



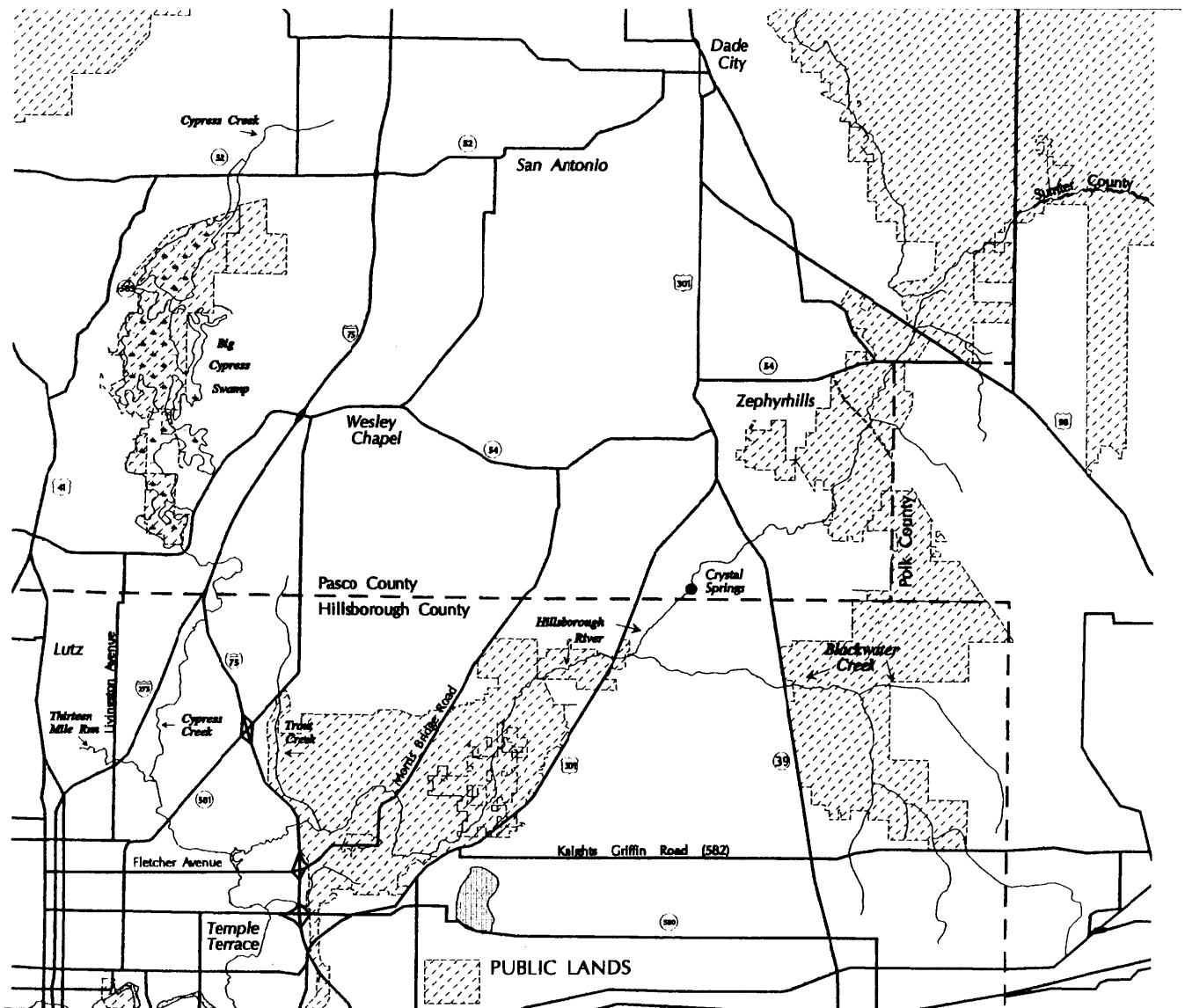
# RIVER FACT SHEET

## THE HILLSBOROUGH RIVER WATERSHED

The main channel of the Hillsborough originates in the area water managers call the Green Swamp. Just south of CR 39 in Pasco County the swamp flow of the river is joined by approximately 30 million gallons of water a day which comes out of the **aquifer** at Crystal Springs.

