheld by courts.

Ex. Turnpike Realty v. Dedham, 284 N.E. 2d 891 (Mass., 1972) cert. denied, 406 U.S. 1108 (1973)

Mass. Supreme Court sustained Dedham's floodplain regulations which restricted repeatedly flooded areas to open space uses such as "woodland, grassland, wetland, agricultural, horticultural, or recreational use." Special exception permits are possible. Landowner's argument that regulations' imposition constituted a taking since land value diminished from $431,000 to $35,000 was rejected by court.

Ex. S. Kemble Fisher Realty Trust v. Board of Appeals of Concord, Mass. App. Ct. Adv. Sh. (1980) 637

Regulations limiting property to open space conservancy uses upheld.

III. Wetland Regulations

Both federal and state courts were asked to address a variety of wetland regulations tightly controlling fill or dreding in wetland areas. Federal courts, in a long line of decisions beginning with Zabel v. Tabb, upheld denial of Federal 404 and Section 10 permits for development in coastal wetlands. Several cases involved denials of permits for dredging and filling in Florida mangroves, which play important hazard reduction roles. Several decisions also addressed Federal 404 permit requirments for inland waters. One decision required Section 404 permits for agricul-

tural activities in bottomland hardwoods along the Mississippi. Flood storage was noted as a reason for protecting these areas. Other decisions held that permits are required for development in inland lake wetlands.

Many state decisions also addressed wetland regulations. Most sustained tight regulations, particularly in the late 1970's. For example, a Maryland court in Potomac Sand and Gravel Co. v. Governor of Maryland (328 U.S. 80, 83 (1946)), sustained the denial of a permit for dredging of coastal wetlands in Charles County. The Rhode Island Supreme Court in J.M. Mills v. Murphy sustained wetland regulations for areas defined to include the 50-year floodplain. The Wisconsin Supreme Court in Just v. Marinette County (56 Wis. 2d 7, 201 N.W 2d 761 (1972)), the most famous of the wetland decisions, strongly supported state-supervised shoreland zoning regulations adopted by Marinette County. These regulations placed lakeshore wetlands in conservancy districts. The New Hampshire Supreme Court in Sibson v. State (336 A.2d 239 (1975)) upheld tight coastal wetland regulations, citing the just case. In Bob Graham v. Estuary Properties, Inc. (Fla. 339 So. 2d 1374 (1981)), the Florida Supreme Court also incorporating this just ruling into Florida judicial law upheld county refusal of a permit that would have resulted in the filling of 1,800 acres of black mangroves in Lee County Florida. (See previous discussion of this case under Florida Statutes Concerning Wetlands.)

IV. Special Permits

Invariably courts upheld regulatory standards as providing sufficient guidelines to regulatory boards to issue special permits.

Ex. Dur-Bar Realty Co. v. City of Utica, 57 A.D.2d 51, 394 N.Y.S. 2d 913 (1977)

Court upheld an ordinance mandating that the board of adjustment consider the impacts on flood heights of proposed uses.

Exception—Courts sometimes found that local boards lacked sufficient data to issue or deny special permits.

Ex. Pope v. City of Atlanta, 243 Ga. 577, 255 S.E.2d 63 (1979), Cert. denied, 440 U.S. 936.

V. Subdivisions Storm Water Management Regulations

Flood and drainage standards in subdivision ordinances upheld by several courts.

Ex. Brown v. City of Joliet, 108 Ill. App. 2d 230, 247 N.E.2d 47 (1962).

Court supported the refusal of subdivision plat because inadequate drainage plans would have lead to drainage and erosion problems.

Exception—Subdivision refusal because of flooding tendancy held invalid if developer willing to fill area to protect against flooding.

Ex. Kessler v. Town of Shelter Island Planning Board, 40 A.D.2d 1005, 338 N.Y.S.2d 778 (1972).

Judicial Response to Specific Challenges

I. Adequacy of Enabling Authority

In the 1969–1980 period 17,000 communities adopted floodplain regulations and no court invalidated regulations on the grounds of inadequate basic enabling authority.

Arguments are sometimes made that local zoning, subdivision control, guilding code, and other land use control enabling statutes do not authorize local adoption of wetland regulations since only a small portion of these statutes specifically mention wetlands. This is not a serious legal challenge in most circumstances. Authorization of adoption of wetland regulations may be found in the broad language of most zoning enabling acts to regulate lands to "promote health" and the "public welfare." Most zoning enabling acts also authorize regulations to encourage the "most appropriate use of land throughout such municipality." A significant number of acts specifically authorize regulations to protect natural resources. The Massachusetts Supreme Court in Turnpike Realty co. v. Town of Dedham observed that the broad zoning enabling language similar to that in most states authorized the adoption of floodplain regulations similar to those adopted for most wetland areas. The court noted that the legislature had expressly amended the general zoning enabling act to authorize floodplain zoning, but that such an amendment was unnecessary.

II. Adequacy of Regulatory Objectives

In the face of landowner challenges, the courts upheld nine major flood loss reduction goals.

A. Prevention of increases in flood height and/or flood velocity whose cumulative impact on other lands could result in great damage and loss of future development.

Ex. Turner v. County Del Norte, 24 C.A.3d 311, 101 Cal. Rptr. 93 (1972).

Ex. Foremen v. State Dept. of Natural Resources, 387 N.E.2d 455 (Ind., 1979).

B. Protecting flood storage.

Ex. Krahl v. Nine Mile Creek Watershed District, 283 N.W.538 (Minn., 1979).

C. Buyer protection from subdivision and sale of floodprone lands.

Ex. Metropolitan St. Louis Sewer District v. E. Zykan, 495 S.W.2d 643 (Mo., 1973).

D. Landowner protection from flood losses due to location of their own uses on floodplain. Court ruling has not sustained the landowner's argument that he be free of regulation because he will bear any flood-related consequences of his activities solely on himself. The ruling has supported floodplain regulations as a valid exercise of police power because of the community-wide consequences which result from a person victimized by a flood, namely:

> An injured person can become a charge of the state, flooded damaged property can depress the value of surrounding areas and the economic and social disruption of flooding inevitably spreads to other parts of the community. ["Commentary, Model Flood Management Ordinance" (draft, 1982), developed for the Southwest Florida Water Management District by Richard Hamann]

Ex. Turnpike Realty v. Town of Dedham, 284 N.E.2d 891 (Mass., 1972).

E. Protection of wildlife and fisheries.

Many wetland cases have given strong support to the protection of wildlife and fisheries. The Fifth Circuit court of Appeals in Zabel v. Tabb upheld the denial by the U.S. Army Corps of Engineers of a permit to fill in Boca Clega Bay in St. Petersburg-Tampa, Florida. The court strongly emphasized protection of fish and wildlife in its opinion.

Ex. Zabel v. Tabb, 430 F.2d 199 (1970).

Ex. Conservation Council of North Carolina v. Costanzo, 398 F. Supp. 653 (1975).

Ex. United States v. Joseph Moretti, Inc., 331 F. Supp. 157 (1971).

F. General welfare protection and promotion, including reduction of flood-related expenses to the public.

Ex. Turnpike Realty v. Town of Dedham, 284 N.E.2d 891 (Mass, 1972).

G. Control of Water Pollution.

Several wetland cases strongly link the regulation of wetland areas to the maintenance of water quality. In one case, Reuter v. Department of Natural Resources, the Wisconsin Supreme Court specifically required the Wisconsin Department of Natural Resources to evaluate the impact on water quality of a proposed permit to dredge a two acre floating bog along the margin of a lake. In a second Wisconsin case, Just v. Marinette Co. which is discussed below, the court emphasized the interrelationships between wetlands and water quality in sustaining wetland regulations:

> We start with the premise that lakes and rivers in their natural state are unpolluted and the pollution which now exists is man-made. The state of Wisconsin under the trust doctrine has a duty to eradicate the present pollution and to prevent further pollution in its navigable waters. This is not, in a legal sense, a gain or a securing of a benefit by the maintaining of the natural status quo of the environment. What makes this case different from most condemnation or police power zoning cases is the interrelationship of the wetlands, the swamps and the natural environment of shorelands to the purity of the water and to such natural resources as navigation, fishing, and scenic beauty. Swamps and wetlands were once considered wasteland, undesirable, and not picturesque. But as the people became more sophisticated, an appreciation was acquired that swamps and wetlands serve a vital role in nature, are part of the balance of nature and are essential to the purity of the water in our lakes and streams. Swamps and wetlands are a necessary part of the ecological creation and now, even to the uninitiated, possess their own beauty in nature.

H. Protection of public rights in navigable waters.

Courts quite often have sustained wetland regulations to protect public rights in navigable waters. See the discussion of the taking issue below.

I. Protection of the natural suitability of the land.

The Wisconsin Supreme Court in a landmark wetland protection case, Just v. Marinette Co., mentioned above, upheld highly restrictive county wetland regulations adopted as part of a state supervised shoreland zoning program. The court emphasized the importance of wetlands to public waters and held that the land owner had no right to destroy the natural suitability of the wetland where such destruction harmed public interests. This language was endorsed by the New Hampshire Supreme Court in Sibson v. State.

Courts afford legislatures broad discretion in the selection of regulatory objectives (Berman v. Parker, 348 U.S. 26 (1954)). Nevertheless they have sometimes invalidated regulations designed to serve several objectives in traditional zoning or wetland regulation contexts:

(1) Protection of aesthetics. Protection of aesthetics has not traditionally been considered a proper sole objective (Barney J. Carey Co. v. Milton, 324 Mass. 440, 87 N.E.2d 9 (1949)) for exercise of police powers although courts are gradually relaxing this rule. Aesthetics is recognized as a valid secondary objective in all states. The traditional unwillingness to uphold regulations designed solely to protect aesthetic values was based, in part, upon a conviction that beauty is purely subjective and not capable of objective evaluation. However, some courts have upheld regulations designed primarily to protect aesthetic values by emphasizing the tangible benefits of such beauty, including property values, tax base, and regional recreation (Jordan v. Village of Menomonee Falls, 28 Wis.2d 608, 137 N.W.2d 442 (1965)). Even where protection of beauty or its benefits are accepted as valid police power objectives, the further question remains: "How tightly may private property by controlled in the name of beauty?" Courts have sustained some restriction of private uses but disapproved others (Bismark v. Bayville, 49 Misc,2d 604, 267 N.Y.S.2d 1002 (Sup. Ct. 1966).

Protection of beauty is almost always a secondary objective in wetland regulation and adds weight to primary goals such as reduction in hazards and protection of wildlife. Wetlands regulations should not, therefore, encounter legal objections on this score.

(2) Maintenance of land in an open condition until public purchase is possible. Courts have quite often held invalid attempts to zone lands to hold them in an open condition until purchase is possible (Long v.

Highland Park, 329 Mich. 146, 45 N.W.2d 10 (1950)), but official mapping to preserve sites for future roadway until purchase is possible has been sustained (Headley v. Rochester, 272 N.Y. 197, 5 N.E.2d 198 (1936)). In addition, the California court in Turner v. County of Del Norte (24 Cal. App. 3d 314, 101 Cal. Rptr. 93 (1972)) upheld a highly restrictive floodplain regulation for an area subject to extreme flood hazards that the public contemplated for future purchase. Plans for long term public purchase of property should not undermine the validity of present regulation based upon valid objectives such as protection of floodway conveyance capacity.

(3) Allocation of private lands to public uses by prohibiting all private uses. Courts have invalidated efforts to zone private land for public uses (Sanderson v. City of Wilmar, 282 Minn. 1, 162 N.W.2d 494 (1968).

III. Discrimination

Courts have ruled against the argument that all landowners who might contribute to a flooding problem should be regulated and that none should be singled out. The ruling cited supports local efforts to map and regulate the most seriously threatened flood hazard areas first with gradual inclusion of other areas over time.

Ex. Bechendorff v. Harris-Galveston Coastal Subsidence District, 558 S.W.2d 75 (Tex., 1977).

Note: Similar regulatory approaches have been sustained by the courts for coastal but not inland wetlands.

Ex. Sand Point Harbor, Inc. v. Sullivan, 136 N.J. Super. 436, 346 A..2d 612 (1975).

Ex. Potomac Sand and Gravel Co. v. Governor of Maryland et. al, 266 Md. 358, 383 A.2d 241 (1972), cert denied, 409 U.S. 1090.

Ex. J.M. Mills, Inc. v. Murphy, 352 A.2d 661 (R.I., 1976).

IV. Reasonableness of Regulations

The substantive content of any regulation must meet the general test for reasonableness, namely, that the ordinance's restrictions do not oppress individuals unduly and are reasonably necessary to achieve the purpose of the regulation.

Courts require that regulations (the means) be reasonably related to the regulatory objectives (the ends) to satisfy due process requirements.

Wetland regulations have not generally been contested as unreasonable although reasonableness is a common issue for broader land and water use controls. For example, courts have held invalid flood plain regulations for areas with no evidence of flooding, drainage regulations requiring an enclosed drainage system where open drainage systems were more appropriate, and pollution controls where there was little threat of pollution and the justification for the regulation was too tenuous.

Courts demand particularly sound use classifications where regulations severely restrict private uses and affect property values. A Connecticut court in Strain v. Mims observed:

> [W]here the value of property of an individual is seriously affected by a zoning regulation especially applicable to it, this fact imposes an obligation to carefully consider questions whether the regulation does, in fact, tend to serve the public welfare and the recognized purposes of zoning.

Some items of interest are

A. Frequency of flooding.

Definition of floodway boundaries have sometimes been sustained by the courts on the basis of flooding frequency,

Ex. Maple Leaf Investors v. Department of Ecology, 88 Wash. 2d 726, 565 P.2d 1162 (1977).

Ex. Foreman v. State Department of Natural Resources, 387 N.E.2d 455 (Ind., 1979).

And sometimes sustained on the basis of historic flood data without any specific mention of frequency.

Ex. Turner v. Del Norte County, 24 C.A.3d 311, 101 Cal. Rptr. 93 (1972).

It appears that quantified estimates of flooding are desirable but not essential.

B. Accuracy of mapping.

In only one case has floodplain regulation been invalidated due to lack of data on flooding.

Ex. Sturdy Homes, Inc. v. Township of Redford, 30 Mich. App. 53, 186 N.W.2d 43 (1971).

(1) First, what data must be used for wetland mapping? If they exist, statutory data gathering and mapping requirements must, of course, be followed. If there are not statutory requirements, the issue of reasonableness depends not only upon the quality and quantity of data, but also upon the specific nature of the regulations based upon this data, the impact of the regulations upon private property owners, and the data refinement procedures available during administration of regulations. Soil maps may be sufficient for wetland definiation in rural environments where property values are low and the impact of regulations upon landowners are minimal, but less satisfactory for regulations in high value urban areas. Soil maps may also be insufficient if used alone, but satisfactory if a special permit regulatory approach is used to permit case-by-case refinement of boundary lines and supplementary data gathering on a case-by-case basis.

In the Just case, the Wisconsin Supreme Court upheld the use of U.S. Geological Survey topographic maps for wetland mapping combined with a written definition of wetland areas:

> [A]reas where groundwater is at or near the surface much of the year or where any segment of plant cover is deemed an aquatic according to N.C. Fassett's "Manual of Aquatic Plants."

A landowner contested the regulations arguing, in part, that the wetland maps were not sufficiently specific and that his land was not a wetland. The Court did not specifically discuss the validity of the maps, but sustained the regulations, noting that the land was clearly wetland by the written test.

In a second case, Loveladies Property Owners Ass'n v. Raab, the New Jersey Supreme Court upheld the position of the New Jersey Dept. of Natural resources that mapping of wetlands and adoption of a restrictive order was a prerequisite to requiring permits from landowners for regulated activities. Great weight was given to the Department's interpretation of the law. This case did not consider the validity of the maps themselves.

Several floodplain zoning cases have considered the validity of floodplain mapping (or the absence thereof). In Iowa Natural Resources Council v. Van Zee the Iowa Supreme Court upheld a state flood plain zoning law which required permits for floodplain uses whether or not flood-

plains had been mapped by the state. In other words, landowners were required to determine whether proposed uses were or were not located in floodplain areas. However, the landowner contesting the regulations in this case was in no position to claim ignorance of flooding problems: he had built a levee at the site.

C. Standards for floodway areas.

Court rulings have sustained rigorous local criteria for defining floodway areas.

Ex. See citations for the section on "Floodway Regulations" (p.).

The courts of New Jersey and Connecticut have held invalid as a taking the application of highly restrictive wetland regulations to entire wetland areas. Definition of subzones may be advisable in some circumstances to permit varying degrees of restriction where property values are high and substantial differences do exist in the flood hazards, pollution potential, wildlife value, or other features of a wetland.

D. Cumulative impacts

For the most part, rulings have sustained regulations of activities which individually could not achieve an adverse effect but cumulatively could produce such a detrimental result.

Ex. Young Heating and Plumbing Co., et al. v. Iowa Natual Resources Council, 276 N.W. 2d 377 (Iowa, 1979).

Ex. Pope v. City of Atlanta, 243 6a. 577, 255 S.E. 2d 63 (1979) cert. denied, 440 U.S. 936.

Exception: Insufficient evidence of cumulative impact in a specific case invalidates denial of permit to fill coastal wetland.

Ex. McGibbon v. Board of Appeals of Duxbury, Mass., 340 N.E. 2d 487 (1976).

The clearest case has to do with the cumulative impact of fills or other uses upon navigable waters.

For example in Hixon v. Public Service Commission, 32 Wis. 2d 608, 146 N.W. 2d 577 (1966) the Supreme Court of Wisconsin affirmed a denial of a permit to maintain a breakwater on the grounds that the breakwater was an unnecessary obstruction to navigation, did not allow for free flow of water, and was detrimental to the public interest. The court observed:

> There are over 9,000 navigable lakes in Wisconsin covering an area of over 54,000 square miles. A little fill

> here and there may seem to be nothing to become excited about. But one fill, though comparatively inconsequential, may lead to another, and another, and before long a great body of water may be eaten away until it may no longer exist. Our navigable waters are a precious natural heritage; once gone, they disappear forever.
>
> Hixon v. Public Service Commission, (32 Wis. 2d 608, 146 N.W.2d at 589 (1966).

Similarly the California Supreme Court sustained regulations controlling the filling within San Francisco Bay and a 100 foot corridor. (Candlestick Properties, Inc. v. San Francisco Bay Conservation and Development Commission, 11 Cal. App.3d 557, 89 Cal. Rptr. 897 (1970).

E. Consideration of present versus future conditions.

Court rulings have upheld flood maps based on existing conditions as sufficient for floodplain regulations as opposed to projected conditions of the watershed in the future.

Ex. A.H. Smith Sand and Gravel Co. v. Department of Water Resources, 270 Md. 652, 313 A 2d 820, 828 (Md., 1974).

Ex. Roberts v. Secretary, Department of Housing and Urban Development, 473 F. Supp. 52 (1979).

F. Judicial Review of Reasonableness

Partly due to their reluctance to assume the mantle of experts and partly due to their endorsement of the separation of judicial, legislative and executive powers, courts have shown deference to agency or legislative determinations where any evidence existed to support such findings.

Ex. Young Heating and Plumbing Co., et al. v. Iowa Natural Resources Council, 276 N.W. 2d (I.S., Ct., 1979).

V. Special Exceptions and Variances

Over a wide range of cases, special permit approaches were sustained by court rulings. In the case of Pope v. Atlanta, 242 Ga. 331, 249 S.E. 2d 16 (1978) the following regulations were upheld:

1) Permits must be sought for development within 2000 feet of streams.
2) Any use within 150 feet of the river and on the 50 year floodplain was restricted to those
    a) not harmful to water corridor's water and land resources
    b) did not significantly impede natural water flow

c) did not contribute significantly to land erosion or siltation.

In several cases the potential for issuing a special permit was considered significant in determining whether regulations were a taking of private property.

Ex. Just v. Marinette County, 56 Wis 2d 7, 201 N.W. 2d 16 (1978).

Ex. Maple Leaf Investors v. Department of Ecology, 88 Wash. 2d 726, 565 P. 2d 11162 (1977).

In every case addressing the issue, court rulings sustained the adequacy of standards set locally as criteria for special permits.

Ex. Wolfram v. Abbey, 55 A.D. 2d 700, 388 N.Y.S. 2d 952 (1977).

Local authorization of a zoning administrator to determine flood hazard areas using data from the corps was upheld by the court.

Several courts ruled that special permits were incorrectly denied in specific circumstances due to an insufficient factual basis for the denial.

Ex. McGibbon v. Board of Appeals of Duxbury, 340 N.E. 2d 487 (1976).

Similarly variances were deemed acceptable due to lack of sufficient evidence of adverse impact of the specially permitted action.

Ex. Schiff v. Maple Shade Tp., 374 A 2d 43, 149 N.J. Super. 448 (N.Y. Super. A.D., 1977).

The Taking Issue

The near total support for floodplain, wetland, coastal zone and other regulations against claims of taking explains why the present focus in the courts is no longer on taking but on "reasonableness" and other aspects of regulations.

When taking was an issue, the courts considered (1) the nature of the property interest, (2) how the interest has been affected and (3) the remedy for impacting the interest.

I. U.S. Supreme Court Cases

Designation of specific buildings as "landmarks" subject to zoning ordinances which required proper upkeep was not deemed a taking because the landowner had a reasonable return on investment and shared such regulatory burdens with all other owners of similar property.

Ex. Penn Central Transportation Corp. v. New York City, 98 S. Ct. 2646 (1978).

Ordinances seeking to prevent premature conversion of open space and thereby avoid the hazards of fire, flood and disturbed geology associated with such adverse impacts was not considered a taking since the landowner had not demonstrated that he was deprived of all economic use of the land. Further, the court noted that the landowner accrued some benefits from said regulations as well.

Ex. Agins v. City of Tiburon, 100 S. Ct. 2138 (1980), affirming 24 Cal. 3d 266, 598 P. 2d 25 (1979).

II. Tests for Taking

At the state and federal court level determination as to whether a taking had occurred or not often involved the use of more than one test. Further, the taking issue was usually considered simultaneously with such issues as the validity of regulatory objectives, basic fairness (due process) and non-discriminatory nature of regulations, and reasonableness. Regulations found deficient in any of the latter aspects were often held to be a taking.

Ex. Sturdy Homes, Inc. v. Township of Redford, 30 Mich. App. 53, N.W. 2d 43 (1971).

