

Chapter 1

Why are Ponds Important in Florida?

Florida's Unique Ecosystems.

An ecosystem can be a planet, a forest, a river, a fallen log, or a pond. Ecosystems are made up of nonliving components such as solar energy, soil, water, air, heat, wind, and a variety of essential chemicals and living components - plants and animals. Whether an ecosystem is small or large depends on where boundaries are established for convenience of studying its environmental functioning as a unit in nature.

Water is everywhere in Florida! Surrounded on three sides by water and with a climate varying from temperate to subtropical, every kind of large aquatic ecosystem - lake, pond, river, spring, swamp, estuary, coral reef, sea, and ocean - can be found in, or around Florida. Three types of large terrestrial ecosystems - forests, grasslands, and savannas - are also found in the state. Each of these major types of ecosystems can be divided further, and all are connected to one another.

Florida has an amazing variety of ecosystems, ranging from the upland mixed forests in northern Florida to the man-

grove swamps in southern Florida. Estuaries, one of the most productive ecosystems on earth, can be found in every stretch of Florida's vast coastal areas in the form of rivers, bays, and lagoons - each characterized by fresh water mixing with salty water, abundant aquatic vegetation, and large populations of fish. Estuaries are the home and spawning grounds for most of our shellfish and commercial and sport saltwater fish.

From pelicans to wood storks, from manatees to blue crabs, and from treefrogs to panthers, Florida's wildlife is a natural wealth many of us treasure. Just as rare and fascinating as Florida's animals are its plants, some so unique that they are found only in one small region of the state. Plants, animals, rainfall, temperature - all are integral parts of ecosystems.

More than any other animal, humans have a tremendous impact on the health of ecosystems they live in or near. These impacts can be **direct** when man uses local resources to sustain life in communities, or **indirect** when resources are needed from distant lands to help support people living in an *artificial* setting such as a highly urbanized area. Because man is a social and cultural animal and population growth has been so rapid in our state, it is necessary to integrate scientific, behavioral, sociological, political, economic, and ethical factors when considering how to best maintain ecological balance. The future of Florida's ecosystems depends on decisions that will be made by citizens like you.

Stormwater Pond



Stormwater Management is necessary to protect Florida's unique natural ecosystems. Simulating natural ponds is one method to accomplish this goal.

Ponds

Natural ponds play an important role in these connected ecosystems. They capture rainwater as it rushes over the ground, reducing erosion and flooding in rivers and streams. By holding much of the stormwater, these ponds also allow nutrients and other chemicals contained in the runoff to be filtered from the water before it moves through the soil into an underlying aquifer or along the surface into our rivers, lakes, and estuaries. Wildlife depend upon ponds for food, shelter and breeding purposes. During the dry season, ponds act as reservoirs, providing much needed water for birds and wildlife.

After observing natural ponds at work and using these natural ponds in early developments to hold the stormwater, people came up with the idea of building ponds to hold and treat stormwater in communities. This was needed where the po-

tential for flooding is increased by covering the ground with concrete and other hard surfaces, as well as when changes in the natural ecological balance occur as a result of development. These "stormwater ponds" are specifically designed to decrease downstream flooding and remove pollutants from the water before it enters a lake, river, or bay - or before it moves into the aquifer. For stormwater ponds to do their job effectively, they must be managed properly. They are man-made ecosystems that require regular maintenance.

Managing stormwater ponds begins with management of the pond's watershed which contributes the water that flows into the pond. The rest of this manual will look at how ponds fit into the bigger watershed picture, how to take care of the watershed that directly affects your pond and how to manage your stormwater pond.

Natural Pond ▼



The watershed connection

We use water everyday in our homes. Every time we flush the toilet, brush our teeth, take a shower, water the lawn or take a drink - we are making the watershed connection.

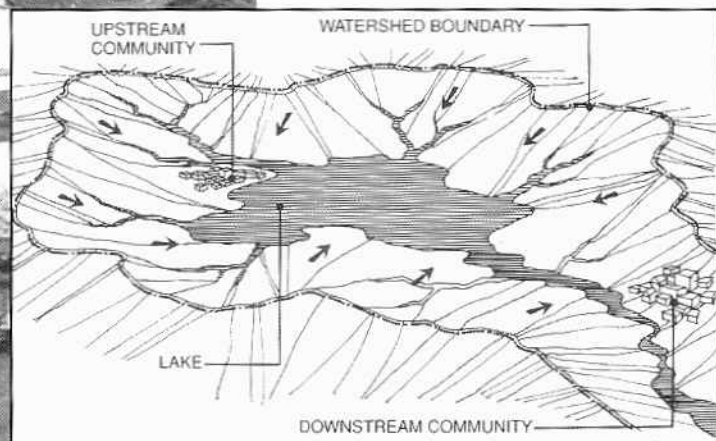
We use water outside our homes. Every time we go swimming in a spring, fishing in a pond, canoeing in a lake or picnicking along the river - we are making the watershed connection.

Every time we pass a storm drain, roadside ditch, a lake, stream or river - we are making the watershed connection.

Everyone, everywhere is connected to a watershed. It doesn't matter if you live in an urban or rural area or next to a water body. We all live in a watershed!

What is a watershed?

What is a watershed? It's an area of land where water falls as precipitation and flows across a variety of land surfaces and drains into a water body. Water bodies receiving this water include ponds, lakes, bays, streams, and rivers. Rivers in Florida either flow into other rivers or empty into the Gulf of Mexico or the Atlantic Ocean.