The river collects water of lesser quality from a large area through its **tributary** creeks. Blackwater Creek drains the eastern portion of the watershed. Flint Creek collects water, including treated **wastewater**, from Plant City and after passing through Lake Thonotosassa flows into the river.

Trout Creek collects storm water runoff from the fast growing area in the northern portion of the watershed. Human activity even at the very edges of the watershed have a impact on the water quality within the river.





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### THE WATERSHED

All of the area that collects rainfall and drains it into an individual river or stream system is called a **watershed**. The area that drains into a river is determined by the shape and elevation of the land surface. This is called the **topography**.

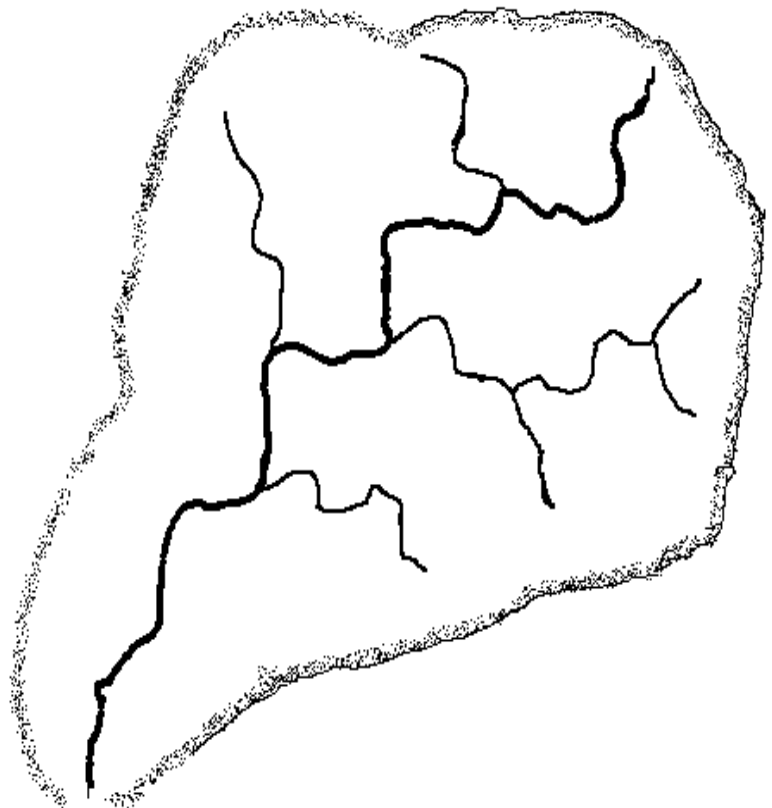
In many ways the watershed of the Hillsborough River resembles a flat shallow pan tilted up on one end. The highest part of this watershed or basin is north and east of the borders of Hillsborough County in an area known as the **Green Swamp**. The lowest corner of the basin is at the mouth of the river where it empties into Tampa Bay. The southern boundary of this watershed roughly follows State Road 60 east almost to Lakeland. The western boundary roughly follows U.S. 41 north into Pasco County.

In Florida the concept of a watershed is confused somewhat because many of our rivers have **ground water** added to their volume by springs. This ground water may have entered the aquifer many miles beyond the boundary of the watershed. In addition the pattern of surface water flow is often altered to meet human needs.

The construction of ditches, canals and dams can have a dramatic effect on the volume of water reaching a river from its watershed.

The volume and flow of water in the Hillsborough River has been altered by all of these human activities. Ditches were first used within the watershed to drain land so that more could be used for grazing cattle and growing crops. Later a large canal system was constructed to control the flooding of homes built in the **floodplain** of the lower river.