Examination of the entire parcel, not just the floodplain or wetland in question, was the norm, and the final test of taking asked whether regulations prevented all economic or reasonable use of the land. Typically courts determine whether a regulation is a taking by balancing the need for a regulation with its impact on a property owner. Related tests as to whether a taking exists are:

A. Physical interference with private lands

Physical use of private property such as building a dam which floods private land or construction of a dune on private land as flood protection has been held to be a taking.

Ex. Pumpelly v. Green Bay Co., 80 U.S. 166 (1871).

Ex. Lorio v. Sea Isle City, 88 N.J. Super 506, 212 A. 2d 802 (1965).

Since wetland regulations don't usually involve such physical use, this test is rarely appropriate. Several courts have held that since regulation don't physically interfere with private lands, they aren't a taking.

Ex. Krahl v. Nine-Mile Creek Watershed District, 283 N.W. 2d 538 (Minn., 1979).

Ex. Maple Leaf Investors v. Department of Ecology, 88 Wash 2d 726, 565 P. 2d 11162 (1977).

B. Diminution of value

Court rulings have allowed regulations to diminish property values up to a certain point at which they're considered a taking. No formula has been established to find this point, so any comparison of property values (pre- and post regulations) is usually inconclusive. This test has been widely cited, but has not been widely applied as a final measure of taking.

Ex. Commissioner of Natural Resources v. S. Volpe and Ca., Inc., 349 Mass. 104, 206 N.E. 666 (1965).

Ex. Morris County Land Imp. Co. v. Parsippany-Troy Hills Tp., 40 N.J. 539, 193 A 2d 232 (1963).

C. Prevention of harm versus conferring a public benefit.

If a regulation seeks to prevent a public harm a taking is usually not found.

Ex. Sibson v. State, 336 A. 2d 239 (N.H. 1975).

The U.S. Supreme Court has held that a local ordinance prohibiting gravel and sand extraction below the water table was not a taking due to possible threats to safety from open excavations.

Ex. Goldblatt v. Town of Hempstead, 369 U.S. 590 (1962).

Therefore if all practical uses are nuisance-like, regulations are not a taking.

Ex. Consolidated Rock Products Co. v. Los Angeles, 57 Cal. 2d 515, 370 P. 2d 342, Cal. Rptn 638 (1962).

Several cases have upheld tight control of residential and apartment uses because of flood hazards to those uses.

Ex. McCarthy v. Manhattan Beach, 41 Cal. 2d 879, 264 P. 2d 932 (1953) cert. denied 348 U.S. 817 (1954).

D. Denial of all reasonable and practical use of the land

This is the most widely applied test, and it focuses not upon speculative loss to the landowner but upon the practicability and reasonableness of uses which remain for the land. Denial of all "practical" or "reasonable" use of the land constitutes a taking. One should note that creation of any nuisance is not a "reasonable" use though it may appear "practical" to the landowner, and regulations against such nuisances are invariably deemed not a taking. Another test of reasonableness is whether the use in question is compatible with uses on adjacent lands. The test for "reasonable use" was stated in:

Ex. Walker v. Board of County Commissioners of Talbot County, 208 Md. 72, 116 A. 2d 393 (1955).

The definition of points relevant in the determination of "practical use" was set down at the direction of the Massachusetts supreme court:

1) The uses which can be made of the locus in its natural state (a) independently of other land of the owner in the area, (b) in conjunction with other land of the owner.
2) The assessed value of the locus...
3) The cost of the locus to the defendant.
4) The present fair market value of the locus (a) subject to the limitations imposed by the commissioner; (b) free of such limitations.
5) The estimated cost of the improvements proposed by the defendant.

Ex. Commissioner of Natural Resources v. S. Volpe and Co., 349 Mass. 104, 206 N.E. 2d 666 (1965).

E. Where a landowner fails to protest a restriction in a timely manner

In cases where harm would result to adjacent landowners from reclassification, a landowner who failed to contest a restriction in a timely manner could not claim the restriction was taking.

Ex. Fillister v. City of Minneapolis, 270 Minn. 53, 133 N.W. 2d 500 (1965) cert. denied 382 U.S. 14 (1965).

F. Where special permits are available

Regulations do not on their face deny all practical uses when special permits are available for structures, fills and other uses. Thus such regulations do not constitute a taking.

Ex. Vartelas v. Water Resource Commission, 146 Conn. 650, 153 A. 2d 822 (1959).

Ex. Just v. Marinette County, 56 Wisc. 2d -, 201 N.W. 2d 761 (1972).

However, if the special exemption procedure is found to be so restrictive that no practical use of the land is possible, then the regulation(s) are held to be a taking.

Ex. Morris County Land Improvement Co. v. Parsippany Troy Hills Tp., 40 N.J. 539, 193 A. 2d 232 (1963).

G. Where regulations affect a portion of the property

Courts have sometimes sustained highly restrictive regulations which focus on only a single portion of the property. In Vartelas v. Water Resource Commission the Connecticut Supreme Court upheld a denial of a permit for a structure with floodway encroachment lines that affected only a portion of the lot. Lot size becomes significant where regulations appear to prevent all practical uses for the entire property.

Ex. Grant v. Kiefaber, 114 Ohio App. 279, 181 N.E. 2d 905 (1960), aff'd 171 Ohio St. 326, 170 N.E. 2d 848 (1960).

H. Where public rights in navigable waters are considered paramount to private rights.

Tight wetland regulations have been sustained by the courts based on the idea that public interests in navigable waters are paramount to the right of private landowners to carry out activities resulting in wetland destruction. Public interests in such waters include navigation, fishing, duck hunting, etc.

Ex. Sibson v. State, 336 A. 2d 239 (N.H. 1975).

Ex. Township of Grosse Ile v. Dunbar and Sullivan Dr. Co., 15 Mich. App. 556, 167 N.W. 2d 311 (1969).

Ex. People, Township of of Smithtown v. Pevermo, 71 Misc. 2d 524, 336 N.Y.S. 2d 764 (1972).

Traditionally, public trust and navigable servitude concepts were applied only to waters and lands within the high water mark. However, broader applications have used such concepts for lands four miles inland from the Mississippi.

Ex. Wolf v. Hurley, 46 F. 2d 515, aff'd per curium, 238 U.S. 801 (1931).

I. No Right to Destroy the Natural Suitability of the Land

Any regulations for uses threatening the suitability or capability of water-related lands were not deemed a taking because no one has a right to injure the public, whose paramount interests have been recognized in private wetlands.

The inescapable issue often is that regulations severely restrict potential development value. Court rulings have not upheld the landowners' claim that potential development is a right. In the case of Just v. Marinette County (56 Wis. 2d 7, 201 N.W. 2d 761 (1972) the court observed:

> The Justs argue their property has been severely depreciated in value. But this depreciation of value is not based on the use of the land in its natural state but on what the land would be worth if it could be filled and used for the location of a dwelling. While loss of value is to be considered in determining whether a restriction is a constructive taking, value based upon changing the character of the land at the expense of harm to public rights is not an essential factor of controlling.
>
> Just v. Marinette County (56 Wis. 2d 7, 201 N.W. 2d at 771 (1972).

The language and logic of this case was upheld in the case of Sibson v. State (336 A. 2d 239 (N.H. 1975)).

Federal Wetlands Jurisdictional Caselaw: An Overview of the Last Ten Years

The last decade has witnessed the gradual expansion of the interpreted jurisdiction of the Federal Government over wetlands. This growth has been spurred at certain points by landmark court decisions. In 1974 in U.S. v. Holland (73-623 (Md. Fla., 1974)) the court declared that the jurisdiction of the U.S. Army Corps of Engineers was not limited to supervision of dredge and fill in "navigable waters" of the United States, as set forth in Section 10 of the Rivers and Harbors Act (1899). The Corps' jurisdiction was extended to "waters of the United States" which include all bodies of water up to the mean high water mark (navigable waters and their tributaries plus adjacent wetlands). In 1975 as a result of the Corps' refusal to assume this added responsibility, the ruling of National Resources Defence Council v. Callaway(74-1242 (D.D.C. (1975)) ordered the

Corps to extend coverage under the 404 program of the Federal Water Pollution Control Act to all waters which could be constitutionally regulated by the Federal Government under the commerce clause. This was affirmed and extended in 1979 in United States v. Byrd(78-2459, 7th Circuit Ct.(1979)) to cover all wetlands which are contiguous to or adjoin interstate lakes. Finally in Avoyelles Sportmen's League v. Alexander(78-1428 (W.D. La., 1981)) the Corps' jurisdiction was interpreted to extend to all freshwater wetlands whose boundaries are defined by vegetation tolerant of saturated water conditions. Thus the domain of federal jurisdiction has been steadily expanded from only an aquatic environment to all wetlands adjacent to any body of water and defined by a perimeter of water tolerant plants.

VI

DRAFT OF CODES AND PERFORMANCE REGULATIONS

Recommended Changes to the Seminole County Comprehensive Plan

This part results from a review of the Seminole County Comprehensive Plan (SCCP). The review identified goals and objectives in the SCCP that did not completely address a concern for wetlands in Seminole County. In addition, new goals and objectives are recommended. This procedure will fit the emerging concern for wetlands into the existing elements of the SCCP.

These expanded goals and added objectives are consistent with the existing goals and objectives of the SCCP. The additions further reinforce the commitment to maintaining a better total environment for Seminole County.

All recommended additions to the SCCP are underlined and changes are struck through, thusly: ~~change~~. References to the page and section of the SCCP are located to the right of each change.

B. Soils — SCCP p. A-1

I. Goals and Objectives

a) Goal: Manage, utilize, conserve, and protect natural resources including groundwater supplies, environmentally sensitive land, wetlands, water storage areas, requisite open space, archeologic and historic sites, insuring that adequate resources are available for future generations.

C. Ecological Communities — SCCP p. A-7

b) Objectives

ii. To encourage the maintenance of existing vegetative cover and/or the establishment of utilization of natural wetland ecological communities as buffers between development activities and other sensitive wetland ecological communities.

E. Surface Water Resources SCCP p. A-29

b) Objectives

viii. To encourage the utilization of wetland ecosystems as buffers between upland development and surface water systems.

F. Natural Resources Summary SCCP p. A-47

b) Objectives

v. To insure that development or activities within wetlands and areas adjacent to wetlands do not threaten safety, cause nusiances, or result in public losses.

vi. To require that private and public resource decision makers evaluate the short- and long-term consequences of development and activities on areas adjacent to and within wetlands, and waters. In addition to considering the reversibility of impact and development, consider alternative strategies for use of areas adjacent to wetlands, and waters.

vii. To balance the public interest in resources with private land use expectations and options.

viii. To encourage the protection of natural groundwater recharge areas.

ix. To require that no one has the unrestricted right to alter the natural character of wetlands if the alteration would pollute the water, increase flood risks, destroy fish and wildlife habitat or cause other nuisances or harms.

Recommendation for Sewer and Water Facilities

B. Sewer Facilities SCCP p. C-1

b) Objectives

v. To encourage low-energy approches to treatment of domestic, agricultural, and industrial wastes.

C. Water Facilities SCCP p. C-11

a) Goals: Manage, utilize, conserve and protect natural resources including groundwater supplies, wetlands, environmentally sensitive land....

b) Objectives

iv. To encourage the protection of natural groundwater recharge areas and manage development of these areas.

Recommendation for Solid Waste SCCP p. C-55

vi. To locate future solid waste disposal facilities in areas where minimal impact on wetlands will be caused.

Recommended Changes to the Policies of the Seminole County Comprehensive Plan

3. Soils Policies A-5

iii. To supplement zoning and subdivision regulations with environmental soil impact ordinance to ensure that the appropriate soil potential is reached and with a wetlands development ordinance to ensure that development in wetlands shall be compatible or compatible with permits to the wetland proposed for development.

b. Development Planning and Regulation Policies A-15

i. ~~A high degree~~ Maximum protection for wetland areas that are designated and defined ~~by hydric vegetation types, frequent flooding, topo and soil conditions~~ in a wetland development ordinance; deep marsh, shallow marsh, wet prairies, cypress domes, hydric hammocks, bayhead, and mixed hardwood swamp.

A-16

v. (c) Development permits are issued only in accord with the prescription of a wetland development ordinance.

A-25

iii. To adopt as part of the community environmental impact statement ordinance, a recharge protection ordinance, and as part of a wetland development ordinance, guidelines for the protection of recharge functions. ~~based upon ensuring that development occurring in "most" and "moderately effective" recharge areas,~~ The ordinances shall ~~maintain~~ protect and, if possible, improve the quality and rate of recharge before development occurs:

A-26

(b) ee. wetland use guideline matrix in wetland development ordinance and performance standards.

A-39

a. iii. To adopt a wetland development ordinance as additional requirement to zoning and other development regulations which provides wetland definitions, permit procedures, and performance standards.

b. Renumber existing ~~iv~~ to v and ~~v~~ to vi A-50

b. iv. To adopt a wetland development ordinance as additional requiremets to zoning and development regulations, which provides wetland definitions, permitting procedures and performance standards.

b. Renumber ~~iii~~ to iv B-9

b. iii. To adopt performance standards for the development of industry in wetlands.

b. Renumber ~~iv~~ to v B-11

b. iv. To adopt performance standards for commercial development in wetlands.

B-13

b. v. To adopt performance standards for agricultural development in wetlands.

A Wetlands Development Ordinance for Seminole County, Florida

The following is a draft ordinance for the protection of wetlands in Seminole County, Florida. It is drafted as Chapter 11, for inclusion in the Seminole County Land Development Code. The present Chapter 11, "Right-of-Way Use Permitting," should be renumbered as Chapter 12.

In reviewing the Seminole County Land Development Code to insure that the Wetlands Development Ordinance is consistent with the entire code it becomes apparent that the present code is a compilation of many separate pieces. It was felt that some reconstruction and rewriting of the entire code is in order to yield an overall comprehensive Land Development Code. Of primary concern should be the "stream-lining" of the various permitting processes into one process.

As a result of the need for some reorganization of the present Land Development Code, the Wetlands Development Ordinance and permitting and review processes are not tied as directly to the code as we would like.

ARTICLE I
IN GENERAL

11.1.1 Findings.

WHEREAS, wetlands serve important biological functions, including food chain production, general habitat, nesting, spawning, rearing and resting sites for aquatic or land species; and

WHEREAS, wetlands through natural water filtration processes serve to purify water; and

WHEREAS, wetlands are often natural recharge areas; and

WHEREAS, wetlands serve as valuable storage areas for storm runoff and floodwaters; and

WHEREAS, the destruction or alteration of wetlands could adversely affect the natural drainage characteristics, sedimentation patterns, and other environmental characteristics; and

WHEREAS, wetlands are significant in protecting surrounding areas from erosion and storm damage; and

WHEREAS, wetlands provide scenic and recreational opportunities; and

WHEREAS, the public health, safety, and welfare of the citizens and inhabitants of Seminole County are served by protection of the wetlands and adjacent areas of Seminole County, Florida.

NOW, THEREFORE, BE IT RESOLVED AND ORDAINED that this ordinance shall be adopted to protect the wetlands of the unincorporated areas of Seminole County, Florida.

11.1.2 Short Title.

This ordinance shall be known as "The Wetlands Development Ordinance of Seminole County, Florida."

11.1.3 Purpose.

It is the purpose of this ordinance to preserve, protect, and improve the public health, safety and comfort, good order, appearance, and general welfare and to conserve, develop, utilize, and protect natural and scenic resources of Seminole County and to implement the Seminole County Comprehensive Plan.

ARTICLE II

APPLICATION AND SUBMISSION REQUIREMENTS

11.2.1 Pre-Application Conference.

It is recommended that the applicant for a wetlands development permit meet with the Land Development Division and the Division of Environmental Services to discuss the proposed development prior to submitting a formal application pursuant to this ordinance.

11.2.2 Application Requirements.

All applicants for development as described in Article IV of this ordinance in the unincorporated area of Seminole County in or within 300 feet of wetlands, encompassing wetlands all or in part described in Article IV of this ordinance shall submit the following information in the application for a wetlands development permit. In some cases, information requirements may be more or less than listed below. The Division of Environmental Services shall determine the extent of application requirements needed for specific development projects.

A. General Information.

1. Name of project.

2. Legal description of the property and size of parcel in acres or square feet.

3. Name, address, and telephone number of the owner or owners of record.

4. Name, address, and telephone number of the applicant or firm he/she represents.

5. Name, address, signature, and registration, if appropriate, of the planner, architect, professional engineer, or landscape architect who proposed the development plan.

B. Existing Site Information.

1. Table of contents listing all material, drawings, maps etc.. Each page should be clearly numbered as page - of - pages (For example, page 1 of 10, 2 of 10, 3 of 10 etc.).

2. Site plan (scale 1" = 50') having date and north arrow indicating vegetative cover for all wetlands on the site and all wetlands within 300 feet of the site.

3. Vicinity map (i.e., an aerial photograph with all relevant information such as property lines, location of drives, structures, etc. Located on photograph.) showing relationship of proposed development to the surrounding parcels within 300 feet of the boundaries of the proposed development.

4. Linear dimensions of the site and wetland areas in the site and within 300 feet of the site.

5. Existing topography with a maximum of one (1)-foot contour intervals for the proposed development site.

C. Description of Proposed Development Activity.

1. Describe the proposed development activity in detail.

2. Explain the proposed work schedule for the development activity.

3. The following is a checklist of development activity. The applicant shall indicate which activity or combination of activities best describe the proposed development. All of these activities are described in Article IV of this ordinance.

DEVELOPMENT ACTIVITY CHECKLIST

Activity	Indicate if Activity is Included in Proposed Development		
	Yes	No	Not Sure
Production of Agricultural or horticultural crops			
Harvesting of timber and wood products			
Cultivating naturally occurring agricultural or horticultural products			
Scenic, historic, wildlife, or scientific preserves			
Maintenance (minor) or emergency repair to existing structures or improved areas			
Removing natural products of wetlands in the process of recreational or commercial fishing, aquaculture, hunting or trapping and creation and maintainence of temporary blinds			
Cleared walking trails having no structural components			
Timber catwalks and docks <4 ft wide			
Timber catwalks and docks >4 ft wide			
Establishing plantings			
Substantial restoration or reconstruction or modification of existing structures and improved areas			
Construction or modification of mosquito control or "drainage" ditches			
Operation of motorized vehicles including airboats			

DEVELOPMENT ACTIVITY CHECKLIST

Activity	Indicate if Activity is Included in Proposed Development		
	Yes	No	Not Sure
Expansion of existing structures or improved areas			
Dredging of any kind other than for mosquito control or drainage ditches			
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land			
Bulkheading			
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of wetland area within property			
Use of any pesticide or herbicide			
Installation of utilities			
Filling $\leq$10% of wetland within property in conjunction with the construction of permitted structures			
Clearing of vegetation in conjunction with the construction of permitted structures			
Construction of permitted structures			
Installation of septic tanks			
Installation of storm water retention basin			
Storage, use, or disposal of any hazardous material			
Solid waste disposal			

11.2.3 Application Submission.

The applicant shall submit six (6) copies of the application for a wetland development permit in a form provided by the Land Development Division. In addition, the applicant shall submit all other materials including, but not limited to, site plans, maps, and surveys, all in six (6) copies. The application for a wetlands development permit shall be submitted no later than 5:00 P.M. seven (7) days prior to the next meeting of the Development Review Committee for the application to appear on the agenda. No application will appear in the agenda if not completely and timely filed.

ARTICLE III

WETLAND DEVELOPMENT PERMIT PROCEDURES

11.3.1 Requirement for Application.

An approved wetlands development permit or approval as to compatibility is required for all listed activities as described in Article IV of this ordinance proposed to be developed in wetlands as described in Article IV of this ordinance or within 300 feet of wetlands larger than one-half (1/2) acre. It shall be unlawful for any person to construct, erect, or alter a building or structure within a wetland or to develop, change, or modify wetlands for which a wetlands development permit is required except in accordance with an approved wetlands development permit.

11.3.2 Review Procedure.

A. All applications for wetlands development permits shall be reviewed by the Land Development Division and the Development Review Committee. The Development Review Committee shall meet to review applications for compliance with the provisions of this ordinance and shall review the verification of wetland categories by the Division of Environmental Services as provided in subsection 11.3.3 of this ordinance.

   This review shall be made by the Development Review Committee within seven (7) working days following the timely receipt of the application for a wetlands development permit. Based on this review, comments shall be included in the Land Development Division's response and decision on verification and classification of wetlands type to the applicant.

B. If the applicant wishes to modify his/her proposal for wetland development thirty (30) days for revisions will be allowed and the procedure in subsection 11.3.2A in this ordinance may be repeated as if it were an original application.

C. The Division of Environmental Services shall review the application and evaluate the development proposal and significance of wetlands as provided for in subsection 11.3.4 of this ordinance. The Division of Environmental Services shall calculate the wetland significance score as provided for in subsection 11.3.4 of this ordinance and determine if any specific standards apply to the application. This determination is made in writing and will form the basis for determination of use and compatibility of the proposed development in the wetland or wetland types related to the application.

D. The Division of Environmental Services Division shall determine use and compatibility of use in the wetland or wetlands described, verified, and evaluated in the application for a wetlands development permit. The determination shall be made based on the procedure described in subsection 11.3.5 of this ordin-

ance. The Division of Environmental Services shall notify the Land Development Division concerning the determination of use and compatability. The determination of compatability shall be one of the following:

1. Denied because the development activity or activities within the wetland and/or adjacent area is incompatible; or,

2. Approved without a permit because the development activity or activities proposed is or are compatible with the wetland and/or adjacent area described in the application; or,

3. Subject to the procedure and conditions set forth by the Division of Environmental Services in a permit for wetland development. This procedure is set forth in subsection 11.3.6 in this ordinance.

The Land Development Division shall notify the applicant in writing which determination has been made and explain the reasons for the determination. In addition, if a permit is required, the Land Development Division shall include a description of the procedure as provided for in subsection 11.3.6 of this ordinance.

E. Time Limitation. The Land Development Division shall affect the reviews and notify the developer as described in subsection 11.3.2 A,B,C,D in this ordinance within fifteen (15) days after the receipt of and confirmation of completeness of the application for a wetlands development permit.

11.3.3 Verification of Wetland Category.

A. Determination of Adequacy of Information. The Division of Environmental Services must determine if the information submitted by the applicant is complete and sufficient. If it is determined by the application is incomplete or insufficient, the Division of Environmental Services through the Land Development Division must advise the applicant what is incomplete or insufficient and allow the applicant thirty (30) additional days in which to provide that information. Any submittals after the thirty (30)-day time limit will require a reapplication fee.

