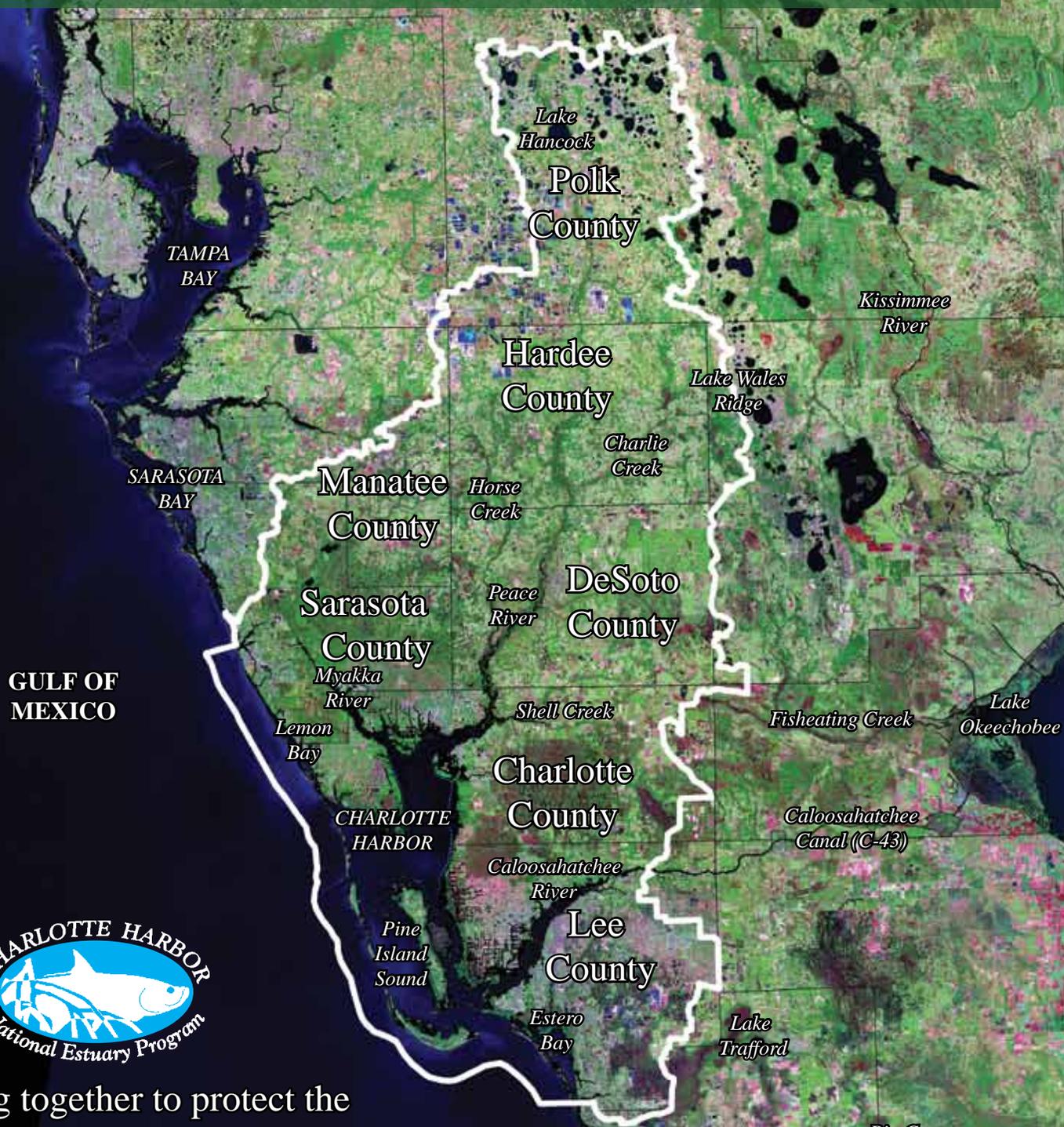


Healthy Rivers, Healthy Bays, Healthy Communities

The Charlotte Harbor Seven-County Watershed Report



Working together to protect the natural environment from Venice to Bonita Springs to Winter Haven

What's inside?

Charlotte Harbor environmental indicators are designed to answer these questions.

1. Do our waters support diverse and healthy **fish** communities?
 - Fish quantity (p. 4)
 - Fish diversity (p. 5)
 2. Are the **fish and shellfish** safe to eat?
 - Fish (p. 6)
 - Shellfish (p. 7)
 3. Is fish and wildlife **habitat** increasing or decreasing?
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 4. What is the condition of our **shoreline**?
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- Where can I find it? (p. 25)
 - Glossary (p. 25)
 - Volunteer opportunities (p. 26)
 - What can you do? (pp. 7, 9, 10, 13, 16, 19, 20, 24, 28)
- Environmental condition summary** (p. 27)
- Can't find it here?** Contact us at chnep@swfrcp.org and we will try to find you the information that you need. See www.chnep.org for our online bibliography and updates to links shown in this report.



There are many wonderful places to explore and events to attend in the Charlotte Harbor seven-county watershed. The annual Water, Wings & Wild Things NatureFest (pictured here) is held at Polk County's Circle B Bar Reserve and Nature Discovery Center.

These places and events represent the astonishing accomplishments of people working in partnership. Come and enjoy hiking, kayaking, canoeing, wading and boating. Get out and explore nature's diverse habitats and waterways.

Our watershed

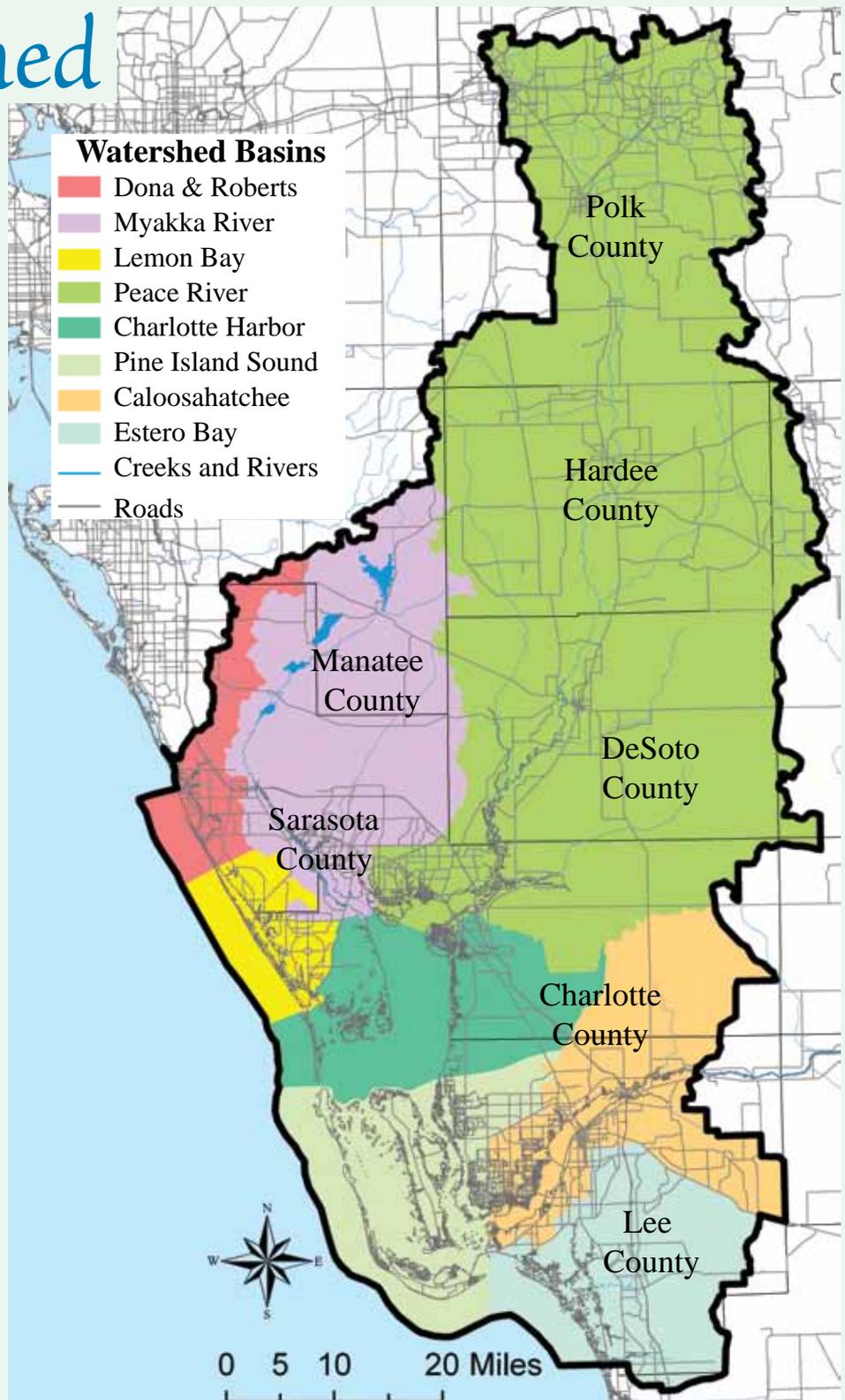
In 1995, Charlotte Harbor was designated an “estuary of national significance,” creating the Charlotte Harbor National Estuary Program (CHNEP). The Charlotte Harbor estuary includes (from north to south) Dona & Roberts Bays, Lemon Bay, Charlotte Harbor, Pine Island Sound and Estero Bay. Our major rivers include the Peace, the Myakka and the tidal Caloosahatchee.

Citizens, scientists, business and industry representatives, resource managers, and elected officials have come together to choose natural resource priorities for the natural environment from Venice to Bonita Springs to Winter Haven. These priorities are identified in the *Comprehensive Conservation and Management Plan (CCMP)*.

This *Charlotte Harbor Seven-County Watershed Report* reviews our progress in implementing the CCMP as reflected in environmental conditions. The CHNEP partners provided the data, analysis and guidance toward the development of this report.

Everyone has influence on the health of the watershed and estuaries. Citizens have become involved in maintaining the health of waterways, restoring natural habitats and advocating on behalf of our natural resources. Moreover, everybody’s daily activities have the power to harm or to help environmental conditions. Through this document, we will give you tips on what you can do to protect our Charlotte Harbor watershed.

See www.CHNEP.org for an online bibliography and updates to links shown in this report.



Charlotte Harbor National Estuary Program

1926 Victoria Ave, Fort Myers FL 33901-3414
239/338-2556 / Toll Free 866/835-5785 / Fax 239/338-2560
www.CHNEP.org

DIRECTOR: Dr. Lisa Beever, lbeever@swfrpc.org / ext 235
DEPUTY DIRECTOR: Liz Donley, ldonley@swfrpc.org / ext 234
COMMUNICATIONS MANAGER: Maran Hilgendorf, mhilgendorf@swfrpc.org / ext 240
PROGRAM SCIENTIST: Judy Ott, jott@swfrpc.org / ext 230



Satellite image on cover produced using NASA Landsat 2000 image.

This report is published as Volume 15, Issue 1 of the CHNEP newsletter *Harbor Happenings*.

Do our waters support diverse and healthy fish communities?

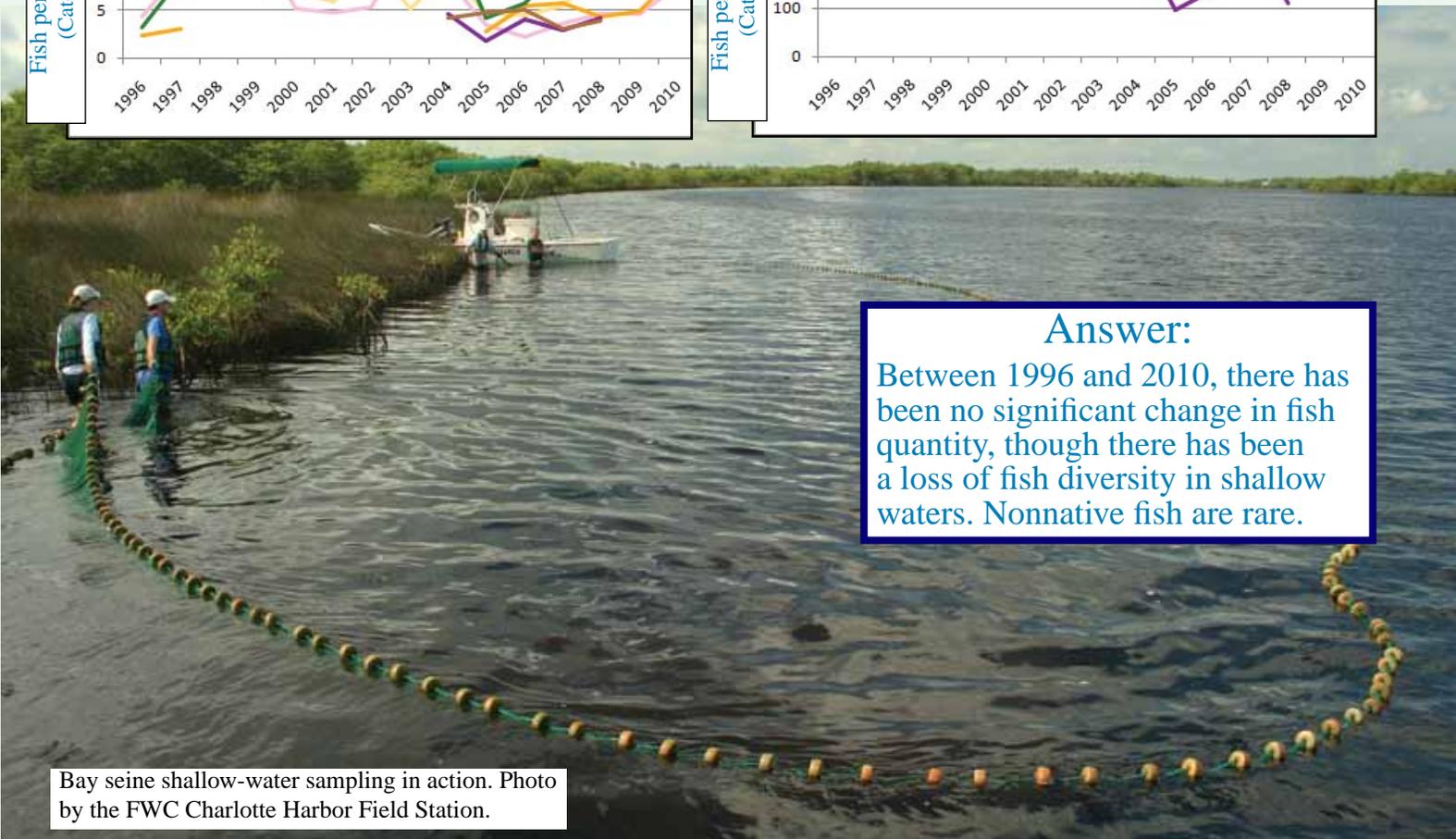
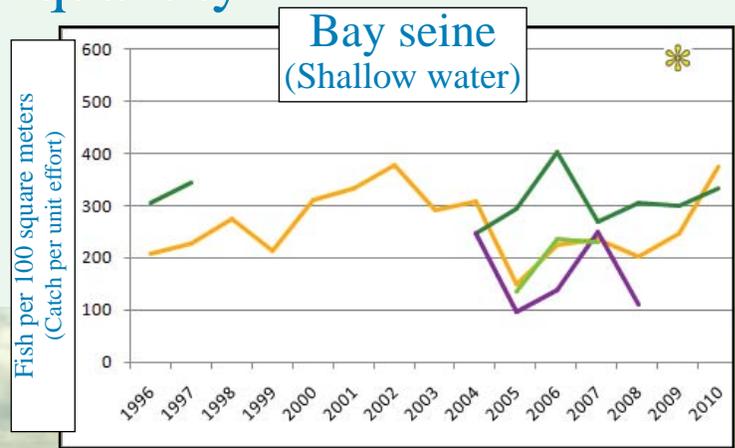
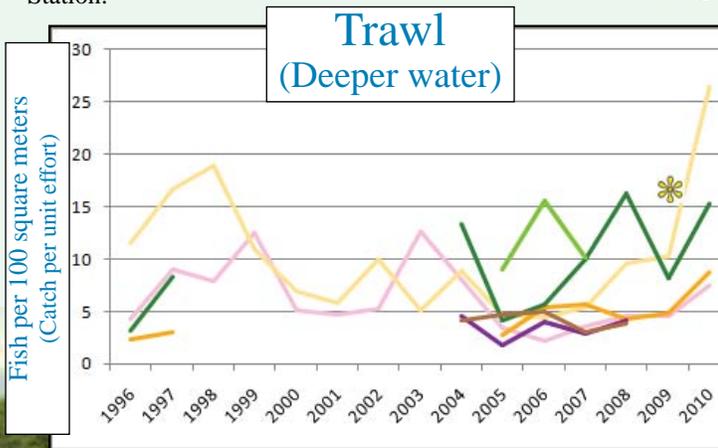


Snook. Photo by the FWC Charlotte Harbor Field Station.

