

# 2014 Environmental Benchmarks Report

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Environmental Protection and Growth Management Department  
ENVIRONMENTAL PLANNING AND COMMUNITY RESILIENCE DIVISION  
Climate, Energy and Sustainability Program

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# EXECUTIVE SUMMARY

In 1999, Broward County began to annually review its efforts to protect the environment by creating the Environmental Benchmarks Report. Today, monitoring relevant environmental benchmarks is one way Broward County is addressing its commitment to the Sterling Performance Excellence Challenge known within the County as “Our Best. Nothing Less.” The Broward County Environmental Planning & Community Resilience Division is using benchmarks to demonstrate environmental improvements and impacts. This document presents benchmarks which represent the state of the resource (Climate, Air, Water, Land, and Marine), the pressures on those resources and the responses that reflect how changes in natural resource management initiatives translate into improvements in the environment. Today and into the future, the Broward County Board of County Commissioners continues to recognize the importance of environmental quality as part of the Commission’s Goal to have and maintain a pristine and healthy environment. The general trends in the benchmarks are shown the figure below.



*Figure: Overview of trends in measured benchmarks representing climate, air quality, and water, land and marine resources. To the left of each resource icon is a red, yellow or green circle shaded to represent the current status of the resource. Green signals a healthy resource. Yellow signals pressures of concern.*

## **Report Format**

The report uses flow charts to help demonstrate how a given resource is impacted by specific pressures and the responses that directly address those pressures. Narrative benchmarks discuss resources where quantitative data is not available. The Appendix further explains the benchmark graphs and often provides web pages to visit for more information. We hope you find the 2014 Benchmarks Report user-friendly and valuable in understanding the status of Broward's environment and the efforts to protect it.

## **Climate**

Globally, the level of greenhouse gas, a major contributor to climate change, continues to increase. Locally, we are experiencing both warmer and colder weather. The long term trend at the Key West tide gauge shows rising sea levels. In response to well substantiated and compelling scientific evidence supporting the validity and urgency of climate change and the public's desire for action, the Broward County Board of County Commissioners is working at the internal, community-wide and regional level to mitigate the causes and adapt to the consequences of climate change. The Government Operations Workgroup has progressively reduced the County's carbon footprint. Implementation of the Broward County Climate Change Action Plan and the Regional Climate Action Plan in coordination with the Southeast Florida Regional Climate Change Compact is addressing climate issues across the County and the four-county region.

## **Air**

Outdoor air quality has been consistently good over the last few years during a period of compliance with ozone and particulate matter standards. The number of "good" air quality days in 2014 was 89.6%, still less recorded bests observed in 2000 (97%) and 2011 (95.1%). In 2014, there were 16 days in which the air quality was affected by "an unusual event" (i.e. wild fire or Saharan dust). Pressures on the air quality from mobile source emissions have continued to decrease since 2007; however, the rate of decrease has slowed as a result of minimal changes in vehicle miles traveled and mass transit ridership since 2012.

The percentage of over-capacity roadway segments has decreased steadily since 2002, reaching 12% in 2013. The use of control equipment by power plants (i.e., electrostatic precipitators (ESPs) and low NOx burners) continues to contribute to reductions in emissions in 2011 by over 81% as compared to 2010. Broward County values public education as a vital link in building local community support and advocacy for efforts that enhance the quality of life for its residents. Broward County continues to develop public outreach events such as Air Awareness Month and Car Care Month which increase community awareness and empower citizens to take personal action to protect air quality. Broward County partners with the Broward County School Board in coordinating educational programs for all public schools. Due to events such as the C3 Challenge, the number of people reached through outreach events has nearly doubled in recent years from 14,544 people in 2010 to 24,585 people in 2014.

## **Water**

The water quality status of our surface water resources in Broward County is generally good, however recent water quality data reveal that the phosphorus concentration of discharges leaving the C-11 West Basin via the S-9 pump station are at 14 ppb which is above the goal of 11 ppb. The data may reflect the effects of continued drought conditions over this time period that serve to concentrate pollutants in stormwater discharges from sporadic rainfall events. The Broward Everglades Working Group continued to meet regularly this year to monitor progress relating to implementation of the C-11 West Basin Pollution Reduction Action Plan and associated water quality

improvements in urban stormwater runoff. The Know-the-Flow Public Education Initiative also continued in 2014 under an agreement with SFWMD to support Everglades water quality protection and restoration. On a county-wide basis, as of 2014, only 19.7% of the county remains dependent on septic systems, 66% of developed land is subject to surface water management regulation and the number of miles of streets swept has nearly doubled since 2009. Each of these activities provides for regional water quality benefits. County-wide water conservation efforts strengthened in 2014 with a total of 206 NatureScape landscape certifications being completed to achieve a year-to-date total of 3,606 certifications county-wide. The NatureScape Irrigation Service saved 106 million gallons of water through irrigation system evaluations. Even in light of an 11% reduction in rainfall in 2014 compared to 2013 levels, potable wellfield withdrawals dropped slightly in 2014, due in part to county-wide water conservation efforts. This serves to further reduce consumptive use pressures on the Biscayne Aquifer, our principle source of drinking water. However, despite the increase in water conservation efforts, a greater percentage of groundwater monitoring wells now show increases in chloride levels, indicating further progression of saltwater intrusion into the Biscayne Aquifer. The County continues its efforts to assess the relative influences of climate and water management operations on saltwater intrusion and is exploring means for managing saltwater intrusion through aquifer recharge. Regional efforts to ensure the preservation of existing water supplies and the timely development of new water sources are also taking place. Since 2008, the Broward Water Resources Task Force has convened to develop recommendations for regional water supply projects and water conservation strategies. At the same time, the Broward Leaders Water Academy was launched to provide elected officials and business leaders with a better understanding of the water resource constraints and opportunities we face as a community and to help ensure well-informed policy and economic decision-making. Overall, regional efforts targeting water quality improvements, water conservation, and water supply planning have all expanded during the last year and regional coordination in water resources activities is expected to be increasingly important part of a successful long-term strategy for meeting future natural system and urban water supply needs throughout the County.

Solid waste production and solid waste production per capita have increased and the percent of solid waste recycled has decreased. Due to high rates of contamination within collected waste for recycling, there is concern for the future sustainability of the recycling industry. Solid waste production and lack of recycling are critical pressures that need to be addressed in the near future. The number of licensed hazardous material and storage tank facilities have increased over the past year. The number of licensed hazardous material sites that have been inspected and found to be in compliance has declined. These numbers, taken together with comments received from the regulated community, demonstrate increasing recession-related financial pressures on Broward businesses. Progress continues on completing cleanup of known potential contaminated sites (now at 58.7% of known contaminated sites cleaned up), continuing an upward trend. Due largely to reductions in staff in previous years, there is a reduction in the number of sites inspected annually.

## **Land**

Prior to development, Broward County was a rich mixture of uplands and wetlands. The western two-thirds of Broward County have been set off as Water Conservation Areas and are in the process of being restored through the Comprehensive Everglades Restoration Plan. The eastern portion of Broward County, approximately 440 square miles, currently supports approximately 1.7 million people which place tremendous stress on the remaining natural lands and pervious areas which serve and wildlife refuges, parklands and aquifer recharge areas.

In recognition of the need to preserve these lands and their biological functions, Broward County residents passed the Safe Parks and Land Preservation Bond referendum in November 2000 which provided for renovation of our park system and acquisition of natural lands and open spaces. As of 2014, the County has 26,320 acres of protected lands and 1,303 acres of unprotected developable lands.

Additionally, the County has provided several programs to improve the urban areas for wildlife habitat and neighborhood aesthetics. The NatureScape Broward program continues to support landscaping by residents and communities create Florida-friendly landscapes that conserve water, protect water quality, and create wildlife habitat.

In addition to the strain on our resources by our population, tropical storms and hurricanes have altered Broward County natural and urban landscapes in the past. Fortunately, no major storms have impacted the county over the past eight years allowing our natural lands and urban tree canopy to recover. Research after Hurricane Wilma has suggested that certain tree species provided better wind resistance and by altering our landscaping palette it is hoped that future storms will be less devastating to our region.