The dam on the river was first constructed to use the energy of falling water to produce electricity. However this caused a conflict between cattle ranchers who lost pasture land to the rising water behind the dam and the power company. Today the dam creates a reservoir from which the City of Tampa draws most of its water supply.



The drainage pattern within a model watershed.



## WHY SOME RIVERS ARE DARKER THAN OTHERS

The color of the water in most southwest Florida rivers is dependent on the source of the water flow. Rivers that receive most of their water from surface runoff in swampy areas are usually dark brown or tea colored. This dark color comes from pigments found in the leaves of trees. When the leaves fall in the water, they decompose, releasing these reddish-brown pigments into the water. Collectively these pigments are called **tannins**. In addition to changing the color of the water, the tannins also made the water more acidic.

Rivers receiving most of their flow from underground sources such as springs usually have very clear to blue water. This is because this water has come from deep under the ground where it has been filtered clean as it seeped through the soils and rocks.

For this same reason, the water quality of rivers varies. Rivers that receive most of their water from surface runoff are low in minerals. These make the water "soft," tending to produce more soap suds for baths and washing dishes and clothes.

On the other hand, rivers that receive most of their flow from deep ground water sources usually have a much

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higher mineral content. The water dissolved minerals from the rocks as it moved through the cracks and holes in the aquifer. This water is "hard" and tends to produce very few soap suds.

### HEALTHY RIVERS

There are a number of factors that can interfere with a river's ability to perform its valuable functions, but they can be grouped into two major categories. Contaminants such as industrial waste, runoff from septic tanks or treatment plants, and stormwater runoff are damaging to rivers. All these sources can degrade the water quality which in turn affects the health of plants and animals living there and of those that depend upon rivers for fresh water, including humans.

The other major factor that damages rivers is alteration of their flow patterns. It is not unusual for a river to change its course naturally. This gradual process generally takes thousands of years. Sometimes, however, a natural event such as a hurricane or tropical storm brings excessive amounts of rain causing flash floods. As a result, volumes of soil wash away and new paths or river channels are rapidly formed. Humans can also change a river's course. Because of their beauty, river banks are popular sites on which to construct

homes. Unfortunately, many of the houses are built on floodplains. To protect property from damaging flood waters, dams, dikes or levees are built to control where the water will flow. While protecting homes, this action of diverting water also prevents nutrient rich mud from being periodically deposited on surrounding lands and other nutrients from being carried to new locations.

A river's normal course is seldom straight. The bends and curves of the natural terrain and the river's own **discharge** cause a variety of twists and turns in its course. Humans alter river flow patterns by channelizing or straightening the flow. Rivers are channelized to redirect flow to areas that need more water such as agricultural fields or pastures. This process is also used to drain water from areas that are used for farming.

Changing the course of a river can have serious consequences. Rivers often empty into other water bodies such as lakes, marshes, or estuaries. The diversion of water may eventually cause lakes and marshes to dry up. It may also change the salinity (saltiness) of an estuary. Such changes may leave many plants and animals without homes. Once the course of a river has been changed, it is very difficult to restore it to its original condition.

From: Waterways - Southwest Florida Water Management District

SUMMER 2000 REVISION

Student Readings 3



# RIVER FACT SHEET

## THE WATER CYCLE

Water is a dynamic substance. It moves across the Earth's surface, beneath the ground and up and down through the atmosphere. This movement of water is called the water cycle.

Water enters the atmosphere through both biological and physical processes. Plants release water when they make food. This process is called **transpiration**. When liquid water is heated at the surface of lakes, rivers and streams it turns into a gas, water vapor. This process is called **evaporation**. Water leaves the atmosphere in the form of **precipitation**. In Florida this is primarily rain. Rainwater makes its way to

streams and lakes through both overland runoff and ground water flow.