Fish quantity and diversity are indicators of the health of water bodies. In 1989, the Fish and Wildlife Research Institute (FWRI) began a program entitled “Fisheries-Independent Monitoring.” Between 1996 and 2010, more than 20,000 samples were taken in the Charlotte Harbor area using a variety of gear, such as trawls and bay seines. These data provide scientists with a rich source of information regarding fish, crustaceans and other taxa (biological groups).

Chart Areas	
	Lemon Bay (1 year)
	Tidal Myakka
	Tidal Peace
	Charlotte Harbor
	Pine Island Sound
	Lower Matlacha
	Tidal Caloosahatchee
	Estero Bay

Fish quantity



Answer:
Between 1996 and 2010, there has been no significant change in fish quantity, though there has been a loss of fish diversity in shallow waters. Nonnative fish are rare.

Bay seine shallow-water sampling in action. Photo by the FWC Charlotte Harbor Field Station.

Status

The graphs on page 4 illustrate fish quantity (fish per 100 square meters) and the graphs below show diversity (using the Shannon-Weiner Index, see glossary). These graphs display information by sampling gear type: trawls for fish in deeper waters and bay seines for fish in shallower waters. The graphs will tell you which years and areas were sampled. Not all gear types are deployed for each area for every year. Also note that the vertical axis for abundance are different for trawls and bay seines.

Over the last 15 years, there is no loss of fish quantity, regardless of gear type or sample area. As shown on the map, diversity sampled by trawls (larger fish) tends to be greatest behind passes.

Trends

Trawl sampling shows no trend in diversity gains or losses. However, bay seine sampling exhibits a statistically significant loss of diversity of small fish for the past five years.

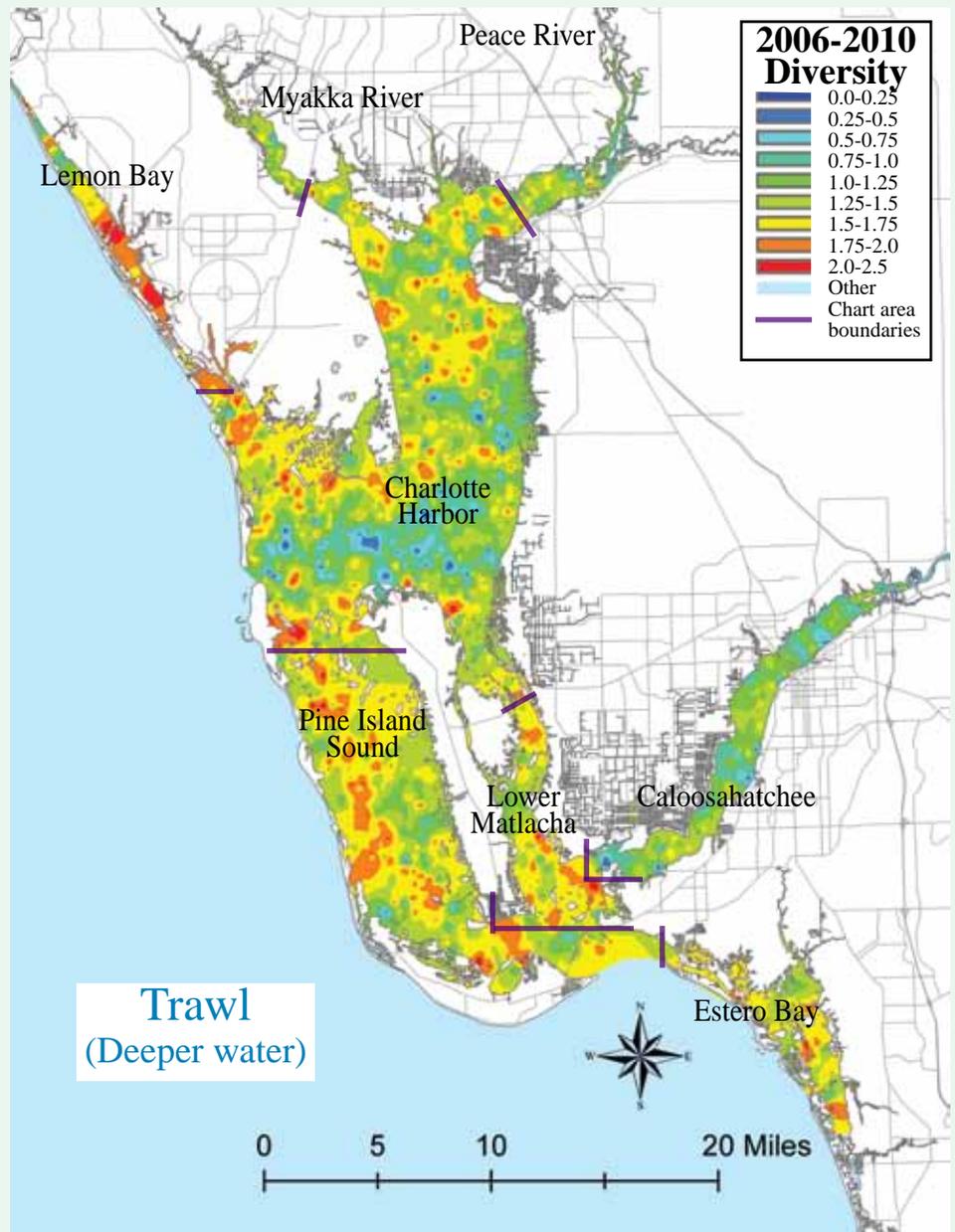
Exotic fish

Eight exotic fish taxa have been collected through all areas, gear types and years of

Chart Areas

-  Lemon Bay (1 year)
-  Tidal Myakka
-  Tidal Peace
-  Charlotte Harbor
-  Pine Island Sound
-  Lower Matlacha
-  Tidal Caloosahatchee
-  Estero Bay

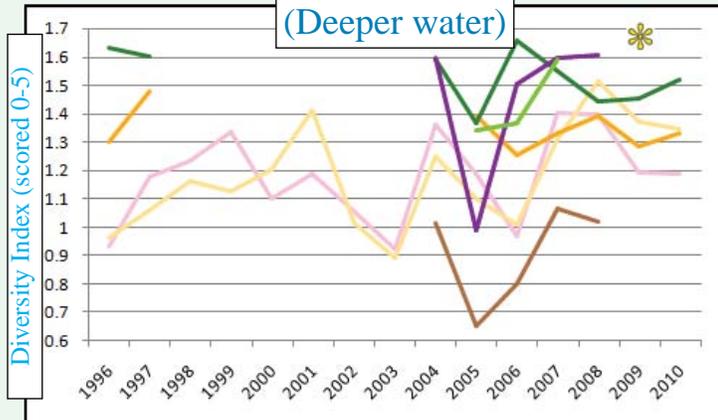
sampling. The most common species to be found in individual samples include spotted tilapia (*Tilapia mariae*), Mayan cichlid (*Cichlasoma urophthalmus*), blue tilapia (*Oreochromis aureus*) and African



jewfish (*Hemichromis letourneuxi*). Although the tidal Caloosahatchee has not been sampled for the entire period of record, it has by far the greatest number of exotic species and samples with exotic

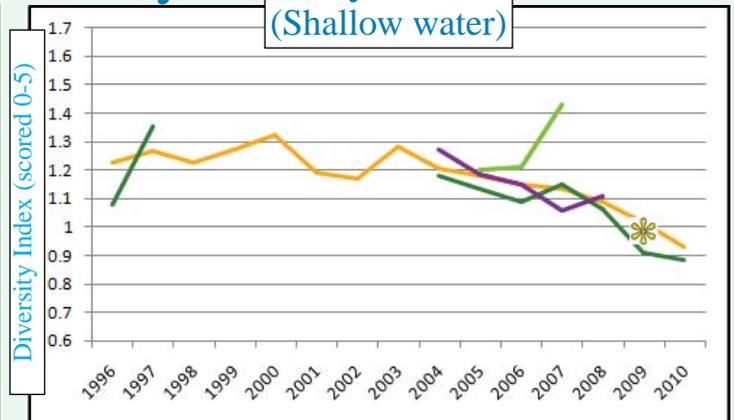
species of all the estuarine areas. Sampled areas are described in the legend to the left and the map above. Of all fish collected, less than one percent (0.06%) are exotic.

Trawl (Deeper water)



Fish diversity

Bay seine (Shallow water)



Are the fish and shellfish safe to eat?

Most fish caught in Florida waters are safe to eat. The Department of Health updates fish consumption advisories. Mercury is the most significant health problem associated with eating some fish. Although there are advisories for fish contaminated with pesticides, PCBs, dioxin and saxitoxin in the state, none of these apply to the seven-county watershed. Fish consumption advisories for methylmercury now account for more than three-quarters of all fish consumption advisories in the United States.

Fish

2011 Florida Fish Advisories for "Do Not Eat" Fish Species in the Charlotte Harbor Study Area		
Species	Women of childbearing age; children	All others
All shark species 43 or more inches; king mackerel 31 or more inches	Do not eat	Do not eat
Blackfin tuna; cobia; king mackerel under 31 inches; little tunny; and all shark species under 43 inches	Do not eat	One meal per month

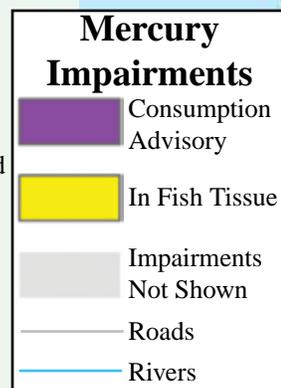
See <http://doh.state.fl.us/floridafishadvice/> for other restrictions and updates.

Status

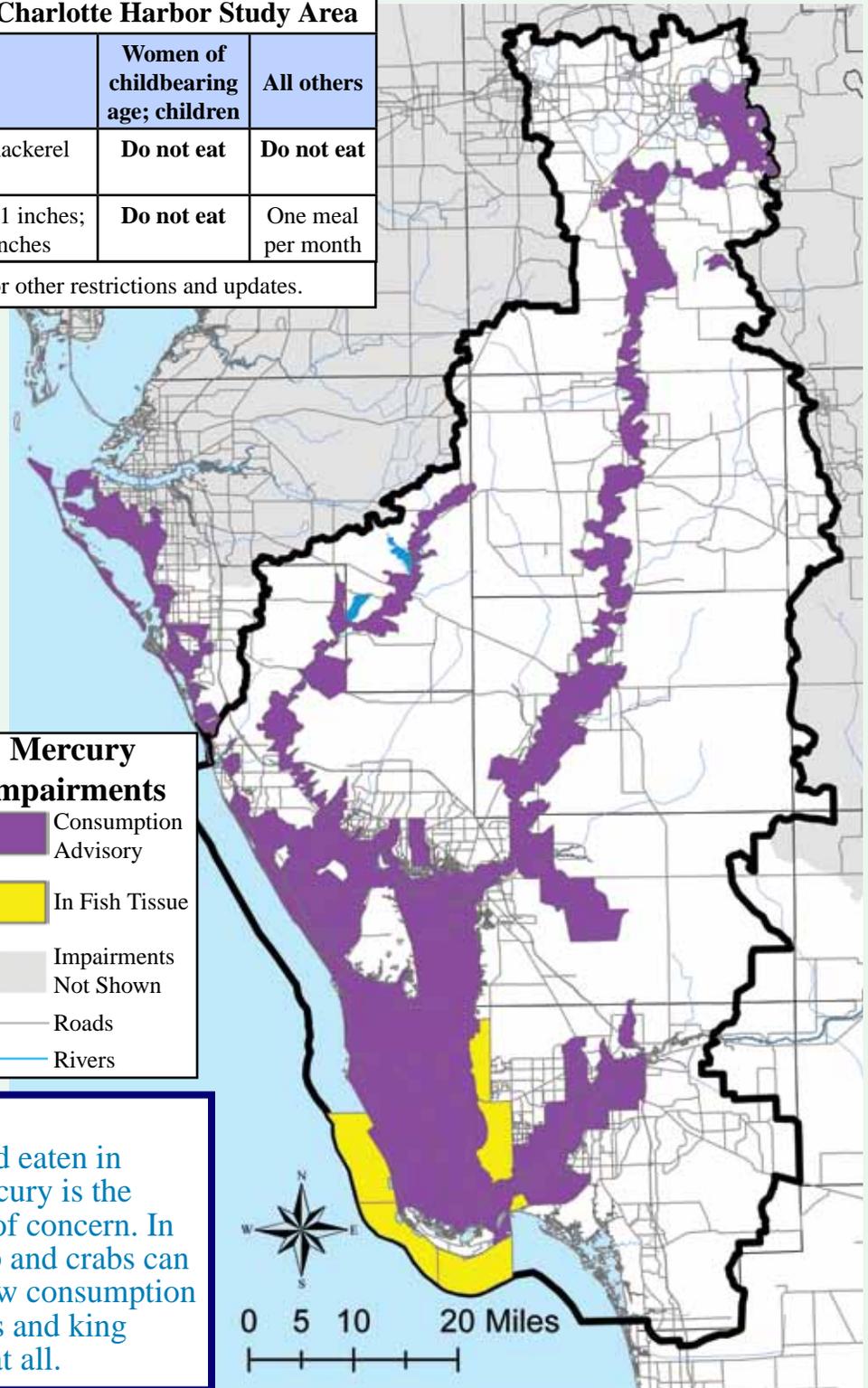
Once in the atmosphere, mercury is widely disseminated and can circulate for years, accounting for its widespread distribution. Mercury has been found in fish tissue in most tested creeks, rivers and estuaries. Fish, except for the species found on the table above, are safe to eat. In general, it is better to eat short-lived fish such as snapper and avoid long-lived fish such as grouper. Long-lived fish have time to accumulate mercury in their tissue. Atmospheric deposition is the dominant source of mercury.

Trends

Between 2005 and 2010, more water bodies have been designated as impaired for mercury because of consumption advisories and mercury found in fish tissue. According to the Environmental Protection Agency, many areas such as Charlotte Harbor have had increasing mercury concentrations because atmospheric deposition has increased.



Answer:
Fish can be safely harvested and eaten in Charlotte Harbor's waters. Mercury is the only documented contaminant of concern. In general, short-lived fish, shrimp and crabs can be eaten more frequently. Follow consumption advisories for fish. Large sharks and king mackerels should not be eaten at all.



Shellfish

Answer:

Shellfish can be safely harvested and eaten in Charlotte Harbor's estuaries. Care should be taken when and where shellfish is harvested for consumption.