For the purpose of looking at the environmental features of our land resources we are approaching them in two ways. One is the quantity and quality of our natural lands which are those lands that preserve habitat for indigenous plants and animals in historically existing community types. The other significant land resource is in our urban landscape. These resources are under significant pressure from a variety of sources including physical development, hydrologic stress, exotic plants and animals, fire suppression, littering, dumping and contamination and even weather events. The County, as well as many other organizations, has taken a variety of steps to respond to these pressures and maintain the value of our land resources as high as possible.

### **Marine**

Broward County's marine resources are fundamental to the area's economy, environment, and quality of life. For the purposes of these benchmarks, our marine resources include a variety of nearshore and offshore coral reefs, 24 miles of sandy ocean beach, and the presence of endangered and threatened sea turtles and manatees. In order to track the quality and quantity of our marine resources, and to enable actions in support of protection, restoration, and enhancement of the resources, the County monitors and actively manages the reefs, beaches, and listed wildlife. Observed fish species diversity on the reefs continues to increase (>93 species), reef fish populations have rebounded, reversing a declining trend observed since 2008. Live coral coverage on the first reef has stabilized in recent years, but is still less than coverage in 2004-2005. Storm activity and impacts during 2004-2005 may have influenced sediment transport and coral health. In 2014, the number of turtle nests have increased since 2011 (3,049 nests in 2014). Florida manatee population has been greater the last four years than the recent past.

High population density, resource use, and coastal build-out result in a number of pressures on the marine resources. These include over-fishing and large numbers of boaters; commercial maritime traffic; inlet-caused beach erosion; beachfront and waterfront development and redevelopment; nutrient-laden runoff and treated wastewater effects on ecosystems in coastal waters; and increasing numbers of residents and visitors. Add to these anthropogenic impacts the naturally occurring cycles of storms, temperature extremes, water quality fluctuations, and harmful algae blooms, and it is clear that these fragile marine resources are at risk. Quantitative trends with respect to these impacts are sometimes difficult to discern due to natural variability and the confounding effects of large-scale events such as hurricanes, upwellings, or synoptic-level temperature events, and in some cases, it may also be difficult to clearly define a single cause of damage to a particular resource. In response to these real and potential risks and damages, the County undertakes a multitude of actions intended to ascertain trends and causes; to mitigate existing impacts to reefs, beaches, and listed wildlife; to prevent future impacts; and to restore resources which have been damaged.

# INTRODUCTION

## PROGRAM PURPOSE

In 1999, one of the County Commission's *New Vision* goals was to review efforts to protect the environment and develop a comprehensive environmental strategy. The Broward County Environmental Protection and Growth Management Department (formerly the Environmental Protection Department) initiated the Benchmarks Program to demonstrate environmental trends. A benchmark is a standard by which to judge or measure something. The benchmarks program strives to judge how the environmental quality of life in Broward County has changed with time. These benchmarks measure how changes in natural resource management initiatives translate into changes in the environment. These benchmarks reflect the Broward County Board of County Commissioners' commitment to a pristine and healthy environment.

## INDICATORS AND PERFORMANCE MEASURES

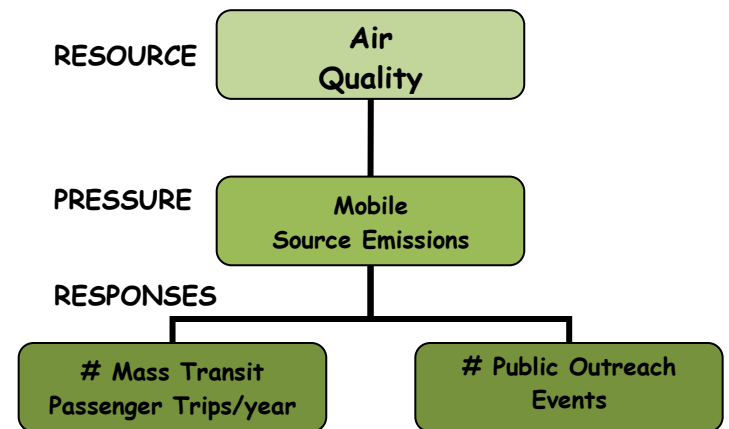
A variety of "indicators" have been selected to evaluate the state of the environment. For instance, we selected "ambient air quality" as an indicator of the health of our air resources. For each indicator, we developed one or more "performance measures" to assess changes in the indicator. In this example, "the percentage of days when the air quality was rated as 'good'," is the performance measure.

## RESOURCE-PRESSURE-RESPONSE CONCEPT

The example performance measure above is useful for tracking the condition of the air *resource*. From a resource management perspective, however, we must be aware of the *pressures* or driving forces that influence air quality. By maintaining awareness of the pressures that influence the resource and how they are changing, we can strive to formulate *responses* to help mitigate adverse impacts on the state of the resource. Continuing with the example, the performance measure "number of vehicle miles traveled" would be an example of a pressure performance measure; vehicle emissions are one of the most significant sources of air pollution. Then we might strive to promote the use of mass transit or use of vehicles that run on cleaner fuels such as electricity or propane to mitigate this impact. This leads to response-type performance measures such as "the number of mass transit trips per year."

## NATURAL RESOURCE CATEGORIES

The Benchmarks Program concentrates on four primary natural resource categories: *climate, air, water, land* and *marine*. For each of these resources, we have identified one or more resource, pressure and response benchmark measures. If historical data is available, we chart it to show trends. For newly-formulated performance measures, historical data may not be available. In these cases, we plot first year baseline data and trends will become evident in future reports. Narratives explain trends in policies, regulation or issues that cannot currently be quantified to give a broader perspective on the status of the resources. The flow charts at the top of each benchmark's page and shown here, provide a visual representation of how the responses and pressures are connected to a specific resource.



Example of a Benchmark Flow Chart

## DATA COLLECTION INTERVALS

When it is available, we will present new data annually noting whether the data is collected for the calendar year, County fiscal year (ending September 30) or State fiscal year (ending June 30). Some data, however, is not available on an annual basis.

## INDICATOR OVERLAP

Sometimes an indicator may reflect upon more than one resource. For instance, development pressure as measured by the number of building permits, affects both land and water resources. When such overlap occurs, we show the indicator in both sections.

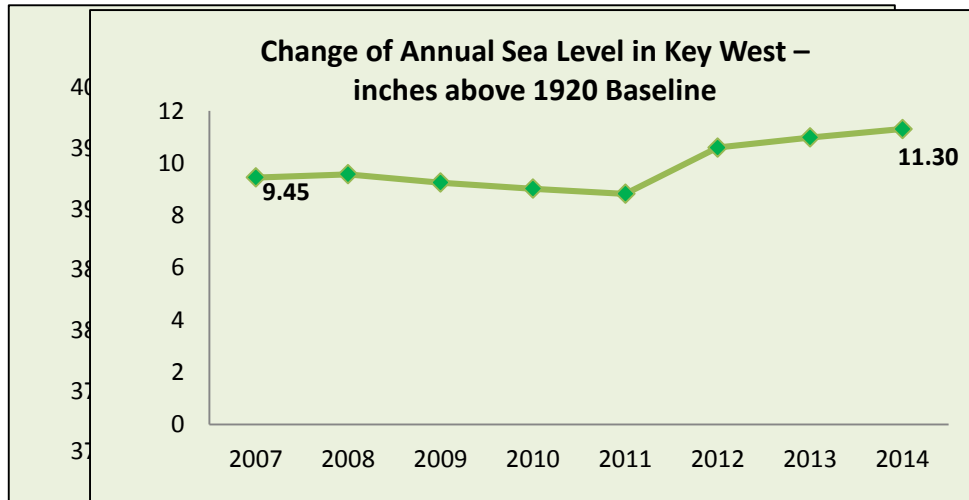
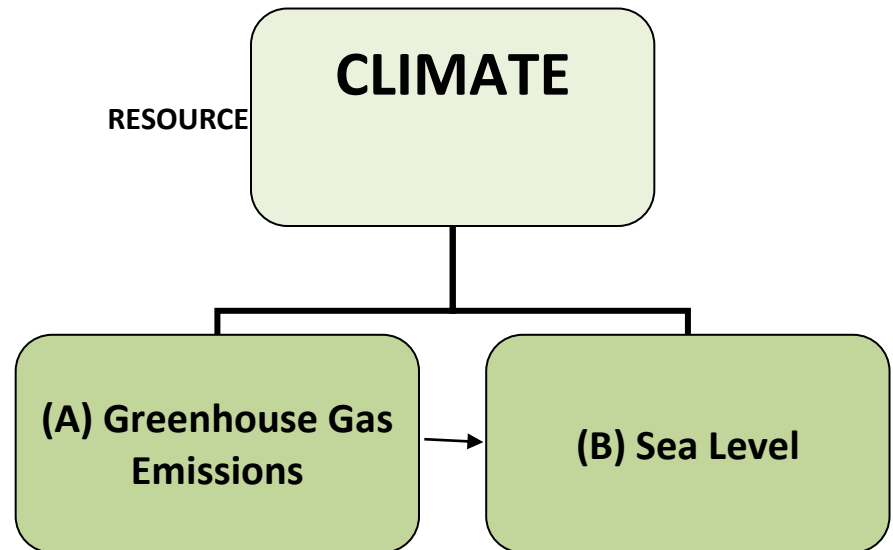
## ENDNOTES