▲ A watershed is the land that water flows across or under on its way to a stream, river or lake.

Some actually disappear into sink holes and are never seen again. Each geographical area that contributes water to a pond, lake, bay, stream or river is a watershed. Large watersheds include a main water body and many smaller tributary watersheds which empty into it.

Once precipitation hits the ground, some of the water will be absorbed by the soil or percolate through it to recharge aquifers. The remaining water, especially during heavy rains, runs off the land and is referred to as stormwater. Stormwater takes numerous routes to its final destination. It may run off your driveway and flow down the stormdrain, or off the road into a ditch. Perhaps it will run off a parking lot and into a stormwater treatment system (pond), or it may flow directly from the land into a stream, river, lake, or even the ocean.

Each water body receives water from numerous tributaries, which in turn have received water from countless other sources, including stormdrains, roadside ditches, wastewater treatment facilities or natural sources such as free flowing springs and direct rainfall.

It's easy to see how most of our daily actions connect us to our watershed. For instance, when we wash dishes, water drains from our homes through a series of pipes, to wastewater treatment facilities, and to receiving water bodies. It's as simple as that! The watershed connection is everywhere. It's up to us to make that connection a positive one.

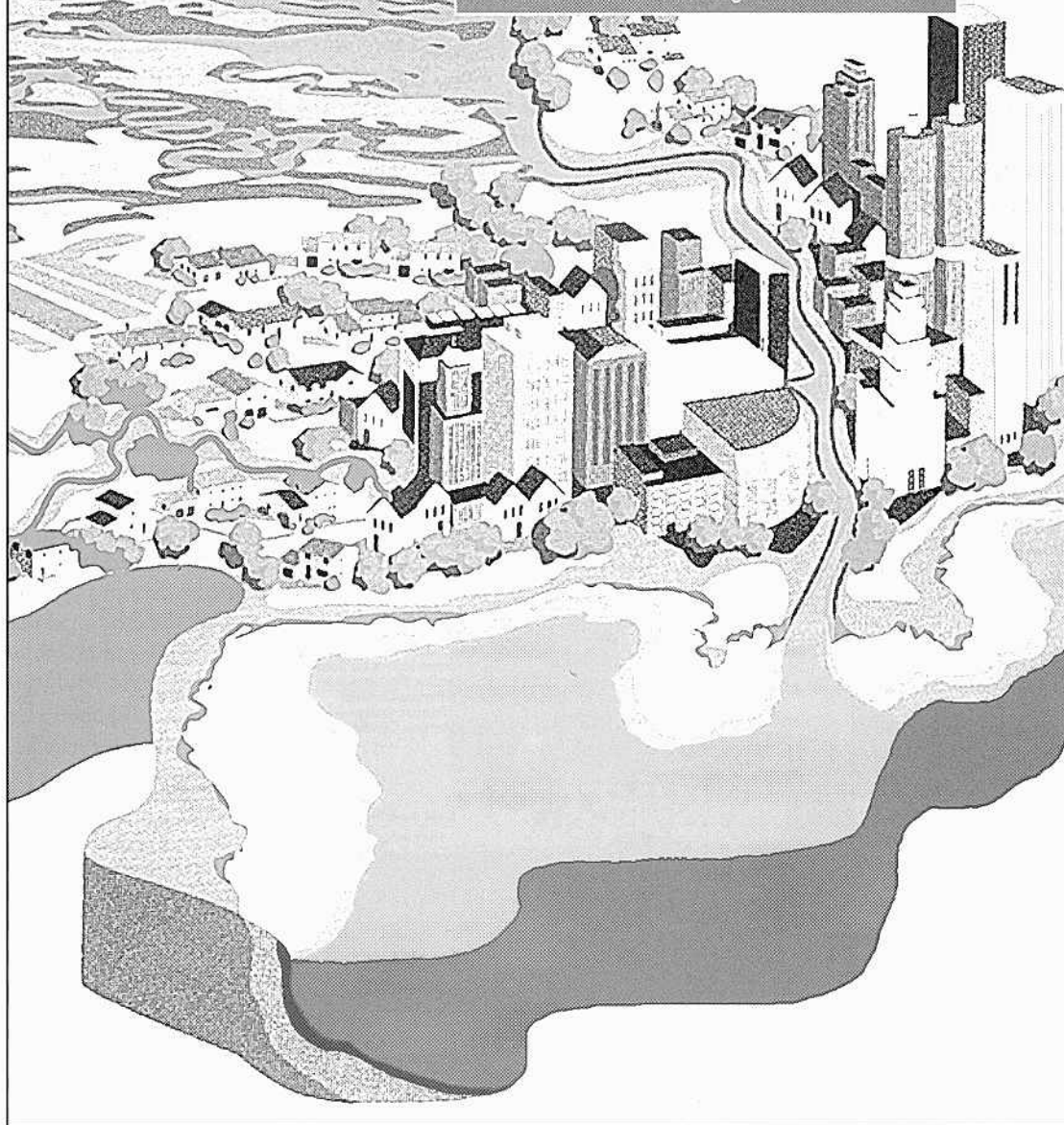
In general, there are two ways for you to make a difference by making a positive watershed connection - *conserve water and protect water.*

Make the watershed connection and take an active role in trying to keep our water as clean as possible. Remember, we are all part of a watershed!