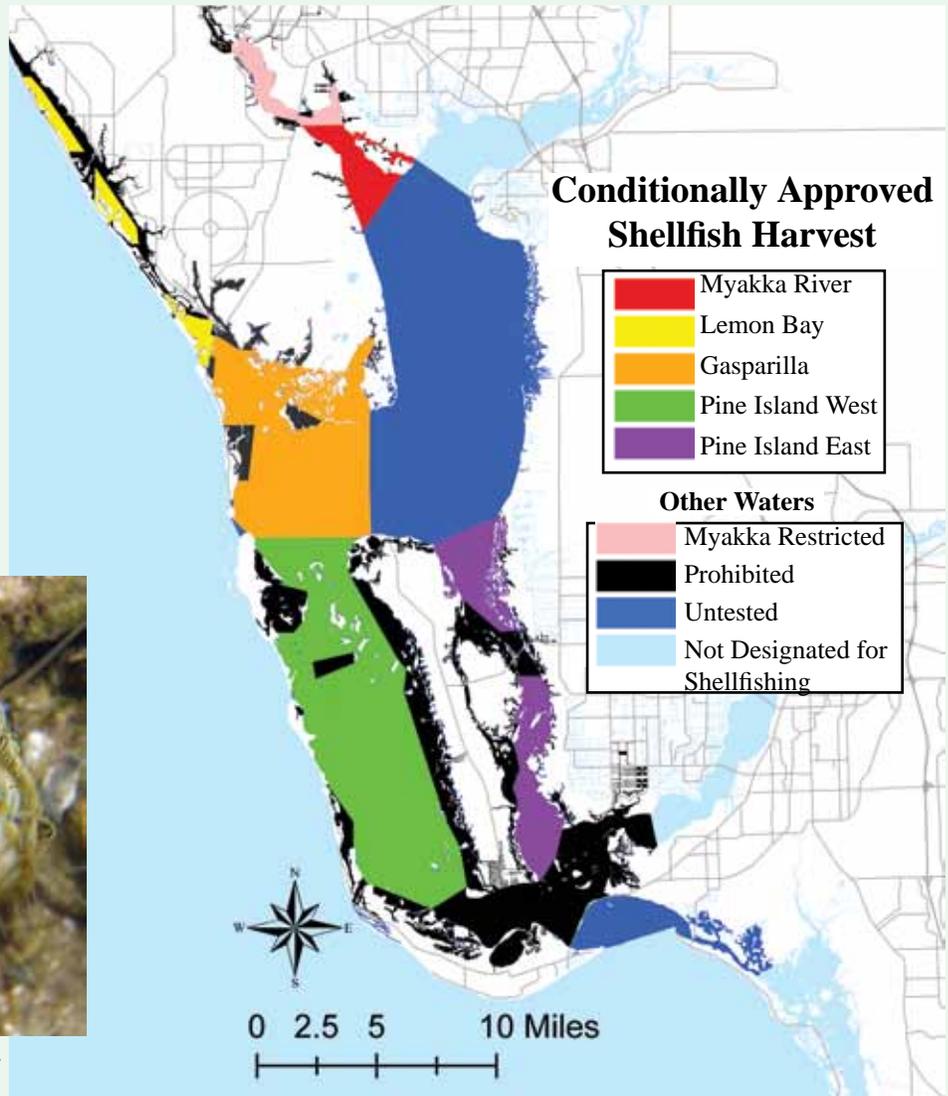
Shellfish, such as clams, scallops and oysters, can concentrate bacteria and red tide toxins in their bodies. When they are eaten raw, these bacteria can cause serious illness or even death. Therefore, only the waters that are regularly monitored and show very low levels of bacteria and red tide are open for shellfish collection.

Status

The Florida Department of Agriculture and Consumer Services is responsible for monitoring shellfish harvest areas and closing them if warranted. The areas are closed for a variety of reasons: red tide, high river flows (as a proxy for bacteria levels) and in advance of hurricanes as a precautionary measure. Currently, 40% of Charlotte Harbor estuarine waters are conditionally approved for shellfish harvest. Since original designation in the 1970s, each area remains conditionally open for shellfish harvest.



Bay scallop. Photo by Katie Fuhr Laakkonen.

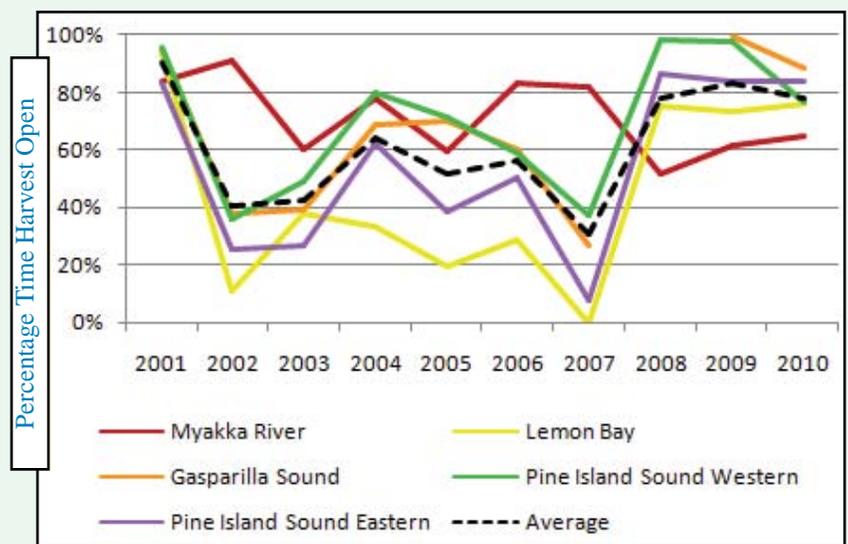


Trends

In general, shellfish harvest closures are greatest during years with heavy rainfall. With heavy rainfall, pollutants are washed from the land and into shellfish harvest areas. The relatively dry years from 2008–2010 allowed for 80% of available conditionally approved areas to be open.

What can you do to determine if fish and shellfish are safe to eat?

- Check <http://doh.state.fl.us/floridafishadvice/> for the most current fish advisories.
- Check http://shellfish.floridaaquaculture.com/seas/seas_southgulf.htm or call 941/833-2552 for shellfish harvest status.



Is fish and wildlife habitat increasing or decreasing?

Florida's growing population and development are replacing natural habitat. Occupying an important transitional zone between tropical and temperate climates, Florida contains more than 1,300 fish and wildlife species and about 3,500 plant species. The CHNEP promotes the protection and restoration of a balance of estuarine, wetland and upland habitats. This section focuses on seagrass, mangrove and freshwater wetland habitats.

What can you do to help seagrasses?

- Avoid boating in shallow areas.
- If you find yourself on a seagrass bed, pole or walk the boat out.
- Support the designation of non-motorized areas in aquatic preserves.
- Reduce your use of yard fertilizer.
- Eliminate sources of soil erosion by laying mulch over exposed earth or planting groundcovers.

Seagrasses play several vital roles in the estuary. These plants "clean" the water by trapping suspended sediments. They provide food directly to manatees and sea turtles and indirectly support sport and commercial fisheries by supplying habitat for fish. Spotted seatrout (*Cynoscion nebulosus*) live out their entire lives within seagrass beds. Seagrasses provide habitat for a wide variety of sea life, resulting in valuable shelling and snorkeling.

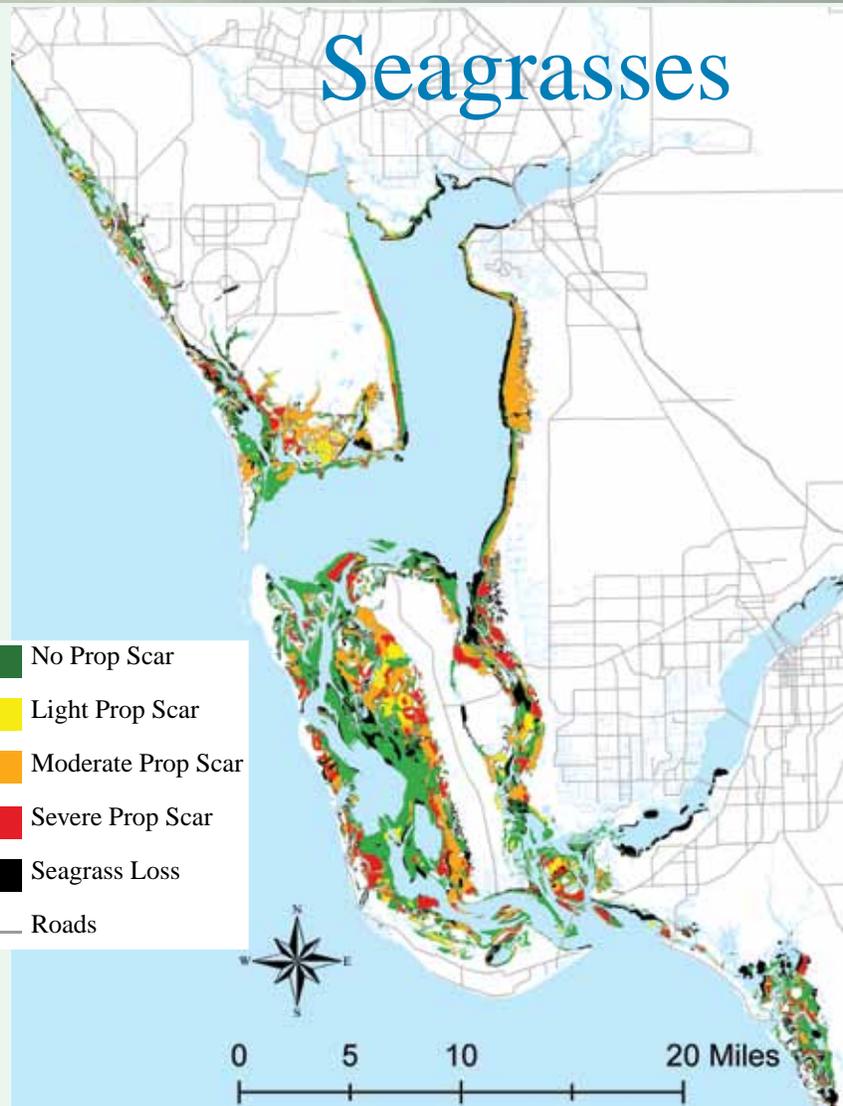
Status

The water management districts typically map and assess seagrass extent every other year. As of 2008, seagrasses covered more than 65,000 acres, 95% of their 1950s extent. Most losses have occurred in the Caloosahatchee and adjacent waters, Matlacha Pass and northern Estero Bay. Permanent losses are associated with the Intercoastal Waterway and adjacent to shorelines that have been hardened (reinforced with seawall or other hard structures).

Trends

Seagrasses have gained more than 6,000 acres (or 10%) since 1999. Unfortunately, boat prop scars are taking their toll. According to the Florida Department of Environmental Protection, "some estimates for recovery to complete coverage by shoal grass are as short as 1.5 years, but usually range from 3-7 years . . . turtle grass perhaps as long as 17 years." In many ways, boat prop scar damage is cumulative. A little more than 1,500 acres of seagrasses were severely prop scarred in 1993. By 2003, such destruction has increased more than seven-fold to more than 11,200 acres.

Although extent of seagrass has been stable in recent years, scientists are concerned that water quality degradation will limit light to seagrass, which will reduce the depth to which seagrasses may grow.



Answer:

Seagrass acreage is 95% of that found in the 1950s. Seagrass extent has expanded 10% since the recorded low in 1999. However, severe prop scars have been increasing, taking a toll on the quality of our seagrass beds.

Mangroves

Mangrove forests form a distinctive broad margin around our estuaries. They cover more than 60,000 acres and may extend inland several miles from open water. Mangroves perform vital, irreplaceable roles in providing food for species such as striped mullet and pink shrimp and habitat for birds and wildlife, and they buffer inland areas from storm surges. Our mangrove species include red, black, white and buttonwood. Mangrove systems have the highest measured annual productivity of any system in the world. They build land, protect areas from storm surge, buffer wind and are important nursery habitat for sea life. They are also critical to the world's carbon balance.

Status

As of 2005, mangroves covered more than 60,000 acres — 91% of their pre-development extent of 66,000 acres. Thanks to public management of most of the remaining mangrove forests and regulations restricting mangrove removal and trimming, extensive mangrove forests surround Charlotte Harbor's estuarine areas. In our area, mangroves have some of the highest diversity of animals measured.

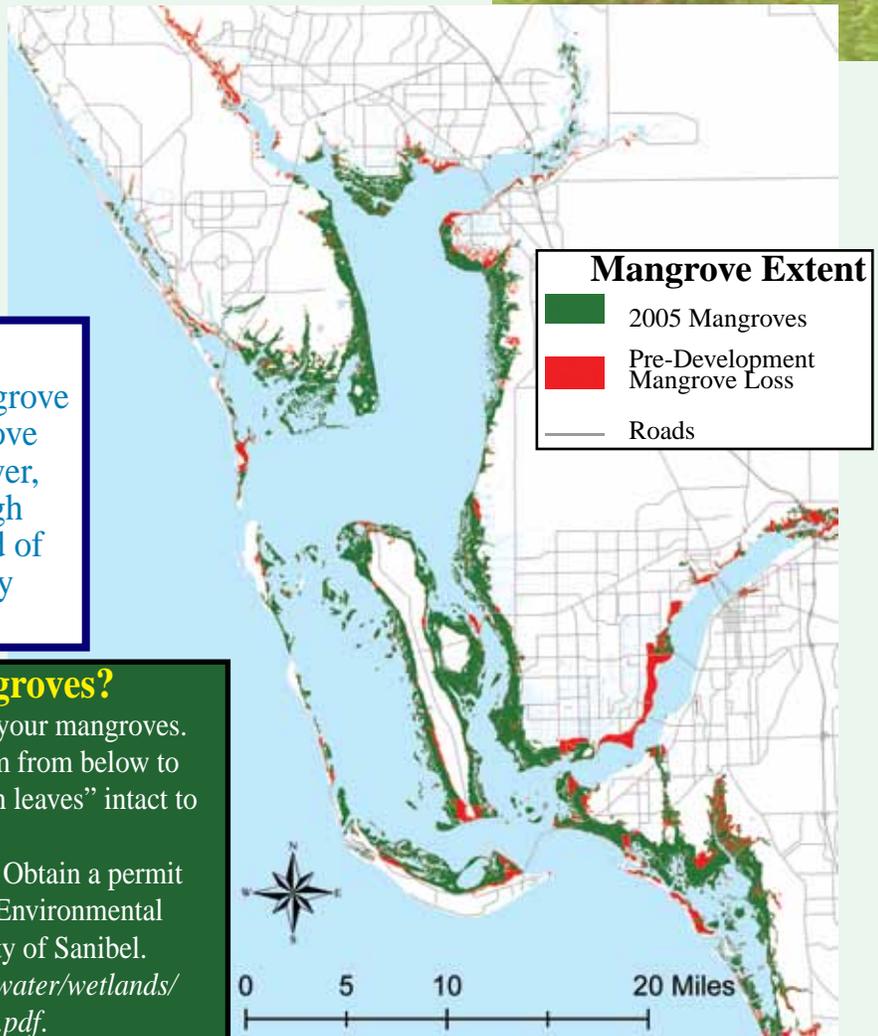
Trends

Since 1990, mangrove area (or extent) has been relatively stable. In a 2010 study, the Southwest Florida Regional Planning Council found that 24.4 acres of mangrove were permitted for removal between 2004 and 2008.

Of 1,230 linear miles of 2005 mangrove shoreline, 34% was degraded, primarily as a result of Hurricane Charley. FishAmerica, Sea Grant, the CHNEP and Florida Gulf Coast University joined forces to restore the damaged shoreline by planting mangrove seedlings, known as propagules.



These volunteers planted mangroves in a damaged fringe.



Answer:

More than 90% of pre-development mangrove area remains. In the last 20 years, mangrove acreage has been relatively stable. However, about five acres are lost every year through permitted development. More than a third of mangrove shoreline is degraded, primarily through the effects of Hurricane Charley.

What can you do to help mangroves?

- If you live on a mangrove shoreline, do not trim your mangroves.
- If you wish to trim a little for view or access, trim from below to create a window. That will leave the tougher “sun leaves” intact to protect the more sensitive “shade leaves.”
- A permit is required before you trim mangroves. Obtain a permit from a local office of the Florida Department of Environmental Protection or, if you live on Sanibel, from the City of Sanibel.
- For more information, go to www.dep.state.fl.us/water/wetlands/mangroves/docs/mangrove_trimming_guidelines.pdf.

Freshwater wetlands

Freshwater wetlands are the liquid heart of the watershed and play several vital roles for creeks, rivers and estuaries. They store and clean water. They provide habitat for a wide variety of migratory and resident birds, mammals, reptiles and amphibians. The Charlotte Harbor watershed has a beautiful variety of freshwater wetland types. They range from cypress domes and cypress strands to temperate hardwoods in river floodplains to flower-laden herbaceous marshes to bay and gum swamps to hydric pine flatwoods. Many of these wetland systems are rare outside of the Charlotte Harbor watershed.

Status

As of 2005, more than 325,000 of 750,000 pre-development freshwater wetland acres have been lost (43%). Most of this loss can be attributed to agricultural drainage, mining and urban land development. State and federal regulations were adopted in the 1970s and 1980s, restricting the dredging and filling of wetlands for urban development. Additional regulations required replacement of wetlands that are eliminated during the mining process. In addition, governments no longer fund large draining programs to increase agricultural land.