The appendix of the report is *Endnotes*. Each benchmark has an associated set of endnotes which is comprised of four sections: (1) *measurement or narrative*, (2) *explanation*, (3) *trends* and (4) *data source*. The *measurement* provides some detail on how we calculated the specific performance measure or why it is included as a narrative. The *explanation* describes the significance of the performance measure with respect to how it might impact the resource. The *trends* section comments on how and why the benchmark has changed over time. Finally, the *data source* provides contact information for readers wanting additional information on the performance measure. You may contact EPCRD at (954) 519-1295 to obtain the data for any of the charts in this document.

We hope you find the report interesting and informative. This document may also be found on the Broward County web page under [Environmental Protection and Growth Management Department](#).

# CLIMATE RESOURCES

**Climate.** Global climate change has emerged as a phenomenon of critical concern worldwide. According to the Intergovernmental Panel on Climate Change: warming of the climate system is unequivocal; global concentrations of greenhouse gases (GHG) have increased markedly as a result of human activities; global air and ocean temperatures are increasing; and average sea level is rising globally. Climate change is very much a part of any current discussion regarding the environment. Climate change is a global phenomenon with significant regional impacts. This section describes local indicators of the climate change, local contributors of greenhouse gases and ways that Broward County Government is responding to this growing environmental concern.



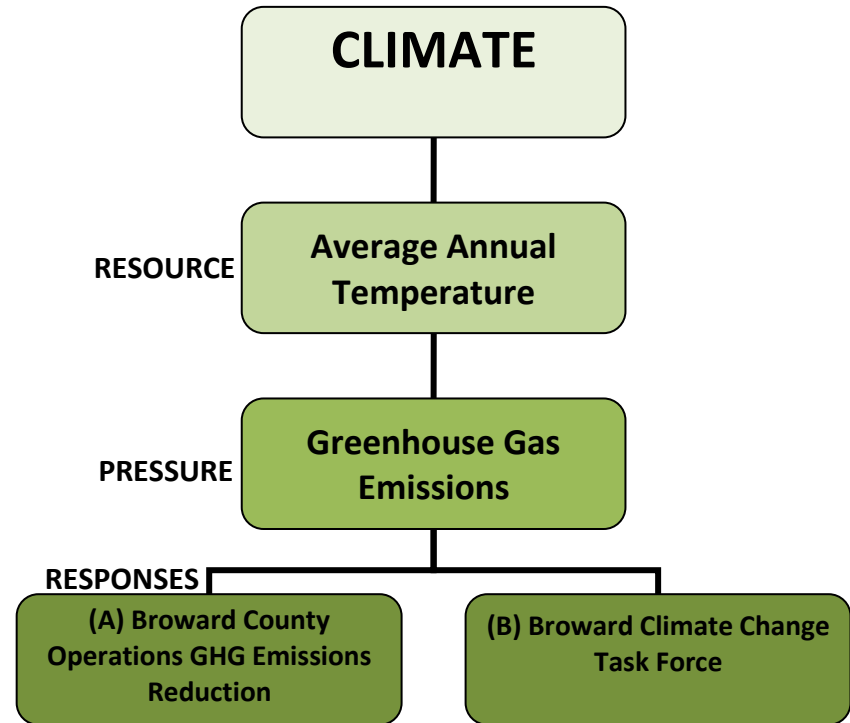
# PRESSURES ON CLIMATE

**Greenhouse Gas Emissions Generated in Broward County** - Emissions from a variety of sources create carbon dioxide and other so called “greenhouse” gases (GHG). The ratio of these gases in the atmosphere is changing in such a way as to increase global temperature. GHG emissions in Broward County come from a variety of sources including vehicles, energy consumption, and waste generation.

**(A) Broward County Government Operations Greenhouse Gas Emissions Reduction** - On June 12, 2007, the Broward County Board of County Commissioners adopted Resolution 2007-391 to reduce emissions in Broward County and to support the U.S. Mayors’ Climate Protection Agreement. The first action was to develop an action plan and provide recommendations on Broward County government operations GHG reduction strategies (Broward County Government Operations Climate Change Report available at [www.broward.org/air/broward\\_county\\_climate\\_change\\_report.htm](http://www.broward.org/air/broward_county_climate_change_report.htm)). Values of GHG emissions are reported in metric tons (tonnes) of carbon dioxide equivalent (eCO<sub>2</sub>).

- Deviation from annual average temperature in Fort Lauderdale from 1950-1970 baseline, 1.46 degrees in 2013.
- Broward County government operations greenhouse gas emissions, 253,420 tonnes CO<sub>2</sub> equivalent in 2012.

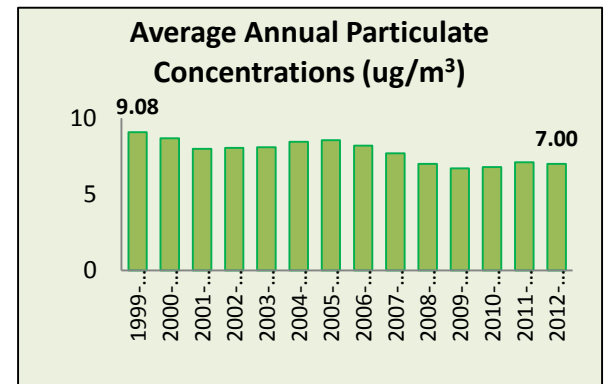
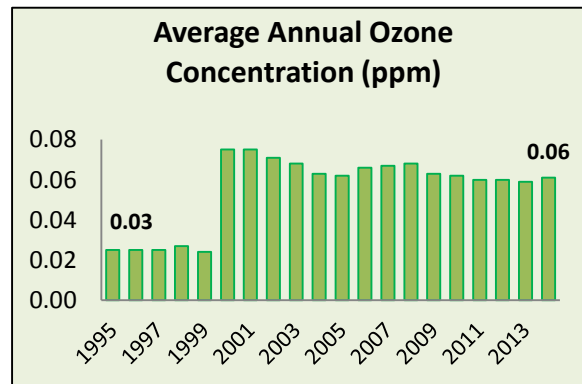
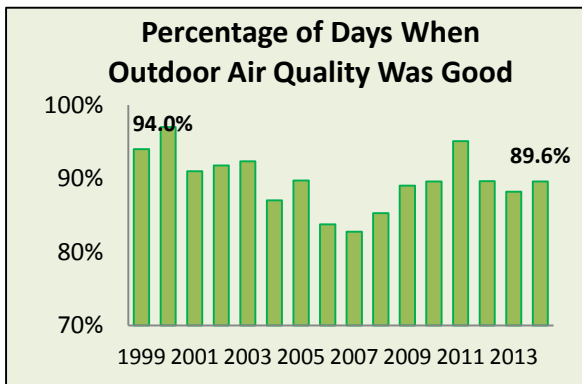
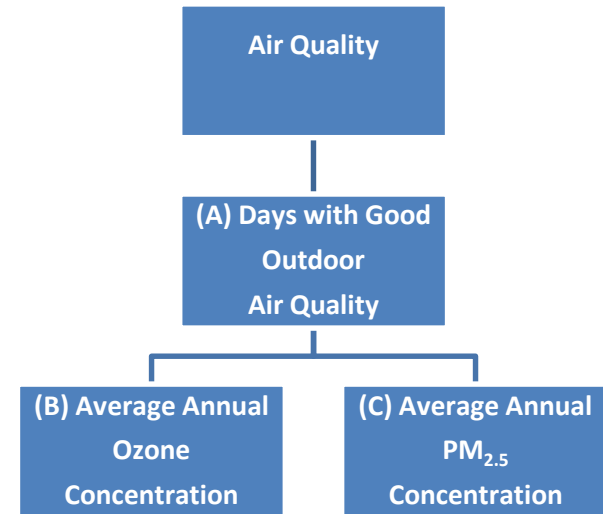
**(B) Broward County Climate Change Task Force** - On June 24, 2008, the Broward County Board of County Commissioners approved Resolution 2008-442 to create a Broward County Climate Change Task Force with the purpose of developing a countywide Climate Change Mitigation and Adaptation Program. The Task Force now convenes to support the implementation of the Climate Change Action Plan to mitigate the causes of climate change and addressing the local implications.