B. Verify Wetland Classification. Final verification of specific wetland categories shall be determined by the Division of Environmental Services. This determination shall be based on the Wetlands Field Guide found in Appendix A of this ordinance. This determination shall be made one (1) week after the completed application has been submitted and reviewed by the Development Review Committee.

C. Classification of Wetlands. The following is a list of wetland categories classified in the Wetlands Field Guide found in

Appendix A and described in Article IV of this ordinance: Deep Marsh, Mixed Hardwood Swamp, Cypress Dome, Bayhead, Hydric Hammock, Shallow Marsh, and Wet Prairie. Every wetland community must be classified in one or more of these categories for each proposed development. The Division of Environmental Services shall be responsible for verifying these classifications, and for incorporating comments on review to the Development Review Committee. The Development Review Committee shall inform the applicant as to compliance and verification of wetland type.

11.3.4 Evaluation for Significance.

All applications for a wetlands development permit shall be evaluated by the Division of Environmental Services. This evaluation and assignment of values shall be based upon the following criteria:

A. Size. The size of a wetland is important. While the values associated with a particular type of community on a unit area basis may be relatively low, when total area is taken into account the contribution of large wetlands of low value may be higher than small wetlands of high value. For example, contributions to food chains by very productive wetlands is high on a unit area basis. But a large area of a less productive wetland may contribute substantially to food chains even though the unit area productivity is lower. Values shall be attributed to wetlands based on the following table of values.

Large (>50 acres)	3 points
Medium (10–50 acres)	2 points
Small (0.5–9 acres)	1 point

B. Connectedness. The extent of connection to major wetland or aquatic systems is a factor that must be considered. The more extensive the connection, the greater potential for contributions to food chains, water quality enhancement, and flood protection. With less extensive connections the wetland community does not play as an important role in these functions. The connection may be determined by ground survey, aerial photos, or USGS maps. Values shall be attributed to wetlands based on the following table of values.

Major connection (i.e., flowing water system or floodplain wetland forest)	3 points
Minor connection (i.e., runoff wetland where waters flow through or during times of heavy rainfall tend to be areas of relatively low velocity flows)	2 points
Isolated (i.e., cypress domes or some shallow marshes and bayheads)	1 point

C. Landscape Diversity. Landscape diversity (edge effect)—The diversity of the surrounding landscape plays an important role in determining the value of any particular wetland. The greater diversity of communities that surround a given wetland community, the greater the potential for utilization of the community

by wildlife. For example, a Cypress Dome surrounded by Pine Flatwoods is considered as embedded in one community; a shallow marsh that borders a Pine Flatwood and a Bayhead is considered to be embedded in two other communities; and a Hydric Hammock that borders a Mixed Hardwood Swamp, a Mesic Hammock and a Pine Flatwood is considered to be embedded in greater than two other communities. The ranking is determined using either a ground survey or aerial photographs to ascertain the type and numbers of different communities that surround the wetland in question. Values shall be attributed to wetlands based on the following table of values.

Embedded in greater than two other communities with clear transitions	3 points
Embedded in two other communities	2 points
Embedded in one other community	1 point

D. Quality of Surrounding Landscape. The overall quality or degree of alteration of the surrounding landscape is important since a particular wetland community may have higher potential for wildlife habitat, water quality enhancement, flood protection, etc., depending on the condition of the surroundings. The ranking is based on highest values associated with least altered surrounding landscape and may be determined using ground survey or aerial photographs. A completely altered landscape is cleared of natural vegetation and has been converted to some use such as agriculture or urban development. A somewhat modified condition is altered to a lesser degree and may include drainage facilities and/or converted to silvicultural activities or may be partially cleared of understory vegetation. Values shall be attributed to wetlands based on the following table of values.

Undisturbed	3 points
Somewhat altered	2 points
Completely altered	1 point

E. Intactness. The condition of the wetland community is of importance. Some wetlands have had extensive alterations in water flow characteristics, vegetation, drainage, fire, etc. With such alteration, functions may be impaired and thus values lower. The ranking is based on the degree of alteration of the wetlands structures and functions, and may be determined by ground survey and in some cases from aerial photos. Examples of somewhat altered conditions include berming around wetlands (that will effect surface water flows), and adjacent drainage channels that do not effect surface water inflow or outflow, but do effect groundwater levels. Somewhat altered also includes selective harvesting of timber. Examples of major alteration include drainage channels cut through the wetland so as to alter hydroperiod and flow characteristics, clear-cutting of vegetation, major fire damage, and harvesting of peat. Values shall be attributed to wetlands based on the following table of values.

Pristine	3 points
Somewhat altered	2 points
Major alteration	1 point

F. Uniqueness. The scarcity of a particular wetland within the county and surrounding counties is of importance. Of primary concern is the scarcity of the wetlands within regions of the county. A survey of the area under question pertaining to review of a potential development will reveal whether or not a particular wetland type is scarce in that region of the county. Values shall be attributed to wetlands based on the following table of values.

Very Scarce	3 points
Somewhat common	2 points
Common	1 point

G. Summation and Significance. The sum of scores from A, B, C, D, E, and F above provides the means to evaluate significance of wetlands. The evaluation is performed by adding the values derived in A, B, C, D, E, and F above. If the sum equals 12 to 18 points, the value of the wetland must be considered high. If the sum is less than or equal to 8, then the value of the wetland must be considered low (or nominal). Compatibility in the Use Guideline Matrix in Article IV of this ordinance may change as a result of the scoring in the evaluation of significance. If the wetland is evaluated as having high significance (a score of 12 to 18), the Division of Environmental Services shall change all compatible (C) activities in the Use Guideline Matrix to compatible with permit (CP). If the wetland is evaluated as having a low significance (a score of 8 or less), the Division of Environmental Services shall change all incompatible (I) activities in the Use Guideline Matrix to compatible with permit (CP).

H. Endangered Species. If there is strong evidence, and such evidence can be substaniated by the Division of Environmental Services that the wetland(s) and/or adjacent area within 300 feet of the wetland(s) is a habitat for endangered species then no permit will be issued and all activities shall be considered incompatible. For the purposes of determining endangered species, the most recent list published by the Florida Game and Fresh Water Fish Commission shall be used for animals, and the most recent list published by the Florida Department of Agriculture shall be used for plants. This provision may be modified by the Development Review Committee acting upon a recommendation of the Division of Environmental Services.

11.3.5 Determination of Use and Compatibility with Wetlands.

The Division of Environmental Services shall determine whether the activity for which the wetlands development permit is proposed is compatible, incompatible, or compatible with permit. In making this determination, the Division of Environmental Services shall use the definitions of devel-

opment activities in Article IV of this ordinance as a guide and shall use the Use Guideline Matrix in Article IV of this ordinance to determine compatibility. This determination shall be made within seven (7) working days and a written finding shall be attached to the application for a wetlands development permit. This determination is subject to the evaluation for significance made by the Division of Environmental Services pursuant to the provisions of subsection 11.3.4 of this ordinance.

11.3.6 Procedure for Permitting.

The Land Development Division acting upon determination of the Division of Environmental Services shall be responsible for issuing a permit for wetland development if a determination has been made that the proposed development is compatible with permit; or issuing an order confirming the determination that the proposed development is compatible and no permit is required; or issuing an order that the proposed development is incompatible and no permit will be issued. In any of these three events, the applicant must be notified in writing as to the status of determination made by the Land Development Division.

A. Conditions of Permit and Inspection.

1. Compatability by Issuance of Permit. The Land Development Division acting upon the determination of the Division of Environmental Services may issue a permit for development in wetlands pursuant to the standards and guidelines for wetland development in Article IV of this ordinance. The standards and guidelines for wetland development shall be written and attached to the application for wetland development. The permit for wetland development shall be conditioned by the standards and guidelines prepared for the particular application and shall form the basis of the permit.

2. Development Inspection. Development in wetlands subject to this provision shall be carried out with strict adherence to the conditions of the permit and shall be subject to periodic inspections performed by the Division of Environmental Services. A final inspection shall be made by the Division of Environmental Services and a determination made as to the adequacy of the development in meeting the conditions of the permit. If all conditions have been met, the Divsion of Environmental Services shall notify the applicant, the Land Development Division, and the appropriate county agency which is responsible for issuing a certificate of occupancy. If conditions are not met, the Division of Environmental Services shall notify the applicant, the Land Development Division, and the appropriate county agency which is responsible for issuing a certificate of occupancy concerning the noncompliance(s) of the development to the conditions set forth in the wetlands development permit. In case of non-compliance(s), the certificate of occupancy shall be withheld until all conditions are met.

11.3.7 Extensions.

An extension for a wetlands development permit beyond the required deadlines may be considered if a written request is submitted by the applicant to the Land Development Division prior to the required deadline.

11.3.8 Fees.

Application fees for a wetlands development permit, as adopted from time to time by the Board, must be paid to Seminole County, Florida, at the time the application for a wetlands development permit or revisions to the permit is made to the Land Development Division.

11.3.9 Wetlands Development Permit Revisions.

Changes to the approved wetlands development permit shall be accomplished according to the Review Procedures in subsection 11.3.2 of this ordinance.

11.3.10 Time Limit on Approval.

Following approval of the wetlands development permit, the applicant shall have one (1) year to commence construction on the site. Any site where construction has not begun within one (1) year shall cause the wetlands development permit to be re-evaluated by the appropriate bodies and any newly adopted procedures and/or standards will be applicable.

11.3.11 Refiling.

Applications for a wetlands development permit may be refiled. If the appeals process outlined in Artile V, the Board denies an appeal, the application may refile for a wetlands development permit. The refiling must meet the following conditions:

1. A period of three (3) months must transpire before an application may be refiled.

2. The proposed development project contained in the new application must be different than the original project.

ARTICLE IV

STANDARDS FOR DEVELOPMENT PERMIT

This Article has four parts. Subsection 11.4.1 is a description of the seven wetland types found in Seminole County. Subsection 11.4.2 is a description of all the activities and the impacts that these activities will have upon wetlands. Subsection 11.4.3 is the use guideline matrix, which matches activity or use to wetland type and determines whether that use or activity is compatible, incompatible, or compatible with a permit. Subsection 11.4.4 is a listing of the performance standards that are necessary to meet the requirements for a wetlands development permit.

11.4.1 Description of Wetlands.

This description of wetlands shall provide the criteria for the Division of Environmental Services, together with Appendix A, in the determination of wetland types. In the event of prolonged dry conditions that may temporarily alter the presence of some or all of the aquatic vegetation described in this subsection, in favor of more terrestrial plant species, the margins of wetlands existing during period of normal rainfall will still be the determining factor in any compatible, compatible with permit, or incompatible decisions, notwithstanding the presence of terrestrial plant species. The Division of Environmental Services shall make the final determination of wetland classification as provided in subsection 11.3.2A of this ordinance.

A. Deep Marsh. Deep marshes are wetlands that are usually dominated by free-floating or rooted aquatic herbs and are usually permanently flooded by fresh water and are found along rivers, lakes, and water courses.

The deep marshes and ponds serve as a filter system for rivers and lakes. This protects the rivers and lakes from eutrophication and provides the marsh with nutrients that are used in the vegetative growth. Marshes will retain water during drought, and large marshes also help slow down water flows at flood times.

Soils commonly associated with this community are nearly level and very poorly drained with coarse-textured or organic surfaces underlain by clay or sand. The soil is covered with 3–6 ft of water during the growing season. No Sphagnum is present, instead substratum is soft muck, rich in decaying organic matter mixed with mineral soil and often silty from inland (river) deposits.

Plants characterizing this community include:

Grasses and Grasslikes: Cutgrass, Leersia hexandra; Watergrass, Echinochloa sp.; Maidencane, Panicum hemitomon; Cattail, Typha sp.; Bulrushes, Scirpus sp.; Rush, Juncus sp.

Rooted Aquatic Herbs: Tape grass, Vallisneria americana; Water-lilies, Nymphaea odorata; Golden Club, Orontium aquaticum; Spatterdock, Nuphar luteum; Coontail, Ceratophyllum demersum; Hydrilla, Hydrilla verticullata; Water milfoil, Myriophyllum sp.

Free-Floating Herbs: Water hyacinth, Eichhornia crassipes; Water-lettuce, Pistia stratioides; Frog's-bit, Limnobium spongia; Duckweeds, Lemna sp. and Spirodela sp.

Deep marshes and ponds provide excellent habitats for many wildlife species. Numerous birds and waterfowl use this community for wintering or year-round. Animals that commonly occur in this community are

Mammals: Otter, raccoon, marsh rabbit, white-tailed deer, Florida water rat, feral hog.

Birds: Herons, egrets, bitterns, ibis, sandhill cranes, rails, limpkins, gallinules, snipes, killdeers, Florida ducks, red-winged blackbirds, marsh hawks, red-shouldered hawks, swallow-tailed kites.

Reptiles: Turtles (mud turtle, red-bellied, snapping turtle, chicken turtle), snakes (mud, water, swamp, brown, cottonmouth, ribbon), alligator.

Amphibians: Sirens, frogs (cricket, pig, leopard).

B. Shallow Marsh. The shallow freshwater marsh is a herbaceous community adapted to prolonged periods of flooding. Many shallow marshes are dominated by one or several species. The shallow marsh appears as an open expanse of grasses, sedges, and rushes, and other herbaceous plants in an area where the soil is usually saturated or covered with surface water for 2 or more months during the year.

The freshwater marshes serve as filter systems for rivers and lakes. This protects the rivers and lakes from eutrophication and provides the marsh with nutrients that are used in the vegetative growth. Marshes will retain water during drought. Large marshes also help slow down water flows at flood times. Fire and water level fluctuation are the major factors affecting these wetland areas. Variations in the water patterns in a marsh will change the plant diversity and productivity. Marsh systems will eventually move to a woody community with exclusion of fire or permanent and lower water level changes.

Soils commonly associated with this community are nearly level and very poorly drained with coarse-textured or organic surfaces underlain by clay or sand. The soil is usually saturated during the growing season, and is often covered with 6 inches or more of water. No Sphagnum is present. Substratum is soft muck, rich in decaying organic matter mixed with mineral soil and often silty from inland (river) deposits.

Within Florida, eight major different types of freshwater marshes have been described. Any one marsh may be composed of

sections of different major types. There is also intergrading of these types. The types are

Flag marshes dominated by pickerelweed, Sawgrass marshes, Arrowhead marshes, Fire flag and other non-grass herbs marsh, Cattail marsh, Spike-rush marsh, Bulrush marsh, and Maidencane marsh.

Plants that characterize this community (depending on type of marsh) include:

Grasses and Grasslikes: Blue maidencane, Amphicarpum muhlenbergianum; Bottlebrush threeawn, Aristida spiciformis; Cutgrass, Leersia hexandra; Maidencane, Panicum hemitomon; Wild millet, Echinocloa spp.; Common reed, Phragmites spp.; Cordgrass, Spartina bakeri; Carex sedges, Carex spp.; Sawgrass, Cladium jamaicense; Flat sedge, Cyperus spp.; Umbrella grass, Fuirena spp.; Bulrushes, Scirpus spp.; Rush, Juncus spp.; Spike rushes, Eleocharis spp.; Beak rushes, Rhychospora spp; Cattail, Typha spp.

Herbaceous: Arrowhead, Saggitaria spp.; Blue flag, Iris savannarum; Fire flag, Thalia geniculata; Pickerelweed, Pontederia cordata; Smartweed, Polygonum spp.; Pennywort, Hydrocotle spp.

The freshwater marshes provide excellent habitats for many wildlife species. Numerous birds and waterfowl use this community for wintering or year-round. Animals that commonly occur in this community are

Mammals: Raccoon, marsh rabbit, white-tailed deer, Florida water rat.

Birds: Herons, egrets, bitterns, ibis, sandhill cranes, rails, limpkins, gallinules, snipe, killdeer, Mottled duck, red-winged blackbird, marsh hawk, red-shouldered hawk, swallow-tailed kite.

Reptiles: Turtles (Eastern box, red-bellied, chicken), snakes (black racer, eastern diamondback, Florida cottonmouth).

Amphibians: Frogs (leopard, little grass, green tree frog), toads.

C. Wet Prairies. The wet prairie, sometimes called freshwater meadow, appears as an open expanse of grasses, sedges, rushes, and herbs in varying proportions, and may also contain scattered shrubs and small trees. The general appearance of the prairie is that of an overgrown field. The wet prairie occurs in areas of low topographic relief and receives water from rainfall and from runoff from higher, nearby areas. It is regularly flooded by freshwater from 0.5 to 2 feet and remains wet to moist throughout much of the year.

Soils are commonly mineral and organic alluvial and are nearly level and poorly drained with coarse-textured surfaces underlain by clay or sand. There is often a thick organic layer that has

high water-holding capacity. The soil helps slow down water flows, and thereby increases water quantity and improves water quality. Fire and artificial water level fluctuations are the major factors affecting these areas. Variations in the natural sequence of either event will change the slough's diversity and productivity. With the exclusion of fire or permanent water level reduction, the plant succession will be to a wooded community.

Grasses are the most common plants found in sloughs. Sedges and rushes also occur with scattered shrubs in some locations. Plants that characterize this community are

Shrubs: St. John's wort, Hypericum fasciculatum; Primrose willow, Ludwigia spp.; Elderberry, Sambucus simpsonii.
Grasses and Grasslikes: Blue maidencane, Amphicarpum muhlenbergianum; Bluejoint panicum, Panicum tenerum; Forked panicum, Panicum dichotomum; Low panicum, Panicum, spp.; Sand cordgrass, Spartina bakeri; Beak rushes, Rhynchospora; Softrush, Juncus effusus; Sloughgrass, Scleria spp.; spike rush (Eleocharis cellulosa); sedge (Cyperus spp.).
Herbaceous: Pickerelweed, Pontederia cordata; Sundew, Drosera spp.; Marsh pink, Sabatia spp.; Meadowbeauty, Rhexia spp.; Milkwort, Polygala spp.; Yellow-eyed grass, Xyris spp.; spiderlily (Hymenocallis spp.); swamplily (Crinum americanum).

This community is productive in regards to food for bobwhite quail, deer, and wading birds. Its low growing vegetative growth provides poor cover for most wildlife species, but this is often offset by the "edge effect" of this community when it is located with flatwoods and hammocks.

Mammals: Bobcat, deer, gray fox, marsh rabbit, opossum, cotton rat, raccoon.
Birds: Bobwhite quail, cranes, egrets, herons, ibis, meadowlark, red-shouldered hawks, snipe.
Reptiles: Cottonmouth moccasin, eastern diamondback rattlesnake, pigmy rattlesnake, ringneck snake, yellow rat snake.
Amphibians: Narrow-mouthed toad, green tree frog, greater and lesser sirens.

D. Cypress Domes. The cypress dome (sometimes called cypress head) is a still-water wetland forest occurring in areas where water is present for much of the year. This community generally occurs in depressions in upland areas of little topographic relief such as the pine flatwoods. It seldom occurs in the floodplains. The dominant specie is pond cypress (Taxodium ascendens) with swamp black gum (Nyssa sylvatica var. biflora) also often found. The largest cypress trees generally occupy the zone flooded most often. Trees become progressively smaller with distance from this zone. In shallower areas around the edges, competition with other species occurs, the likelihood of fire is greater, and there are a large number of seedlings.

Smaller cypress ponds tend to be more regular in shape; larger ponds tend to be asymmetrical and may occur in strands.

This community is poorly drained and water is at or above ground level a good portion of the year. Cypress domes provide water storage areas by holding excess water and slowly releasing it into the water table. Water quality is enhanced by the community, which functions as a waste treatment plant by absorbing nutrients from the water. Fire is a stress factor, primarily on the drier portions, but water is important in all areas. Water enters the cypress dome directly from rainfall or runoff. The water level is highest in summer and peak productivity occurs in early spring. Standing water will result in slow tree growth especially if it occurs during the growing season. Natural regeneration of cypress requires fluctuation of the water. Flooding during the dry season will prevent the cypress trees from reproducing. Water must be available to germinate the seeds because it provides natural stratification. However, when the seedling starts to grow, its top must be maintained above water. Both drastic changes in the water level and a stabilized water level may change the plant community. If the water level is lowered the cypress-gum swamp can succeed to bay forest.

Soils commonly associated with this community are nearly level or depressional, poorly drained and have loamy subsoils and sandy surfaces. Taxodium ascendens is found in acidic soils.

Plants that characterize this community are

Trees: Pond cypress, Taxodium ascendens; Swamp black gum, Nyssa sylvatica var. biflora.
Shrubs: Common buttonbush, Cephalanthus occidentalis; Southern wax-myrtle, Myrica cerifera.
Vines: Laurel greenbrier, Smilax laurifolia.
Grasses and Grasslikes: Maidencane, Panicum hemitomon; Sawgrass, Cladium jamaicense.
Herbaceous: Cinnamon fern, Osmunda cinnamomea; Fall-flowering ixia, Nemastylis floridana; Pickerel weed, Pontederia cordata; Royal fern, Osmunda regalis; Spanish moss, Tillandsia usneoides; Stiff-leafed wild pine, Tillandsia utriculata; Sphagnum moss, Sphagnum spp.

This community is very important for wildlife refuge areas and as a turkey roosting area. It is well suited for waterfowl and wading birds, and aquatic animals may be found in large numbers. The permanent residents of cypress domes are relatively few, but much of the wildlife of the flatwoods is dependent on these ponds for breeding purposes. Animals frequently found in cypress domes include:

Mammals: Cotton mice, raccoons, opposum, bats.
Birds: Woodpeckers, towhees, catbirds, yellowthroats, Carolina wrens, cardinals, kingfishers, bitterns, herons, ibises, woodstorks, common egrets, warblers, sparrows.

Reptiles: Green anole, Florida cottonmouth.
Amphibians: Lesser siren, frogs (green tree frog, squirrel tree frog, southern chorus, leopard).

E. Hydric Hammocks. Areas dominated by broad-leaved (mixed deciduous and evergreen) trees growing on soils that are poorly drained, but not subject to seasonal or periodic flooding, are considered hydric or low hammocks. Such hammocks are generally restricted to areas between the river swamp and the edge of the flatwoods. Hydric hammocks often occupy soils that are nearly saturated with moisture due to seepage of groundwater from higher areas. Topography is low and nearly level. These hammocks are not flooded for as long a period of time as are associated mixed hardwood swamps. The mixed hardwood swamp community is found within depressional areas of the hydric hammock.