Trends

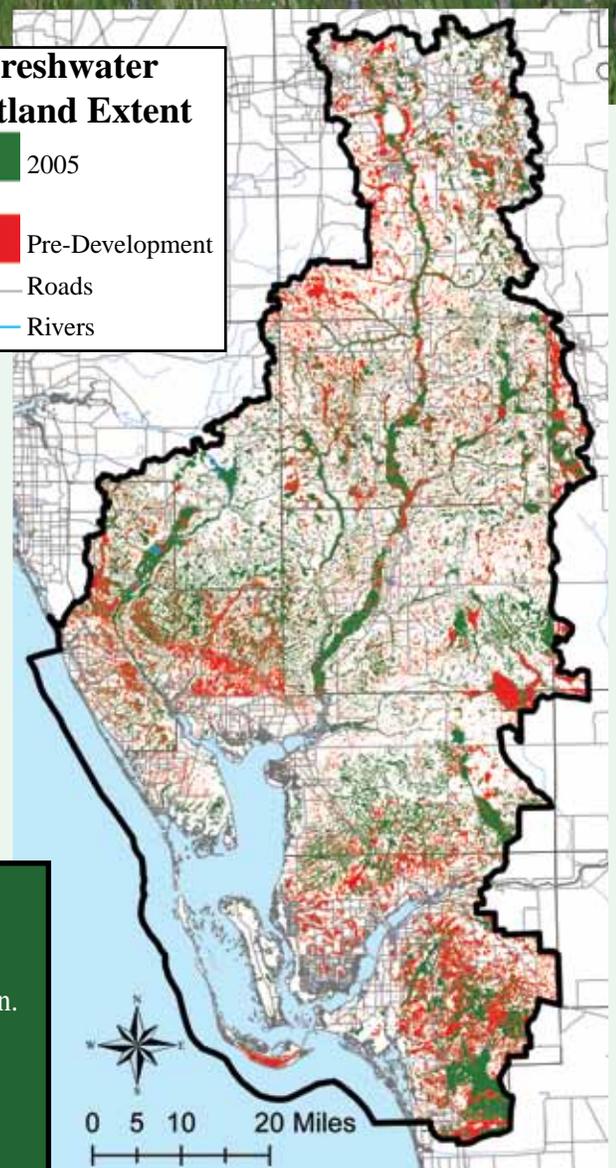
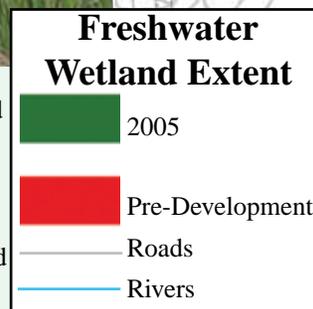
In the middle of the 19th century, when the General Land Office surveyed the new Florida territory, 25% of the future Charlotte Harbor study area consisted of freshwater wetlands. Since then, there has been a 43% decrease in total freshwater wetlands. Between 1990 and 2005, there was a 2.5% wetland loss, which may be

related to agricultural exemptions for wetland impacts.

By the year 2000, an invasive exotic plant named “melaleuca” had completely taken over more than 5,600 acres of freshwater wetlands, more than twice the amount from the previous decade. This increasing trend seems to have been arrested. In 1997, Australian melaleuca snout beetles, also known as melaleuca weevils, were released. They reduce the trees’ ability to reproduce by 80%. In 2002, melaleuca psyllids were released as a second control. The psyllid can kill small seedlings, stunt new vegetative growth and accelerate aging of mature leaves.

Answer:

Only 57% of pre-development freshwater wetland areas remain. Between 1990 and 2005, another 2.5% of freshwater wetlands were lost. Expansion of melaleuca infestation has been reduced through biological and other controls.



What can you do to help freshwater wetlands?

- If you live on a lake, encourage native emergent vegetation around the lake edge.
- Encourage your governments to enact rules that require local mitigation.
- Vote in favor of programs designed to purchase land for environmental protection and parks. Much freshwater wetland acreage has been protected through these programs.
- Support private land trusts (see p. 25).

What is the condition of our shoreline?

The shoreline is an important transition area from land to water. Native vegetation such as mangroves and salt marsh provide valuable contributions to the food web and protect land from erosion. As shorelines are impacted by hardening, mangrove trimming and exotic plant infestations, these values diminish. Shoreline alterations reduce the availability and diversity of food to fish, affecting their growth rate and survival.

Shorelines

Removal of vegetation, filling the transition from land to water, and hardening with seawalls and riprap degrade habitat on which fish and wildlife rely.

Status and Trends

By 2005, native habitats were replaced by seawalls and riprap on 18.5% of our natural estuarine shoreline. Comparing the 2005 estimates to a 1995 statewide shoreline study indicates the amount had not changed significantly in the decade.



Hedged mangroves



Lifted mangroves

Mangroves are healthiest when they are not trimmed. However, “lifting” or “windowing” mangroves (shown on the right) is healthier and requires less maintenance than “hedging” mangroves (shown on the left). Trim as little as possible.

Answer: More than 18% of natural shoreline has been lost. Of urban mangroves, 52% are trimmed, which degrades them. Nonnative plants dominate 3% of shorelines.

Mangroves

Mangrove cutting is harmful to the estuarine environment, the mangrove trees themselves, and the animals that depend upon mangroves. Cutting a 16-foot fringing red mangrove forest to 5.5 feet reduces primary production by 83%, flowering by 95%, propagules (seedlings) by 73% and leaf crop by 71%.

Status and Trends

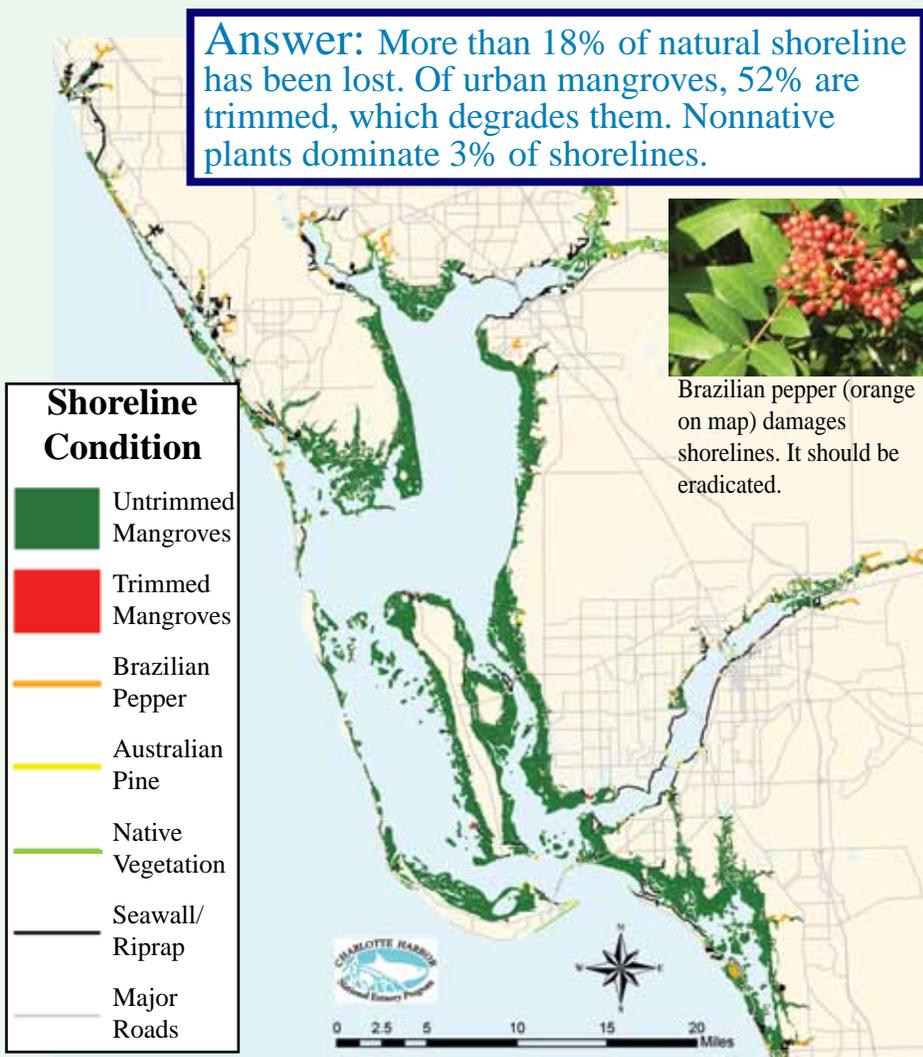
More than 4,000 urban lots were reviewed in 2007 and 2010. In 2010, 52% of the lots had mangroves, up 4% from 2007. Of lots with mangroves, 39% trimmed them, up 7% from 2007. Of trimmed mangroves, 38% were less than 6 feet in height, a violation of state standards, down 8% from 2007.

Exotics

Plants have been brought from elsewhere in the world to Florida. Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarina* spp.) and others outcompete native plants, change water flows, reduce habitat for native wildlife and benefit nuisance exotic animals.

Status and Trends

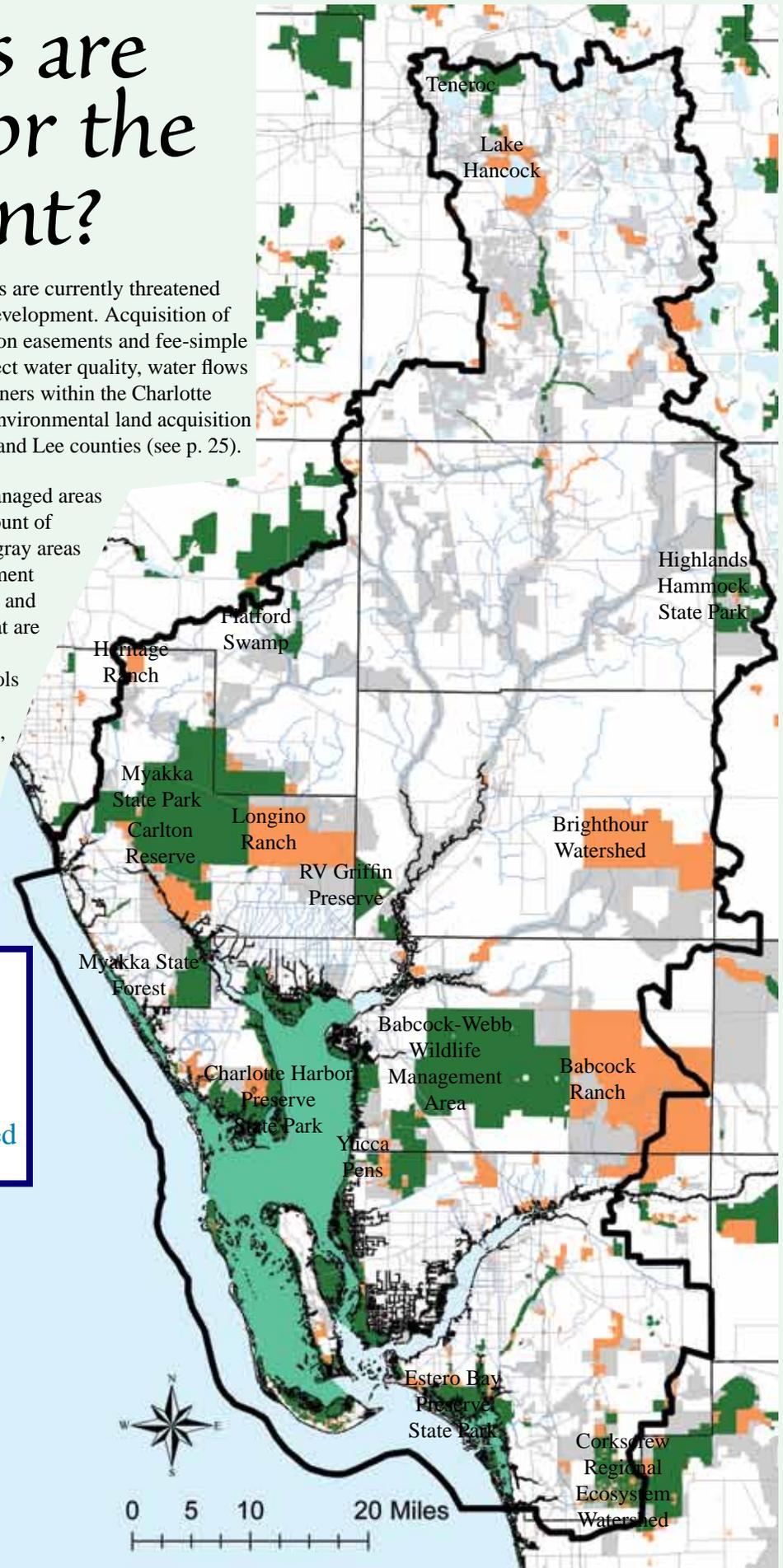
As of 2005, Brazilian pepper dominated 2% of natural shorelines, mostly in natural tidal creeks. Australian pine dominated 1% of natural shoreline. Together, 3% of the shoreline has been degraded.



What lands are managed for the environment?

Important areas of existing natural habitats are currently threatened with substantial alteration due to rapid development. Acquisition of development rights, including conservation easements and fee-simple title, is the single most beneficial way to protect water quality, water flows and timing, and habitat. All urban county partners within the Charlotte Harbor National Estuary Program have local environmental land acquisition programs, including Polk, Sarasota, Charlotte and Lee counties (see p. 25).

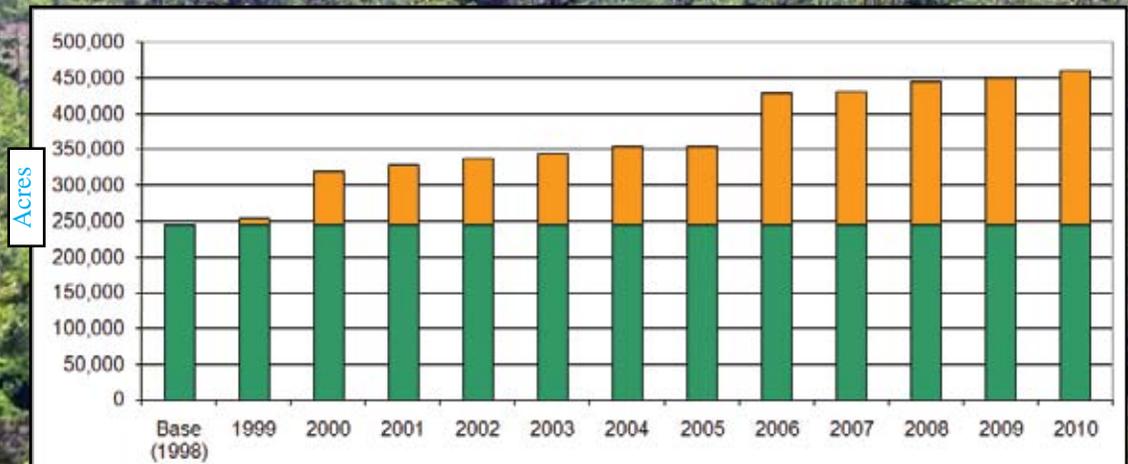
Green areas on the map and chart represent managed areas in 1998. Orange represents the substantial amount of land placed into management after 1998. The gray areas are the CHNEP's vision of additional management areas needed, highlighting habitat connectivity and floodplain protection. There are many tools that are used by our partners to help identify important land for protection and management. These tools include Florida Department of Environmental Protection's Integrated Habitat Network (IHN), Florida Fish and Wildlife Conservation Commission's Cooperative Conservation Blueprint, Wildland Conservation's Peace River Greenway Initiative and the City of Winter Haven's Sustainable Water Resource Management Plan for Peace Creek Watershed.



Answer:
 More than 460,000 acres are in conservation management. There has been a gain of more than 210,000 acres since 1998. A total of 14% of our watershed land is in conservation.



Conservation land acquisitions



Babcock Ranch, acquired in 2006 and shown here, is the largest single land acquisition in Florida.

Public acquisition of development rights through outright ownership (fee-simple title) and conservation easements is a primary method to maintain open space in an urbanizing area and a reservoir of important plants and animals in the agricultural landscape. As contiguous areas are conserved, “wildlife corridors” allow movement of animals and seeds and promote healthy populations.

Status

As of 2010, more than 460,000 acres were under some form of conservation management through state, water management district, county, city, federal and private nonprofits (in that order.)

Trends

The CHNEP set a goal to double land under conservation management by all of our partners between 1998 and 2025. As of 2010, 217,000 acres (90%) have been acquired. Land under conservation management in 1998 is shown in dark green within the map to the left and the above chart. Additions are in orange.