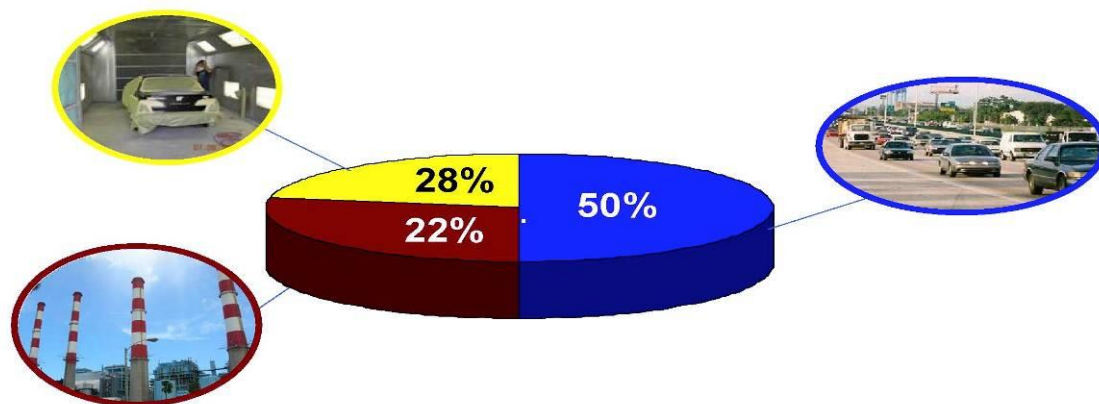
# AIR RESOURCES

**Air is essential for life.** In South Florida, we depend on clean air to allow residents and visitors to enjoy the warm weather and many natural resources the area has to offer. The Air Quality Program determines the air quality by measuring parameters which have the potential to impact human health and the ecosystem around us. A number of different parameters are used to generate an air quality index reading – a single number which tells us if the air quality is healthy or not. Two of the major parameters which impact the air quality index are the ambient concentrations of ozone gas (a byproduct of emissions, sunlight, and heat) and PM<sub>2.5</sub> (particulate matter of aerodynamic diameters less than 2.5 mm which can travel deep into the lungs).



# PRESSURES ON AIR QUALITY

**What influences air quality?** In Broward County, the main culprits are emissions from both on-road and non-road mobile sources (i.e., motor vehicles, trucks, construction equipment, and lawn equipment). However emissions from major industries (i.e., large industries, power plants, and petroleum terminals) and small facilities (i.e., gas stations, dry cleaners, and auto body shops) also add to the pollution burden of the air over Broward County. Infrequently occurring extraordinary natural and anthropogenic events (i.e., Saharan dust, wild fires, and vegetative debris burning) can also have significant effects as well.



## ■ Mobile Sources

A moving source of pollution

### On-road

Examples: cars, trucks, motorcycles

### Non-road

Examples: boats, trains, lawn-mowers, construction equipment

## Stationary Sources

A place or object from which pollutants are released and which does not move around.

- **Major Industry:** A stationary source that emits or has the potential to emit any pollutant regulated under the Clean Air Act at a significant emission rate.

Examples: power plants, petroleum terminals

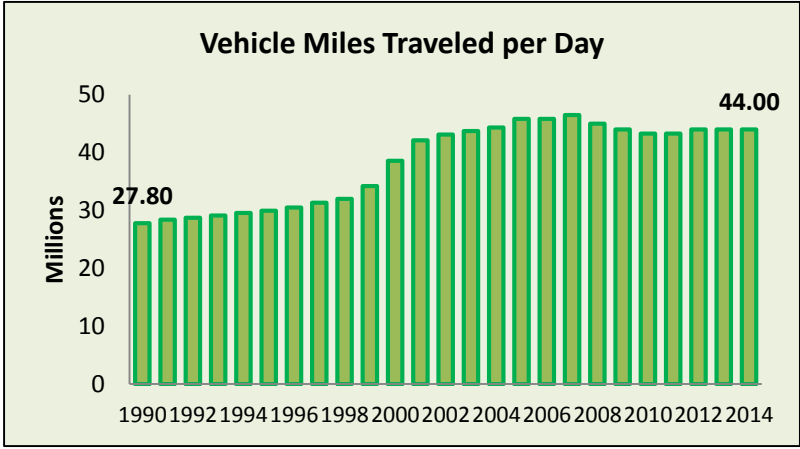
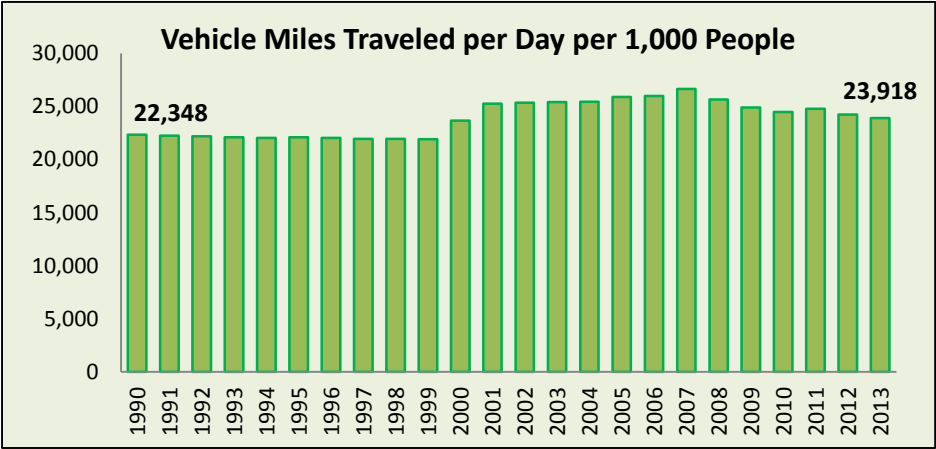
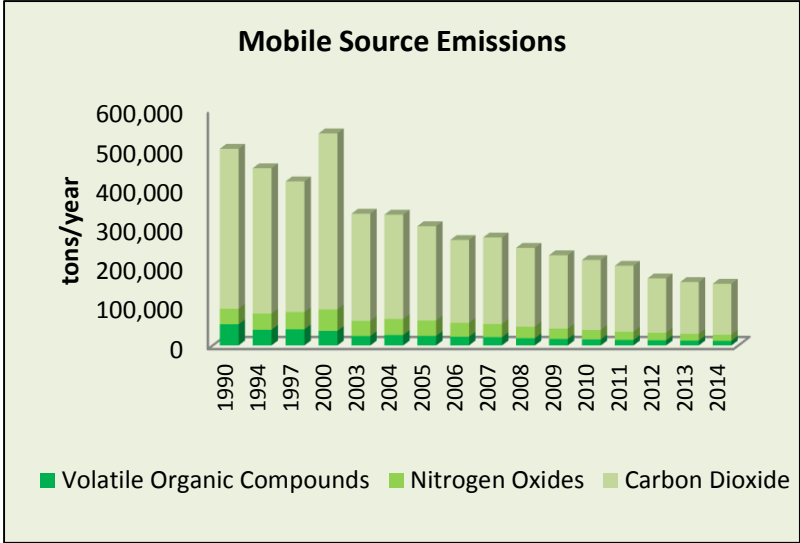
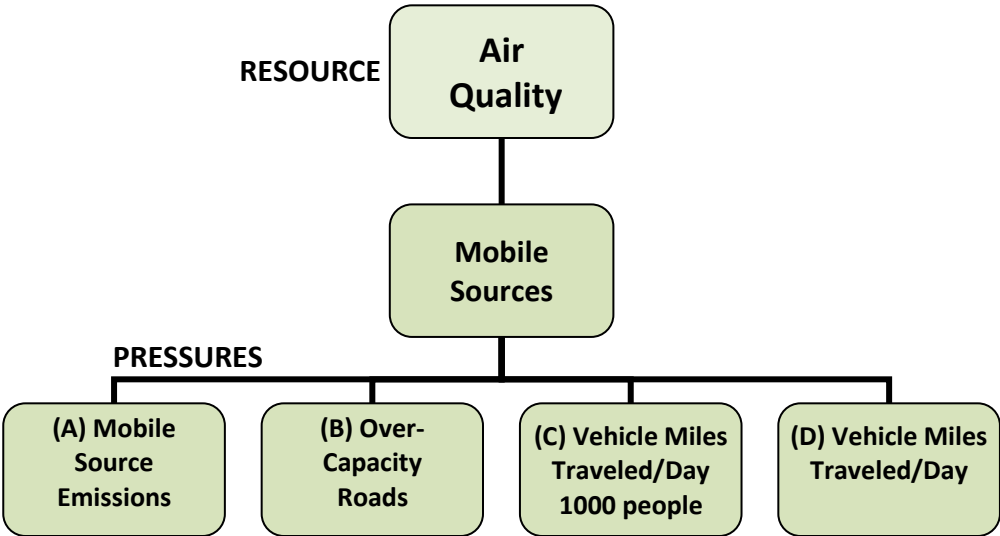
- **Small Operations:** A stationary source that emits small amounts of air pollution.