Cabbage palm hammocks are included in this category because of hydroperiod and soil similarities. This community occurs on nearly level land. Water movement is very gradual to and through the natural drainageways, swamps, ponds, and marshes associated with this community. During the rainy season, usually June through September, the water table is on or near the soil surface. The natural vegetation of cabbage palm hammocks is typically scattered pine and cabbage palm with an understory of palmetto and grasses.

Numerous soil types occur within hydric hammocks. The soils are most often nearly level, poorly to somewhat poorly drained, and coarse textured to fine textured in the subsoil. Some parts of the subsoil are calcareous or neutral to moderately alkaline. The surface and subsurface layers are coarse textured. The soil is rich in organic matter and consequently has greater water-holding capacity than the soil of the xeric hammocks. Soils receive, in addition to direct rainfall, seepage and runoff from higher areas and have a very high water table.

This community supports a luxuriant growth of vegetation with a diversity of species. Although supporting plants that are found in both drier and wetter sites, this community has definite flora characteristics. Slight differences in plant composition occur depending upon water relationships. The slightly wetter sites contain a higher percentage of grasses and herbaceous plants. Although these differences are recognized, they are not significant enough to delineate as separate communities. Plants that characterize this community are

Trees: Cabbage palm, Sabal palmetto; Popash, Fraxinus caroliniana; Tulip-poplar, Liriodendron tulipifera; Laurel oak, Quercus laurifolia; Live oak, Quercus virginiana; Red bay, Persea borbonia; Red cedar, Juniperus siliciola; Red maple, Acer rubrum; Sweetbay, Magnolia virginiana; Sweetgum, Liquidambar styraciflua; Water oak, Quercus nigra; Southern Magnolia, Magnolia grandiflora; Slash pine, Pinus elliotii; Blue beech, Carpinus caroliniana.

Shrubs: Waxmyrtle, Myrica cerifera; Sawpalmetto, Serenoa repens; Gallberry, Ilex glabra.
Vines: Poison ivy, Toxicodendron radicans; Virginia creeper, Parthenocissus quinquefolia; Wild grape, Vitis spp.; Yellow jassamine, Gelsemium sempervirens; Greenbrier, Smilax laurifolia; Trumpet creeper, Campsis radicans.
Grasses and Grasslikes: Panicum spp.
Herbaceous: Cinnamon fern, Osmunda cinnamomea; Royal fern, Osmunda regalis; Spanish moss, Tillandsia usneoides.

Hydric hammocks are one of the most productive and diverse wildlife habitats. It is good for reptiles and amphibians, being moist most of the year. Cabbage palm hammocks offer good food and cover to many species of wildlife. Food value comes from palm and palmetto, fruit, pine mast, and acorns from associated oaks. Legumes and grasses furnish good food sources to quail and other small birds. Wildlife species include:

Mammals: Bobcat, deer, black bear, opposum, gray squirrel, and various species of mice and rats.
Birds: Hawks, turkeys, owls, woodpeckers, and numerous songbirds.
Reptiles: Green anole, Southeastern five-line skink, Florida cottonmouth, Dusky pigmy rattlesnake, Eastern coral snake, and other snakes.
Amphibians: Several species of salamander, frogs and toads.

F. Bayhead. The term "bayhead" designates an association dominated by broad-leaved evergreen trees that grow in very acid, saturated soils that are subject to periodic flooding. Bayheads characteristically occur in depressions in the flatwoods or as marginal growths about flatwoods ponds that are not subject to excessive variations in water level. This community occurs on nearly level to gently sloping land or hillsides or in depressed areas. The shrubs have many stems and thick foliage and often appear impenetrable. It is common to find this type associated with swamps bordering streams. They are peat-forming communities.

Bayheads are usually maintained by seepage from higher land. Drainage of the bog or immediately upslope will strongly modify or destroy these environments. Seepage water keeps them almost constantly wet, and they protect adjoining swamps from fire during dry periods. They acts as small reservoirs by receiving seepage water and metering it out in a small but steady supply. Where a wide fluctuation of water level occurs, fire becomes a limiting factor by killing the bayhead type of vegetation during periods of low water. It is suspected that only small amounts of water are evaporated or transpired from this community relative to other wetlands. During dry periods lightning may start fires that will consume peat to the depth of the water table.

Soils commonly associated with this community are nearly level to gently sloping, acid, somewhat poorly to very poorly drained,

sandy or loamy soil adjacent to drainageways that are fed by seepage water. The soil is nearly always moist, with the water table at or near the surface. Soil moisture during nonstorm periods is provided by groundwater seepage, usually from higher areas.

Plant that characterize this community are

Trees: Red bay, Persea borbonia; Sweet bay, Magnolia virginiana; Loblolly bay, Gordonia lasianthus; swamp black gum, Nyssa sylvatica var. biflora; Pond cypress, Taxodium ascendens; Red maple, Acer rubrum; and pond and slash pine, Pinus serotina and P. elliottii.
Shrubs: Hollies, Ilex spp.; fetterbush, Lyonia lucida; waxmyrtle, Myrica cerifera, Virginia willow, Itea virginica.
Vines: Muscadine grape, Vitis rotundifolia; bamboo vine, Smilax laurifolia.
Grasses and Grasslikes: Panicum spp.; Carex spp.; Cyperus spp.
Herbaceous: Cinnamon fern, Osmunda cinnamomea; Sphagnum moss, Sphagnum spp.; Virginia chain fern, Woodwardia virginica.

Animal species include:

Mammals: Opposum, armadillo, cotton mouse, bobcat.
Birds: Red-shouldered hawk, barred owl, tree swallow, Carolina wren, robin, hermit thrush, warblers, sparrows, cardinal.
Reptiles: Snakes (Peninsula ribbon, Eastern mud, King).
Amphibians: Narrow-mouthed toad.

G. Mixed Hardwood Swamp. The mixed hardwood swamp ecological community borders rivers and basins that are either submerged or saturated part of the year, is dominated by deciduous hardwood trees, and is found in strands along many drainageways and watercourses and areas influenced by seasonal flooding. Included in this category is the river swamp located extensively along the St. Johns River, Wekiva River, and associated water bodies. The river swamp is subject to periodic fluctuations in water level as a result of seasonal rainfall patterns. Although these mixed hardwood swamps are characterized by a preponderance of deciduous tree species, they are generally not dominated by any one species. Such hardwood swamps are variable, with species types dependent upon the size of the waterway, its flow rate, water quality, and silt-turbidity characteristics. Periodic flooding is essential to maintain this ecosystem and is the dominant factor for providing needed nutrients. If the system is drained or flooded for an extended length of time, a new community will result. Water level fluctuation of the system within normal yearly extremes is about 2.5 ft, but can be as much as 5.0 ft.

Hardwood swamp areas are of great value for maintaining good water quality and quantity and for wildlife and wilderness values. Water quality is enhanced through the actions of sedimentation and uptake of nutrients by vegetation. During flood

times, when waters reach their highest elevations the swamp fringe of lakes and rivers help to reduce suspended nutrients and organic matter and slow water flows due to the friction of many trunks, stems, and roots. As waters recede to dry season elevations, much nutrients and organic matter are effectively "trapped" behind the natural levee between the swamp fringe and the open water.

Water plays an important part in this community. If the water cycle is maintained, the community will tolerate disturbance, but if the water table is lowered or periodic water is not available, the system will change. The community is highly endangered due to its sensitivity to changes in the water cycle. Practices such as improper channelization, drainage, and impoundment are especially damaging. Mixed hardwood swamp forests are natural storage areas for floodwater. They slow the flow of water, improve water quality and gradually feed water to the rivers. These areas also assimilate inorganic and organic waste and reduce pollution levels. Oxygen diffusion is great in the swamp forest because of the large air-to-water surface area. The slow movement of the rivers and obstructions also help with the diffusion. Downstream systems, including estuaries, receive energy through detritus from this system.

Soils associated with this community are nearly level, very poorly drained, dark colored, and have coarse- to medium- textured surfaces underlain by finer textured material or are organic. The mixed hardwood system, unlike the bayhead, produces little or no peat.

The transition from river swamp to hydric hammock is often broad and ill defined where the topographic changes are very gradual. Rather extensive areas intermediate between the two associations occur where the periodic flooding is of brief duration.

Plants of the mixed hardwood swamp include:

Trees: Bald cypress, Taxodium distichum; swamp black gum, Nyssa sylvatica var. biflora; water locust, Gleditsia aquatica; water ash, Fraxinus caroliniana; red maple, Acer rubrum; water hickory, Carya aquatica; cabbage palm, Sabal palmetto; sweet gum, Liquidambar styraciflua.

Shrubs: Buttonbush, Cephalanthus occidentalis; willow, Salix caroliniana; bluestem palmetto, Sabal minor; waxmyrtle, Myrica cerifera.

Vines: Mikania, Mikania scandens; pepper vine, Ampelopsis arborea; poison ivy, Toxicodendron radicans.

Grasses and Grasslikes: Sawgrass, Cladium jamaicensis; marsh grass, Spartina bakeri.

Herbaceous: Royal fern, Osmunda regalis; Cinnamon fern, O. cinnamomea.

A mixed hardwood swamp hosts a large variety of wildlife. It is especially well suited for waterfowl, reptiles, amphibians, and

mammals. Animals found in this community must withstand the flooding that occurs periodically. Animal species commonly found include:

Mammals: Opposum, gray and southeastern flying squirrel, red fox, raccoon, and bobcat.
Birds: Green heron, egrets, red-shouldered hawk, turkey, chickadees, titmice, yellow-billed cuckoo, wood duck, limpkin, owls, warblers, cedar waxwing, woodpecker, and wren.
Reptiles: Green anole, ground skink, black racer.
Amphibians: Lesser siren, narrow-mouthed and southern toads, green and squirrel tree frogs, green house and leopard frogs.

The various species of hardwood vegetation provide good food and cover for these wildlife species.

11.4.2 Description of all the Activities and the Impacts that each of these Activities have upon Wetlands.

The following description of activities shall provide the Division of Environmental Services with a description of both the activities, and a description of the impacts that each of these activities have upon wetlands and adjacent areas. The procedure is provided in subsection 11.3.2C and 11.3.4 of this ordinance.

A. Production of agricultural or horticultural crops. The production of agricultural crops within wetlands requires the alteration of water levels and the removal of naturally occurring vegetation. In most cases, water levels must be held at levels below the soil surface to facilitate the growth of plants that are not accustomed to the wetland conditions. In some cases, soils, because of their high organic matter content, are most suitable for cultivation but oxidize away when exposed to air; further drawdown of water levels is usually required.

The production of many agricultural crops within wetlands affects all wetland parameters adversely except recharge potential. The ability for water quality enhancement is lost since waters no longer flow through vegetation with subsequent uptake and removal of nutrients. The hydroperiod is adversely affected when wetlands are drained. With the loss of vegetative cover, the drawdown of water, and the planting of agricultural crops that have higher evapotranspiration rates, evapotranspiration is increased. Normal and storm water storage capacity is adversely affected, since water levels must be held artificially low to accommodate agricultural crops. With lowered water tables and loss of storage capacity, recharge potential can be moderately reduced. All three biological parameters are adversely affected with the loss of naturally occurring vegetation. Wildlife that depend on the vegetation for food and cover must seek these elsewhere. Both life form richness and gross primary production are lost with the removal of vegetation.

The production of agricultural or horticultural crops in areas adjacent to wetlands has moderate effects upon water quality enhancement, since runoff from agricultural areas may carry high nutrient loads; hydroperiod, since drainage in adjacent areas can both decrease and increase normal and storm water runoff flows; and wildlife utilization because of loss of habitat, noise, and alterations of hydroperiod associated with drainage in surrounding lands.

B. Harvesting of timber and wood products. The harvesting of timber from wetland communities usually has only moderate effects on parameters of importance. Generally, adverse effects of machinery are relatively temporary, unless major drainage and the building of tramways or elevated roadways are done within the wetland. Wherever possible, the harvesting of timber should be carried out with a minimum amount of heavy machinery, and no drainage of the wetland should be allowed prior to harvesting. The only communities that have enough commercially viable timber are cypress wetlands, some hydric hammocks, and some mixed hardwood swamps. If selective harvesting is done within these systems, then enough vegetation remains after harvesting to carry on important functions.

If clear-cutting of timber is done, effects are more adverse and total disruption of functions is possible. Since selective harvesting leaves much vegetation to carry out important functions, and since the disruptions during the harvesting activity are only temporary, moderate effects result for water quality enhancement, hydroperiod, and evapotranspiration; other parameters show nominal impacts. Wildlife utilization is adversely affected as wildlife for the most part leave the area after harvesting. Life form richness is adversely affected with the cutting of dominant tree species and the "trampling" of understory vegetation. Gross primary production is adversely affected, since some vegetation is harvested and much is trampled.

The harvesting of timber and wood products in areas adjacent to wetlands has moderate impacts on water quality enhancement, since vegetative cover is removed and runoff is increased, carrying higher loads of sediments, organic matter, and nutrients; on hydroperiod, due in part to increased runoff; and on wildlife utilization, since the removal of vegetation surrounding a wetland may cause disruption of feeding, breeding, and other activities of wildlife that may utilize these adjacent areas.

C. Cultivating naturally occurring agricultural or horticultural products. The cultivation of naturally occurring vegetation requires that most wetland parameters remain in an unaltered condition, since the vegetation to be cultivated is native to these conditions. However, water quality enhancement may be moderately affected, as are hydroperiods, since cultivation within wetlands by necessity may limit these two parameters. Normal storage capacity is generally little affected, but storm

storage capacity may be limited, since the storage of storm water runoff may conflict with cultivation in wetlands. Soil matrix is generally unchanged; thus, recharge potential is little affected. Evapotranspiration rates are not affected. Wildlife utilization, richness of life forms, and gross primary production are moderately affected, since some vegetation is removed and frequent presence of people may interfere with wildlife use.

There are only nominal impacts associated with cultivating naturally occurring agricultural or horticultural products in areas adjacent to wetland communities.

D. Scenic, historic, wildlife, or scientific preserves. The use of wetland communities for preserves has no adverse effects on parameters of importance. However, there may be some moderate effects concerning storm water storage capacity, since high water levels associated with storm water storage may conflict with intended use as a preserve. Wildlife utilization may be moderately affected due to the continual presence of people or high volumes of people that are associated with scenic and historic preserves.

E. Maintenance (minor) or emergency repair to existing structures or improved areas. Minor repairs and/or emergency repairs are activities where use of structures does not change and/or there is no addition to the structure or improved area. Such activities will have little adverse impact beyond those impacts already experienced due to the presence of the structure. Wildlife use may be moderately affected if repairs require construction equipment, since the noise levels associated with construction activity may result in wildlife leaving the area.

F. Removing natural products of wetlands in the process of recreational or commercial fishing, aquaculture, hunting or trapping, and creation and maintenace of temporary blinds. The use of wetland communities for the above is regulated by other agencies of the federal, state, and local governments, and, as such, generally has nominal adverse impacts on the parameters of importance.

G. Cleared walking trails having no structural components. Cleared walking trails have a nominal impact on all parameters of wetland communities, since the area of cleared vegetation is minor when compared to the total area of the wetland community.

H. Timber catwalks and docks less than or equal to four (4) feet wide. Most of the impact associated with catwalks is a result of construction activities disrupting wetland structure and function. The trampling of vegetation and the disruption of normal wildlife activities are the most serious impacts during construction. Once construction is complete, small catwalks have only nominal impact on overall structure and function. Moderate impacts may be experienced by all three biological

parameters, since construction activities may have impact causing wildlife to leave, altering life forms present and reducing gross primary production through trampling and shading.

I. Timber catwalks and docks greater than four (4) feet wide. Large catwalks and docks may impede water flow, having moderate impact on water quality enhancement and evapotranspiration. Biological functions may be moderatley impacted from both construction activities and the long-term presence of a large structure within the habitat.

J. Establishing plantings. The planting of non-native wetland species requires that most wetland parameters be changed to accommodate plant species that cannot tolerate wet and/or submerged conditions. Thus, such plantings have the potential to moderately affect all physical parameters except recharge potential. In most cases, the planting of non-wetland species is accomplished by depositing fill material so that root systems are above water levels. If the plantings are to be wetland species, then the degree of impact is related to the areal extent of planting. Biological parameters may be moderately impacted, since the activity may cause wildlife to leave, alter life form richness, and change gross primary production.

K. Substantial restoration or reconstruction or modification of existing structures. Major repair, modification, or restoration is defined as a change in use, or modifications, repairs, etc., that cost at least ten percent (10%) of the physical value of the structure and do not increase the area of structure or improved area. Such activities may have adverse impact beyond those already experienced due to the presence of the existing structure. The magnitude of impact is related to the degree of modification, restoration, repair, or reconstruction and the eventual use of the structure.

L. Construction or modification of mosquito control or "drainage" ditches. The construction of mosquito control and drainage ditches is specifically intended to lower water levels within wetland systems. Whether ditches are constructed within the wetland community or adjacent to the wetland, the net result is the same but may differ in magnitude—all physical parameters are adversely affected as is wildlife utilization and gross primary production. Life form richness is moderately affected, since drainage may result in succession to a more terrestrial community with subsequent changes in types of life forms and gross primary production.

Drainage ditches constructed in areas adjacent to wetlands alter quantity and quality of surface water flows, thus all physical parameters except evapotranspiration are moderately affected. In addition wildlife utilization may be moderately affected, since the presence of heavy equipment and extensive alterations of physical parameters may drive wildlife from the area.

M. Operation of motorized vehicles including airboats. The operation of motorized vehicles within wetlands can have a major impact on wildlife, depending on the frequency of occurrence. Continual disturbance caused by high noise levels may drive wildlife from the area and interfere with normal breeding, feeding, and other activities. Even in areas adjacent to wetlands, if noise generated by motorized vehicles is sufficient, wildlife can be adversely affected. Oil contamination of waters from exhaust of motorized boats can be significant, causing a degradation of water quality (the potential for moderate effect) and stress to water fowl.

The operation of motorized vehicles in areas adjacent to wetlands can have moderate impact on wildlife, since high noise levels in these adjacent areas can interfere with normal breeding, feeding, and other activities.

N. Expansion of existing structures or improved areas. Expansion of existing structures is defined as any addition to structure that represents an increase in total enclosed floor space, roofed floor space, uncovered decks, or slabs in excess of ten percent (10%) of the existing floor space or that cost a total of at least ten percent (10%) of the physical value of the existing structure, whichever is lower. The expansion of improved areas is defined as any activity such as the deposition of fill material, new road work, dredging, impounding, or the clearing of vegetation that represents an increase in area of "improvement" of at least ten percent (10%) of the area presently in the "improved state."

Such activities may have adverse impact beyond those already experienced because of the presence of the existing structure or improved area, and the magnitude is related to the present and intended use of the structure or improved area and specific construction activities.

O. Dredging of any kind other than for mosquito control or drainage ditches. Dredging is defined as: to dig, gather, or pull out soil, organic mattter, peat, or muck from the ground surface or below the ground surface within a wetland or adjacent area. Dredging of material from a wetland community has an overall adverse impact on all parameters by lowering water tables, interrupting surface water flows, reducing potential recharge, and altering hydroperiod. In addition, depending on the degree of dredging, wildlife, life form richness, and gross primary production are adversely affected.

Dredging in areas adjacent to wetlands has moderate impact on all parameters, the degree of impact depending on the magnitude of the dredging activity, topography, and groundwater conditions present.

P. Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from

adjacent land. The discharge of effluents into wetland communities is still considered to be experimental by the Florida Department of Environmental Regulation, and special permits from DER are required (see section IV-3 of Implementation Strategies). It is felt that any discharges of sewage effluent should be permitted by the local government agency as well, since there are moderate impacts associated with such actions. All physical parameters except evapotranspiration are affected with the increase of water levels due to the quantity of water released and the increased nutrient load. Biological parameters are also affected, since increased nutrient loading generally increases gross primary production, changes types of life forms present, increases the utilization by wildlife, and may change species of wildlife attracted to the wetland.

The discharge of wastes in areas adjacent to wetland has nominal impact upon all parameters, unless the discharge requires extensive alteration of the area in which case, one is directed to all associated activities for the determination of specific impacts.

Q. Bulkheading. Bulkheading is defined as the construction of any structure, partition, retaining wall, or earthen mound that interrupts, resists, directs, or shuts off the natural flow of surface water. Bulkheads can be used to accomplish either of two tasks, impound water or restrict the flow of water, and either task has an adverse impact on most physical parameters of importance. The net result of bulkheading is an alteration of the quantity of water flow and water storage, thus adversely affecting water quality enhancement, hydroperiod, and storage capacities. Impoundment results in too much water, lengthening hydroperiod, reducing potential water quality enhancement, and affecting evapotranspiration. Deeper water and longer hydroperiods will severely stress some wetland vegetation not adapted to such conditions because each wetland community type has very specific water depth requirements and hydroperiods. All biological parameters are moderately impacted, since bulkheading will not necessarily kill the community completely but only cause shifts in floristic and wildlife species.

Bulkheads in areas adjacent to wetlands can reduce the total volume of surface water flow received, having an adverse effect on hydroperiod and storage capacity with moderate effects on water quality enhancement and potential recharge. In the same manner, biological parameters are moderately affected, since reduced surface water flows will cause shifts in species composition to species that are more tolerant to the dryer conditions.

R. Filling other than in conjunction with construction of permitted structures or improved areas and/or greater than 10% of wetland area within property boundary. Filling is defined as the deposition of soil, rock, riprap, organic matter, or any other material that results in raising the ground surface elevation. The net result of filling wetlands is the alteration of hydro-

logic conditions to such an extent as to create upland conditions (i.e., dry land) where wetland conditions prevailed. Thus the impact is adverse on most physical parameters. Water quality enhancement, hydroperiod, storage capacity, and recharge potential are adversely affected, since ground levels are raised and wetland vegetation is eliminated. Evapotranspiration is moderately affected, since in some cases evapotranspiration may be increased due to changes in vegetation. Adverse effects are experienced by all biological parameters, since vegetation is eliminated and most physical parameters have been changed.

Filling in areas adjacent to wetlands has moderate impact on all physical parameters, since quality and quantity of surface water flows may be altered. The impacts associated with filling in adjacent areas on biological parameters are nominal, since this activity may have only indirect effects on these parameters.