Rainwater becomes **groundwater** when it soaks through the sand and enters the limestone below. This process is called **percolation**. In Florida this limestone is filled with holes. Some are as small as a pin point, others are large enough to drive a car through. These holes are often interconnected to form channels. When this is the case, the water can flow through the rock.

Rainfall can soak into the ground until all of the spaces between the grains of sand are filled up. This is called the

**saturation** point. When the ground is completely saturated puddles will form until the water has time to sink in, evaporate, or run off.

A river may continue to receive both runoff and **groundwater** long after a rain. In a natural system the flow of the runoff water is slowed by vegetation along the river corridor and is released slowly into the river. The groundwater usually flows even slower through the porous rock called the **aquifer** and may be released into the river in small amounts through seepage or in larger amounts through **springs**.

The movement of water within a watershed is dependent on the water cycle. Activities which affect one part of the cycle, such as clearing the forest along the river, can have an effect on the total cycle.

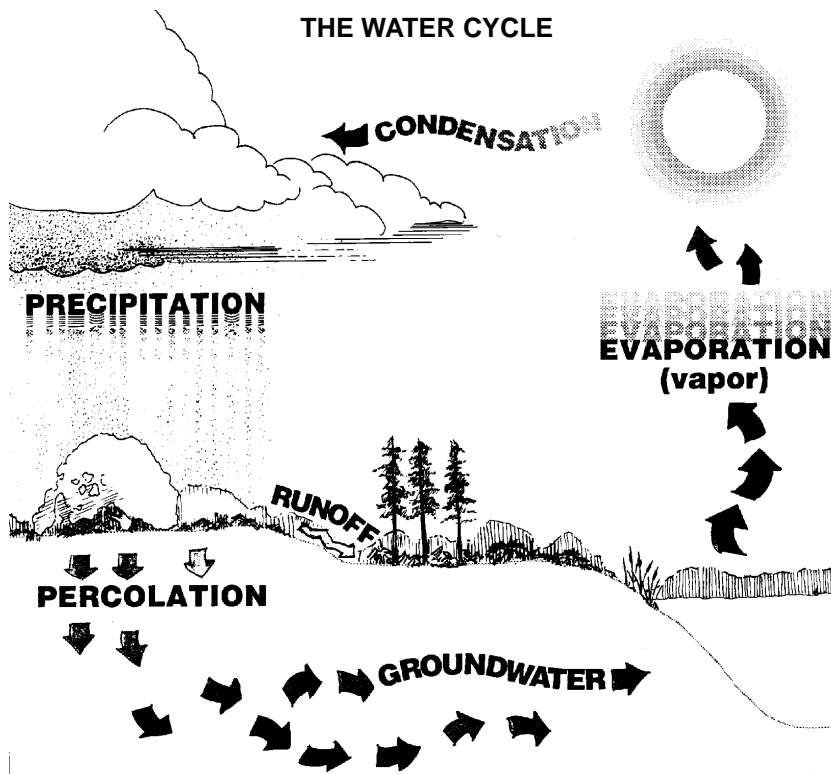


Diagram from: Water From The Ground UP - Southwest Florida Water Management District



# RIVER FACT SHEET

## RIVERS

There are 13 major rivers in southwest Florida. They are important to humans for a variety of recreational and economic uses. These same rivers play an important role in transporting fresh water and nutrients to estuaries and the Gulf of Mexico. They also provide special habitats for many organisms and are freshwater sources for those animals that live in surrounding woods and forests.

## THE BIRTH AND LIFE OF A RIVER

Water that drains off the land collects in tiny brooks that merge into larger streams, and finally into a single river. The entire area drained by such a network is called a **watershed** or a **drainage basin**. River systems can have many different patterns of branching, but the most common patterns seen in southwest Florida are **dendritic** and **meandering**. These patterns predominate here because of the relatively flat topography (surface area), **homogeneous** soils, heavy loads (the amount of sediment transported by a river), and age of the rivers. Rivers may be young, old, or somewhere in-between. The surrounding topography and the shape of drainage patterns are indicators of a river's age. Steep surrounding terrain and a reasonably straight channel are evidence of a young river. A wide floodplain and a winding, twisted channel indicate an old river.