Examples: dry cleaners, paint spray booths



Regulated Air Curtain Incineration of Debris from Hurricane Wilma

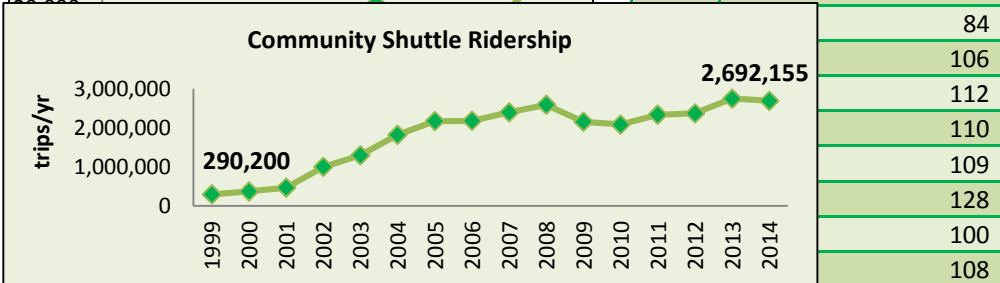
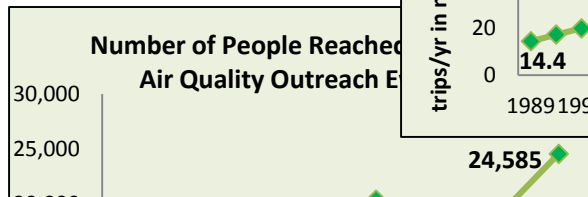
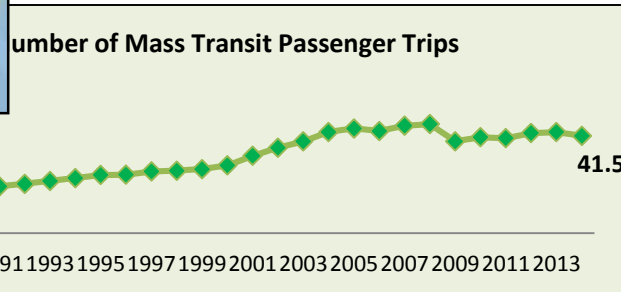
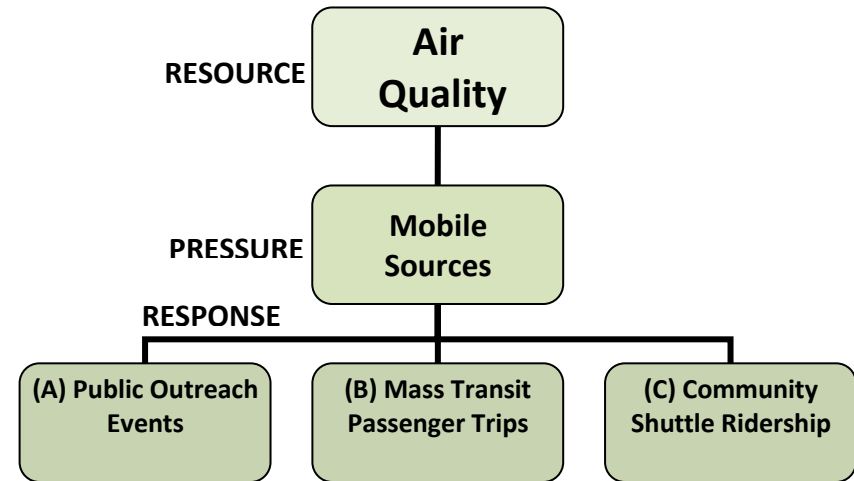
# PRESSURES ON AIR QUALITY – Mobile Sources



The over-capacity roadway segments metric provides a more comprehensive picture of how vehicular traffic and the adequacy of the roadway system can affect the environmental quality of life in a county experiencing continuing urbanization. The percentage of over-capacity roadway segments was 12 percent in 2013.