S. Use of any pesticide or herbicide. Pesticides and herbicides have negative impact on the biological components of wetland communities. Wildlife is adversely affected from the actions of pesticides, and life form richness and gross primary production are adversely affected from the actions of herbicides. With the adverse effects of herbicides on plant life, there is a corresponding adverse effect on evapotranspiration and water quality enhancement. Recharge potential is affected adversely, since the recharge of waters contiminated with pesticides and herbicides represents a serious threat to health safety. Other parameters show only nominal impacts.

The use of pesticides and herbicides in areas adjacent to wetlands may have adverse to moderate impacts depending on the runoff characteristics of these surrounding areas, thus impacts for water quality enhancement, evapotranspiration, and biological parameters are moderate.

T. Installation of utilities. Utilities used in this context refer to electrical transmission lines, sewage lines, storm water lines, potable water supply lines, and associated access roads necessary for maintenance. Such utility systems in themselves cause moderate impact to wetland communities. Transmission lines have minor structures that touch the ground thus impact is relatively small. Other utility systems that are below ground have impact during construction since there is much digging; however, once in place and vegetation and original contours reestablished, little long-term impact is realized. The major problem with utility systems traversing wetland communities is the access road that must accompany the system. Usually fill material is dug directly from either the wetland site or an adjacent site and deposited to develop a roadbed. The digging and filling can cause major impact in itself and have long- term impact through impeding surface water flows, impounding waters, and altering hydroperiods. In this respect, the roads are much like bulkheads.

Water quality enhancement is adversely impacted, as is hydroperiod and storage capacity. Evapotranspiration and recharge potential are moderately affected, since vegetation is not severely altered, and the wetland can still act as a dry season recharge system.

All biological parameters are moderately impacted, since the roads are like bulkheads, not killing the community completely, but causing shifts in the floristic and wildlife composition of the wetland.

The roads that accompany utility systems and the system itself, when constructed in areas adjacent to wetland communities, generally do not impede surface water flows, thus have nominal impact. For the most part, roads on these dryer lands do not act as bulkheads, since they are not constructed specifically to surround a wetland community, and can be designed and constructed with culverts of sufficient size and quantity to insure that waters are not impounded or impeded.

U. Filling less than or equal to 10% of wetland area within property boundary. Filling is defined as the deposition of soil, rock, riprap, organic matter, or any other material that results in raising the ground surface elevation.

If the area of fill is kept at 10% of the area of wetland, if every precaution is taken to minimize disturbance of surrounding unaltered areas, and if roads and filled areas are designed so as not to impede, interrupt, or otherwise negatively affect surface water flows, impacts associated with filling are moderate. The stress associated with a 10% reduction in wetland community area will be moderate concerning all parameters as long as secondary impacts are minimized and great care is taken to insure that there is no long-term degradation of a larger area of the wetland.

Filling in areas adjacent to wetlands has moderate impact on all physical parameters, since quality and quantity of surface water flows may be altered. The impacts associated with filling in adjacent areas on biological parameters are nominal, since this activity may have only indirect effects on these parameters.

V. Clearing of vegetation in conjunction with the construction of permitted structures. The clearing of vegetation within wetland communities where the area of clearing is not greater than 10% of the wetland within the property boundaries will have moderate impacts on all parameters for the community as a whole. A loss of 10% of the structure of any community will have some impact on physical and biological parameters, but in the long run the associated stress will not be of sufficient magnitude to disrupt functional values completely. It is imperative, however, that the area of clearing not be greater than 10% and that the sum of all disturbed land, whether filled, cleared, or otherwise alter-

ed, not be greater than 10% of the wetland area within the property boundary.

Great care must be taken to insure that disruption of surrounding unaltered vegetation be minimized and that the clearing operations do not leave debris spoil or other matter that will negatively impact surface water flows in surrounding areas of the wetland community.

Clearing in areas adjacent to wetlands will have moderate impact on physical parameters, since the quality and quantity of surface water flows may be altered. The impacts associated with clearing in adjacent areas are nominal, since this activity may have only indirect effects on these parameters.

W. Construction of permitted structures. Permitted structures are those outlined in the Seminole County Land Development Code (SCLDC) and include all structures listed as permitted uses under the following zoning classifications:

	Art # SCLDC
AC Agricultural Development & Conservation District	V
A-1 Agricultural	VI
RC-1 Country Homes District	VII
R-1, R-1B, and R-1BB Single-Family Dwelling District	VIII
R-1AAA, R-1AA, and R-1A Single-Family Dwelling District	IX
R-2 One- and Two-Family Dwelling Districts	X
R-3 and R-3A Multiple-Family Dwelling District	XI
R-4 Multiple-Family Dwelling District	XII
RM-1 Single-Family Mobile Home Residential District	XIII
RM-2 Single-Family Mobile Home Park District	XIV
RM-3 Travel Trailer Park and Campsites	XV
PUD Planned Unit Development	XVIII
UC University Community District	XIX
PLI Public Lands and Institutions	XX
RP Residential Professional	XXI
OP Office District	XXII
CN Restricted Neighborhood Commercial District	XXIII
C-1 Retail Commercial District	XXIV
C-2 Retail Commercial District	XXV
C-3 General Commercial and Wholesale District	XXVI
CS Convenience Commercial District	XXVII
M-1A Very Light Industrial District	XXVIII

The zoning classification M-1, Industrial District (Art XXIX, SCLDC), is a conflicting use because of the magnitude of construction activity, building and improved area size, and potential long-term adverse impacts associated with the types of industrial operations permitted under this zoning classification.

The construction of permitted structures will have moderate impact on all parameters, depending on the magnitude of construction activity. Impacts may be greatly reduced if struc-

tures are elevated on pilings rather than situated on filled lands. Associated improved areas that must be filled are the main source of negative impact. Long-term impact as a result of the maintenance of improved areas and runoff from lawns and parking lots can be minimized if filled areas are kept to a minimum. At no time should the area of filled roads, access drives, docks, catwalks, decks, and all other disturbed areas be greater than 10% of the wetlands within the property boundary.

The construction of permitted structures in areas adjacent to wetlands has nominal impact on all parameters. However, all other development activities associated with construction may have moderate to adverse impact, and each development activity should be consulted separately.

X. Installation of septic tanks. The use of septic tanks in wetlands can have adverse impact on the ability of the wetland to enhance water quality if concentrations of sewage are too large or if the vegetation and drainage characteristics of the wetlands are altered to such an extent that vegetation can no longer serve the function of nutrient uptake. This can occur either by vegetation removal or by channelization of water flow through the wetland. Other parameters are moderately affected, with the degree of impact related to the size and density of septic tank.

Septic tanks in adjacent areas to wetlands have only nominal impact upon wetland parameters, with the exception of water quality enhancement and hydroperiod, which may be moderately affected because of increased nutrient loads and water inputs.

Y. Installation of storm water retention basins. Because of the increased volume of water, and because of the loss of vegetation and the dredging necessary to install such systems within wetlands, there is an adverse impact on all parameters. Most wetland communities act as "natural" storm water retention areas and filters, but these functions can be severely impaired if altered through dredging and/or channelization to "improve" water holding capacity or flow.

The most advantageous system is to construct retention basins adjacent to wetlands to collect runoff waters and then release them slowly to the receiving wetland. The impacts associated with the installation of such storm water systems in adjacent lands are for the most part nominal if runoff waters are not seriously degraded in quality such as those that may come from some industrial and commercial land uses. Water quality enhancement and hydroperiod are moderately affected with the increased quantity of water and accompanying nutrients and other pollutants.

Z. Storage, use, or disposal of any hazardous material. Because of the nature of wetlands as interface systems between uplands and both surface water and groundwater, the potential for serious

impact resulting from hazardous materials use, storage, or disposal within wetlands is very great. The potential for water quality enhancement, potential recharge, wildlife, and gross primary production can all experience adverse impacts. Nominal effects are experienced by other physical parameters, since these activities do not impact them directly. Life form richness may be moderately affected, since such activities may cause loss of vegetation depending on the specific activity and material involved.

The use, storage, and/or disposal of hazardous materials in areas adjacent to wetlands has the same impacts as these same activities within the wetland, since hazardous materials tend to have long life and great mobility when released in the environment.

AA. Solid waste disposal. The use of wetland communities and adjacent areas for the disposal of solid wastes can have obvious adverse effects on the structure and function of these communities. The deposition of potential hazardous material within or adjacent to wetlands, as discussed in the previous activity, can have severe impact upon surface water and groundwater systems. In addition, dredging for landfill purposes destroys all wetland functions when done within the wetland, and can have adverse impacts on physical parameters when done in adjacent areas. Lowered water levels, loss of surface water supplies (in some cases), and increases in surface water runoff (in other cases) all contribute to adverse impacts.

Since the materials deposited in solid waste disposal areas are not entirely made up of hazardous materials, the impacts associated with the use of adjacent areas as waste disposal sites are not as severe as mentioned concerning the disposal of hazardous materials; as a consequence, moderate impacts are expected for recharge potential and wildlife utilization. Moderate impacts are also expected for normal and storm water storage capacity, as the activities of dredging and filling in adjacent areas may increase surface water runoff and/or decrease groundwater flows.

11.4.3 Use Guideline Matrix.

The Division of Environmental Services shall use Table 11.4.3 (Use Guideline Matrix) to match the proposed development activities with the wetland type or types and determine whether that use is incompatible, compatible, or compatible with permit. Any development activities not covered in the Use Guideline Matrix shall be assessed on a case-by-case basis by the Division of Environmental Services. The procedure for determination of compatibility is provided in subsection 11.3.2D and 11.3.5 of this ordinance.

11.4.4 Performance Standards and Guidelines for a Wetlands Development Permits.

It shall be the responsibility of the Division of Environmental Services to apply these standards and guidelines to all activities that require a

Table 11.4.3. Use Guideline Matrix.

Activity	Deep Marsh		Mixed Hardwood Swamp		Cypress Domes		Bayheads		Hydric Hammock		Shallow Marsh		Wet Prairie	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Production of Agricultural or horticultural crops	I	C	I	C	I	C	I	C	I	C	I	C	CP	C
Harvesting of timber and wood products	NA	C	I	C	CP	C	CP	C	I	C	NA	C	NA	C
Cultivating naturally occurring agric. or hort. products	CP	C	CP	C	CP	C	C	C	C	C	CP	C	C	C
Scenic, historic, wildlife, or scientific preserves	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Maintenance (minor) or emergency repair to existing structures or improved areas	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Removing natural products of wetlands in the process of recre. or comm. fishing, aquaculture, hunting or trapping and creation and maint. of temporary blinds	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Cleared walking trails having no structural components	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks <4 ft wide	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Timber catwalks and docks >4 ft wide	C	C	C	C	CP	C	C	C	C	C	CP	C	C	C
Establishing plantings	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Substantial restoration or reconstruction or mod. of existing structures and improved areas	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C

Table 11.4.3. Use guideline matrix (continued).

Activity	Deep Marsh		Mixed Hardwood Swamp		Cypress Domes		Bayheads		Hydric Hammock		Shallow Marsh		Wet Prairie	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction or mod. of mosquito control or "drainage" ditches	I	CP	I	CP	I	CP	CP	CP	I	C	I	CP	CP	C
Operation of motorized vehicles including airboats	CP	C	C	C	C	C	C	C	CP	C	CP	C	C	C
Expansion of existing structures or improved areas	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Dredging of any kind other than for mosquito control or drainage ditches	I	CP	I	CP	I	CP	I	CP	I	C	I	CP	CP	CP
Discharge of domestic, agricultural, or industrial waste (persuant to DER permit) or the discharge of storm runoff waters from adjacent land	CP	C	CP	C	CP	C	CP	C	I*	C	CP	C	C	C
Bulkheading	I	I	CP	CP	CP	CP	CP	CP	CP	CP	I	I	CP	CP
Filling other than in conjunction with construction of permitted structures or improved areas and/or >10% of the wetland area within property	I	CP	I	C	I	CP	CP	CP	I	C	I	CP	CP	C
Use of any pesticide or herbicide	I	CP	I	C	I	CP	I	C	I	C	I	CP	CP	C
Installation of utilities	I	C	CP	C	CP	C	CP	C	CP	C	I	C	CP	C
Filling $\leq$10% of wetland within property in conjunction with the construction of permitted structures	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Clearing of vegetation in conjunction with construction of permitted structures	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C

Table 11.4.3. Use guideline matrix (continued).

Activity	Deep Marsh		Mixed Hardwood Swamp		Cypress Domes		Bayheads		Hydric Hammock		Shallow Marsh		Wet Prairie	
	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area	Within	Adj. Area
Construction of permitted structures	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Installation of septic tanks	CP	C	CP	C	CP	C	CP	C	C	C	CP	C	CP	C
Installation of storm water retention basin	I	C	I	C	I	C	I	C	I	C	I	C	CP	C
Storage, use, or disposal of any hazardous material	I	I	I	I	I	I	CP	CP	I	CP	I	I	CP	CP
Solid waste disposal	I	CP	I	CP	I	CP	I	CP	I	C	I	I	CP	CP

C = Compatible;
CP = Compatible with permit; and
I = Incompatible.

Criteria: $\geq$2 I:I; 1 I:CP; $\geq$5 CP:CP; $\geq$5 C:C (unless 1 or more I).

*I = Five of the six physical parameters for this wetland are "low" (see Table IV-2). The discharge of effluent or excess surface runoff requires that physical parameters be "moderate" or "high." With the large volume of water associated with the discharge of effluent, and high nutrient load, this wetland community would be under considerable stress. With low water quality enhancement potential, few nutrients are taken up, requiring a much greater area for "treatment." With low hydroperiod, storage capacity, and recharge potential, this community cannot effectively accept the large volume of water associated with waste discharge, or excess surface runoff.

wetlands development permit. The determination of the applicable standards and guidelines by the Division of Environmental Services, shall form the basis for conditions for a wetlands development permit. Procedures are provided in subsection 11.3.6 of this ordinance.

The use guideline matrix, Table 11.4.3 in subsection 11.4.3 of this ordinance, lists development activities in the rows of the table and indicates whether these activities are compatible, compatible with permit, or incompatible with each wetland type listed in the columns of the table. Incompatible uses are those uses that adversely affect at least two physical or biological functions. Such uses disrupt the normal functioning of wetland communities and can cause increased pollution of surface waters and groundwaters, increased flood risks, destruction of fish and wildlife habitat, and increased erosion and subsequent downstream sedimentation. Development activities that are designated as compatible effect physical and biological functions in a nominal manner and no permits are required. Those development activities that are designed as compatible with permit have the potential to effect physical and biological functions in an adverse manner. These activities shall be subject to constraints that will limit their impact.

The following discussion lists permitted development activities and the constraints, or performance criteria, necessary to mitigate potential adverse impacts on physical and biological functions of importance.

A. Production of agricultural or horticultural crops. The production of agricultural or horticultural crops within wetlands is incompatible with all wetland types except wet prairies. This activity is compatible subject to the issuance of a wetlands development permit in wet prairies and must meet the following performance criteria:

1. Performance Criteria—

a. Drainage ditches or channels shall not be any deeper than 3 feet.

b. Water level control structures to maintain water levels at least equal to the values below during dry season are required at outfall points where surface waters exit property.

Hydric Hammock, 0.05 meters;
Mixed Hardwood Swamp, 0.3 meters;
Cypress Dome, 0.25 meters;
Bayhead, 0.15 meters;
Wet Prairie, 0.25 meters;
Shallow Marsh, 0.35 meters; and
Deep Marsh, 0.6 meters.

The water level control structures shall be constructed as variable weirs, such that the height of the weir can be raised and lowered to facilitate

control of water level in drainage ditches or channels.

The production of agricultural or horticultural crops in areas adjacent to wetlands is compatible with all wetland types. However, see 11.4.4 L Construction of Mosquito Control or Drainage Ditches, 11.4.4 S Use of Pesticides or Herbicides, and 11.4.4 R Filling (all subsections of this ordinance) in areas adjacent to wetlands for possible constraints that may affect agricultural or horticultural use of lands adjacent to particular wetland types.

B. Harvesting of timber and wood products. The harvesting of timber and wood products is incompatible with mixed hardwood swamps and hydric hammocks because of the adverse effects on biological functions. This activity is compatible subject to issuance of a wetlands development permit for cypress domes and bayheads and must meet the following performance criteria:

1. Performance Criteria—

a. There shall be no drainage of the wetlands.

b. Harvesting shall be carried out during the dry season (usually from October through May.)

c. The use of heavy equipment shall be discouraged.

d. There shall be no construction of tramways nor roadways that require fill in cypress domes.

e. Harvesting shall be carried out as selective cutting of timber rather than clear-cutting, where trees of 8 inches or greater dbh (diameter at breast height) are harvested.

The harvesting of timber and wood products in areas adjacent to wetlands is compatible with all wetland types. However, see 11.4.4 O Dredging, 11.4.4 Q Bulkheading, 11.4.4 R Filling, 11.4.4 S Use of Pesticides or Herbicides, and 11.4.4 L Construction of Mosquito Control or Drainage Ditches (all subsections in this ordinance) in areas adjacent to wetlands for possible constraints that may affect timber and wood products harvesting in areas adjacent to particular wetland types.

C. Cultivating naturally occurring agricultural or horticultural products. The cultivation of naturally occurring vegetation is a compatible activity within bayheads, hydric hammocks, and wet prairies and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, and shallow marshes. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. There shall be no construction of drainage ditches, berms, or bulkheads nor filling of any kind.

b. There shall be no diversion nor impoundment of water.

c. There shall be no clear-cutting of vegetation—harvesting or cutting of vegetation, if necessary, should be done at a rate of 10% of the total wetland area per year, and those areas previously harvested shall be reseeded or revegetated and left untouched for a period of not less than 10 years.

The cultivation of naturally occurring vegetation in areas adjacent to wetlands is compatible with all wetland types. However, see 11.4.4 O Dredging, 11.4.4 Q Bulkheading, 11.4.4 R Filling, and 11.4.4 L Construction of Mosquito Control or Drainage Ditches (all subsections of this ordinance) in areas adjacent to wetlands for possible constraints that may affect cultivation of naturally occurring vegetation in areas adjacent to wetlands.

D. Scenic, historic, wildlife, or scientific preserves. The use of wetland communities and adjacent areas for scenic, historic, wildlife, or scientific preserves is compatible with all wetland types. However, see all other appropriate development activities elsewhere in Table 11.4.3 for all improvement or development activities that are associated with the creation, maintenance, and operation of such preserves for possible constraints that may affect the use of particular wetland communities.

E. Maintenance (minor) or emergency repair to existing structures or improved areas. The maintenance or emergency repair of existing structures or improved areas within or in areas adjacent to wetland communities is compatible with all wetland types.

F. Removing natural products of wetlands in the process of recreational or commercial fishing, aquaculture, hunting or trapping, and creation and maintenance of temporary blinds. The above described activity is compatible within and in areas adjacent to all wetland communities. However, many of these activities are subject to regulations by other state, local, and federal agencies, and nothing in these regulations should be construed as to override, circumvent, or in any way affect the regulation and permitting of these activities by said agencies.

G. Cleared walking trails having no structural components. The establishment of cleared walking trails of four (4) feet or less within and in areas adjacent to wetlands is compatible with all wetland types.

H. Timber catwalks and docks less than or equal to four (4) feet wide. The construction of timber catwalks and docks less than

or equal to four (4) feet wide is compatible within and in areas adjacent to all wetland types. If compatibility changes because of wetland significance, use performance criteria for I (below).

I. Timber catwalks and docks greater than four (4) feet wide. The construction of timber catwalks and docks that are greater than four (4) feet wide is compatible within deep marshes, mixed hardwood swamps, bayheads, hydric hammocks, and wet prairies and is compatible subject to the issuance of a wetlands development permit within cypress domes, and shallow marshes. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. The structure and foundation system of the catwalk or dock shall be designed so as not to impede, interrupt, or impound surface water flows.

b. Construction shall take place only during the dry season (usually from October through May).

c. The use of heavy equipment shall be minimized. Any clearing of vegetation shall be confined to the immediate right-of-way of the catwalk or dock and shall not exceed a width equal to the width of the catwalk or dock plus five (5) feet to either side.

d. There shall be no temporary filling of the wetland for construction or any other purposes except in those wetlands where filling is permitted.

e. All pilings shall be driven to desired depth and shall not be jetted into the soil.

The construction of timber catwalks and docks in areas adjacent to wetlands is compatible with all wetland types. However, see all other activities listed in Table 11.4.3 that may relate to the construction of catwalks and docks for possible constraints.

J. Establishing plantings. The establishment of plantings within wetlands is compatible with hydric hammocks and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. The area of planting shall not exceed ten percent (10%) of the area of each wetland or wetland area affected within the property boundary.

b. There shall be no drainage of surface water or groundwater except in wet prairies where the con-

struction of drainage ditches of not more than three (3) feet depth is permitted.

c. A buffer strip one hundred (100) feet wide of natural unaltered vegetation shall be left between the established planting and any surface water body or natural drainage system.

The establishment of plantings in areas adjacent to wetlands is compatible with all wetland types. However, see all other activites listed in Table 11.4.3 that may relate to associated activities with the establishment of plantings for possible constraints.

K. Substantial restoration or reconstruction or modification of existing structures and improved areas. The substantial restoration or reconstruction or modification of existing structures within wetlands is compatible subject to the issuance of a wetlands development permit with all wetland types except hydric hammock. In hydric hammocks this activity is compatible; however, see all relevant activities listed in Table 11.4.3 in subsection 11.4.3 of this ordinance for possible constraints that may affect the restoration, reconstruction, or modification of an existing structure within hydric hammocks.

The permitted activity in all other wetland types must conform to all specific relevant activities listed in Table 11.4.3 in subsection 11.4.3 of this ordinance and the following performance criteria:

1. Performance Criteria—

a. Any reconstruction, restoration or modification of filled roads or dikes must be designed such that natural surface water flows are not impounded. The installation of culverts in sufficient quantity and size so as not to impede surface waters are required.

b. Total filled or improved area shall not exceed ten percent (10%) of the wetland within the property boundary.

c. The use of heavy equipment shall be minimized.

d. In addition to the above criteria, applicable activities associated with the restoration, reconstruction, or modification of existing structures and improvied areas found elsewhere in Table 11.4.3 in subsection 11.4.3 of this ordinance should be consulted for possible additional constraints.