*Stormwater Pond***TIP**

At home: Landscape your yard with plants that need a minimum of water and fertilizer. Use only the amount of fertilizers and pesticides that plants need.

In your community: Protect wetlands that serve as natural buffers against pollution, soil erosion, and flooding.



▲ *A healthy watershed is one that is in harmony with the needs of people, land and natural resources.*

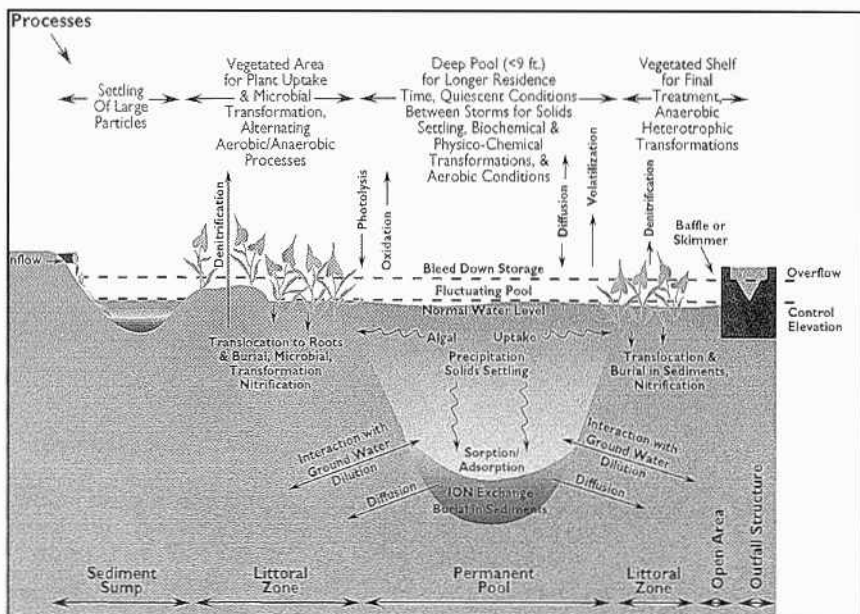
Types and Functions of Stormwater Ponds

Different Pond Types

Ponds constructed to store excess runoff from storms are called wet detention ponds because they detain and slowly release surface water flow after rain occurs. Initially, detention ponds were built to solve flooding problems by providing temporary storage for storm water. As lakes, streams and estuaries became more polluted because of stormwater runoff, ponds were designed and built to improve stormwater quality.

Several processes take place within the various zones of the pond to remove and transform pollutants before water is discharged downstream. The different zones should include a permanent pool of water, a shallow littoral shelf with aquatic plants, and a fluctuating pool (Figure 1). The **permanent pool** allows particulate forms of pollutants time to settle to the bottom where, through various processes under ideal conditions, they are buried in the sediments. The permanent pool also

removes soluble nutrients from the water by physical, chemical and biological reactions in the water column. About 65 percent of the pond area is required to be kept as an open water permanent pool when stormwater ponds are constructed according to SWFWMD criteria. Vegetation in the **littoral zone** provides the substrate for the attachment of decomposer microorganisms that break down and dissolve organic material and behave somewhat like the trickling filters used by sewage treatment plants. A minimum of 35 percent of the pond bottom is required to be shallow enough to support wetland plants according to SWFWMD criteria. Plants also take up pollutants directly but some of these nutrients are released back into the water when the plant dies, with the harvesting of plants, there is a net reduction in pollutants from plant uptake. The **fluctuating pool** slowly releases detained stormwater and reduces peak flows

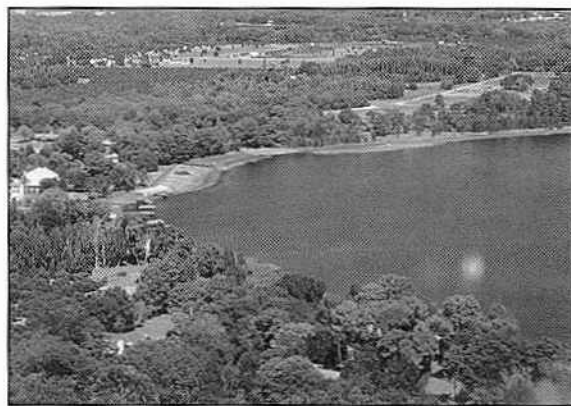


▲ Figure 1. Idealized Wet Detention Pond

Getting To Know Your Pond

Natural Ponds:

In Florida there are several types of ponds. The one that is most familiar to people all over the world are our natural ponds and lakes that are so highly photographed and promoted. These ponds have been formed in depressions, and have developed a surrounding ecosystem that is unique.



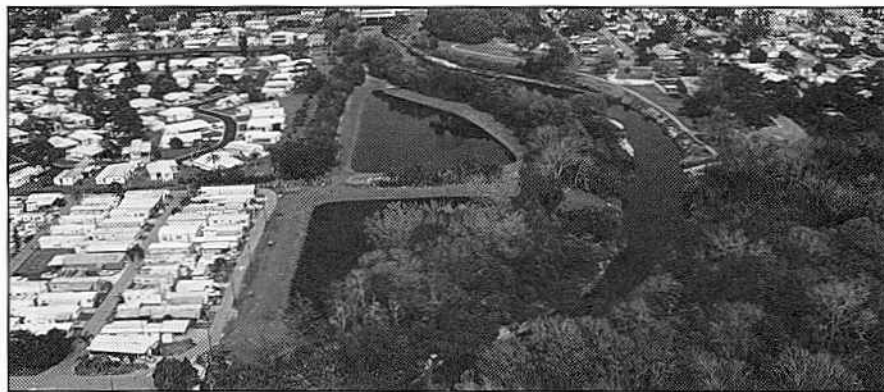
▲ *Natural Pond*

Man-made Ponds:

Florida also has many types of man-made ponds. Some of these type are excavated for fill material, commonly referred to as dug outs, where the topography is fairly flat or water is not flowing naturally nearby. Another type of man-made pond is an embankment pond, where there is some rolling topography and a intermittently flowing stream. These ponds have a constructed dam and spillways to convey the water through or around them. Some of these man-made ponds incorporate aspects of both types.