The state of Florida manages the majority, more than 60%, of the lands in conservation management. The Southwest Florida Water Management District and South Florida Water Management District manage another 19%. Counties that have land acquisition programs possess another 17% of conservation lands. Other agencies

include the federal government through the National Wildlife Refuge System, private land trusts and cities. More than 85% of property in conservation management is owned outright by a public or managing agency. The 15% in conservation easements provide for unimproved pasture and other agricultural uses, which are disappearing.

Almost 14% of the CHNEP’s landmass is under conservation management. Peace River basin has the least percentage under conservation management (at 7%), while Charlotte Harbor proper has the greatest (at 52%). Almost 49% of the CHNEP’s estuarine waters are under state aquatic preserve or federal wildlife refuge management.

What can you do to help manage lands for the environment?

- Vote in favor of programs designed to purchase land for environmental protection such as Conservation Charlotte, Lee County’s Conservation 20/20, Polk County’s Environmental Lands Program and Sarasota County’s Environmentally Sensitive Lands Protection Program (ESLPP).
- Support private land trusts such as the Lemon Bay Conservancy, Calusa Land Trust, Audubon Society, Sanibel-Captiva Conservation Foundation and the Nature Conservancy.
- Volunteer with a land trust or at Bok Tower Gardens, Charlotte Harbor Environmental Center, Crowley Museum and Nature Center, Calusa Nature Center and Planetarium and other nature centers.
- Donate land as a bequest or living trust.
- Explore donating a conservation easement on property as a tax benefit.
- Recommend parcels that are desirable for acquisition to land trusts and governments with land acquisition programs.

Who restores nature?

Governments, businesses, industry and private organizations all work to restore the environment. Hydrologic restoration (return of water flows and timing to water bodies) is the best, but most complicated, restoration to do. Managers must ensure that adjacent private properties are not negatively impacted by hydrologic restoration intended to improve the freshwater and estuarine water quality and habitat. Exotic plant invasion is reduced, reducing management costs. Hydrologic restoration includes removing spoil piles, which are sites for exotic plant invasion, filling ditches and making canals wider and shallower, which in turn, increases water table levels, reduces wildfire and retains water for times of drought. Water quality repair typically is the second most complicated restoration, but it usually has habitat benefits. Habitat improvements include wetland restoration, exotic removal and controlled burns.

Since 2000, counties restored more managed land than other groups (68%). In large measure, it is due to new conservation programs to acquire property and financial commitments to bring new conservation land under management. Much state land was already under management by the year 2000. A big example is the Babcock-Webb Wildlife Management Area. The state was responsible for 21% of restoration acreage, followed by water management districts at 5% (though they contributed financial resources for partnerships with counties, cities, nonprofits, utilities and the federal agencies). Cities, nonprofit organizations and utilities were responsible for the remaining 6% of land restoration.

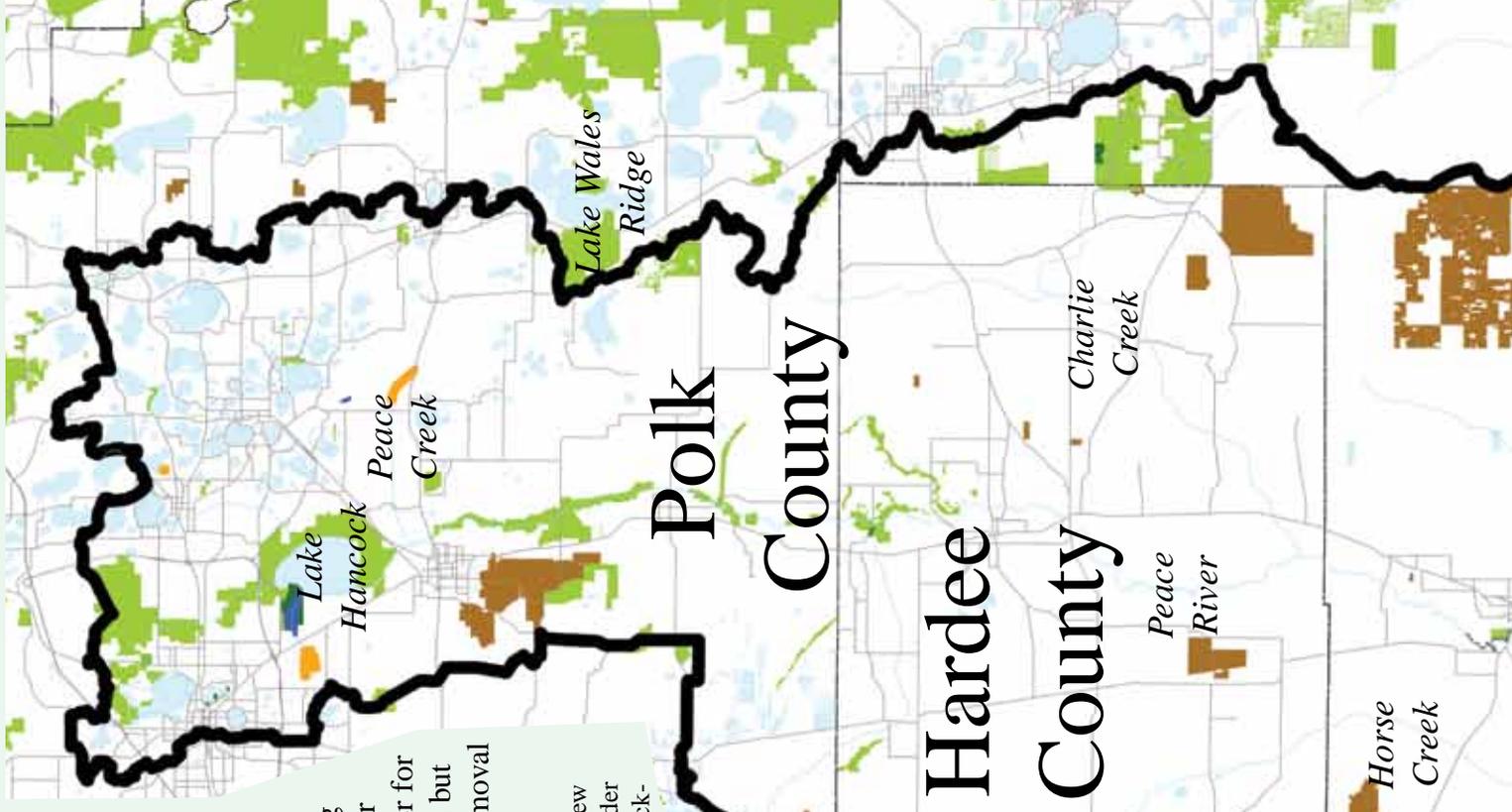
Status

Between 2000 and 2010, more than 68,000 acres were restored by public and private agencies.

Between 2007 and 2011, all coastal counties and most coastal cities in our watershed have adopted ordinances reducing fertilizer use on a quarter million acres of urban land. As a result, hundreds of tons of excess nutrients are not added to the watershed every year. In addition, the Southwest Florida Water Management District's Facilitating Agricultural Resource Management Systems (FARMS) Program has reduced nutrient pollution and conserved water on more than 115,000 acres of agricultural property within the Charlotte Harbor watershed. These efforts on private lands appear to be the next great trend in restoration.

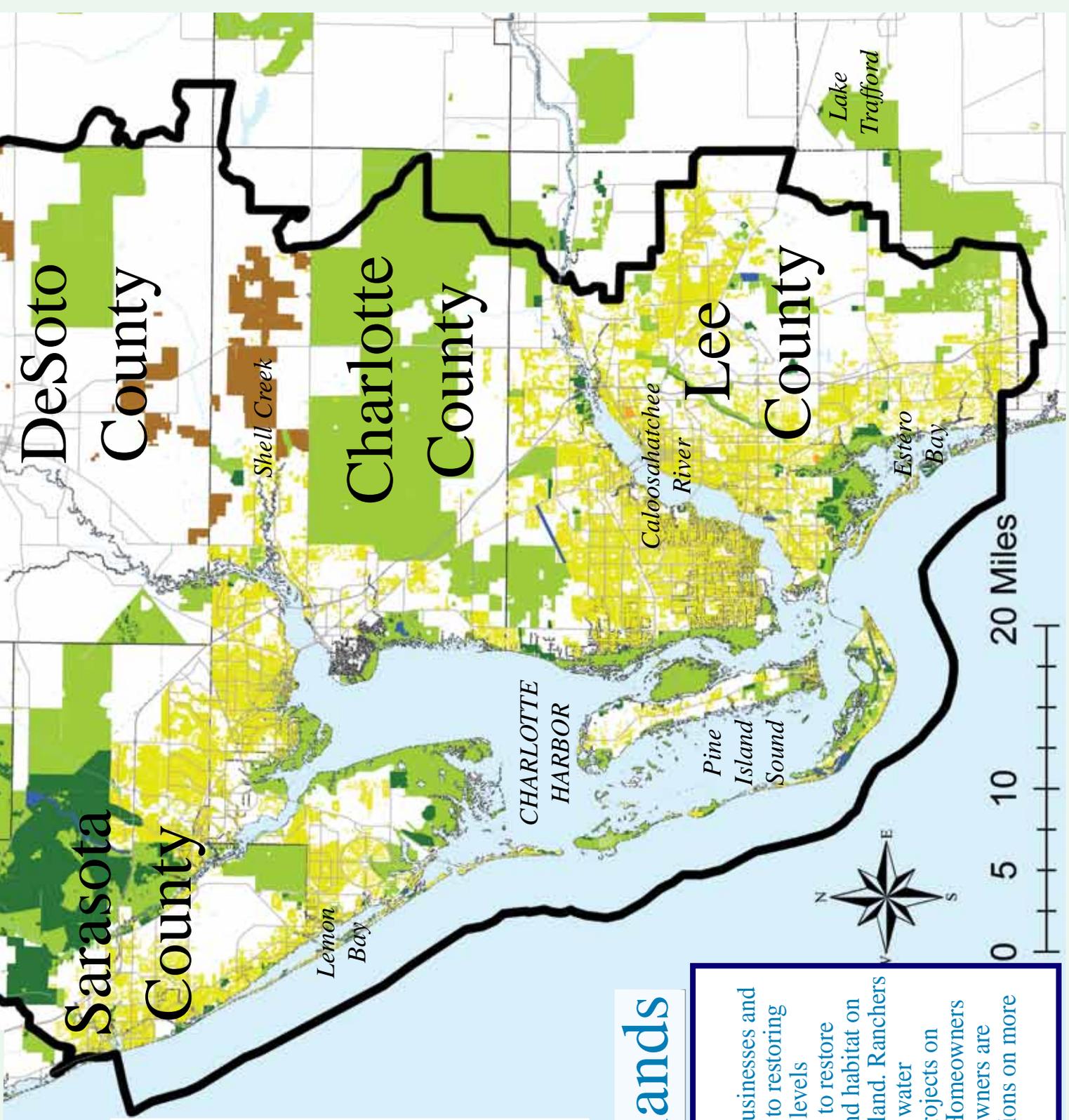
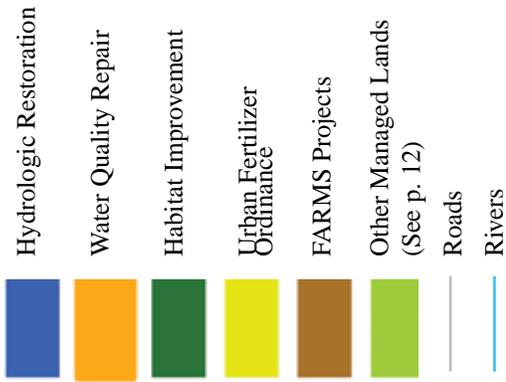
Trends

Between 2000 and 2005, an average 8,000 acres were restored annually. Between 2006 and 2010, the average dropped to 4,000 acres, a 50% reduction in restoration project activities. However, this drop in public restoration has been more than compensated by the increase in restoration on private lands.



GULF OF MEXICO

Restored Lands (2000–2010)



Restored lands

Answer:

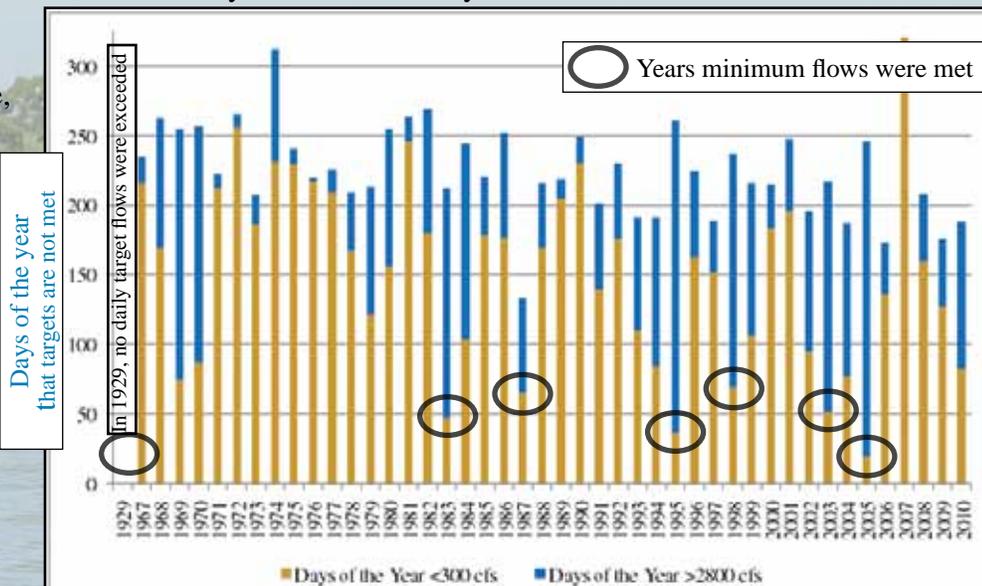
Governments, industries, businesses and homeowners all contribute to restoring nature. Governments at all levels have implemented projects to restore hydrology, water quality and habitat on more than 68,000 acres of land. Ranchers and growers have installed water conservation and quality projects on more than 115,000 acres. Homeowners and commercial property owners are reducing fertilizer applications on more than 250,000 acres.

Are our river flows natural?

The flow of fresh water from the watershed is critical to the health of the estuary. Some aquatic plants and animals are adapted to the salty Gulf of Mexico. Others thrive in the dynamic environment of the estuary where salinity changes throughout the day and throughout the year. Still others can only survive in a freshwater environment where the salty waters never invade. When people modify the level of the water table, dam rivers or divert freshwater flows, the amount, timing and placement of fresh and salty water can change dramatically. Water management districts set minimum flows to protect water resources from significant harm. The Caloosahatchee has the greatest flows, followed by the Peace and Myakka. River flows are a function of rainfall, the size of the watershed feeding the river and the amount of impervious surface, such as concrete, fill and projects, to drain land.

Answer:

Caloosahatchee flows are not natural. After the locks were constructed in 1965, minimum monthly flows of 300 cubic feet per second (cfs) were reached in only four years of the last 44. More than 20% of months exceeded unhealthy average flows of 2,800 cfs.



The Caloosahatchee is the largest of three major rivers in the Charlotte Harbor watersheds. Originally, the river did not have a direct connection to Lake Okeechobee. In the 1880s, 1940s and 1960s, successive channelization and construction of dams and locks have changed the timing and amount of flow.

The South Florida Water Management District adopted a minimum mean monthly flow of 300 cubic feet per second (cfs) at Franklin Lock and Dam (S-79). The measure of an exceedance is a salinity of 10 parts per thousand for a 30-day average or a single daily average of 20 parts per thousand at the gage in Fort Myers.

Status

Flows from the Caloosahatchee are the least natural of all rivers within the study area. The river does not receive enough water in the dry season and receives too much in the wet season. Demands for irrigation water in the dry season divert water from the river. Increasing impervious surface and drainage projects shunt excess water to the river.

Caloosahatchee

Trends

The above graph shows the number of days of flow that had less than 300 cfs (in brown) and more than 2,800 cfs (in blue). In 1929, river flows were measured daily in LaBelle. No day was below 300 cfs nor above 2,800 cfs for this year of normal rainfall. Each year after 1965, when the Franklin Lock (S-79) and associated works were constructed, a significant number of days are below the minimum and maximum river flows measured at the lock. Since 1966, the Caloosahatchee failed to meet the minimum flow and salinity in 38 of 44 years. Since 1966, 20% of all months exceeded unhealthy average flows of 2,800 cfs.