The substantial restoration, reconstruction, or modification of existing structures or improved areas is compatible in areas

adjacent to all wetland types. However, see specific activities as related for possible constraints.

L. Construction or modification of mosquito control or "drainage" ditches. The construction or modification of mosquito control or drainage ditches within deep marshes, mixed hardwood swamps, cypress domes, hydric hammocks, and shallow marshes is an incompatible activity. This activity is compatible subject to the issuance of a wetlands development permit within bayheads, and wet prairies and must meet the following performance criteria:

1. Performance Criteria—

a. All drainage ditches or mosquito control ditches shall be no deeper than three (3) feet measured from the ground surface.

b. A surface water control structure or weir shall be constructed at the outfall point and/or the property line. Said structure shall have a variable height to facilitate water level control in drainage ditches and to maintain at least the levels given below.

Hydric Hammock, 0.05 meters;
Mixed Hardwood Swamp, 0.3 meters;
Cypress Dome, 0.25 meters;
Bayhead, 0.15 meters;
Wet Prairie, 0.25 meters;
Shallow Marsh, 0.35 meters; and
Deep Marsh, 0.6 meters.

c. The discharge of waters from ditches into surface water bodies or open water streams shall be discouraged and minimized. Discharge into existing compatible wetlands whenever possible shall be encouraged.

d. The use of herbicides for the removal of vegetation from drainage ditches is prohibited in bayheads and shall be discouraged in wet prairies; instead, mechanical harvesting should be used for vegetation removal.

e. The use of pesticides is prohibited in bayheads and shall be discouraged in wet prairies.

The construction or modification of mosquito control or drainage ditches in areas adjacent to hydric hammocks and wet prairies is a compatible activity but compatible subject to the issuance of a wetlands development permit in areas adjacent to deep marshes, mixed hardwood swamps, cypress domes, bayheads, and shallow marshes. The permitted activity must meet the following performance criteria:

2. Performance Criteria—

a. All drainage ditches or mosquito control ditches shall be no deeper than three (3) feet, measured from the ground surface.

b. Discharge from drainage or mosquito control ditches directly to surface water bodies or open water streams shall be discouraged and minimized. Discharge into existing compatible wetlands or constructed retention basins that have been seeded and/or vegetated with wetland plant species shall be encouraged.

c. Drainage or mosquito control ditches shall be constructed as swales, with gently sloping sides not to exceed a 4:1 slope.

d. The use of herbicides for the removal of vegetation in drainage or mosquito control ditches shall be prohibited in areas adjacent to deep marshes, cypress domes, and shallow marshes and discouraged in areas adjacent to all other wetland types; instead, mechanical harvesting should be used for vegetation removal.

e. The use of pesticides in drainage or mosquito control ditches shall be prohibited in areas adjacent to deep marshes, cypress domes, and shallow marshes and shall be discouraged in areas adjacent to all other wetland types.

M. Operation of motorized vehicles including airboats. The operation of motorized vehicles within mixed hardwood swamps, cypress domes, bayheads, and wet prairies is a compatible activity, but compatible subject to the issuance of a wetlands development permit within deep marshes, hydric hammocks, and shallow marshes and must meet the following performance criteria:

1. Performance Criteria—

a. The operation of terrestrial vehicles such as jeeps, swamp buggies, all terrain vehicles (ATV), and the like shall be prohibited.

b. The operation of airboats within deep and shallow marshes shall occur only during the normal high water period of the year (usually from May through October).

The operation of motorized vehicles in areas adjacent to wetlands is a compatible activity with all wetland types.

N. Expansion of existing structures or improved areas. The expansion of existing structures or improved areas within all wetland types is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

1. Performance Criteria—

a. Total filled areas (including any existing filled areas and those proposed) shall not exceed 10% of the wetland within the property boundaries.

b. Any filled roads or other improved areas shall not impede surface water flows within the wetland nor impound waters. Roads and other improved areas should be constructed with installed culverts of sufficient size and quantity so as not to impede, interrupt, or impound normal or storm surface water flows.

c. The use of heavy equipment shall be minimized.

d. All additions or new structures shall be designed to conform to flood-prone regulations, and in the absence of applicable flood-prone jurisdiction, shall be constructed so that the finished floor elevation of occupied spaces is at least three (3) feet above established high water elevations or the distance above natural ground surface as given below for each wetland type.

Deep marsh, nine (9) feet;
Mixed hardwood swamp, eight (8) feet;
Cypress domes, seven (7) feet;
Bayheads, seven (7) feet;
Hydric hammocks, six (6) feet;
Shallow marshes, eight (8) feet; and
Wet prairies, seven (7) feet;

e. In addition to the above performance criteria, applicable activities associated with the expansion of structures and improved areas found elsewhere in Table 11.4.3 in subsection 11.4.3 of this ordinance should be consulted for possible additional constraints.

The expansion of existing structures or improved areas in areas adjacent to wetlands is compatible with all wetland types; however, all associated activities should be consulted separately for possible additional constraints.

O. Dredging of any kind other than for mosquito control or drainage ditches. Dredging for purposes other than drainage or mosquito control ditches (which is dealt with separately in Table 11.4.3 of subsection 11.4.3 of this ordinance) is incompatible with all

wetland types except wet prairies, where it is a compatible activity subject to the issuance of a wetlands development permit and must meet the following performance criteria:

1. Performance Criteria—

   a. Dredged areas shall not exceed ten percent (10%) of the wetland within the property boundary.

   b. The deposition of the dredged material must conform to all performance criteria related to filling or bulkheading within or adjacent to wetlands.

   c. There shall be no direct surface water connection from dredged or excavated areas to surface water bodies or open water streams.

   d. If an outfall from the dredged or excavated area is necessary for the removal of excess storm waters, then a shallow retention basin shall be constructed and seeded or vegetated with wetland plant species to act as a filter for runoff. Said retention basin shall be considered as part of the ten percent (10%) allowable area of dredging within the wetland or that portion of the wetland within the property boundary.

Dredging for purposes other than drainage or mosquito control ditches in areas adjacent to wetlands is compatible with hydric hammocks and is compatible subject to the issuance of a wetlands development permit in areas adjacent to deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies and must meet the following performance criteria:

2. Performance Criteria—

   a. The deposition of dredged material must conform to all performance criteria related to filling and/or bulkheading within or adjacent to wetlands.

   b. There shall be no direct surface water connection from dredged or excavated areas to surface water bodies or open water streams.

   c. If an outfall from the dredged or excavated area is necessary to remove excess storm waters, then the outfall shall either be routed through a <u>compatible</u> wetland or a shallow retention basin constructed and seeded or vegetated with wetland plant species to act as a filter for runoff.

   d. The dredged or excavated area shall not be so close to the adjacent wetland so as to cause the flow of

surface waters from the wetland to the dredged or excavated area.

e. Surface water flows and/or sheet flow runoff shall not be interrupted, impounded, or diverted away from receiving wetland communities as the result of the dredged or excavated area or the deposition of fill from the dredged or excavated area.

P. Discharge of domestic, agricultural, or industrial wastes (pursuant to DER permit) or the discharge of storm runoff waters from adjacent lands. The use of wetland communities for the recycling of treated wastes is considered an experimental use of wetland communities and has special exemptions by permit from the Florida Department of Environmental Regulation (see Chapter 17-4 of "Rules of the Department of Environmental Regulation," Florida Department of Environmental Regulation). If a DER permit is obtained, the use of wet prairies for discharge of treated wastes is compatible. The discharge of effluent is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, and shallow marshes.

The discharge of treated effluent into hydric hammocks is an incompatible activity; this is a special case because known data on the physical parameters of hydric hammocks indicate that considerable stress would be experienced by this type of community should the volumes of water associated with waste discharge be recycled through the system. In addition, the area of hydric hammock necessary to insure that the system is not overloaded with water causing flooding stress may make the use of hydric hammocks uneconomic.

The discharge of treated effluent from domestic, agricultural, and industrial sources into wetlands that are considered compatible with the issuance of a wetlands development permit must first be permitted by the Florida Department of Environmental Regulation and then meet the following performance criteria:

1. Performance Criteria—

a. Wherever possible, the wetlands used for domestic and agricultural wastewater recycling shall be isolated wetlands and not wetlands that have direct hydraulic connection to surface waters.

b. The discharge of industrial wastewater shall be to isolated wetlands only and not into wetlands that have any direct hydraulic connection to surface water bodies.

c. The discharge of industrial wastewaters containing concentrations of heavy metals or toxic substances in excess of those concentrations of established

state and federal guidelines into wetlands shall be prohibited.

d. The discharge of agricultural wastewaters containing pesticides or herbicides in excess of concentrations established by state and federal guidelines shall be prohibited.

e. A water budget shall be calculated and the volume of wastewater determined such that the capacity of the wetland is not exceeded. The volume of water to be released shall be determined such that a period of dry conditions within forested wetlands will prevail during the normal dry season (usually October through May) for at least a three (3)-month period and that will not cause a rise in the normal wet season (usually May through October) water levels of greater than ten percent (10%), whichever is less. The volume of water released to non-forested wetlands shall be determined such that it will not cause a rise in the normal wet season (usually May–October) levels of greater than ten percent (10%).

f. If wetlands that have a direct hydraulic connection with surface waters are utilized for domestic and agricultural wastewater recycling, then the discharge point shall be located such that a minimum flow through (or residence) time is established to give sufficient treatment so as not to cause a degradation of the quality of the receiving surface water body.

g. The discharge of wastewater and storm water runoff shall be constructed so as to avoid the channelization or establishment of a direct conduit such that wastewater flows through the wetland without sufficient residence time or exposure to vegetation.

h. The discharge of excess storm water runoff shall not be excessive in volume or velocity. Where volume or velocity can be expected to be excessive after a rain fall event, retention ponds shall be constructed on uplands to receive storm water runoff, allow some settling of sediments, and slowly release the waters to the wetland.

i. The discharge of storm water runoff from industrial or commercial land uses shall first be to a retention basin (pond) constructed on uplands and seeded or vegetated with wetland species. Storm waters may then be released to wetlands.

The use of areas adjacent to wetlands for recycling wastewater and discharging storm water runoff is compatible with all wetland types.

Q. Bulkheading. Bulkheading within deep marshes and shallow marshes is an incompatible activity.

Bulkheading within mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and wet prairies is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

1. Performance Criteria—

a. Bulkheads shall be constructed for the purposes of protecting structures or improved areas from potential floodwaters only. All other purposes are deemed inappropriate.

b. Bulkheads that impound waters, raising water levels within the wetland above normal storm water storage levels as determined by the County Engineer shall be prohibited.

c. Bulkheads constructed for the purposes of diverting, impeding, or excluding natural surface water inflow to a wetland or outflow from a wetland shall be prohibited.

d. Bulkheads shall not be constructed that will constrict the flow of water and thus increase flow velocity within wetlands.

e. The use of heavy equipment during construction shall be minimized.

Bulkheading in areas adjacent to deep marshes and shallow marshes is incompatible. Bulkheading in areas adjacent to mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and wet prairies is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

2. Performance Criteria—

a. Bulkheads constructed for the purposes of diverting, impeding, or excluding natural surface water runoff into a wetland shall be prohibited, except for bulkheads constructed as part of a development drainage system, which shall be constructed so as to impede storm water runoff when necessary such that the outflow hydrograph from the drainage system approximates the hydrograph of conditions existing prior to development or redevelopment.

b. Bulkheads constructed in areas adjacent to wetlands shall not result in the channelization of water flow into a wetland community.

R. Filling other than in conjunction with construction of permitted structures or improved areas and/or greater than 10% of wetland area within property boundary. Filling of wetlands for purposes other than fill deposited in conjunction with the construction of permitted structures or improved areas is incompatible within deep marshes, mixed hardwood swamps, cypress domes, hydric hammocks, and shallow marshes and is compatible subject to the issuance of a wetlands development permit in bayheads and wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. The fill material shall be "clean fill" and not garbage, refuse, toxic or contaminated material, or any other material that through the actions of soil water leaching may cause a degradation of surface water and groundwater quality.

b. The filled area shall not exceed ten percent (10%) of the wetland within the property boundary. In wet prairies, where dredging is a permitted activity, the filled area and dredged area combined shall not exceed ten percent (10%) of the wetland area within the property boundary.

c. Any filled roads or improved areas shall neither impede surface water flows within wetlands nor impound waters. Roads and other improved areas shall be constructed with installed culverts of sufficient size and quantity so as to not impede, interrupt, or impound normal or storm surface water flows.

d. Precautions shall be taken to minimize disruption of the surrounding wetland and surface water bodies. During construction, turbidity screens and any other means necessary to minimize siltation, sedimentation, and/or erosion shall be used at all times, and left in place for a period of time sufficient for stabilized conditions to develop on the filled area.

e. A buffer strip fifty (50) feet wide of natural undisturbed vegetation shall be maintained between filled areas and any surface water body.

Filling in areas adjacent to mixed hardwood swamps, hydric hammocks, and wet prairies is a compatible activity. Filling in areas adjacent to deep marshes, cypress domes, bayheads, and shallow marshes is compatible subject to the issuance of a wetlands development permit and must meet the following criteria:

2. Performance Criteria—

a. The fill material shall be "clean fill" and not garbage, refuse, toxic or contaminated material, or any material that through the actions of soil water leaching may cause a degradation of surface water and groundwater quality.

b. The filled area shall not divert, impede, or exclude natural surface water runoff into or out of a wetland.

c. The filled area shall not result in the channelization of surface water flow into a wetland.

d. Precautions shall be taken to insure that erosion and subsequent sedimentation of the fill material shall not occur within any wetland.

e. A buffer strip fifty (50) feet wide of natural undisturbed vegetation shall be maintained between filled areas and any surface water body.

S. Use of any pesticides or herbicides. The use of any pesticide or herbicide is incompatible within deep marshes, mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and shallow marshes. The use of any pesticide or herbicide within wet prairies is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

1. Performance Criteria—

a. Application of pesticides or herbicides shall occur only during the normal dry season (usually from October through May).

b. Equipment for the application of the pesticide or herbicide shall be chosen so that it best directs the chemical to the target organism.

c. Every care shall be taken to avoid direct contamination of surface water during application and during the mixing and preparation of the chemical.

d. Aerial application or mist blowing of pesticides or herbicides shall be avoided whenever possible.

The use of any pesticide or herbicide in areas adjacent to mixed hardwood swamps, bayheads, hydric hammocks, and wet prairies is a compatible activity. The use of any pesticide or herbicide in areas adjacent to deep marshes, cypress domes, and shallow marshes is compatible subject to the issuance of a wetlands development permit and must meet the following performance criteria:

2. Performance Criteria—

a. Application of pesticides or herbicides shall occur only during the normal dry season (usually from October through May).

b. Equipment for the application of the pesticide or herbicide shall be chosen so that it best directs the chemical to the target organism.

c. Every precaution shall be taken to avoid the direct contamination of surface water during the application and during the mixing and preparation of the chemical.

d. Aerial application or mist blowing of pesticides or herbicides shall be avoided whenever possible.

T. Installation of utilities. The installation and construction of utility systems including roads is incompatible within deep marshes and shallow marshes and is compatible subject to the issuance of a wetlands development permit in mixed hardwood swamps, cypress domes, bayheads, hydric hammocks and wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. The installation of utilities including roads shall conform to all performance criteria given for specific activities that are associated with said installation.

b. Where filling, dredging, and/or bulkheading are incompatible, utility systems and roads shall be constructed above ground on supports, piers, or bridging.

c. Areas cleared as rights-of-way or easements shall not be greater than ten percent (10%) of the wetland area within the property boundary.

d. In wetlands where dredging, filling, or bulkheading is compatible subject to the issuance of a wetlands development permit, the utility system or road shall not impede, interrupt, or impound normal sur-

face water flows. In these wetlands, utility systems and roads shall be constructed with installed culverts or bridging of sufficient size and quantity so as not to impede, interrupt, or impound normal or storm surface water flows.

e. Every care shall be taken to minimize disruption of the surrounding wetland and surface water bodies. During construction, turbidity screens and any other means necessary to minimize siltation, sedimentation, and/or erosion shall be used at all times, and left in place for a period of time sufficient for stabilized conditions to develop in the disturbed area.

The installation of utility systems or roads in areas adjacent to wetlands is compatible with all wetland types; however, see all related activities listed in Table 11.4.3 of subsection 11.4.3 of this ordinance for possible constraints.

V. Filling less than or equal to 10% of wetland area within property in conjunction with the construction of permitted structures. Filling less than or equal to 10% of the wetland area within property is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies and is compatible within hydric hammocks. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. Filling shall be in conjunction with the construction of permitted structures and associated access roads, yards, and septic tanks only.

b. The area of fill and all other improved areas, excavations, cleared areas, decks, catwalks, and area of structures shall not exceed 10% of the wetland within the property boundary.

c. The fill material shall be "clean fill" and not garbage, refuse, toxic or contaminated material, or any other material that through the actions of soil water leaching may cause a degradation of surface water and groundwater quality.

d. Any filled roads or improved areas shall neither impede surface water flows within wetlands nor impound waters. Roads and other improved areas shall be constructed with installed culverts of sufficient size and quantity so as to not impede, interrupt, or impound normal or storm surface water flows.

e. Precautions shall be taken to minimize disruption of the surrounding wetland and surface water bodies. During construction, turbidity screens and any other means necessary to minimize siltation, sedimentation, and/or erosion shall be used at all times, and left in place for a period of time sufficient for stabilized conditions to develop on the filled area.

f. A buffer strip fifty (50) feet wide of natural undisturbed vegetation shall be maintained between filled areas and any surface water body.

Filling in conjunction with the construction of permitted structures in areas adjacent to wetlands is compatible with all wetland types.

V. Clearing of vegetation in conjunction with the construction of permitted structures. The clearing of vegetation in conjunction with the construction of permitted structures when clearing is less than or equal to 10% of the area of wetland within the property is compatible within hydric hammocks and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. The activity shall be carried out during the normal dry season (usually October through May) only.

b. The area of clearing and all other areas of fill, access roads, docks, catwalks, structure, and improved areas shall not exceed 10% of the wetland within the property.

c. All materials that are cleared from the wetland shall be removed from the site and not piled or windrowed within the wetland community.

d. Precautions shall be taken to minimize impacts to surrounding vegetation. During clearing operations turbidity screens and any other means necessary to minimize siltation, sedimentation, and/or erosion shall be used at all times and left in place for a period of time sufficient for stabilized conditions to develop in the cleared area.

e. A buffer strip fifty (50) feet wide of natural undisturbed vegetation shall be maintained between cleared areas and any surface water body.

f. Clearing shall be carried out only in conjunction with the construction of permitted structures.

Clearing in areas adjacent to all wetlands is a compatible activity provided that the activity is in conjunction with the construction of permitted structures and/or activities.

W. Construction of permitted structures. The construction of permitted structures is compatible within hydric hammocks and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads, shallow marshes, and wet prairies. Permitted structures are those outlined in the Seminole County Land Development Code (SCLDC) and include all structures listed as permitted uses under Article V through Article XXVIII of the code. Structures not permitted within wetlands are those given under Article XXIX (M-1 Industrial District) as permitted uses within this classification. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. All improved areas (including access roads, parking lots, docks, catwalks, area of structure, yards, cleared areas, retention basins, etc.) shall be no greater than 10% of the area of the wetland within the property boundaries.

b. If the wetland is included in lands designated as "flood-prone area," all conditions, provisions and restrictions of the flood-prone classification ordinance shall apply in addition to the performance criteria contained herein, and the conditions, provisions, and restrictions of the flood-prone classification ordinance shall take precedence.

c. In the absence of a flood-prone classification, all structures shall be constructed so that the finished floor elevation of occupied spaces is at least three (3) feet above established high water elevations or the distances above natural ground surface given below for each wetland type.

Deep marsh, nine (9) feet;
Mixed hardwood swamp, eight (8) feet;
Cypress dome, seven (7) feet;
Bayhead, seven (7) feet;
Hydric hammock, six (6) feet;
Shallow marsh, eight (8) feet; and
Wet prairie, seven (7) feet.

d. The use of heavy equipment during construction shall be minimized.

e. The drainage system for the improved area shall comply with the conditions, restrictions, and pro-

visions of the drainage system design standards for Subdivision Regulations as outlined in the Seminole County Land Development Code.

f. Access roads and other improved areas shall be designed and located so as not to impede, interrupt, or impound normal and storm surface water flows, unless the impoundment is wholly within the improved area and used for the purposes of a storm water retention basin.

g. All commercial and industrial uses within wetlands shall have retention basins for storm water runoff. Said retention basins shall be designed and constructed with sediment traps and litter or trash screens. All storm water runoff shall be routed through the retention basin, sediment trap, and litter or trash screens before release or outfall from the improved area. If the retention basin in constructed within the wetland, it is considered to be part of the improved area, and said area, including all roads, parking lots, structures, lawns, cleared areas, etc., shall not exceed 10% of the wetland within the property.

h. Any operation or activity that stores, uses, or produces toxic matter shall insure that the release as waterborne toxic matter beyond the boundary of improved area shall not exceed one-thirtieth (1/30) of the Threshold Limit Values (TLV) permitted of those toxic matters currently listed in the Threshold Limit Values adopted by the American Conference of Governmental Industrial Hygienists. If a toxic substance is not contained in this listing, the applicant shall satisfy the Department of Health that the proposed levels will be safe to the general population. The measurement of waterborne toxic matter shall be at the outfall from the improved area and shall be a composite of samples taken at 1-hour intervals after an incident or a composite of samples taken at 3-hour intervals for general runoff.

The construction of permitted structures in areas adjacent to wetlands is compatible with all wetland types. However, all activities associated with the construction of permitted structures should be consulted separately.

X. Installation of septic tanks. The installation of septic tanks in conjunction with single family dwellings and mobile homes at densities of less than or equal to one (1) unit per five (5) acres is compatible within hydric hammocks and is compatible subject to the issuance of a wetlands development permit within deep marshes, mixed hardwood swamps, cypress domes, bayheads,

shallow marshes, and wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. Septic tanks shall conform to all provisions of Seminole County Health Department Regulations 10D-6.

b. Septic tanks shall either be elevated on filled areas such that the lowest point of the drain field is a minimum of three (3) feet above the normal high water level in the wetland or be located on suitable upland soils having proper percolation rates, and wastes shall be pumped from a holding tank to this upland septic tank and drain field.

c. The maximum number of septic tanks within wetland areas shall be one (1) per five (5) acres.