Both of these pond types are generally built and managed for multiple purposes. Several of these uses are recreation, water

supply, fish production, flood control, and wildlife habitat. There are several good publications available on their use and management from your local Soil and Water Conservation District, the USDA-Natural Resources Conservation Service or the Cooperative Extension Service. See chapter 6 for a list of these publications. The uses of man-made ponds also include stormwater management. It is the pond built specifically for stormwater management upon which this citizen's guide is focused. The management techniques may apply, however, in part, to these other ponds and their uses.



▲ *Man-made Ponds*



*Man-made
Stormwater Pond* ►

Man-made Stormwater Ponds:

Water flowing over the land during and immediately following a rainstorm is called stormwater runoff. Stormwater runoff from lands that undergo development cause significant problems for landowners downstream, for local governments, and for the rivers and bays which ultimately receive the runoff. These problems include sediment accumulation, pesticides, excess nutrients from fertilizers, waste and decaying vegetations, litter, oils, and solvents among other lesser known pollutants.

As a result of stormwater, transport, sediment fills our ditches and streams causing flooding and requiring expensive restoration. High stream velocity causes bank erosion, moves sediment downstream, and causes more flooding, loss of wildlife habitat, and property damage. This sediment must be removed, at great cost, from culverts, ditches, streams and navigable waters to restore their capacity. Additionally, the other pollutants mentioned are also carried with the stormwater.

The volume of stormwater generated by a rain storm depends upon the total amount of rainfall, the amount that soaks into the soil, evaporates, or is taken up

by plants, and how much is stored in ponds, pools and puddles. These amounts vary with the type of soil, plants, topography and land use.

Changes in land use affect runoff in two important ways: (1) the volume and rate of overland flow, and (2) the potential impacts on water quality. As an area becomes increasingly more urban through the construction of buildings, streets, parking lots and driveways, exposed soil is paved over or compacted by traffic. Consequently, the type and distribution of vegetation in these areas also change, the surface becomes more impervious, less water can soak in, and runoff is increased.

Changes in land use also directly affects water quality. In natural systems natural processes recycle most of the pollutants found in stormwater. We disturb these biological processes with our development and add pollutants to the system with our everyday activities such as: lawn and garden management with fertilizers and pesticides, trips to the store with cars leaving oil, gasoline and tire wear on the roads, walking the dogs, etc. All of these pollutants are carried by stormwater runoff to our ponds, lakes, streams and bays.

These materials create high pollutant loadings of:

- sediment which clogs drainageways, smothers bottom living aquatic life and increases cloudiness of the water;
- organic matter that as it rots removes oxygen from the water that can lead to fish kills and foul smells;
- nutrients, mostly nitrogen and phosphorus, which cause unwanted and increased growth of algae and weeds in our waters;
- metals, such as lead, copper, zinc, cadmium and chromium, which can accumulate in fish and shellfish disrupting reproduction and making them unusable as food;
- oils and greases which are toxic to many aquatic plants and animals;
- viruses and coliform bacteria which contaminate ponds, lakes, and bays and prevent swimming, fishing and shellfish harvesting; and
- excessive fresh water which changes the salinity of bays, alters the types of life in the bays, and disrupts important nursery areas of the bays.

Stormwater is a major source of pollutants to our ponds, lakes, streams and bays. Improved stormwater management will reduce pollutants from our activities.

Of primary importance to minimizing the effects of stormwater on water quality is the first flush. This term describes the washing action that stormwater has on accumulated pollutants. The first few minutes of a thunderstorm will wash 90 percent of the pollutants off the streets and parking lots into the ponds and streams. This creates a shock loading of pollutants. Certain stormwater ponds are designed to accept and treat this loading before passing the water downstream.

Stormwater ponds hold water for a designed period of time to allow streams to flow more slowly and thereby carry less suspended sediment and stretch the storm flow over a longer period of time at a lower level. During this holding time more water soaks into the soil which adds to the recharge of our shallow aquifers.

Additionally, when stormwater ponds are designed properly, wildlife are encouraged to use the ponds and the number of different types of wildlife is increased.

Residential Stormwater Pond ▼



Researching Pond Ownership and Maintenance Responsibilities:

This section will describe how a person can know if he/she is legally permitted to do any work in a stormwater pond or other excavated water body that receives stormwater runoff, and how to find details of required maintenance, if any.