Since construction of the Franklin Lock in 1965, the Caloosahatchee received an average annual flow equivalent to the 1929 flows, adjusting for location of the 1929 gage. During the last decade (2001–2010), the Caloosahatchee received 12% more water annually than in 1929.

What can you do to help natural river flows?

- Hold water on your property so that it can percolate into the ground or leave the property slowly. Techniques include cisterns for irrigation, not filling in swales or wetlands and building wetland flower gardens.
- Avoid adding new impervious surface. If you can, replace impervious surfaces, such as concrete or asphalt, with pervious materials, such as permeable interlocking concrete pavers, porous concrete or Flexi-Pave™.
- Plant native trees such as pines, oaks and sabal palms, especially on shorelines, creating at least a 10-foot buffer.

Peace

The Peace River is our second largest river. The Southwest Florida Water Management District set low flow thresholds to restrict withdrawals under these levels. The threshold was set in Bartow at 17 cubic feet per second (cfs) and in Arcadia at 67 cfs.

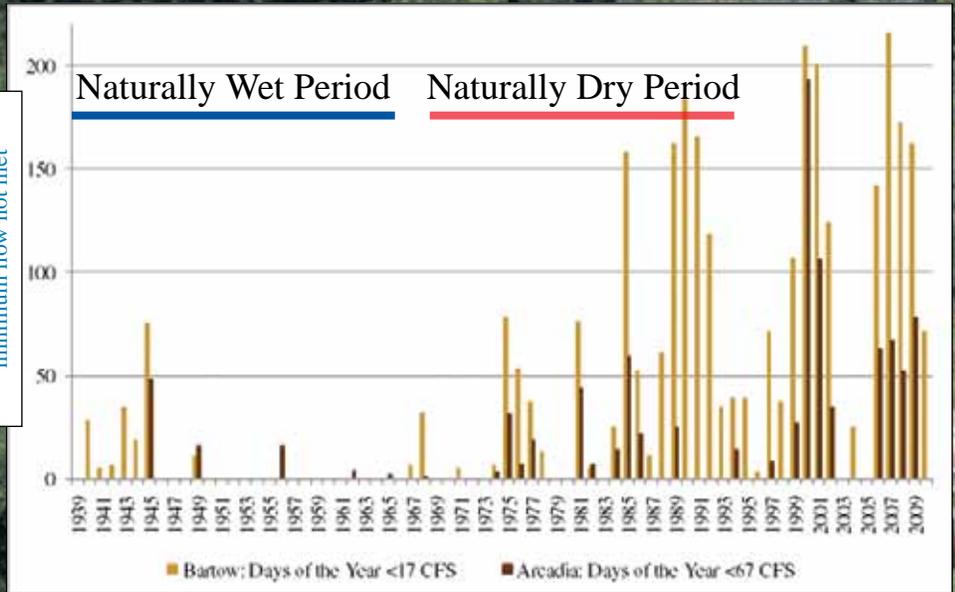
Status

The alteration of wetlands, streams and lakes, combined with natural periods of drought, has greatly diminished the flow of water in the Peace River and its tributaries and has altered ecosystems, particularly in the northern portions of the watershed.

Trends

In general, the 1930s through the early 1960s were wetter than the subsequent three decades. A lull in tropical cyclone activity from 1970–1994 contributed up to one-third of the observed decline in wet-season rainfall. The remaining effect is from manmade alterations. Though minimum flows were not met 15%–33% of the days in the last decade, long-term compliance standards of 547 cfs were met.

Days of the year minimum flow not met

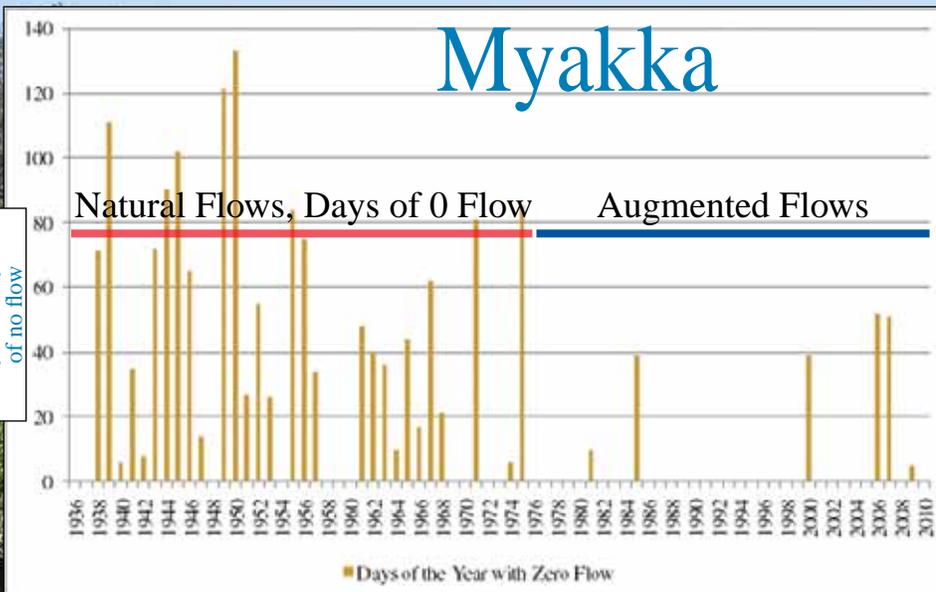


Answer:
Since the mid-1970s, the upper Peace River has not received minimum flows for a significant number of days in most years. That trend has increased in the middle Peace River at Arcadia.

Photo by Richard Gant, SWFWMD.

Myakka

Days of the year of no flow



The Myakka River is our third largest river and our only designated Wild and Scenic River. Significant land acquisition within its watershed renders the Myakka as our most natural river.

Status

Though most of the river corridor is relatively natural, alterations of the river and its watershed are significant in several locations. Land alterations that were intended to dry swampy land and control flooding have resulted in impacts, such as damage to natural systems, increased flood stages and loss of floodplain storage.

Trends

Total annual flows for the Myakka are similar to the wet and dry periods displayed in the Peace River chart. However, the Myakka used to dry completely as its natural condition before the mid-1970s and significant irrigation. FARMS projects (see pp. 14 and 15) have helped to return the Myakka to a more natural condition than in the 1990s.

Answer:
The Myakka River receives too much flow from dry season irrigation. Diversion of Cow Pen Slough flows from the Myakka River basin balances some of this increased flow.

Is our water clean?

Clean water is critical for human and environmental health. There are multiple threats to water quality in the CHNEP study area, including excessive levels of bacteria, nutrients and turbidity. Additional concerns include toxins and harmful algal blooms.

Bacteria

Bacteria, as measured by fecal coliform, affect our ability to use water for drinking, swimming and shellfishing. The state water standards establish bacteria limits for different types of uses. The most stringent standards are for shellfishing areas (see p. 7). Other, less stringent standards, apply for drinking water and for recreation, such as swimming and fishing. Bacteria can come from a variety of sources, but those of most concern come from fecal waste of animals and people. Sources of fecal bacteria include malfunctioning septic systems, leaking sanitary sewers, confined animal feedlots and untreated waste from wastewater plant overflows. Other sources such as urban pet waste and stormwater can be significant sources, especially after a heavy rainfall. For this reason, many shellfish areas are closed immediately after a large rain event.

Status

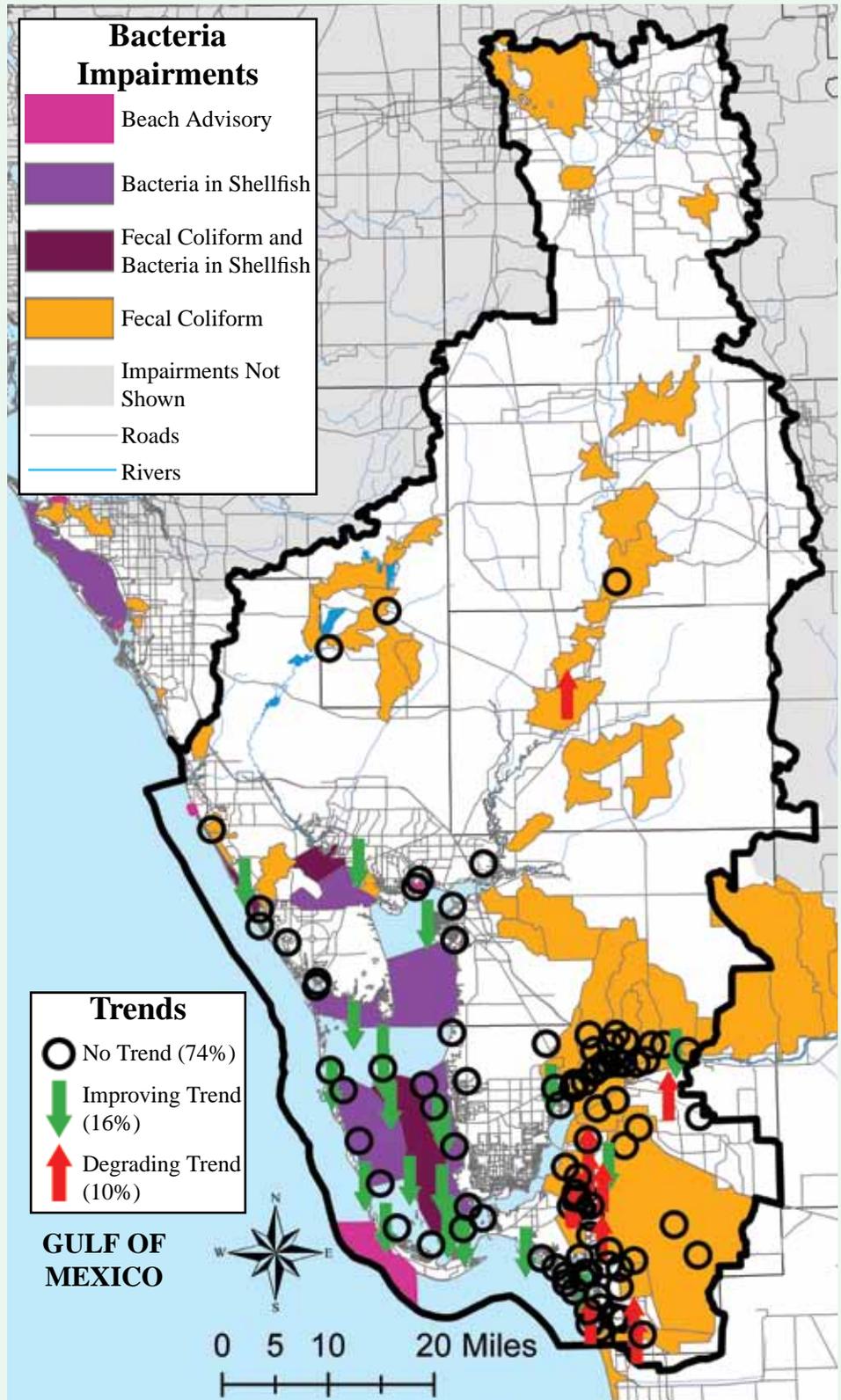
Most shellfish harvest areas are closed due to bacteria contamination at least some time in the year, leading to an impaired status. The orange areas of the map are where fecal coliform levels are too high to safely fish or swim. In 2008, 18% of the CHNEP area was impaired. By 2010, bacteria impairments increased to 22% of the CHNEP area.

Trends

There has been a decreasing trend of fecal coliform levels in Pine Island Sound and Charlotte Harbor, likely due to replacing septic tanks with central sewer. Several stations show increasing trends of fecal coliform levels in Estero Bay and the Peace River in Arcadia. Of all long-term stations, 13 have an increase ↑ in fecal coliform, 99 have no trend ○ and 22 have a decrease ↓, a 6% overall improvement.

Answer:

Bacteria and nutrient problems are numerous and growing worse. One bright mark is some improving trends in estuaries, probably due to cities replacing septic tanks with central sewer.



Nutrients



What can you do to help reduce bacteria and nutrients?

- Maintain your septic tank.
- Eliminate turfgrass and plant native gardens.
- Abide by local fertilizer ordinances.
- Use boat pumpouts. If your boat does not have a head, bring a portable toilet.
- Clean up after your dog to reduce bacteria and nutrients.

Filamentous green algae accumulation after nutrient-rich water releases in 2005.

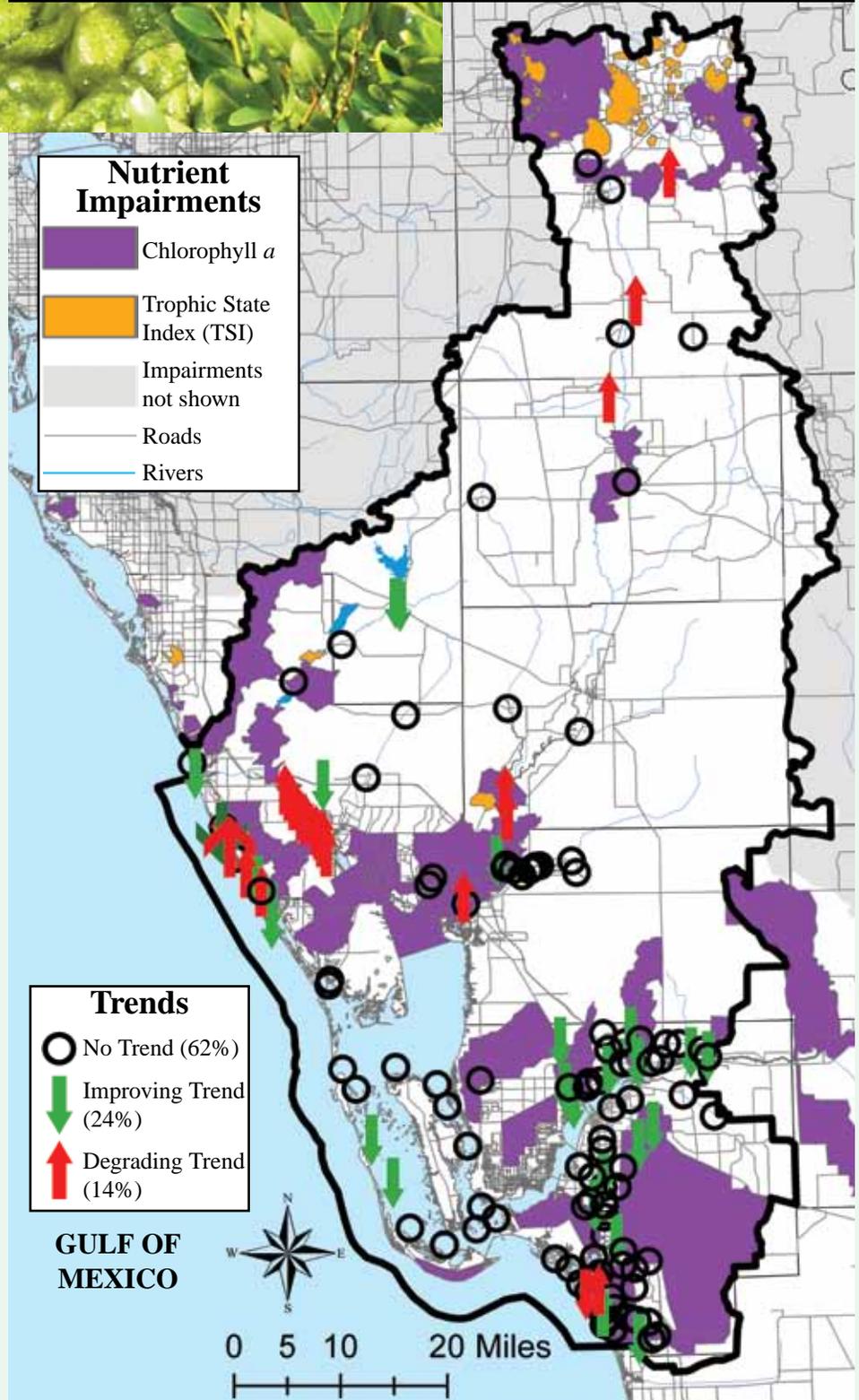
The amount of nutrients entering a water body has important effects on water quality. Plants and animals that live in lakes, rivers and estuaries use these nutrients, especially nitrogen and phosphorus, to grow and survive. However, when excessive amounts of nutrients enter the water, negative impacts can occur. Excessive nutrients may cause algal blooms that turn the water green and block sunlight for submerged aquatic plants. When the nutrients are used up, the algae dies in large quantities. Bacteria that consume the algae deplete the oxygen in the water. Low oxygen, called “hypoxia,” can kill fish and other animals that cannot escape the area. Chlorophyll *a* indicates nutrient enrichment based on green pigments. Trophic state index (TSI) is a measure typically applied to lakes that uses nitrogen, phosphorus, chlorophyll *a* and water clarity.