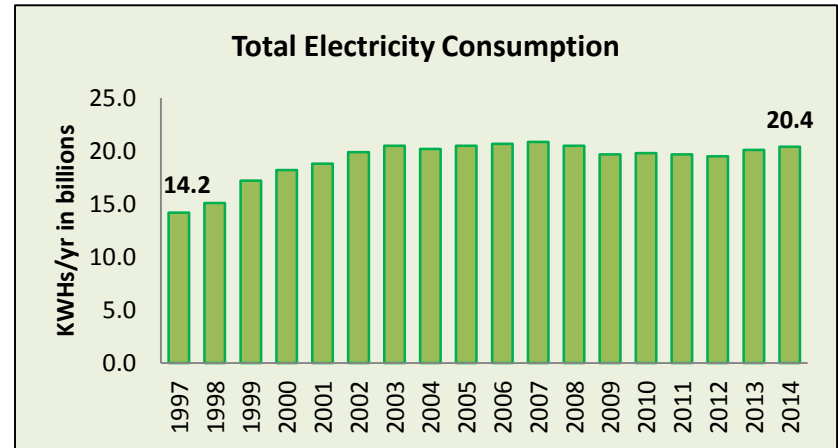
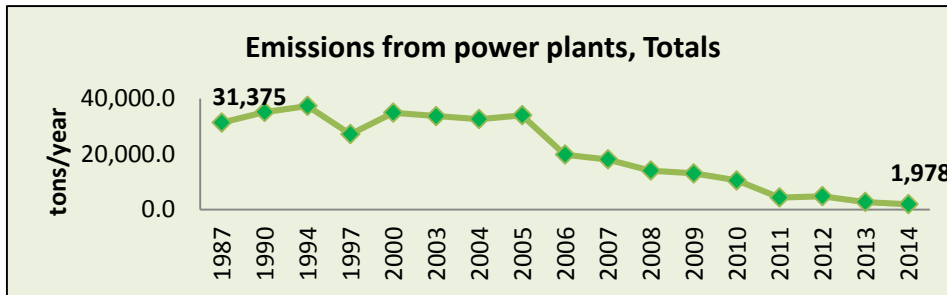
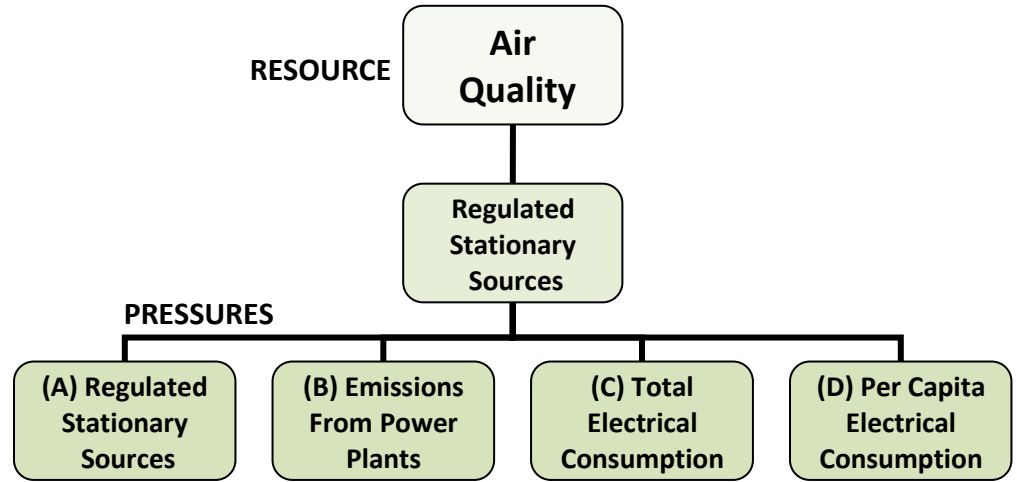
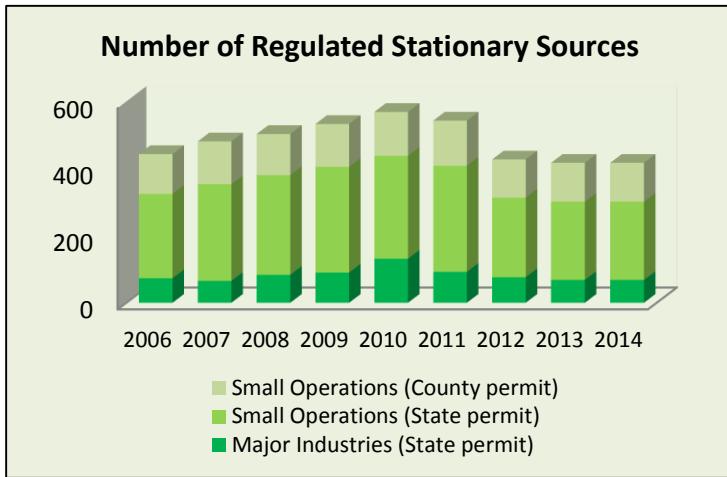
# RESPONSES TO PRESSURES ON AIR QUALITY – Mobile Sources

**Mobile Sources** - To reduce the impacts of mobile sources on quality, development and implementation of strategies to reduce the number of vehicles on the road and their associated emissions are important to protect air quality. Actions that support vehicle reduction include educating the public about air quality issues and promoting the use of mass transit (i.e. buses and Tri-Rail), carpooling, vanpooling, ridesharing and the use of alternative fueled vehicles.



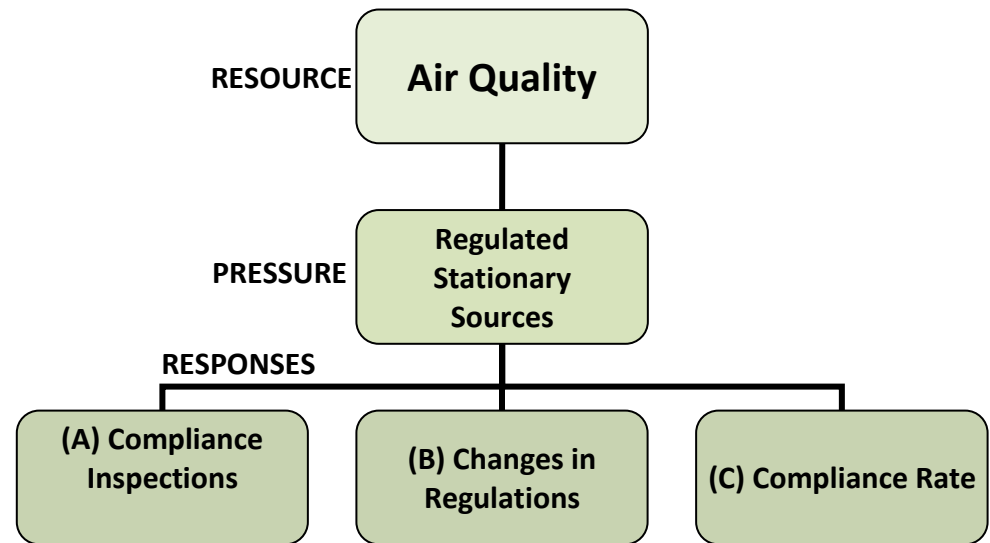
2005	113
2006	116
	84
	106
	112
	110
	109
	128
	100
	108

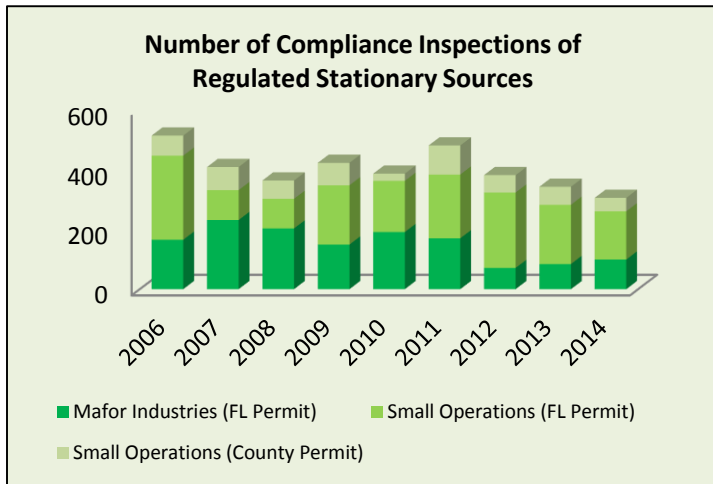
# PRESSURES ON AIR QUALITY – Regulated Stationary Sources



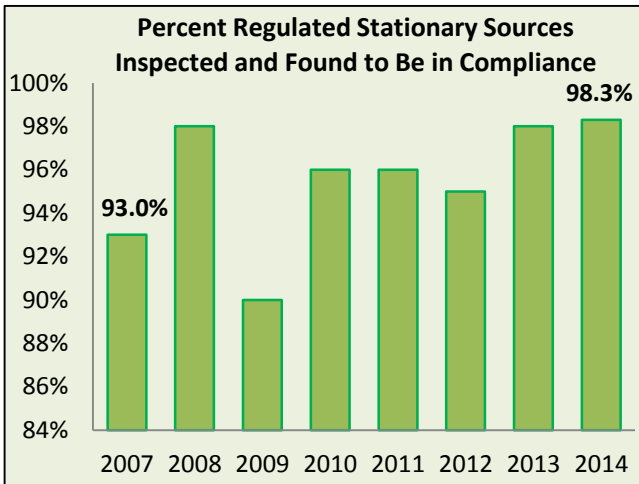
- **Per Capita Electrical Consumption**, in 2012, 9,360 kwh/yr.
- **Emissions from Power Plants, CO**, in 2013, 375.7 tons/year.
- **Emissions from Power Plants, NOx**, in 2014, 1996.3 tons/year.
- **Emissions from Power Plants, PM**, in 2013, 129.6 tons/year.
- **Emissions from Power Plants, SO2**, in 2014, 11.7 tons/year.
- **Emissions from Power Plants, VOCs**, in 2013, 4.5 tons/year.
- **Mobile Source Emissions, totals**, in 2014, 157, 230 tons/year.