Subdivisions, shopping centers, industrial parks, and any other project creating impervious, or paved, surfaces, including roads, buildings and parking lots that were constructed after 1982 in Florida were required to obtain a Stormwater Discharge permit from the Department of Environmental Protection, or DEP, (formerly called the Department of Environmental Regulation) or from the South Florida Water Management District. This permit required that the runoff generated from the project be collected and "treated" to remove pollutants such as greases and oils, fertilizers, and heavy metals by holding the water in stormwater ponds. In 1984, the various Water Management Districts received stormwater permitting responsibilities, but in some cases, such as using natural wetlands to treat stormwater, the DEP retained permitting responsibilities. Now, the Water Management Districts are responsible for most residential and commercial stormwater permitting in Northeast, Central and South Florida.

Stormwater Discharge permits are issued to the property owner. The permits contain specific maintenance instructions for the stormwater management facilities. These facilities include ponds, culverts and inlets, some wetlands, and conveyance ditches. The instructions may be part of the permit, or may be on the approved construction drawings that are returned to the owner after permit issuance. A copy of the

approved construction drawings are also retained by the permitting agency. The owner is required to obtain an "operation permit" after the project is completed. The operation permit designates who is responsible for maintenance and protection of the stormwater facilities. In the case of a commercial or residential subdivision or condominium, the owner is required to transfer the operation permit to the Homeowners, Property Owners or Condominium Owners Association (HOAs, POAs & COAs) after it is legally established, which must occur before the developer moves on.



STATEMENT OF COMPLETION AND REQUEST FOR TRANSFER TO OPERATION ENTITY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
 1379 BRIDAL STREET • BROADALAND, FL 34926-6895
 (813) 790-7711 OR FLORIDA WATER 1 (800) 422-1476

Within 30 days after completion of construction of the surface water management system, the owner or authorized agent must submit the original plus one copy of this form and two complete sets of certified as-built drawings for the surface water management system structures and appurtenances. Upon receipt, this Statement of Completion will be reviewed and the system may be inspected for compliance with the approved permit and as-built drawings. The operation phase of this permit is effective when the Statement of Completion for is signed by an authorized District representative.

1. **SURFACE WATER MANAGEMENT SYSTEM INFORMATION:**
 Permit No.: _____ County: _____
 Project Name: _____
 Permittee: _____
 Address: _____
 City, State, Zip: _____
 Telephone: () _____

2. **I HEREBY CERTIFY THAT (Please check accurately and initial only one box):**

☐ A. At the time of final inspection, the surface water management system was completed substantially in accordance with the permitted construction plans and information. Any minor deviations from the permitted plans and specifications will not prevent the system from functioning in compliance with the requirements of Chapters 40D-4, and 40D-40, or 40D-45, F.A.C. (The as-built drawings and information submitted to the District shall confirm this certification.)

☐ B. At the time of final inspection, the system was not completed in substantial conformance with the permitted construction plans and information. (The registered professional engineer shall explain in writing, and with confirming depiction on the as-built specification. In this case, the professional engineer shall complete, but not sign and seal, the Statement of Completion.)

This certification shall be verified by TWO COPIES of attached "as-built" drawings (as-built drawings must be signed, dated and sealed by a Registered Professional Engineer or Land Surveyor, as required by State Law).

By: _____ Signature of Engineer of Record _____ Name (please type) _____ F.L.P.E. No. _____
 Date: _____ Company Name _____
 Phone () _____ Company Address _____
 City, State, Zip _____

FORM 547 (2/00) (M)
 Rev 40D-1.001, F.A.C.

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Residential and Commercial Subdivisions, Including Condominiums:

Stormwater ponds may be owned by individual lot owners, by HOAs, POAs & COAs or by the city or county in which they are located. Ownership can be determined by looking at the recorded plat¹ of the subdivision or condominium. Ownership does not necessarily confer maintenance responsibility. In some cases, a pond shown on a plat as being owned by adjacent lot owners will be included in a drainage conveyance easement² recorded in the official county records. Note that an individual lot survey is drawn from both the recorded plat and actual field measurements and will also show the lot line and any drainage easement within the lot if the lot extends into a pond. The easement may dedicate the pond area to an owners association for maintenance, or to the county or city for maintenance, despite the fact that it is owned by the adjacent lot owners. In other cases, the pond area may not have a drainage easement recorded over it, but is designated as a "common area", to be owned and maintained by the subdivision's homeowner's

association. In other cases, lot owners may own a pond with no drainage easement, and they may be responsible for its maintenance. Owners Association documents, including the Articles of Incorporation and the Declaration of Covenants and Restrictions, that are received when a lot or condominium is purchased, may often include information designating the entity that is responsible for maintenance of the pond.

To determine who can or must legally maintain a pond, and what restrictions cover pond maintenance, first check your lot survey to see where your lot lines extend. Then:

- 1. Check to see if a drainage easement covers the pond.
- 2. Check with the Owners Association to see a copy of the recorded plat for easement language, and to see to whom the easement was dedicated for maintenance. If the association does not have a copy of the plat, go to the county records office to see or obtain a copy of the plat.
- 3. Check the approved construction plans for maintenance instructions. Read the Owners Association documents. Read the Stormwater Discharge permit. The Owners Association should contain a copy of it.
- 4. Finally, contact the local Water Management District's permitting section (or with the local DEP office if they issued the Stormwater Discharge permit) to verify your conclusions or to fill in any missing information.