Status

Two common measures of nutrient pollution are chlorophyll *a* (green in waterways) and TSI for lakes. In 2010, 18% of the CHNEP area was impaired for nutrients, up from 11% in 2008.

Trends

Excessive chlorophyll *a* is an indicator that nutrients are causing an increase in algae. Of the 168 long-term chlorophyll *a* stations, 23 have an increase ↑, 105 have no trend ○ and 40 have a decrease ↓, a 10% overall improvement.



Water clarity

Seagrass beds require light to live. Degraded water clarity reduces the light received by seagrass. When this happens, seagrass at the deep edge of the beds can die and then the function of this habitat is reduced. In Charlotte Harbor's estuaries, water clarity is a function of colored dissolved organic matter (CDOM), turbidity and chlorophyll (phytoplankton). Phytoplankton (microscopic algae) and CDOM are critical for the health of the estuary and for the food webs they support. Unfortunately, unnaturally high levels of phytoplankton can bloom from excess nutrients, and unnaturally high levels of CDOM can be present from increased freshwater flow from drainage projects.

Status

Since 2002, the Coastal Charlotte Harbor Monitoring Network (of various partner agencies) has provided stratified random sample data to assess ambient water quality conditions. Sarasota County began its monitoring program earlier for Lemon Bay and the Myakka. Under this program, water clarity is measured by light attenuation (Kd), a measure of how much light is lost through the water column.

Seagrass segments—which have as much or more seagrasses than measured in the 1950s—include tidal Myakka, Charlotte Harbor, Pine Island Sound and San Carlos Bay. The CHNEP has established restoration targets for the other segments.

In 2009, three of the ten segments had stable or improving conditions (shown in green in table). No segment had declining conditions (shown in rose). The remaining seven segments are listed as cautionary (shown in yellow). From a scale of all segments declining to all segments stable or improving (3 steps), 65% of the target has been reached.

Trends

Through each segment's period of record, four segments have shown improvement: Lemon Bay, Tidal Myakka, Tidal Peace and Charlotte Harbor. Three of these segments went from a degraded condition to an improving condition (against the same measures for each year). All four segments are within the jurisdiction of the Southwest Florida Water Management District, who has placed a priority on improving water quality through partnerships with local governments and others. The approach appears to be working well.

Answer:

In 2009, seven of ten segments did not meet our water clarity targets. Pine Island Sound, Tidal Myakka and San Carlos Bay have excellent water clarity and seagrass extent, rivaling the 1950s. Estero Bay appears to be getting worse.

The only segment that appears to be getting worse is Estero Bay. The Estero Bay watershed has had much development during the recent decades. Scientists believe that turbidity is the root of Estero Bay's water clarity problems. In addition to construction and other activities adding more sediment to waterways, boating in this shallow, lagoonal bay stirs up the sediments, causing continual problems with turbidity.

What can you do to help improve water clarity?

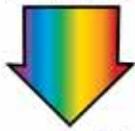
- Don't disturb plant cover. Maintain native trees and understory.
- Power your boat in sufficient depth to not disturb sediments.
- Follow tips to reduce nutrients.

Bay Segments

Year	Dona & Roberts Bays	Lemon Bay	Tidal Myakka River	Tidal Peace River	Charlotte Harbor	Pine Island Sound	Matlacha Pass	San Carlos Bay	Tidal Caloosahatchee	Estero Bay
1998										
1999										
2000										
2001										
2002										
2003										
2004										
2005										
2006										
2007										
2008										
2009										

= declining conditions
 = cautionary conditions
 = stable or improving conditions

Full Spectral Light



Seagrasses need blue or red light



Water Column absorbs mostly red light

Phytoplankton absorbs blue and red light

CDOM absorbs mostly blue light

Seagrasses die without enough blue or red light at the deep edge

Full Spectral Light



Quality of light

Sunlight is a form of electromagnetic radiation. A particular range of wavelengths (colors) constitute visible light. When objects receive light, they absorb some wavelengths and reflect others. The primary colors of light are red, green and blue. All colors combine to make up white light. Photosynthesis requires mostly blue but can also use red light. Green light is not absorbed, which causes chlorophyll, a pigment in plants, to appear green. In natural conditions, seagrasses will grow as deep

as sufficient blue or red light penetrate the water column. Phytoplankton in the water column is a direct competitor for blue and red light, with its own chlorophyll absorbing the blue and red light. The water column itself absorbs mostly red, but also green light, transmitting blue light that seagrasses can utilize. Colored dissolved organic matter (CDOM) is the tea-colored substance found in our area and is made up of tannins and other substances. CDOM absorbs mostly blue, but also green light, and transmits a brownish-red light, which seagrasses can also utilize. Turbidity is caused by living and nonliving particles suspended in the water, which absorb the full spectrum of light.

What limits light to seagrasses?

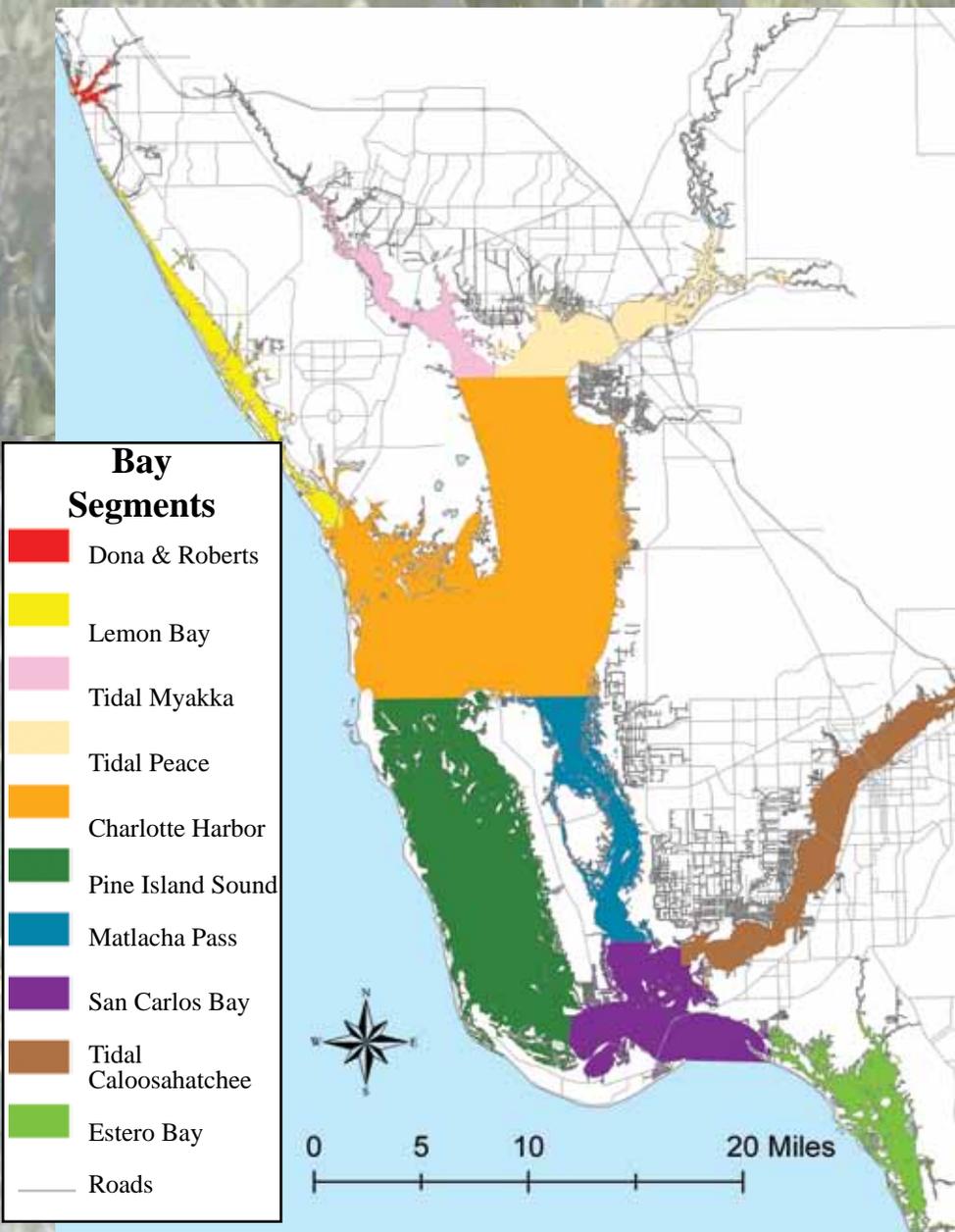
- Phytoplankton
- Combined effects of water with CDOM
- Turbidity

Using Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Program data, the Florida Department of Environmental Protection found that each of its aquatic preserves had a different personality. Lemon Bay and Upper Charlotte Harbor, including the Tidal Peace and Tidal Myakka rivers, had their most serious problems with phytoplankton; Matlacha Pass with CDOM; and Estero Bay with turbidity. Gasparilla Sound and Pine Island Sound are in good shape. Aside from the aquatic preserves, tidal Caloosahatchee is burdened with excessive phytoplankton blooms.



By: Lisa B. Beever, PhD, AICP
with assistance from L.K. Dixon
Date: 2/1/11

Symbols courtesy of the Integration and Application Network (ian.umces.edu/symbols/), University of Maryland Center for Environmental Science



What is the source of water pollution?

In earlier pages, you read that excessive nitrogen and phosphorus concentrations in the water cause problems such as algal blooms, low dissolved oxygen and seagrass loss. More total nitrogen and phosphorus is delivered to water bodies during times of high rain and creek flow. The total amount is called a “load.” For estuaries, the load can be as much of a problem as the concentration. In addition to excess nutrients, suspended sediments cause problems such as murky water. Septic tanks, urban land uses, agriculture and mining contribute nutrients and sediments to creeks and the estuaries. In addition, air pollution can be deposited as nitrogen and phosphorus from the atmosphere. For example, automobiles emit oxides of nitrogen (NOx), which can be a source of airborne nitrogen pollution.

Answer:

The biggest per-acre sources of nitrogen pollution are failed septic tanks, feedlots, commercial property and row crops. Commercial property, multifamily residences and mining are the most significant sources of suspended solids.

The natural landscape produces a healthy level of nutrients and sediments. Pollution is defined as that above a healthy level. Pollution loads have been measured for the Charlotte Harbor watershed using pollution concentrations combined with water flows at most downstream gages. For ungaged areas, loads from various land uses are estimated and calibrated for these known areas. Then, the loads for various land uses are applied to the ungaged areas for total estimated loads. Pollution loads have been estimated for total nitrogen (TN), total phosphorus (TP) and total suspended solids (TSS). Loads by land use are shown on the conceptual diagram on the right.

Status

Pollution loads vary each year because the amount of water flowing to creeks, rivers and estuaries varies from rainfall. The amount of water flowing to a water body is called a “hydrologic load.” From 1995 through 2007, the greatest hydrologic load occurred in 1995 (more than 12 million cubic meters) and the lowest was in 2007 (under 2 million cubic meters). The average hydrologic load was more than seven million cubic meters.

Pollutant Loads



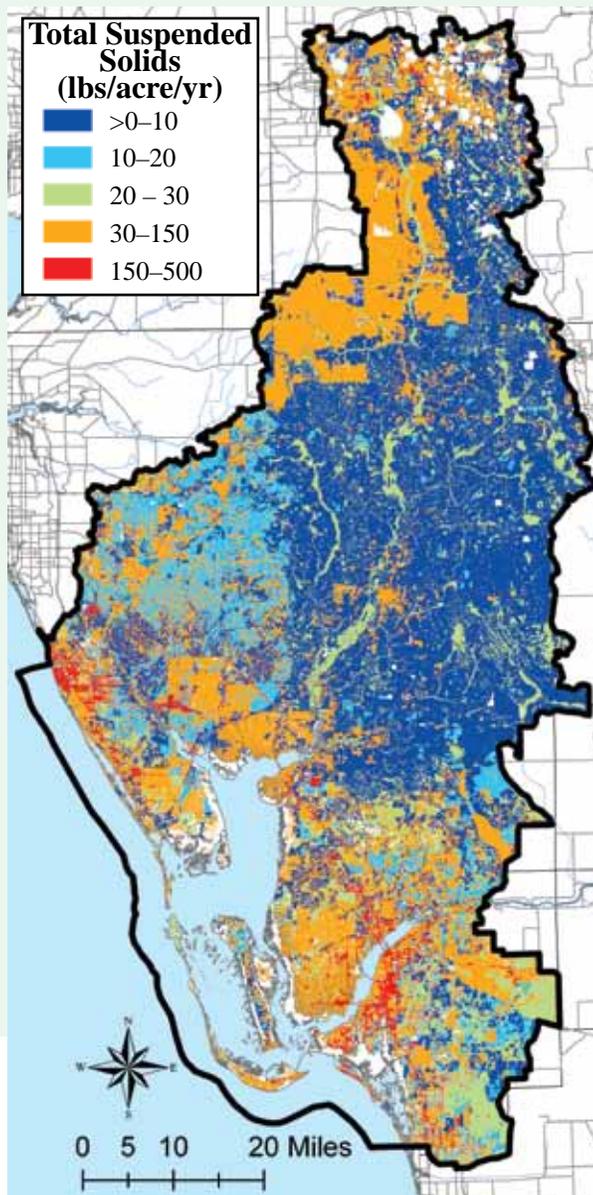
Pollutants are carried with water flow. Tons of TN varied from more than 2,000 in 2007 to more than 18,000 in 2005, with an average of just under 10,000. (1 ton=907 kilograms=2,000 pounds) Tons of TP varied from more than 500 in 2007 to just under 4,000 in 2005, with an average of just over 2,000. Tons of TSS varied from more than 10,000 in 2007 to more than 125,000 in 2005, with an average of more than 57,000. The reason 2005 had such high pollution loading relates to a two-year period of intense rain and numerous hurricanes, as well as releases of dirty water in advance of each impending hurricane to protect structures.

Estuarine numeric nutrient criteria have been drafted for TN and TP, as expressed in total tons of load. Though the draft is preliminary, the CHNEP is considering an overall TN standard of 9,000 to 11,500 tons per year. From 1995 through 2007, this standard was met by 47% of the individual segments annually.

Sarasota County recently found that swales reduce TN loads by 10 pounds per acre per year over curb-and-gutter. Counties and cities are seeking the most cost-effective ways to reduce pollution and adopt them in state-required Basin Management Action Plans (BMAPs).

Trends

In 1999, the CHNEP assessed pollutant loads from 1975 through 1990. We compared this 15-year period ending in 1990 to the 17-year period ending in 2007. It appears that there may have been a reduction in pollution loading of TN by 48%, of TP by 36% and of TSS by 47%. There are alternative explanations for the decrease in pollution loading in the face of urban growth. Fewer urban development and mining regulations, as well as agricultural best management practices, were in place during the earlier period. Developments permitted before 1975 were allowed to build under the old standards. As better standards were put into place, pollutant loading may have decreased in general from the 1975–1990 period to the 1995–2007 period. Another explanation is that pollution loading was overestimated for the earlier



Annual pollution (in pounds per acre)

Atmospheric Deposition

(applies to Open Water, processes of land uses incorporates it)
 TN = 5.3
 TP = .01

Wastewater Treatment

TN=.03 / acre served
 TP < .01 / acre served
 TSS=.3 / acre served

Row Crop

TN = 6.9
 TP = 1.3
 TSS = 24

Pasture

TN = 3.3
 TP = 1.0
 TSS = 10

Mining

TN = 2.8
 TP = 0.4
 TSS = 119

Citrus Grove

N=1.8
 P=0.8
 TSS=10

Feedlot

TN = 46.5
 TP = 9.0
 TSS = 118

TN=Total Nitrogen
 TP=Total Phosphorus
 TSS=Total Suspended Solids

period to account for greater uncertainties due to less available water quality data.

The above map displays distribution of the loads of total suspended solids. In general, the maps showing the distribution of nitrogen and phosphorus have a similar appearance, with the most intense loading of pollution for urban areas and lesser loading from the rural landscape.