# RESPONSES TO PRESSURES ON AIR QUALITY – Regulated Stationary Sources



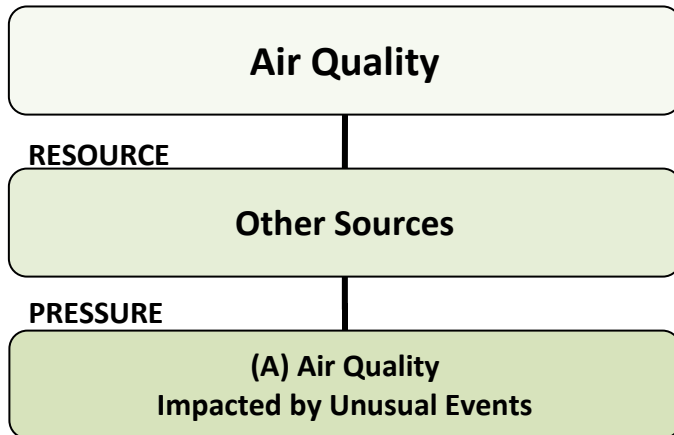


**(B) Changes in Stationary Source Regulations** – The Federal, State, and local regulations governing air quality are frequently updated as needs change.

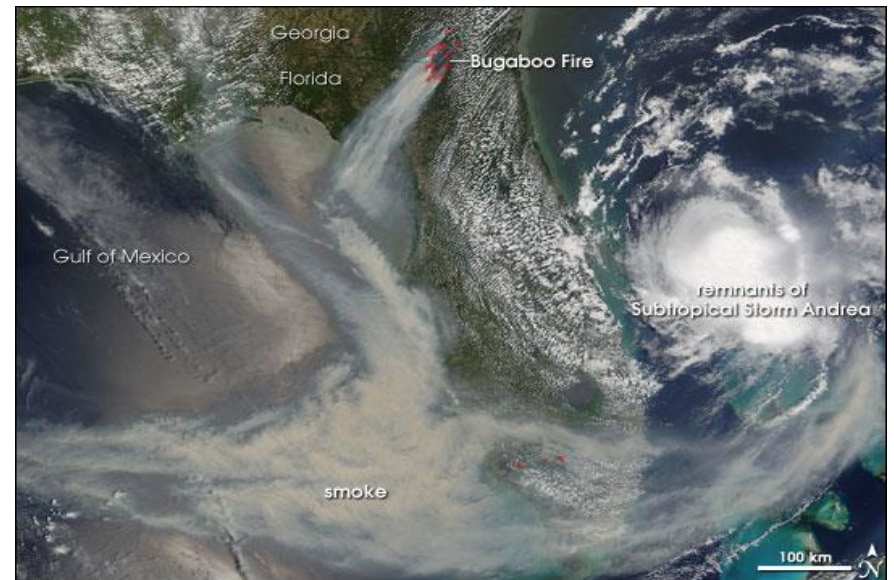
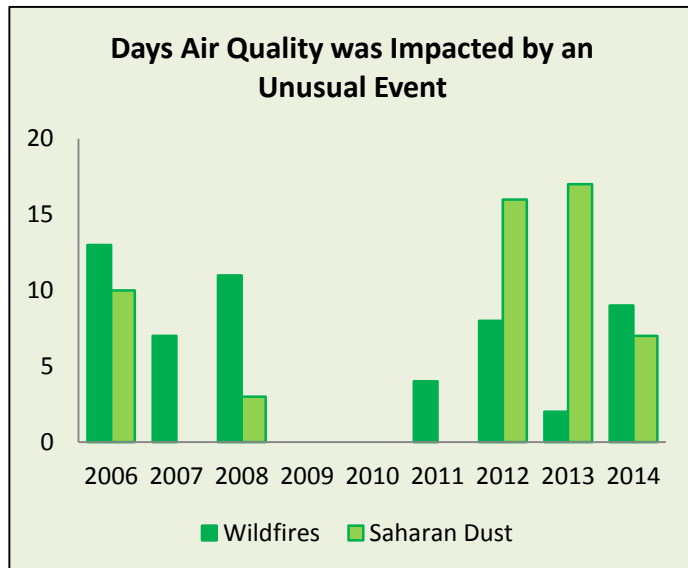




# PRESSURES ON AIR QUALITY – Other Sources



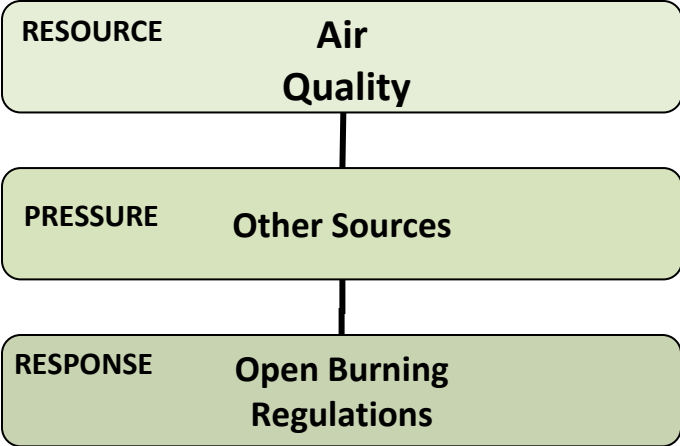
**Air Quality Impacted by Unusual Events** – Large quantities of dust, originating in the African Sahara desert, are periodically blown across the Atlantic Ocean and can, on certain days, impact air quality. Other factors, such as fireworks, wildfires, and open burning, can also have an effect on the air quality in Broward County. Tracking of these events began in 2006.



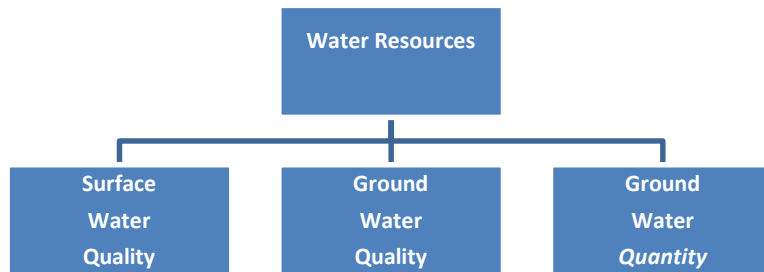
*Courtesy of the National Aeronautics and Space Administration (NASA) MODIS Rapid Response Team, Goddard Space Flight Center*

# RESPONSES TO PRESSURES ON AIR QUALITY – Other Sources

**Open Burning Regulations:** In Broward County, open burning is regulated under Broward County Code Chapter 27, Article IX. To reduce the impact of smoke from open burning operations in Broward County, open burning is subject to required operational practices including minimum set-back distances and prohibitions on certain materials. Broward County also coordinates with local officials and agencies to ensure comprehensive compliance with all open burning regulations. In the unusual event of a nearby large-scale fire (e.g. wildfires, forest fires, burning of sugar cane fields) that affects air quality in Broward County, the Broward County Air Quality Program issues public health advisories through the Air Quality Index, EnviroFlash, and local press releases.