▲ *Planted littoral zone in residential stormwater pond.*

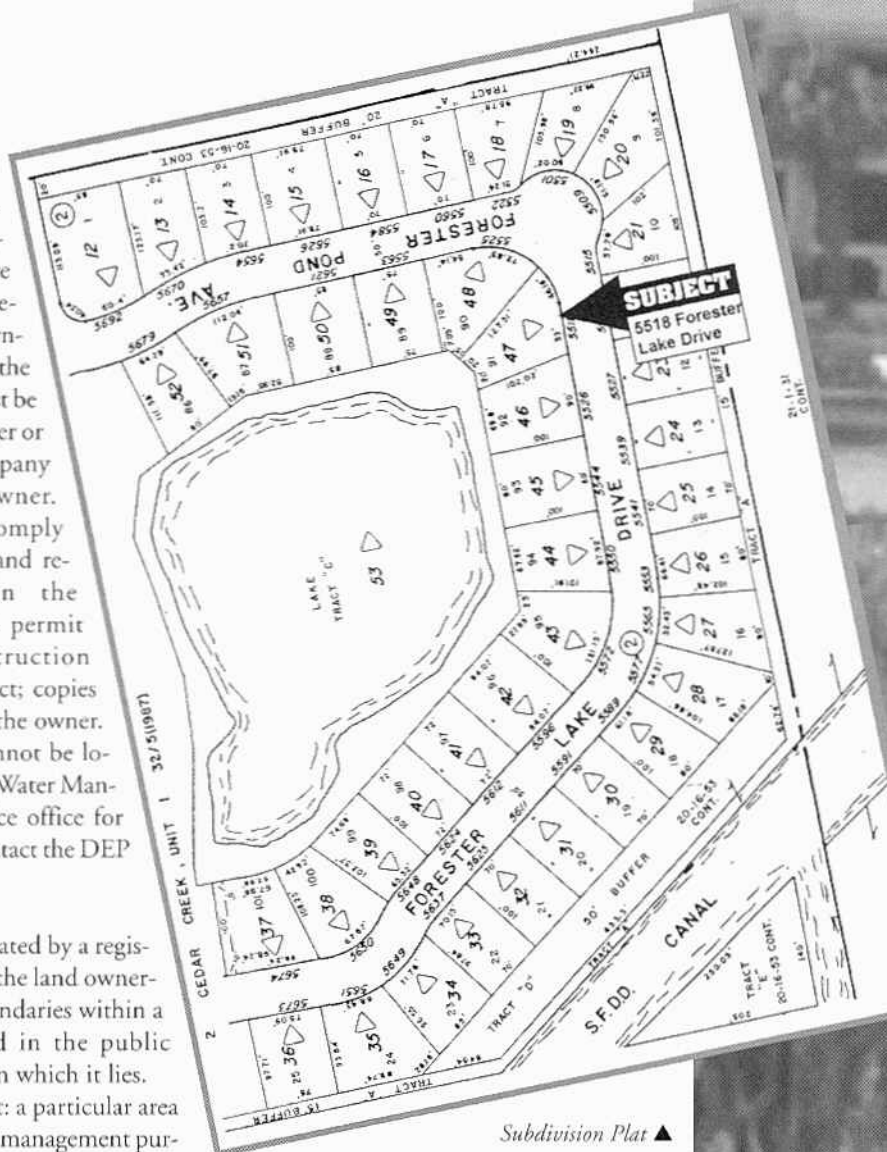
Commercial Sites:

In the case of shopping centers and apartment complexes - where the developer or subsequent owner retains ownership and control over the facilities - the pond must be maintained by the owner or the management company designated by the owner. Maintenance must comply with the instructions and restrictions found in the stormwater discharge permit and approved construction drawings for the project; copies of which are issued to the owner. If these documents cannot be located, contact the local Water Management District service office for this information, or contact the DEP for older projects.

Footnotes:

¹Plat: a drawing, created by a registered land surveyor, of the land ownership and easement boundaries within a subdivision, recorded in the public records of the county in which it lies.

²Drainage easement: a particular area reserved for stormwater management purposes, such as a pond, drainage ditch or swale, or storm sewer line. An easement is recorded over land owned by one entity - a homeowner, for example - and is dedicated to another entity - the city, county or the subdivision's Owners Association, for example - for maintenance. The easement will contain specific restrictions regarding what the land owner and the maintenance entity can do within the easement. The easement may be recorded with a subdivision plat in the county records, or may be recorded separately in the official county records if it does not lie within a subdivision.



Subdivision Plat ▲

Stormwater Pond



Research your water management district permit or your subdivision documents to determine restrictions on stormwater pond maintenance.

Check with the local water management district for stormwater pond maintenance guidance.

Taking a Pond Field Trip:

One of the first steps to take when creating a pond management plan is to obtain a copy of the approved construction drawings and maintenance plans for the pond, as well as for your subdivision. Determine the type of pond yours was designed to be, and what sections of your subdivision were designed to drain to your pond (this area is often called the "drainage basin" or "watershed"). Then, compare the original plans with what you see...take a walk around the subdivision and pond. Inventory the elements that

you are required to maintain, and contrast them with your ideas of how you think the pond should look. You might contact the local water management district service office or your local county stormwater utility to see if a biologist or engineer is available to help you with your "pond walk".