The diagram to the left shows average annual pollution in pounds per acre by various land uses. Note the high contributions of failing septic tanks and feedlots. It was estimated that septic tanks failed at a rate of 10%–30%. The next steps down in terms of pollution are feedlots, commercial uses, row crops and atmospheric deposition (from air pollution).

Emerging concerns

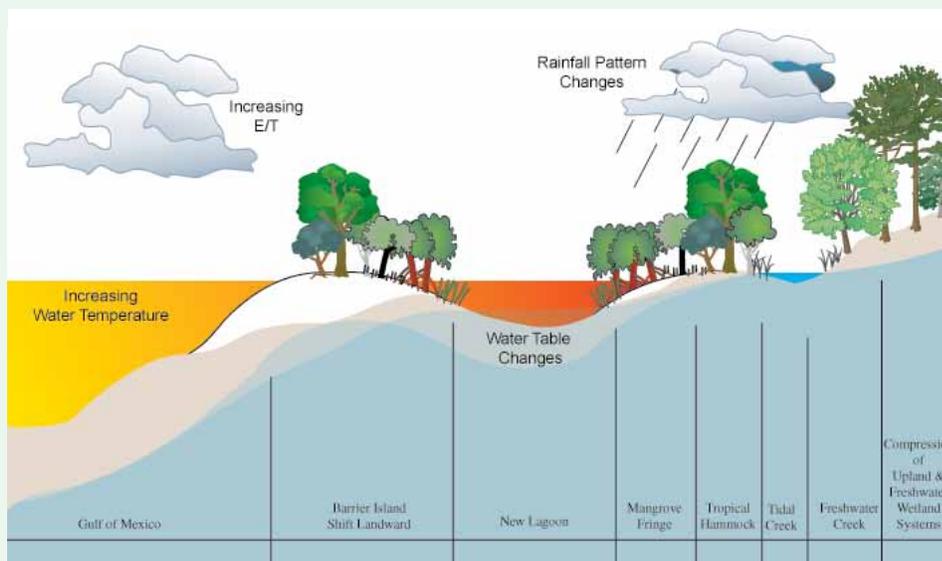
Climate change

The climate is changing. It has been changing since the formation of the atmosphere and the presence of water as vapor, liquid and ice on the surface of the earth. Global temperatures have risen and fallen and changed air chemistry, hydrology, geomorphology, habitats, plant and animal species, sea level, and water temperature and chemistry. With the advent of human civilization, changes in the climate have changed human economy, human health, infrastructure and land use.

The question is not *whether* the Charlotte Harbor region will be affected by climate change but how much it will be affected and in what ways. Key questions include the degree to which change will continue, how rapidly change will occur, what type of changes will occur and what the long-term human and ecological effects of these changes will be. The Charlotte Harbor region is particularly vulnerable to the effects of climate change. Topography is flat, naturally poorly drained and not very high above existing sea level. The majority of conservation lands and the regional economy have major investments within close proximity of the coast or lake water bodies. The savanna climate is naturally extreme, even without new changes.

In the past 100 years, average air temperatures have increased, the number of days in the year over 90°F have increased, rainfall delivered in the rainy season has increased, rainfall delivered in the dry season has decreased and sea level has risen about 8 inches. Since 1965, sea level has risen at the Fort Myers gage by one inch per decade. In addition, salt marshes and seagrass beds have migrated landward by approximately 100 yards since 1950.

These changes have implications for future environmental and infrastructure decisions. To learn more, visit the CHNEP's Climate Ready Estuary (CRE) website at <http://chnep.org/projects/climate/CRE.htm>.



The diagram above displays some of the continuing impacts of climate change. These effects include water temperatures, sea level rises, changes in precipitation, water table changes and habitat migration.

Pharmaceuticals

Pharmaceuticals and personal care products (PPCPs) have become an emerging water pollution problem of concern. Ecoestrogens include a variety of widely used compounds such as pesticides, pharmaceuticals, agricultural supplements and chemicals utilized in the production of plastics, detergents and other household items. As endocrine disrupters, ecoestrogens are capable of altering the normal functions of natural hormones responsible for regulating animal development, reproduction, immune function and other critical physiological processes. Because of this, exposure to these pollutants has been linked with reproductive and health disorders in a number of wildlife and human populations.

In 2006, ecoestrogens were measured by Mote Marine Laboratory in water samples from Charlotte Harbor, Peace River, Myakka River and the Caloosahatchee. The most significant estrogenic activity was found in the Caloosahatchee. Ecoestrogens were found near other developed areas also.

In 2008, ecoestrogens were measured in the Caloosahatchee and in a fish species called hogchoker (*Trinectes maculatus*). Ecoestrogens do not appear to pose significant health threats to wildlife populations residing in the Caloosahatchee, based on low ecoestrogen concentrations and the apparent lack of ecoestrogen effects in hogchokers found in the Caloosahatchee.

What can you do to help address pharmaceuticals and personal care products?

- Identify outdated products and set them aside for proper disposal.
- Never dispose of PPCPs in your drain or toilet.
- Most Sheriff's offices in the Charlotte Harbor study area offer unwanted medication drop-off sites. Contact your local Sheriff's Office to find your nearest location.

In 2009, Mote Marine Laboratory tested for the presence of steroid, impotence treatment, lipid-lowering drug and six anti-depressant chemicals in water samples, wastewater samples and the blood plasma of bull sharks found in the Caloosahatchee and, as a control, the Myakka River. Presence was often at undetectable or near detectable levels. Detection appears to be associated with the most widely prescribed drugs.

Citizens Toolkit



Photo by David Garrison.

Where can I find it?

Native plants

The Association of Florida Native Nurseries members grow, plant and sell Florida native plants. Visit them at www.afnn.org or call toll free at 1-877/FLA-AFNN.

Native plant information

Excellent sources of Florida native plant information include the Florida Native Plant Society and their many local chapters, county Extension offices and water management districts. There are also many excellent books available on Florida native plants.

Melaleuca mulch

Mulch helps to keep plants moist, adds healthy nutrients to the soil and looks nice while your ground covers grow. We recommend melaleuca mulch because it removes noxious invasive trees from the landscape. We do not recommend cypress mulch. See www.gomulch.com.

Rain barrels and cisterns

County Extension offices offer information, including workshops, on how to construct your own rain barrel. Go to www.ifas.ufl.edu and search "rain barrel."

Local land trusts

Supporting your local land trust is a wonderful way to protect native habitat in your own community. We have many outstanding local land trusts protecting and restoring native lands, including:

- Calusa Land Trust
- Conservancy of Southwest Florida
- Conservation Foundation
- CREW Land and Water Trust
- Green Horizon Land Trust
- Lemon Bay Conservancy
- Wildlands Conservation

Can't find it here? Contact us at chnep@swfrpc.org and we will try to find you the information that you need. See www.chnep.org for our online bibliography and updates to links shown in this report.

Local land acquisition

Several local governments have land acquisition programs. Significant and beautiful examples of Florida's native habitats have been placed into conservation through these programs. See this outstanding work at:

- Conservation Charlotte
- Lee County's Conservation 20/20
- Sarasota County's Environmentally Sensitive Land Protection Program
- Polk County's Environmental Lands Program

Parks

In addition to the wonderful natural areas acquired through the previously mentioned programs, we can enjoy many state, water management district and local parks (see p. 12).

Grants

If you have a great idea regarding stewardship or how to protect water quality, water flows or habitat, the CHNEP offers Public Outreach Grants of up to \$5,000 and micro-grants of up to \$250. To apply, follow instructions at www.chnep.org/Grants/Grants.htm.

Water atlas

Additional data, analyses and information is available at www.wateratlas.com. Select the Charlotte Harbor Water Atlas.

Friends

The Friends of the Charlotte Harbor Estuary, Inc. is the CHNEP's support group. Make a tax deductible donation to support our programs at www.chnep-friends.org or

Friends of Charlotte Harbor Estuary
PO Box 2245
Fort Myers FL 33902-2245

Glossary

Basin

Watershed. An area of land, draining to a common water body.

CDOM

Colored dissolved organic matter. The tea-colored substance in Florida's fresh water made of tannins and other constituents.

CCMP

Comprehensive Conservation and Management Plan. The guiding document for all NEPs.

Chlorophyll

Chlorophyll is a green pigment found in plants, algae and cyanobacteria.

CHNEP

Charlotte Harbor National Estuary Program. One of 28 national estuary programs created by Section 320 of the Clean Water Act.

Shannon-Weiner Index

A commonly used measure of biodiversity. A common range is 0 to 5, with 5 as very high diversity. Charlotte Harbor fisheries' range of 0.07 to 1.7 is typical of such data.

TN

Total nitrogen. Nitrogen is the most abundant element in the atmosphere and necessary to make proteins. TN includes all nitrogen forms, ammonia, nitrites, nitrates and organic nitrogen-proteins and urea.

TP

Total phosphorus. Phosphorus is abundant in Florida and important for making cell membranes, DNA and other molecules. It is found mostly as phosphate and can be available to plants (orthophosphate) or tied to small particles, bacteria and soil.

Turbidity

Turbidity is the cloudiness or haziness in water caused by individual particles (suspended solids) that scatter and absorb light.

Water body

A distinct area of open water such as a bay, river, creek, lake or canal.

Volunteer opportunities

Water quality monitoring

Through the award-winning Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network (CHEVWQMN), citizen volunteers take water quality samples in coastal waters at sunrise on the first Monday of each month. Data collected are astonishingly valuable to scientists who assess the health of area waters. To receive training and to join, call 941/575-5861 or 239/463-3240. Similar opportunities are available with Cape Coral Canalwatch at 239/574-0785 and Lee County Hyacinth Control District Pond Watch Program at 239/694-2174.

Fisheries monitoring

The Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute conducts Fisheries Independent Monitoring (FIM) throughout the Charlotte Harbor estuaries. If you would like to help catch and measure fish and see science in action, call 941/613-0945.



Photo by Catherine Corbett, CHNEP.

Coastal, lake and canal cleanups

Keep America Beautiful, Inc., its affiliated groups, and others offer community cleanups throughout the seven-county Charlotte Harbor area several times every year. Search the web for one in your location or check out the CHNEP Water Atlas events tab at www.wateratlas.org.

Exotic plant removal

Several area organizations, including land trusts, host workdays to remove exotic pest plants such as Brazilian pepper (*Schinus terebinthifolius*) and Caesar's weed (*Urena lobata*).

Oyster reef restoration

Citizen volunteers construct oyster reefs. Approximately twice per year, Florida Gulf Coast University organizes teams of people to place bundled fossil oyster shell at historical oyster reef locations. Contact Dr. Aswani Voley at 239/590-7216.

Scallop monitoring

Citizen volunteers monitor scallop populations in Lemon Bay and Gasparilla and Pine Island sounds. Each summer, Florida Sea Grant extension agents and Sarasota County staff organize the scallop searches. Sarasota County and Charlotte County Sea Grant staff assist Florida Fish and Wildlife Conservation Commission with monthly monitoring of juvenile stages of scallops in Lemon Bay. For more information about the scallop searches, call Charlotte County Sea Grant at 941/764-4346, Lee County Sea Grant at 239/533-7518 or Sarasota County at 941/232-8445.



Photo by Melynda Brown, Florida Department of Environmental Protection.

Environmental condition summary

	Historical Change	Recent Change	Quality
Fish Communities	No abundance change 1996–2010	Diversity loss in shallows 1996–2010	<1% exotic fish
Mercury in Fish	Long-lived fish in all waters Pre-Development–2010	Increasing impairments 2005–2010	Most fish safe to eat, following guidelines
Shellfish Harvest Areas	60% area loss Pre-Development–2010	0% area loss 2005–2010	17% of the time harvest is closed
Seagrasses	5% loss 1950–2008	10% gain 1999–2008	37% severely scarred
Mangroves	9% loss Pre-Development–2005	<1% loss 2004–2008	34% shoreline degraded
Freshwater Wetlands	43% loss Pre-Development–2005	2% loss 1990–2005	1% wet melaleuca
Natural Shoreline Loss	18.5% loss Pre-Development–2005	<1% loss 1995–2005	3% dominated by exotics
Mangrove Trimming	39% urban mangrove trimmed Pre-Development–2010	25% increase in trimming 2005–2010	Mostly hedged, not lifted
Managed Lands	460,000 acre gain Pre-Development–2010	90% recent gain 1998–2010	15% of study area in preservation
Restoration Projects	68,000 public acres restored 2000–2010	50% public project decrease 2006–2010	>365,000 acres privately managed thru ordinances and projects
Caloosahatchee Flows	Flows too high in wet season and too low in dry, 1929–2010	Low flow threshold not met 80% of years, 2000–2010	12% increase in total annual flow 2000–2010 compared to 1929
Peace River Flows	Flows too low 1939–2010	Low flow threshold not met 15%-33% of days, 2000–2010	14% decrease in total annual flow 2000–2010 compared to 1939-1999
Myakka River Flows	Flows too high in dry season 1937–2010	8 more days/year of 0 flow 2000–2010 versus 1937–1999	4% decrease in total flow 2000–2010 compared to 1937–1999
Bacteria	22% impaired Pre-Development–2010	Increasing impairments 2005–2010	6% improvement in station trends
Nutrients, chlorophyll <i>a</i>	18% impaired Pre-Development–2010	Increasing impairments 2005–2010	10% improvement in station trends
Water Clarity	7 in 10 targets not met 1950–2010	4 in 10 show improvement 1998 or 2003–2009	66% seagrasses acreage are in seg- ments rivaling 1950s
Pollutant Loads (Nitrogen)	47% estuarine targets not met 1995–2007	48% improvement 1995–2007 versus 1975–1990	10–30% septic tanks failed

	= satisfactory conditions (better than 10% change)		= cautionary conditions (between 30% and 10% change)		= unsatisfactory conditions (worse than 30% change)
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Habitat, hydrology and water quality have all been degraded in the Charlotte Harbor seven-county watershed. The assault began many decades ago. Recently, we have done well protecting remaining critical habitat, reducing exotic plant invasion and improving hydrology and water quality at specific locations. There is more work to do. Much of the work may require increased education, regulation and enforcement, including reducing prop scars in seagrasses, mangrove trimming, failing septic tanks and nonpoint source pollution. Other work requires significant public projects, much of which is planned, permitted or is under way.

What can you do?

1. Keep your boat and our water clean.

Rinse and scrub your boat hull and decks with a brush instead of using soap. If your boat is stained, use phosphate-free soap or laundry detergent. Take your boat out of the water when doing thorough cleaning, scraping or painting jobs. Always use pumpouts to empty your holding tank.

2. Watch for and keep exotic plants and animals out of our area.

When boating, remove plants and animals from your boat, trailer and other equipment after taking them out of the water. Return unwanted pet reptiles and aquarium fish to the store where you bought them or take advantage of the Florida Fish and Wildlife Commission's Nonnative Pet Amnesty Day events. Never release nonnatives into the wild.

3. Use your car less and never pour anything down the storm drain.

Vehicles are the biggest cause of air pollution in Florida. Oxides of nitrogen from automobiles deposit from the atmosphere and add to nutrient pollution. Oil, grease, metals and car emission contribute pollutants to our waterways. Recycle used motor oil.

4. Keep vegetation and shorelines natural.

Preserve the established native trees around your home. Plant new trees and shrubs that are native to Florida.

5. Use less water.

Replace water-thirsty landscape plants and turf with drought-tolerant native plants. Run only full loads of laundry and dishes. Install low-flow water fixtures, such as showerheads, faucets and toilets, when possible.

6. Cut down on fertilizers and pesticides.

Select native plants that do not require fertilizers. If you must fertilize, avoid the rainy season, choose a fertilizer with slow-release nitrogen and maintain a native plant buffer along shorelines. Follow local fertilizer ordinances.

7. Pick up after your pets.

Police the area where your pets go and pick up after them. Dispose of the waste in the toilet or place in trash in a sealed plastic bag. This helps to keep polluting nutrients and fecal coliform from our waterways.

8. Keep your septic tank in top working order.

Have your system inspected every 2–3 years and get your tank pumped when needed.

9. Reduce impervious surfaces in your yard.

Improve water quality and water flows by reducing the area concrete and asphalt at your home or business. You can replace with pavement materials, such as permeable interlocking concrete pavers, porous concrete or Flexi-Pave™.

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Charlotte Harbor National Estuary Program

1926 Victoria Ave
Fort Myers FL 33901-3414

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