The installation of septic tanks in areas adjacent to wetland communities is compatible with all wetland types.

Y. Installation of storm water retention basins. The construction of storm water retention basins within wetlands is incompatible with deep marshes, mixed hardwood swamps, cypress domes, bayheads, hydric hammocks, and shallow marshes and is compatible subject to the issuance of a wetlands development permit within wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. The size of the retention basin shall be limited to ten percent (10%) of the wetland area or area of wetland within the property boundary.

b. If the retention basin is part of a larger development area, the combined area of improved area, structures, roads, etc. and the retention basin shall be no larger than ten percent (10%) of the wetland area or area of wetland within the property boundary.

c. The retention basin shall not be dug any deeper than is necessary within the wetland, but rather constructed using a combination of excavation and berms. Deep excavations for the purposes of retention basins shall be discouraged.

d. The discharge of waters from a retention basin into surface water bodies and open water streams shall be discouraged and minimized. Discharge into

existing, compatible wetlands whenever possible shall be encouraged.

e. The retention basin shall be vegetated, and the use of herbicides and/or pesticides within the retention basin for vegetation and insect control shall be discouraged. Instead, mechanical vegetation removal, when necessary, shall be used whenever possible.

The installation of storm water retention basins in areas adjacent to wetlands is compatible with all wetland types.

Z. Storage, use, or disposal of any hazardous material. The storage, use, or disposal of any hazardous material within wetlands is incompatible with deep marshes, mixed hardwood swamps, cypress domes, hydric hammocks, and shallow marshes and is compatible subject to the issuance of a wetlands development permit in bayheads and wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. Every care shall be taken to insure that release of hazardous materials to the environment through the actions of winds, surface waters, or groundwaters shall not exceed one-thirtieth (1/30) of the Threshold Limit Values (TLV) permitted of those hazardous materials currently listed in the Threshold Limit Values adopted by the American Conference of Governmental Industrial Hygienists.

b. The storage, use, or disposal of hazardous material shall not occur in any wetland having a direct hydraulic connection to surface water bodies.

c. Tests shall be undertaken to determine the nature of groundwater flows in the immediate area, and based on the results of these tests, no solid waste disposal shall occur where seepage from the disposal site may threaten public health and safety, endanger wildlife, or potentially degrade potable water supplies.

d. There shall be no dredging within wetlands where the storage, use, or disposal of hazardous materials is proposed or is being carried out, nor shall there be any activity that will disrupt the existing natural land contours. This includes, but is not limited to, use of heavy equipment, drilling of wells, excavations, jetting of pilings, or construction of any structure.

e. The storage, use, or disposal of hazardous material in areas designated as "flood-prone areas" as described by the Seminole County Land Development Code flood-prone classification ordinance shall be prohibited.

The storage, use, or disposal of any hazardous material in areas adjacent to wetlands is incompatible with deep marshes, mixed hardwood swamps, cypress domes, and shallow marshes and is compatible subject to the issuance of a wetlands development permit with bayheads, hydric hammocks, and wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

a. The storage, use, or disposal of hazardous materials in areas adjacent to wetlands that have direct hydraulic connections to surface water bodies shall be prohibited.

b. There shall be no storage, use, or disposal of hazardous materials in areas adjacent to wetlands that have been dredged or filled, that have had any structure constructed within, or that have had wells drilled, pilings jetted, or any excavations carried out within the adjacent wetland.

c. Tests shall be undertaken to determine the nature of groundwater flows in the immediate area, and based on the results of these tests, no solid waste disposal shall occur where seepage from the disposal site may threaten public health and safety, endanger wildlife, or potentially degrade potable water supplies.

d. There shall be no drainage channels or ditches constructed in the adjacent area that will allow surface waters to enter any wetland.

e. All retention basins constructed in conjunction with the storage, use, or disposal of hazardous materials shall have an impermeable lining and shall be of sufficient size as to store all anticipated storm water runoff from a twenty-five (25)-year rainfall event.

f. The storage, use, or disposal of hazardous materials in areas designated as "flood-prone areas" as described by the Seminole County Land Development Code flood-prone classification ordinance shall be prohibited.

AA. Solid waste disposal. The use of wetlands as a solid waste disposal site is incompatible with deep marshes, mixed hardwood

swamps, cypress domes, bayheads, hydric hammocks, and shallow marshes and is compatible subject to the issuance of a wetlands development permit within wet prairies. The permitted activity must meet the following performance criteria:

1. Performance Criteria—

   a. Solid waste disposal shall not occur in any wetland that has a direct hydraulic connection with any surface water body.

   b. Tests shall be undertaken to determine the nature of groundwater flows in the immediate area, and based on the results of these tests, no solid waste disposal shall occur where seepage from the disposal site may threaten public health and safety, endanger wildlife, or potentially degrade potable water supplies.

   c. Solid waste disposal within all wetlands designated as "flood-prone area" as described by the Seminole County Land Development Code flood-prone classification ordinance shall be prohibited.

The disposal of solid wastes in areas adjacent to wetlands is incompatible with deep marshes, mixed hardwood swamps, cypress domes, and shallow marshes and is compatible subject to the issuance of a wetlands development permit in areas adjacent to bayheads, hydric hammocks, and wet prairies. The permitted activity must meet the following performance criteria:

2. Performance Criteria—

   a. The disposal of solid wastes shall not occur in areas adjacent to wetlands that have a direct hydraulic connection to surface water bodies.

   b. There shall be no solid waste disposal in areas adjacent to wetlands that have been dredged or filled, that have had any structure constructed within, or that have had wells drilled, pilings jetted, or any excavations carried out within the adjacent wetland.

   c. There shall be no drainage channels or ditches constructed in the adjacent area that will allow surface waters to enter any wetland.

   d. Tests shall be undertaken to determine the nature of groundwater flows in the immediate area, and based on the results of these tests, no solid waste disposal shall occur where seepage from the disposal site may threaten public health and safety,

endanger wildlife, or potentially degrade potable water supplies.

e. The disposal of solid wastes in areas designated as "flood-prone areas" as described by the Seminole County Land Development Code flood-prone classification ordinance shall be prohibited.

ARTICLE V

WAIVERS AND APPEALS

Any applicant for a wetlands development permit has the opportunity to appeal to the Board any of the following actions taken by the Division of Environmental Services or the Land Development Division.

1. Verification of Wetland Category (Type).

2. Determination of Intended Use and Wetland Compatibility and Granting of Permit with Conditions.

The purpose of the appeal must be stated in writing in forms provided by the Land Development Division. The appeal must be taken within thirty (30) days following the date of the appealed action. The appeal must be reviewed by the Development Review Committee and a written recommendation filed with the Board and the applicant. The Board shall hear the appeal after public notice as provided for in the Development Code. The Board shall, by its own motion, deny the appeal or provide for specific waivers to the provisions of this ordinance. In granting of a waiver or waivers, the Board must find that it does not circumvent the purpose and intent of this ordinance.

ARTICLE VI

ENFORCEMENT AND VIOLATION PROVISIONS

11.6.1 Enforcement.

A. General. Within the jurisdiction of the provisions of this ordinance, no wetlands development permit shall be issued unless the wetlands development permit application meets all the requirements of these regulations and has been approved in accordance with the requirements as herein provided.

B. No building permit shall be issued for the construction of any building in violation of the provisions of these regulations.

11.6.2 Violation.

Any person who violates the provisions of this ordinance shall be guilty of a misdemeanor, which, upon conviction, shall be punishable by a fine not to exceed Five Hundred and no/100 Dollars ($500.00), or by imprisonment in the county jail not to exceed sixty (60) days, or by both such fine and imprisonment. Each day that the violation continues shall constitute a separate violation.

ARTICLE VII

LEGAL STATUS

11.7.1 Savings Clause.

If any part or provisions of this ordinance or application thereof to any person or circumstances are adjudged invalid by any court of competent jurisdiction, such judgment shall be confined in its operation to the part, provision, or application directly involved in the controversy in which such judgment shall have been rendered and shall not affect or impair the validity of the remainder of this ordinance or the application thereof to other persons or circumstances. The Board of County Commissioners hereby declares that it would have enacted the remainder of this ordinance even without any such part, provision, or application.

11.7.2 Interpretation.

A. General. In their interpretation and application, the provisions of this ordinance shall be held to be the minimum requirements for the promotion of the public health, safety, and general welfare.

B. Conflict with Public and Private Provisions.

1. Public Provisions. Provisions of this ordinance are not intended to interfere with, abrogate, or annul any other county rule or regulation, statute, or other provision of law. Where any provisions of this ordinance or any other county, state, or federal rule, regulation, or other provision of law are in conflict, whichever provisions are most restrictive or impose highest standards, shall control.

2. Private Provisions. The provisions of this ordinance are not intended to abrogate any easements, covenant, or any other private agreement, or restriction, provided that, where the provisions of this ordinance are more restrictive or impose higher standards or regulations than such easment, covenant, or private agreement or restriction, the provisions of this ordinance shall govern.

11.7.3 Effective Date.

The provisions of this ordinance shall take effect upon adoption by the Board of County Commissioners. Developments for which site plans have been approved prior to the effective date may be developed and completed according to the pre-existing requirements for site plan development. However, developments with site plans which are approved prior to the effective date shall not be substantially amended or changed after the effective date except to conform with the regulation established herein.

APPENDIX A
GUIDE TO THE IDENTIFICATION OF WETLANDS

The following key is meant to be an elementary field guide, using easily identifiable characteristics, to the wetland types found in Seminole County and described previously. Consideration has been made for averaged (expected) conditions for each wetland. Atypical climate (heavy rains or drought) or recent disturbances (fire or drainage) may render the key inaccurate. Determination of species present (whenever possible) will provide a clearer definition of wetland type when compared with the descriptions of wetland vegetation given in the Classification Scheme above.

To use the guide, start with item 1 and make choices until a type is found.

1. Is the community seasonally inundated and/or is the soil primarily organic peat or muck?
   a) Yes, go to 2.
   b) No, not defined as a wetland.
      2. What season it it?
         a) (May to October), go to 3.
         b) (October to May), go to 10.
            3. Are trees dominant life form?
               a) Yes, go to 4.
               b) No, go to 8.
                  4. Is the system adjacent to a river or lake?
                     a) Yes, go to 7.
                     b) No, go to 5.
                        5. Is there standing water other than puddles?
                           a) Yes, go to 6.
                           b) No, Hydric Hammock.
                              6. Are the dominant trees cypress?
                                 a) Yes, Cypress Dome.
                                 b) No, Bayhead.

7. Is there standing water?
   a) Yes, Mixed Hardwood Swamp.
   b) No, Hydric Hammock.

8. Is the wetland adjacent to a river or lake?
   a) Yes, Deep Marsh.
   b) No, go to 9.

9. Are there scattered trees or shrubs?
   a) Yes, Wet Prairie.
   b) No, Shallow Marsh.

10. Are trees the dominant life form?
   a) Yes, go to 11.
   b) No, go to 15.

11. Is the system adjacent to a river or lake?
   a) Yes, go to 14.
   b) No, go to 12.

12. Are the majority of trees evergreen?
   a) Yes, Bayhead.
   b) No, go to 13.

13. Do many of the trees exhibit buttresses and is there a significant number of cypress knees?
   a) Yes, Cypress Dome.
   b) No, Hydric Hammock.

14. Is the community found on a gentle slope with little to no standing water?
   a) Yes, Hydric Hammock.
   b) No, Mixed Hardwood Swamp.

15. Is the community adjacent to a river or lake?
   a) Yes, Deep Marsh.
   b) No, go to 16.

16. Are there scattered shrubs or trees?
   a) Yes, Wet Prairie.
   b) No, Shallow Marsh.

Permitting Process for a Wetlands Development Permit

Given in Figure VI-1 is a diagram illustrating the permitting process for wetlands development. A development application enters the wetlands development permitting process if, during site plan review, subdivision review, or development order review, it is determined that the development activity is within or in areas adjacent to wetlands. In addition to the presently required submittals for site plan review, subdivision review, and development order review, it is recommended that the developer also submit information on vegetative cover. All wetland within and in areas within 300 feet of the development area should be classified into the seven (7) wetland categories described previously. The Land Development Division may facilitate the classification of wetland type by developers by providing the Wetlands Field Guide and Wetland Classification Scheme to all potential developers.

Upon determination of the existence of wetland within or in areas adjacent to the proposed development, the application for development enters the "wetlands loop," requiring a separate application for a wetlands development permit. The Land Development Division (LDD) reviews the application for completeness and forwards the application to the Division of Environmental Services (DES) for review and verification of correct classification of wetland type(s). The verification should include a site visit by DES personnel. Upon verfication, DES notifies the Development Review Committee (DRC) in writing that the wetland type(s) has been verified.

The DRC must notify the development in writing of the findings of the initial DES review, and either request additional information and/or modification of the application or deem the application adequate. If additional information and/or modification is needed, the developer may modify and resubmit the application or appeal the findings of the DRC to the Board of County Commissioners. If no additional information and/or modification is needed, the application is reviewed further by DES for signifcance of wetlands.

The review for significance of individual wetlands is completed by DES personnel using a combination of field investigations, aerial photographs, and wetlands maps. The score determined during the special significance review may alter the compatibility of intended development

activity with the wetlands affected. If the overall score is less than 8 points, the wetland is considered of low or nominal value. If the overall score is equal to or greater than 12 points, the wetland is considered of high or significant value. Based on the score, the compatibility for development activities in the Use Guideline Matrix may change. If the wetland is scored as having nominal value, all incompatible (I) activities are changed to compatible with permit (CP). If the wetland is scored as having significant value, all compatible (C) activities become compatible with permit (CP). Changes in compatibility effect activities both within wetlands and in areas adjacent to wetlands.

After review for special significance, the DES determines compatibility of use with wetland type using the Use Guideline Matrix. The findings at this point will show one of three possible conditions: (1) the development activity is compatible with the wetland(s); (2) the development activity is incompatible with the wetland(s); or (3) the development activity is compatible subject to the issuance of a wetlands development permit. The determination of compatibility is forwarded to the Land Development Division, who in turn notifies the developer in writing of the status of compatibility.

If the findings are that the activity is compatible, the proposed development does not need a wetlands develoment permit and may proceed. If the findings are that the activity is incompatible, no permit will be issued and the proposed development may not proceed. If the findings are that the activity is compatible subject to the issuance of a wetlands development permit, a permit with conditions will be issued and the development may proceed subject to the fullfillment of said conditions. The developer may appeal the findings of the DES and LDD to the Board of County Commissioners.

After the "wetlands loop," the application for site plan review, subdivision review, or development order may proceed through the appropriate normal permitting process.

APPENDIX A
WILDLIFE ASSOCIATED WITH WETLANDS

Table A-1. Amphibians species list.

Species Common Name	Species Latin Name	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Flatwood Marsh	Shallow Intermittent	Permanent Herbaceous	Swamp Thicket
Greater Siren	Siren lacertina	U	U	U	-	U	-	C	C
Lesser Siren	Siren intermedia	U	C	C	-		-	-	C
Dwarf Siren	Pseudobranchus striatus	U	U	U	-	C	-	C	U
Dusky Salamander	Desmognathus auriculatus	C	U	-	-	-	-	-	-
Dwarf Salamander	Eurycea quadridigitata	C	U	U	-	-	-	-	U
Striped Newt	Notophthalmus perstriatus	-	U	U	-	U	-	U	-
Narrow-mouthed Toad	Gastrophyrne carolinensis	C	C	U	C	C	B	B	C
Spadefoot Toad	Scaphiopus holbrooki	C	U	U	-	C	-	B	-
Southern Toad	Bufo terrestris	-	C	U	U	C	-	C	-
Oak Toad	Bufo quercicus	-	-	-	U	-	C	B	B
Spring Peeper	Hyla crucifer	C	-	-	-	-	-	-	-
Green Treefrog	Hyla cinerea	C	U	C	U	C	C	C	C
Barking Treefrog	Hyla gratiosa	-	U	U	-	C	B	B	-
Pinewoods Treefrog	Hyla femoralis	-	U	U	-	C	B	B	-
Squirrel Treefrog	Hyla squirella	C	C	C	U	-	B	B	U
Little Grass Frog	Limnaoedus ocularis	-	U	U	U	C	C	C	U
Cricket Frog (Southern)	Acris gryllus	-	-	-	-	U	-	C	-
Southern Chorus Frog	Pseudacris nigrita	-	U	C	-	U	B	B	-
Greenhouse Frog	Eleutherodactylus planirostris	C	C	U	-	-	-	-	-
Gopher Frog	Rana areolata	C	-	-	-	-	-	B	-
Leopard Frog	Rana utricularia	U	C	C	U	C	C	C	U
Pig Frog	Rana grylio	-	U	U	-	-	C	C	U
Bullfrog	Rana catesbiana	U	U	U	-	U	-	-	U
River Swamp Frog	Rana heckscheri	U	-	-	-	-	-	-	-

U = Uncommon;
C = Common;
B = Breeding Ground; and
Blank = Rare or no data.

Table A-2. Reptiles species list.

Species Common Name	Species Latin Name	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Flatwood Marsh	Shallow Intermittent	Permanent Herbaceous	Swamp Thicket
American Alligator	Alligator mississippiensis	U	-	-	-	U	-	C	-
Snapping Turtle	Chelydra serpentina	U	-	U	-	U	U	C	-
Musk Turtle	Sternotherus odoratus	-	-	-	-	-	-	C	-
Mud Turtle	Kinosternon bauri	-	-	U	-	-	U	C	U
Eastern Box Turtle	Terrapene carolina bauri	-	U	U	-	C	C	C	-
Chicken Turtle	Deirochelys reticularia	-	U	U	-	-	C	C	-
Fla. Softshell Turtle	Trionyx ferox	-	U	U	-	-	C	C	-
Fla. Red-bellied Turtle	Chrysemys nelsoni	-	-	U	-	-	C	C	-
Peninsula Cooter	Chrysemys floridana-peninsularis	U	U	U	-	U	C	C	-
Striped Mud Turtle	Kinosternon bauri	-	U	U	-	-	U	U	U
Stinkpot	Sternotherus odoratus	-	U	U	-	-	C	C	-
Green Anole	Anolis carolinensis	C	C	C	-	C	U	U	C
Southern Fence Lizard	Sceloporus undulatus undulatus	-	-	-	-	C	-	-	-
Glass Lizards	Ophisaurus sp.	-	-	-	-	C	-	C	-
Six-lined Racerunner	Cnemidophorus sexlineatus	-	-	-	-	-	-	-	-
S.E. Five-line Skink	Eumeces inexpectatus	C	-	-	-	C	-	C	-
Ground Skink	Lygosoma laterale	-	C	U	U	-	-	-	U
Fla. Green Water Snake	Natrix cyclopion floridana	-	U	U	-	-	U	C	-
Brown Water Snake	Nerodia taxispilota	U	U	U	-	U	-	-	-
Banded Water Snake	Nerodia	C	U	U	-	U	C	C	U
Striped Swamp Snake	Regina alleni	-	U	U	-	-	C	C	U
Black Swamp Snake	Seminatrix pygaea	-	U	U	-	-	U	U	-
Florida Brown Snake	Storeira dekayi victa	C	U	U	-	-	C	C	-
Eastern Garter Snake	Thamnophis sirtalis	-	U	U	U	-	C	C	U
Peninsula Ribbon Snake	Thamnophis sauritus	-	U	U	C	U	C	C	C
Pine Woods Snake	Rhadinaea flavilata	-	-	-	-	C	-	-	-
Eastern Mud Snake	Farancia abacura	-	U	U	C	U	C	C	C
South. Ring-neck Snake	Diadophus punctatus	C	-	-	-	-	C	C	-
Rough Green Snake	Opheodrys aestivus	C	U	U	U	-	C	-	U

Table A-2. Reptiles species list (continued).

Species Common Name	Species Latin Name	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Flatwood Marsh	Shallow Intermittent	Permanent Herbaceous	Swamp Thicket
Black Racer	Coluber constrictor	C	C	U	-	C	C	U	-
Eastern Indigo Snake	Drymarchon corais couperi	C	U	U	U	-	U	U	-
Eastern Coachwhip	Masticophis flagellum	U	-	-	-	-	U	U	-
Yellow Rat Snake	Elaphe obsoleta quadravittata	C	U	U	U	-	U	U	U
King Snake	Lampropeltis spp.	C	U	U	C	-	C	C	C
Red Rat Snake	Elaphe guttata	C	-	-	-	-	-	-	-
Eastern Coral Snake	Micrurus fulvius	C	U	U	-	C	-	-	-
Florida Cottonmouth	Agkistrodon piscivorus	C	U	C	-	C	C	C	U
Eastern Diamondback	Crotalus adamanteus	C	-	-	-	C	C	-	-
Dusky Pygmy Rattlesnake	Sistrurus miliarius	C	U	U	-	C	U	U	U

U = Uncommon;
C = Common;
B = Breeding Ground; and
Blank = rare or no data.

Table A-3. Mammals species list.

Species Common Name	Species Latin Name	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Flatwood Marsh	Shallow Intermittent	Permanent Herbaceous	Swamp Thicket
Opossum	Didelphis marsupialis	C	C	C	C	C	U	U	C
Short-tailed Shrew	Blarina carolenesis	U	-	-	U	C	-	U	-
Southeastern Shrew	Sorex longirostris	C	-	-	-	-	-	-	-
Least Shrew	Cryptotis parva	-	U	U	-	C	-	-	-
Eastern Mole	Scalopus aquaticus	-	-	-	-	C	-	-	-
Northern Yellow Bat	Vespertillionidae	-	-	C	-	-	-	-	-
Evening Bat	Vespertillionidae	-	C	C	-	-	-	-	-
Armadillo	Dasypus novemcinctus	-	C	U	C	-	U	U	U
Marsh Rabbit	Sylvilagus palustris	-	U	U	-	C	C	C	C
Eastern Cottontail	Sylvilagus floridanus	-	U	U	-	C	U	-	-
Gray Squirrel	Sciuris carolinensis	C	C	U	-	-	-	-	-
Southern Flying Squirrel	Glaucomys volans	-	C	-	-	-	-	-	-
Fox Squirrel	Sciuris niger	-	-	-	-	C	-	-	-
Marsh Rice Rat	Oryzomys palustris	C	U	-	U	C	U	C	C
Eastern Harvest Mouse	Reithrodontomys humulis	-	-	-	-	-	U	U	-
Cotton Mouse	Peromyscus gossypinus	C	C	C	C	C	U	U	C
Golden Mouse	Peromyscus nuttalli	C	-	-	-	C	-	-	-
Hispid Cotton Rat	Sigmodon hispidus	C	U	U	U	C	C	C	C
Eastern Woodrat	Neotoma floridana	C	U	-	-	-	-	-	-
Florida Muskrat	Neofiber alleni	U	-	-	-	U	U	U	-
Red Fox	Vulpes vulpes	-	C	-	-	-	-	-	-
Gray Fox	Urocyon cinereoargenteus	C	-	-	-	C	-	-	-
Raccoon	Procyon lotor	C	C	C	-	C	C	C	C
Striped Skunk	Mephitis mephitis	C	U	-	-	C	-	-	-
Black Bear	Euarctos americanus	C	-	-	-	C	U	U	-
River Otter	Lutra canadensis	U	U	U	-	U	U	U	-
Bobcat	Lynx rufus	C	C	U	C	C	U	U	-
Feral Hog	Sus scrofa	U	C	C	-	C	C	C	C
White-tailed Deer	Odocoileus virginianus	C	U	U	U	C	C	C	U

U = Uncommon;
C = Common;
B = Breeding Ground; and
Blank = Rare or no data.