The beginning of a river is its **head**. The head of a river can be at a **spring** or at the start of narrow runoff channels developed during rainstorms. The end of a river, where it enters a lake or ocean, is known as the **mouth**. The amount of water that flows past a particular point in a river in a specified amount of time is called **discharge**. Discharge is usually measured in cubic feet per second. Smaller rivers, streams and creeks that discharge into a larger river are called **tributaries**. Some rivers experience seasonal or periodic flooding during which their nutrient rich loads are deposited on the land areas bordering a river. The area that receives these sediments is called a **floodplain**. The actual sediments that are carried and deposited by rivers are called **alluvium**. When rivers enter a lake or ocean, their discharge decreases rapidly and alluvium accumulates as a **delta**, or triangular shaped deposit of sediment at the mouth of the river.

The flow of a river is faster on the outside of a curve and slower on the inside. This results in soil from the outer curve of a river bank being eroded away, while new soil is deposited on the inner curve. The outer edge of a curve, where erosion is occurring, is called a **cutbank** and the inner edge, where deposits are accumulating, is called a **point bar**. As cutbanks and

point bars continue to form, a river eventually takes on a snakelike shape, twisting in **meanders**, or big winding curves. Sometimes a river's own channels may cut through one of its meanders. When this happens the flow through the meander is greatly reduced and deposits accumulate at the ends of the curve finally cutting it off from the river, forming a small **oxbow lake**. Oxbow lakes ultimately fill in to form a marsh or wetland bordering the river's new channel.

## RIVER HABITATS

Rivers provide many habitats for fish and other organisms. A river's flow pattern is the primary force in the development of these habitats. Overhangs, small caves and holes on a river's cutbank provide important homes for invertebrates and fish. Point bars serve as nesting or food source areas for turtles, alligators and wading birds. Some bottom living creatures, such as mussels and clams, live in the shifting sands of a river's inner curves. Trees that have been undercut on the banks may eventually fall into the river. The leaves, twigs, branches and bark become dwellings for algae and invertebrates. They also provide cover and shelter from the river's current for smaller fish.

From: Waterways - Southwest Florida Water Management District



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### THE GREEN SWAMP

People say the Green Swamp is “authentic Florida” They mean that the Green Swamp looks like what they think Florida should look like. The Green Swamp is located about 40 miles northeast of Tampa Bay. It is one of Florida’s most important wetlands.

The Green Swamp is an area of 850 square miles of special beauty where we can study Florida’s environment. Like other wetland areas, the Green Swamp provides a home and food for fish and wildlife. Among the animals living there are storks, eagles, alligators and bears. These are species that are in danger of dying out if they are not protected.

We are lucky to have the Green Swamp for another reason. It helps us manage our water supplies in many ways.

As we learned in studying other wetlands, the Green Swamp helps to hold back flood waters. It also stops soil from being washed away. Water quality is improved in the Green Swamp because it helps get rid of floating dirt, chemicals and pollution.

But the Green Swamp is important to us for another reason. It also is a source of water to recharge the Floridan Aquifer. This is where we get much of our drinking water. The Green Swamp also is the beginning of four major rivers in our area. As you can see, the Green Swamp is a very important part of our lives.

Scientists say that, next to rainfall, the Green Swamp is our most important source of water. But wetlands in Florida have been disappearing. Since about 1955, more than six million acres of wetlands have been dried out and used for building on or farming.

To prevent the same thing from happening in the Green Swamp, the Southwest Florida Water Management District has bought thousands of acres of wetlands there. These areas are now safe from human damage. They are set aside as places where nature will be allowed to deliver water in the same way it has for thousands of years.