Mallard ducks utilizing a stormwater pond. ▼





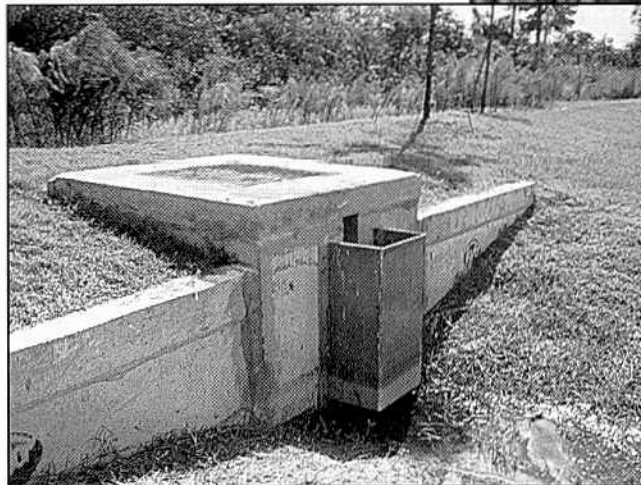
Major items to Observe

Inflow and Outflow Structures:

The type of outflow control structure constructed for your pond will give you a clue as to what type of treatment pond design you have. This structure is usually built of concrete and regulates the pond water discharge. Often, the control structure has an iron grate on top, and an aluminum or fiberglass baffle placed in front of the openings. The baffle acts as a skimmer and prevents floating greases, oils and litter from discharging downstream.

- Ponds without outflow structures may have been constructed only for fill and will usually have no permitted maintenance requirements.
- Ponds designed to be wet detention ponds usually have a two stage overflow structure, with a wide rectangular opening and a small hole to slowly drain the water called the bleed-down orifice, usually no larger than 3" in diameter, or with a V-shaped notch. The vegetation at the shallow end of ponds is required to be protected by permit.
- Ponds designed with sand filtration beds (often called effluent filtration or side drain filter ponds) will have a concrete outfall box in which a 6, 8 or 12" diameter PVC pipe is inserted below water line. By removing the grate top, you may see the pipes inside the outfall structure, usually coming in from either side of the box. Also look for PVC "cleanouts" along the pond bank in which the sand filter is embedded; these are inspection ports which run from the filter bed up to the bank, with a PVC cap screwed on for protection. Effluent filtration ponds are required by permit to be inspected frequently to ensure the filters have not clogged.

Check for built up debris, sediment and vegetation at each storm inlet that feeds the pond, and note which structure needs work to maintain free flow. Note where screens, fish excluders³ (if present), grates and baffles are clogged or not properly positioned. If the pond is equipped with a side bank sand filter or underdrain facility, check the outflow structure to see if water is flowing out after a rain event and see if vegetation has clogged the filter area. Your maintenance plan should include steps to remove excess debris and sediment, replace screens and grates, and replace or unclog the sand filter if it is not functioning properly. All vegetation that becomes established over the filter area must be removed so its roots do not clog the filter.



▲ Outflow Control Structure





Pretreatment Sediment Basin ▲

Grading and Sediment Accumulation:

Measure the pond depth below current water level at various locations. If the pond has a designated "littoral zone"¹, take several depth measurements there. Measure the depth in the inflow sediment sumps² and at pond outflow structure. Observe pond banks and note erosion channels and areas that must be resodded or otherwise grassed. Note deviations from permitted drawings. Your maintenance plans should include steps to re-grade and resod eroded banks.



▲ *A stand of desirable wetland vegetation.*

Vegetation:

Note the amount and location of existing plant coverage, and identify the plants species. Identify which plants are "desirable" and "undesirable" for your pond or your particular tastes. You might contact the local Water Management District or Department of Environmental Protection office, or consult the references listed in Chapter 6 - Resources & References, for help in determining the difference between desirable and undesirable species. Note the plant coverage over the pond's designated littoral zone, if there is one. Identify the density and general type of algae (mat- or blob- forming filamentous algae, or water-tinting planktonic algae).

Your maintenance plan should include methods to weed out undesirable vegetation and replace it with desirable species, if an aesthetically-pleasing pond is your goal. If you have more algae than plants, your maintenance plans may include steps to reduce fertilizer use in your yard. Don't forget your neighbors' lawns that either surround the pond, or drain to the storm sewer that drains to the pond. Include steps to create more littoral zone in which to plant attractive vegetation. In general, the more emergent⁴ vegetation a pond supports, the less algae grows, unless there is such a huge inflow of nutrients that they can't be taken up by the emergent vegetation. An open water permanent pool also increases the pollution removal capabilities of wet detention ponds.

Special Subdivision Guidance:

Walk through your subdivision with the construction drawings, and note which areas contribute drainage to your stormwater pond via gutters and storm sewers. Anything dumped on the ground within the contributing drainage area can make its way to your pond. Grass clippings blown into gutters are washed into storm sewers and into the ponds, causing nutrient overload. Paints and used motor oils that are dumped into storm sewers flow directly to ponds. Pesticides sprayed on lawns are washed into the ponds via the storm sewer system. Areas of bare soil may erode with heavy rains, and the resulting sediment can also end up in ponds. Your maintenance plan should include ways to prevent these deleterious materials from reaching your pond, mainly by educating your neighbors to be more careful and more aware. Your local stormwater utility may have an inlet marking program you can use to help educate your neighbors.

Also note the other ways water from the drainage basin is designed to reach the pond. Conveyance swales or ditches may carry stormwater from rear lot areas, and are sometimes designed to provide some water quality treatment themselves. Compare the ditch or swale depth and width to the permitted drawings. You may find that some residents have built fences or sheds over or across a swale; because this impedes flow, these items should be removed (many swales and ditches are encompassed by legal drainage easements, which are protected by law, permit, and/or deed restrictions). Lawn or garden clippings dumped in swales and ditches should be removed.