Table A-4. Birds species list.

Species Common Name	Species Latin Name	Season	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Swamp Thicket	Shallow Intermittent	Flatwood Marsh
Pied Billed Grebe	Podilymbus podiceps	P	-	-	-	-	-	-	C
Anhinga	Anhinga anhinga	P	-	R	R	-	-	-	C
Green Heron	Butorides virescens	P	-	C	R	-	R	R	C
Little Blue Heron	Florida caerulea	*P	-	R	C	-	-	C	C
Cattle Egret	Bubulcus ibis	P	-	C	C	-	-	C	R
Great Egret	Casmerodius albus	*P	-	C	C	-	R	C	C
Snowy Egret	Leucephoyx thula	*P	-	C	C	-	R	C	C
Louisiana Heron	Hydranassa tricolor	*P	-	R	C	-	-	C	C
Blk.-Crowned Night Heron	Nycticorax nycticorax	*P	-	R	R	-	R	-	C
Yellow-Crowned Night Heron	Nycticorax violacea	P	-	R	C	-	C	-	C
Least Bittern	Ixobrychus exilis	*P	-	-	-	-	-	-	C
American Bittern	Botaurus lentiginosus	W	-	-	-	-	-	R	C
Wood Stork	Mycteria americana	*P	-	-	C	-	-	C	C
Glossy Ibis	Plegadis falcinellus	*P	-	-	-	-	-	C	C
White Ibis	Eudocimus albus	P	-	R	C	-	-	C	C
Mottled Duck	Anas fulvigula	P	-	-	-	-	-	C	C
Green-winged Teal	Anas carolinensis	W	-	-	-	-	-	C	C
Blue-winged Teal	Anas discors	W	-	-	-	-	-	C	C
American Widgeon	Anas americana	W	-	-	-	-	-	-	C
Northern Shoveler	Anas clypeata	W	-	-	-	-	-	-	C
Wood Duck	Aix sponsa	P	-	C	C	-	-	-	R
Ring-necked Duck	Aythya collaris	W	-	-	-	-	-	-	R
Hooded Merganser	Lophodytes cucullatus	W	-	C	C	-	-	-	-
Turkey Vulture	Cathartes aura	P	R	R	R	R	R	C	R
Black Vulture	Coragyps atratus	P	R	R	R	R	R	C	R
Swallow-tailed Kite	Elanoides forficatus	S	R	C	R		-	-	-
Sharp-shinned Hawk	Accipiter striatus	W	C	C	R	R	R	-	-
Cooper's Hawk	Accipiter cooperii	*W	C	R	R	R	R	-	-
Red-tailed Hawk	Buteo jamaicensis	P	R	R	R	R	R	R	R
Red-shouldered Hawk	Buteo lineatus	P	C	C	C	C	C	R	C

Table A-4. Birds species list (continued).

Species Common Name	Species Latin Name	Season	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Swamp Thicket	Shallow Intermittent	Flatwood Marsh
Short-tailed Hawk	Buteo brachyurus	*P	R	R	R	-	-	-	-
Southern Bald Eagle	Haliaetus leucocephalus	*P	R	R	R	R	R	R	C
Marsh Hawk	Circus cyaneus	W	-	-	-	-	R	C	C
Osprey	Pandion haliaetus	P	C	R	C	-	-	-	R
American Kestrel	Falco sparverius	*P	-	-	-	-	-	R	-
Bobwhite	Colinus virginianus	P	R	R	-	-	R	R	-
Turkey	Meleagris gallopavo	P	C	C	R	R	R	R	-
Sandhill Crane	Grus canadensis	*W	-	-	-	-	-	C	C
Limpkin	Aramus guarauna	*P	-	C	C	-	-	C	-
King Rail	Rallus elegans	P	-	-	-	-	C	C	C
Virginia Rail	Rallus limicola	W	-	-	-	-	R	R	C
Sora	Porzana carolina	W	-	-	-	-	R	C	C
Black Rail	Laterallus jamaicensis	W	-	-	-	-	-	R	R
Purple Gallinule	Porphyrala martinica	S	-	-	-	-	-	R	R
Common Moorhen	Gallinula chloropus	P	-	-	-	-	-	R	C
American Coot	Fulica americana	P	-	-	-	-	R	R	C
Killdeer	Charadrius vociferus	P	-	-	-	-	-	C	C
Black-bellied Plover	Squatarola squatarola	P	-	-	-	-	-	-	R
American Woodcock	Philohela minor	W	R	R	-	R	C	R	-
Common Snipe	Capella gallinago	W	-	-	-	-	C	C	C
Spotted Sandpiper	Actitus macularia	W	-	-	-	-	-	-	R
Greater Yellowlegs	Tringa melanoleuca	W	-	-	-	-	-	C	C
Lesser Yellowlegs	Tringa flavipes	W	-	-	-	-	-	C	C
Least Sandpiper	Calidris minutilla	W	-	-	-	-	-	C	C
Dunlin	Calidris alpina	W	-	-	-	-	-	-	R
Western Sandpiper	Calidris mauri	W	-	-	-	-	-	-	R
Sanderling	Calidris alba	W	-	-	-	-	-	-	R

Table A-4. Birds species list (continued).

Species Common Name	Species Latin Name	Season	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Swamp Thicket	Shallow Intermittent	Flatwood Marsh
Short-bill Dowitcher	Limnodromus griseus	W	-	-	-	-	-	R	R
Long-bill Dowitcher	Limnodromus scolopaceus	W	-	-	-	-	-	R	R
Black-necked Stilt	Himantopus mexicanus	S	-	-	-	-	-	C	C
Ring-billed Gull	Larus delawarensis	W	-	-	-	-	-	R	R
Gull-billed Tern	Gelochelidon nilotica	S	-	-	-	-	-	R	R
Forster's Tern	Sterna forsteri	P	-	-	-	-	-	-	R
Least Tern	Sterna albifrons	S	-	-	-	-	-	-	R
Black Skimmer	Rynchops niger	P	-	-	-	-	-	-	R
Mourning Dove	Zenaida macroura	P	C	R	R	-	R	C	-
Ground Dove	Columbigallina passerina	P	-	-	-	-	R	R	-
Yellow-billed Cuckoo	Coccyzus americanus	S	C	C	R	C	R	-	-
Barn Owl	Tyto alba	P	R	R	-	R	R	R	R
Screech Owl	Otus asio	P	C	C	C	R	R	-	-
Great-horned Owl	Bubo virginianus	P	R	R	R	-	R	R	-
Florida Burrowing Owl	Speotyto cunicularia	P	-	-	-	-	-	R	-
Barred Owl	Strix varia	P	C	C	C	C	R	-	R
Chuck Will's Widow	Caprimulgas carolinensis	S	C	C	R	C	-	-	-
Whip-Poor-Will	Caprimulgus vociferus	W	C	R	R	R	R	-	-
Chimney Swift	Chaetura pelagica	S	-	-	-	-	-	-	C
Ruby-throated Hummingbird	Archilochus colubris	S	C	C	R	-	-	-	-
Common Flicker	Colaptes auratus	P	C	R	R	R	-	-	-
Pileated Woodpecker	Dryocopus pileatus	P	C	C	R	R	R	-	-
Red-bellied Woodpecker	Melanerpes erythocephalus	P	C	C	C	C	R	-	-
Yellow-bellied Sapsucker	Sphyrapicus varius	W	C	C	C	C	-	-	-
Hairy Woodpecker	Picoides villosus	*P	C	-	R	-	-	-	-
Downy Woodpecker	Picoides pubescens	P	C	C	C	R	-	-	-
Great-grested Flycatcher	Myiarchus crinitus	S	C	C	C	C	-	-	-
Eastern Phoebe	Sayornis phoebe	W	C	C	C	C	C	R	R
Acadian Flycatcher	Empidonax virescens	S	C	-	-	-	-	-	-
Tree Swallow	Iridoprocne bicolor	W	-	R	R	C	C	C	C

Table A-4. Birds species list (continued).

Species Common Name	Species Latin Name	Season	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Swamp Thicket	Shallow Intermittent	Flatwood Marsh
Purple Martin	Progne subis	S	-	-	C	-	C	C	C
Blue Jay	Cyanocitta cristata	P	C	C	C	C	-	-	-
Common Crow	Corvus brachyrhynchos	P	-	R	C	-	-	C	-
Fish Crow	Corvus ossifragus	P	C	C	C	R	C	C	C
Carolina Chickadee	Parus carolinensis	P	C	C	C	R	-	-	-
Tufted Titmouse	Parus bicolor	P	C	C	C	R	-	-	-
House Wren	Troglodytes aedon	W	R	C	R	R	C	-	-
Carolina Wren	Thryothorus ludouicianus	P	C	C	C	C	C	-	-
Short-billed Marsh Wren	Cistothorus platensis	W	-	-	-	-	R	C	R
Mockingbird	Mimus polyglottus	P	R	R	R	-	C	R	-
Gray Catbird	Dumetella carolinensis	W	C	C	C	C	C	-	-
Brown Thrasher	Toxostoma rufum	S	C	R	R	R	R	-	-
American Robin	Turdus migratorius	W	R	C	C	C	C	-	-
Hermit Thrush	Hylocichla guttata	W	C	C	R	C	-	-	-
Blue-gray Gnatcatcher	Polioptila caerulea	P	C	C	C	C	C	-	-
Ruby-crowned Kinglet	Regulus calendula	W	C	C	C	C	C	-	-
Water Pipit	Anthus spinoletta	W	-	-	-	-	-	U	R
Cedar Waxwing	Bombycilla cedrorum	W	C	C	C	R	R	-	-
Loggerhead Shrike	Lanius ludovicianus	P	R	-	-	R	R	R	-
White-eyed Vireo	Vireo griseus	P	C	C	R	C	C	-	-
Solitary Vireo	Vireo solitarius	W	C	C	C	C	-	-	-
Red-eyed Vireo	Vireo olivaceous	S	C	C	R	-	-	-	-
Black and White Warbler	Mniotilta varia	W	C	C	C	C	R	-	-
Orange-crowned Warbler	Vermivora celata	W	C	C	R	R	R	-	-
Northern Parula	Parula americana	S	C	C	C	-	-	-	-
Yellow-rumped Warbler	Dendroica coronata	W	C	C	C	C	C	R	R
Yellow-throated Warbler	Dendroica demonica	P	C	C	C	-	-	-	-
Prairie Warbler	Dendroica discolor	W	C	C	R	C	C	-	-
Palm Warbler	Dendroica palmarum	W	C	C	C	R	C	C	R
Common Yellowthroat	Geothlypis trichas	P	C	C	C	R	C	C	C

Table A-4. Birds species list (continued).

Species Common Name	Species Latin Name	Season	Hydric Hammock	Hardwood Swamp	Cypress Swamp	Bay Forest	Swamp Thicket	Shallow Intermittent	Flatwood Marsh
Red-winged Blackbird	Agelaius phoeniceus	P	R	C	C	-	C	C	C
Boat-tailed Grackle	Quiscalus major	P	-	R	R	-	C	C	C
Common Grackle	Quiscalus quiscula	P	C	C	C	-	-	-	-
Brown-headed Cowbird	Molothrus ater	W	-	-	-	-	-	C	-
Summer Tanager	Piranga rubra	S	C	C	C	R	-	-	-
Cardinal	Cardinalis cardinalis	P	C	C	C	C	C	-	-
American Goldfinch	Carduelis tristis	W	C	C	C	C	C	U	-
Rufuos-sided Towhee	Pipilo erthrophthalmus	P	C	C	-	C	C	R	R
Savannah Sparrow	Passerculus sandwichensis	W	-	-	-	-	C	C	R
Grasshopper Sparrow	Ammodramus savannarum	W	-	-	-	-	-	R	-
Henslow Sparrow	Passerherbulus henslowii	W	-	-	-	-	-	R	-
LeConte's Sparrow	Passerherbulus candacutus	W	-	-	-	-	-	R	-
Vesper Sparrow	Pooecetes gramineus	W	-	-	-	-	-	R	-
White-throated Sparrow	Zonotricha albicollis	W	-	-	-	-	C	-	-
Swamp Sparrow	Melospiza georgiana	W	-	R	-	-	C	R	C
Song Sparrow	Melospiza melodia	W	-	-	-	-	C	-	-
Total Common Species			48	51	44	24	30	36	42

Notes: Based on U.S. Fish and Wildlife (USDI) information the table includes those birds expected to be found within the wetland ecosystems already defined.

Seasons: P = permanent resident; W = winter resident; S = summer and/or breeding resident. Transients and accidentals were excluded from this list.

Abundance: C = abundant, common, and uncommon: these are all regular visitors in the appropriate seasons in decreasing degree of abundance; R = rare and very rare: these birds reflect small percentages of the populations in their habitats and/or occupy very specific habitats.

* Refers to species listed by Florida Committee on Rare and Engandered Plants and Animals as "Endangered, Threatened, and Rare." Included are species of special concern, referring to mostly wetland species whose habitats are being reduced.

Table A-5. Endangered, threatened, rare, and species of special concern for the wetlands of Seminole County.

MAMMALS	
Endangered:	None
Threatened:	Sherman's Fox Squirrel Florida Black Bear West Indian Manatee
Rare:	Southeastern Shrew Florida Weasel
Species of Special Concern:	Round-tailed Muskrat
BIRDS	
Endangered:	Wood Stork Florida Everglades Kite Ivory-billed Woodpecker
Threatened:	Southern Bald Eagle Florida Sandhill Crane
Rare:	Short-tailed Hawk
Species of Special Concern:	Cooper's Hawk Limpkin Southern Hairy Woodpecker
AMPHIBIANS	
Threatened:	Florida Gopher Frog
Rare:	Striped Newt
REPTILES	
Species of Special Concern:	American Alligator
PLANTS	
Endangered:	Cuplet Fern Hand Fern
Threatened:	Florida Bonamia Fall Flowering Ixia Needle Palm Florida Coontie
Rare:	Spoon Flower

Sources for Tables A-1, A-2, A-3, A-4, and A-5

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General Note:

The wetland classification used in the above determination of wildlife associated with wetlands is somewhat different than that used to classify the wetlands of Seminole County. Cross reference of names in tables A-1, A-2, A-3, A-4 with wetland types found in Seminole County is as follows:

Bay Forest = Bayhead
Swamp Thicket = Wet Prairie
Shallow Intermittent = Shallow Marsh
Flatwood Marsh = Shallow Marsh
Cypress Swamp = Cypress Dome
Hardwood Swamp = Mixed Hardwood Swamp
Permanent Herbaceous = Deep Marsh

APPENDIX B
CROSS REFERENCE OF MAJOR SOIL ASSOCIATIONS
AND THE WETLANDS OF SEMINOLE COUNTY

Soil Associations and Wetland Communities

Table B-1 lists the major soil associations that are found within broad categories of wetland type. A more thorough listing would require a detailed wetlands map of the county. The cross reference of soil type and wetland community listed in Table B-1 is derived by cross referencing the Soil Conservation Service, Soil Survey for Seminole County with a vegetation map of Seminole County produced by the Center for Wetlands, University of Florida, under contract to the St. Johns Water Management District.

Brief Description of Soil Types

The following is a brief description of soil types occurring within wetland communities of Seminole County. For more detailed descriptions, see the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey for Seminole County.

Blanton Series: low ridges mostly in the western part of the county. Slightly acid, well drained, low organic matter.

Brighton Peats: marsh areas adjoining lakes. Strongly acid, poorly drained, high nitrogen, fibrous, south-central region has high diatom concentration.

Charlotte Series: low flats and the St. John River floodplain. Poorly drained, low organic content.

Delray Series: low flats in the northern and eastern parts of the county. Slightly acid to mildly alkaline, poorly drained, high organic matter.

Felda Series: St. John River floodplain, along some streams. Slightly acid to neutral, poorly drained.

Iberia Series: St. John River floodplain and associated lakes. Neutral, very poorly drained, high organic matter.

Immokalee Series: bands between ridges and swamps. Strongly acid, poorly drained, low organic matter.

Istokpoga Series: very strongly acid, very poorly drained woody parts; high nitrogen.

Leon Series: bands between ridges and swamps, adjacent to ponds; strongly acid, poorly drained, deep lying organic pan.

Manatee Series: slight depressions, Celery Delta and St. Johns River floodplain; neutral to mildly alkaline, very poorly drained.

Okeechobee Series: northern marshes. Slightly acid to neutral, porous muck over fibrous peat, high nitrogen.

Plummer Series: low areas, flats. Very strongly acid, poorly drained, low organic content.

Pamello Series: low ridges. Very strongly acid, moderately well drained.

Pompano Series: low flats, St. John River floodplain, adjacent to streams. Slightly acid to neutral, poorly drained; low organic matter.

Rutlege Series: low flats. Very strongly acid, very poorly drained, high organic matter.

Sandy Alluvial: adjacent to streams.

Swamp: depressions, bayheads, drainageways, strongly acid to neutral.

Terra Ceia Series: Black Hammock, Lake Jessup. Slightly acid to neutral, very poorly drained, mucky and high in nitrogen.

Table B-1. Cross reference of wetland communities and soil associations.

HYDRIC HAMMOCKS

Blanton fine sand, low, 0–5% slopes
Blanton fine sand, low, 5–8% slopes*
Blanton fine sand, high, 0–5% slopes*
Brighton peat
Brighton peat, shallow variant*
Brighton, Istokpoga and Okeechobee soils
Charlotte fine sand*
Delray fine sand
Delray fine sand, moderately shallow, high*
Delray mucky fine sand*
Delray fine sand, high*
Iberia clay loam, overflow
Iberia mucky loam*
Immokalee fine sand
Immokalee sand
Istokpoga peat, deep
Istokpoga peat, moderately deep*
Lakewood sand, 0–5% slopes*
Leon fine sand, 0–2% slopes
Leon sand*
Made land
Manatee fine sand
Manatee loamy fine sand*
Manatee-Delray complex, overflow
Ona fine sand*
Plummer fine sand
Plummer fine sand, high
Pomello fine sand, 0–5% slopes
Pompano fine sand
Pompano fine sand, moderately shallow*
Rutlege fine sand
Rutlege fine sand, high*
Rutlege mucky fine sand*
Rutlege and Pompano soils, ponded
Rutlege, Plummer, and St. Johns soils
St. Jucie fine sand
St. John fine sand*
Swamp
Terra Ceia muck*
Wabasso fine sand*

MIXED HARDWOOD SWAMP

Blanton fine sand, low, 0–5% slopes
Brighton, Istokpoga and Okeechobee soils
Delray fine sand, high*

Table B-1. Cross reference of wetland communities and soil associations (continued).

MIXED HARDWOOD SWAMP continued
Iberia clay loam, overflow
Immokalee fine sand
Immokalee sand
Leon sand
Leon fine sand
Leon fine sand, 0–2% slopes
Manatee-Delray complex, overflow
Plummer fine sand, high
Pomello fine sand, 0–5% slopes
Rutlege fine sand
Rutlege mucky fine sand*
Rutlege and Pompano soils, ponded
Sandy alluvial land
Swamp
RIVERINE CYPRESS
Brighton, Istokpoga and Okeechobee soils
Iberia clay loam, overflow
Immokalee fine sand
Immokalee sand
Leon fine sand, 0–2% slopes
Manatee-Delray complex, overflow
Pompano fine sand
St. Johns fine sand
Sandy alluvial sand
Swamp
CYPRESS DOME
Brighton, istokpoga and Okeechobee soils
Delray fine sand*
Delray fine sand, high
Immokalee fine sand
Manatee-Delray complex, overflow
Plummer fine sand
Pompano fine sand
Rutlege fine sand
Rutlege and Pompano soils, ponded
Swamp
BAYHEADS AND BOGS
Immokalee fine sand
Lakewood sand, 0–5% slopes
Okeechobee much
Pompano fine sand
Rutlege fine sand
Rutlege mucky fine sand
Swamp

Table B-1. Cross reference of wetland communities and soil associations (continued).

WET PRAIRIES	
	Felda fine sand
	Iberia clay loam, overflow
	Manatee-Delray complex, overflow
	Pompano fine sand
	Terra Ceia muck
FRESHWATER MARSH	
	Blanton fine sand, high, 0–5% slopes
	Blanton fine sand, high, 5–8% slopes
	Blanton fine sand, low, 0–5% slopes
	Brighton, Istokpoga and Okeechobee soils
	Delray fine sand
	Delray fine sand, high
	Felda fine sand
	Iberia clay loam, overflow
	Immokalee fine sand
	Leon fine sand, 0–2% slopes
	Made land*
	Manatee-Delray Complex, overflow
	Okeechobee muck
	Orlando fine sand, 0–5% slopes*
	Plummer fine sand
	Plummer fine sand, high
	Pomello fine sand, 0–5% slopes
	Rutlege fine sand
	Rutlege fine sand, high
	Rutlege and Pompano soils, ponded
	Swamp

*Indicates a soil that is a relatively uncommon type associated with the particular wetland community.

The wetland communities given above were taken from a vegetation map of Seminole County, prepared by the Center for Wetlands at the University of Florida under contract to the St. Johns River Water Management District. Soil maps were overlaid with the vegetation map to produce the cross reference. Shallow and deep marshes were not differentiated in this mapping effort and Riverine Cypress is considered Mixed Hardwood Swamp.

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