And, in fact, the Green Swamp is getting some more help in working its water miracles. With careful management, the Green Swamp will continue to serve us as an important natural part of our water supply network.

Text from: Water From The Ground UP - Southwest Florida Water Management District





# ECOSYSTEM FACT SHEET

## WET MEADOWS AND PRAIRIES

Wet meadows and wet prairies are similar except for size. Wet meadows are small features which are found in upland communities. Wet prairies are larger features which may contain islands of upland vegetation.

### Wet Meadows

Wet meadows are wetlands which are dry for most of the year. They are often found in small shallow depressions within upland communities. These communities contain plants which can handle both wet and dry conditions. They usually have a very thin layer of organic material which may partially cover white sand.

Due to the surrounding uplands the soil in these communities are usually acidic. Common plants include wire grass, hat pin, meadow beauty, beakrush and carnivorous plants such as the sundew.

### Wet Prairies

Most wet prairies grow on sandy soils with thin layers of organic material. The up-

per soil is usually white to light gray sand to a depth of 34 inches, with a white or bright yellow subsoil. There is often a thin organic layer on the surface produced by the decomposition of plant material during the wet season. The soils are usually slightly acidic and are composed primarily of quartz grains.

During the rainy season, these communities are covered with water up to a depth of 4 feet. Typically, wet prairies merge with freshwater marshes. They often contain scattered islands of open pine woods and hammock vegetation. As with many other communities, the dis-

tribution of species is influenced by the surrounding communities. Common plants include sand cordgrass, hatpin, beakrush, madencane, smartweed, and St. John's wort.

During extremely dry periods **old field** plants such as dog fennel or broom sedge may become abundant. Wet prairies are usually the beginning stages for the development of more water tolerant community will occur. Drainage of many wet prairie communities for development or pasture has prevented their progression towards marsh communities.



Wet meadow surrounded by upland forest.

Summer 2001 Revision



# ECOSYSTEM FACT SHEET

## CYPRESS DOME

Cypress dome swamps are characterized as shallow, forested, circular depressions which have a dome shape. This shape is due to the fact that the shortest trees grow in the shallower water at the outer edge while the tallest trees grow in the deeper water in the center. This difference in growth results from the constant stress caused by period of drought and fire.



Pond cypress is usually the dominant plant. It differs from bald cypress in that it has smaller, tighter needles and a slower growth rate. Other trees include red maple, dahoon holly, swamp bay, sweet bay, and willow. The understory consist of cinnamon fern, royal fern, chain fern, poison ivy, wax myrtle, button bush, green brier, and lizard's tail.



Summer 2001 Revision

Cypress domes develop in sandy flatwoods or sandhills where the surface has slumped as a result of a shallow **sinkhole**. The soil is a thick layer of decomposing plant material called **peat**. The subsoil is usually a layer of sand on top of lime rock. Some cypress domes have a clay or hardpan layer between the sand and the rock which helps retain water.

Cypress domes receive most of their water by seepage through the sand of the surrounding uplands. Most are closed ecosystems. Most water loss is by **evapotranspiration** by the plants. Some cypress domes are connected to other wetland systems by creeks which only flow during the wet season.

Fire plays a role in the survival of a cypress dome community. Fires normally invade the outer edges of the domes about every 5 years. The wet interiors are normally burned only once in a 100 years when the dome is completely dry. The more frequent fires at the edges occasionally kill the outer trees thus maintaining the dome shape.

Cypress domes may have an open pond or marsh in their center. This gives them a donut shape from the air. This area is too deep for young cypress trees to survive.

Alligators will sometimes use this pond as a home. As the water level falls during the dry season, the alligator will deepen the hole thus preserving a water source for other animals.

Emergent plants such as pickerelweed and fire flag may grow around the edges of the pond. Water lilies may grow in the center.

Many cypress domes have been clear cut. The cypress logs cut from the small pond cypress make excellent fence post. Today cypress domes are protected by state law.