▲ Typical inflow pipe.

Footnotes:

¹ Littoral zone: "the shallow zone within a pond or lake with sufficient light penetration to support the growth of rooted, emergent aquatic plants."

² Sediment sump: "a deeper area within a pond specifically constructed as a basin to trap incoming sediments and to provide an area deep enough to prevent the growth of vegetation at inflow and outflow points."

³ Fish excluder "a device placed on pond outflow points that is required by the Florida Game and Freshwater Fish Commission to prevent stocked grass carp from leaving the pond."

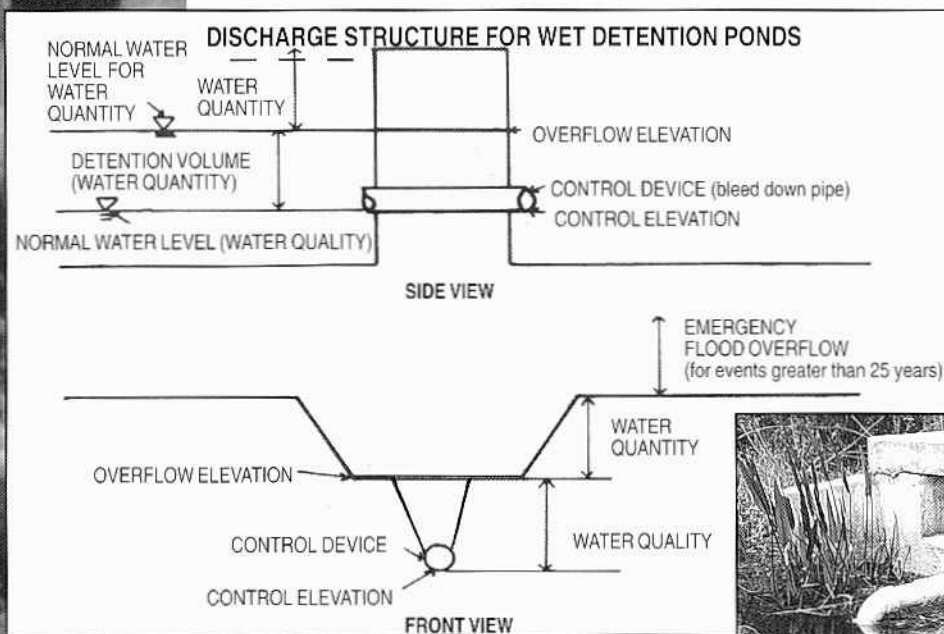
⁴ Emergent vegetation: "aquatic vegetation rooted in shallow zones that normally grows leaves and stems above the water surface."



Identifying Your Pond:

The type of pond in your development can often be identified by looking at the outlet structure (usually made out of concrete) where water flows out of the pond after rain events. Systems dug as borrow pits usually have no outfall structure, although they may have a structure to maintain a certain water level. In permitted wet detention stormwater ponds the outfall structure usually has a rectangular or V-notch or pipe that slowly releases the water out of the pond over several days (Figure 3). Wet ponds with filtration (effluent filtration) are systems that have perforated pipes packed with gravel buried in trenches either around the pond or

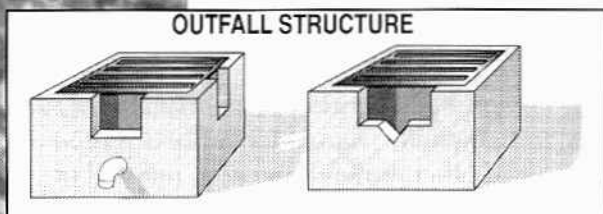
underneath the pond (see Figure 2). Sometimes the end of the pipes can be seen where they enter the sides of the drop box (the deeper rectangular concrete box usually covered by an iron grate) associated with the outfall structure of the pond. These ponds typically do not contain a shallow littoral zone and the entire pond bottom is set at one elevation. Another identifying feature for filtration systems are capped observation wells called "clean-outs" located in the banks around the pond. A good description of different types of stormwater management systems is given in "Stormwater Management: A Guide for Floridians" and "How to Op-



▲ Figure 3. Weir structure for wet detention pond. Alternative design could have a V-notch.



▲ Wet detention pond outfall structure.



◀ How to recognize a wet detention pond: Look at the outfall structure. If it looks similar to the ones to the left and about a third of the pond is shallow or covered with vegetation (or recruiting vegetation if the pond is newly constructed) there's a good chance the facility is a wet detention pond.

erate & Maintain Your Stormwater Management System". Both are available at no charge from your SWFWMD Service Office. You will find the address and telephone number to order your copies in Chapter 6 - Resources & References.

To do any work in permitted stormwater systems including the wet detention and filtration systems described above, permission must be granted by the permitting agency or agencies. Chapter 6; Resources provides the jurisdictional areas and the offices to contact before doing any work in permitted systems in southwest Florida. You will find them cooperative and helpful in analyzing your problems and providing information to keep your system in good working order.

Remember, before doing any work in your permitted stormwater pond be sure to get permission and advice.

Stormwater Pond

TIP



The removal of littoral shelf vegetation (including cattails) from permitted wet detention ponds is prohibited unless approved by the permitting agency. Removal includes dredging, the application of herbicide, cutting, and the introduction of grass carp.



▲ Outlet Structure.

This photo shows a bleed down notch, shallow rectangular overflow weir and pond skimmer.