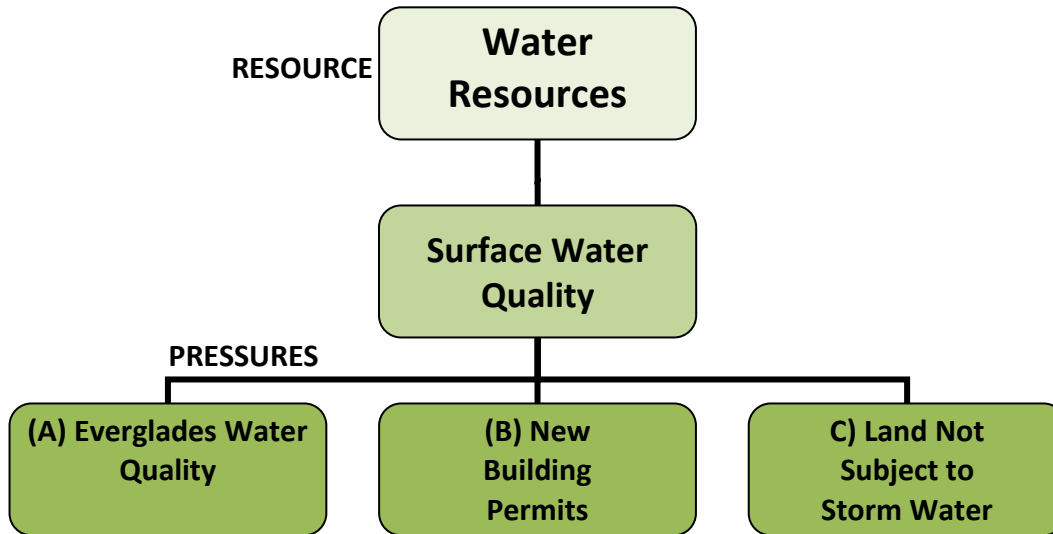
# WATER RESOURCES



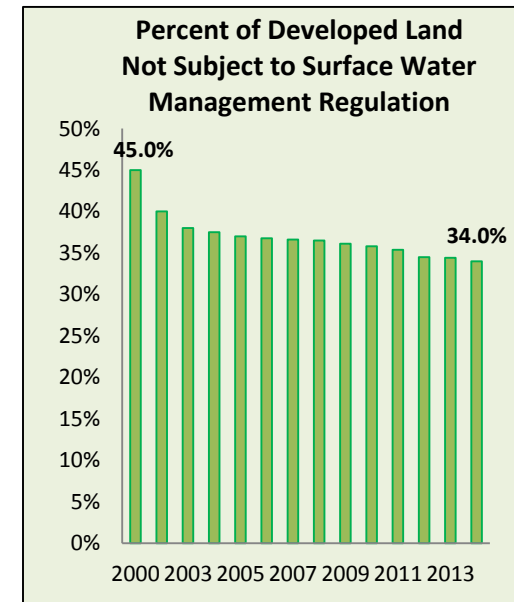
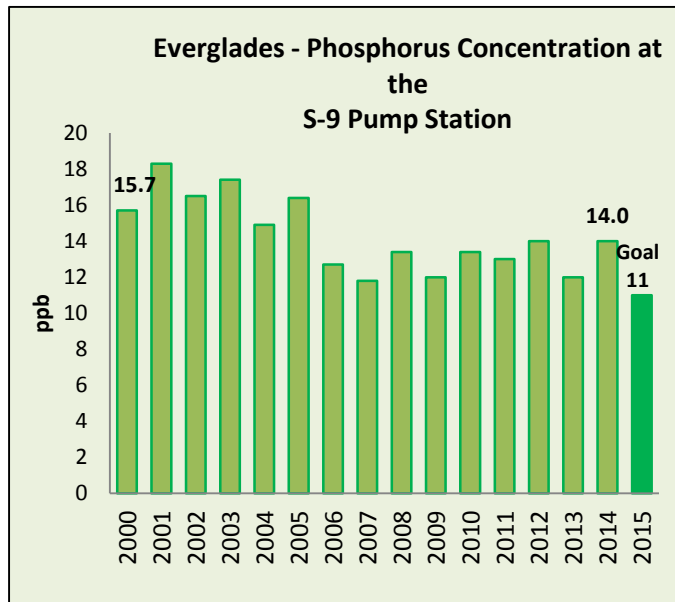
**Water** is what makes our planet unique. The availability of an adequate supply of clean water is one of the primary criteria that allow human and ecological communities to exist in a given location. South Florida hosts a network of canals, an underground source of drinking water called the Biscayne Aquifer, and distinct cycles of seasonal and annual rainfall. A growing human population is competing with the Everglades and urban wetland, upland and coastal ecosystems to use these resources for drinking water, recreation and irrigation, and has the potential to greatly influence the quality of water reaching these natural areas.



# PRESSURES on WATER RESOURCES – Surface Water



**Surface Water** - Surface water includes our vast network of urban canals and lakes, the brackish estuarine waters of tidal rivers, the Intracoastal Waterway, and the natural areas that encompass the Everglades ecosystem. The water quality requirements and standards differ among these different environments. In this section, we see how the existing water quality compares to the 2010 goal.



# RESPONSES TO PRESSURES ON SURFACE WATER QUALITY

RESOURCE

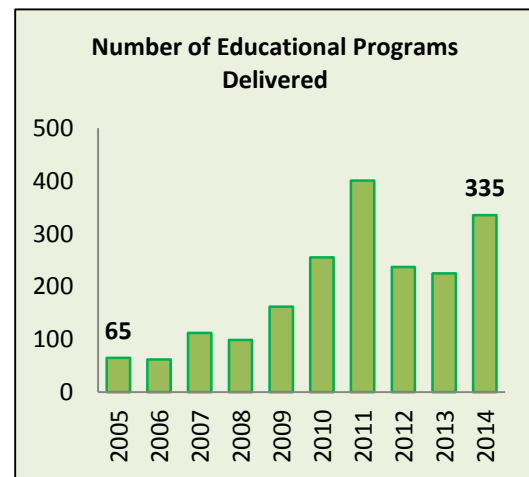
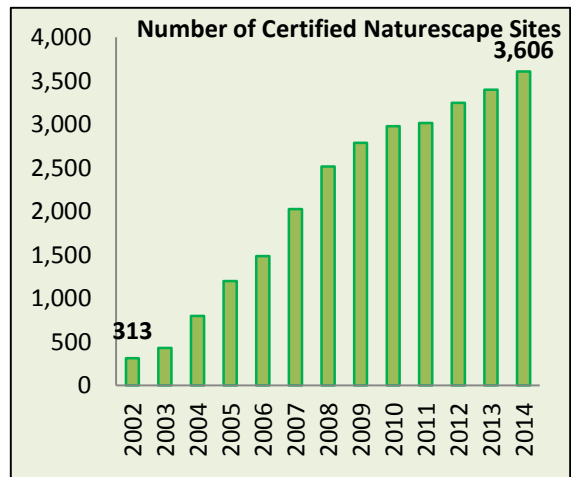
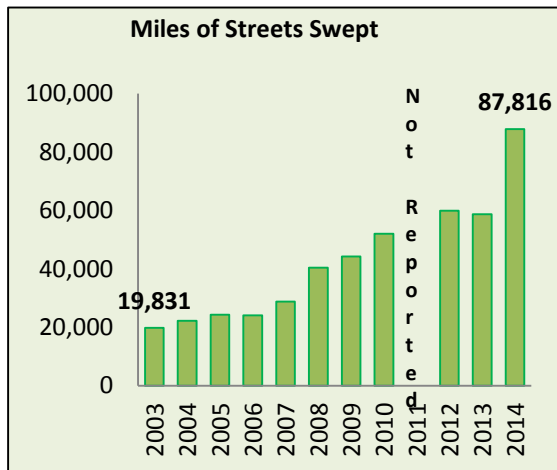
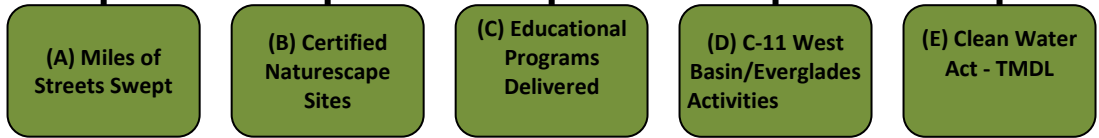
Surface Water Quality

PRESSURE

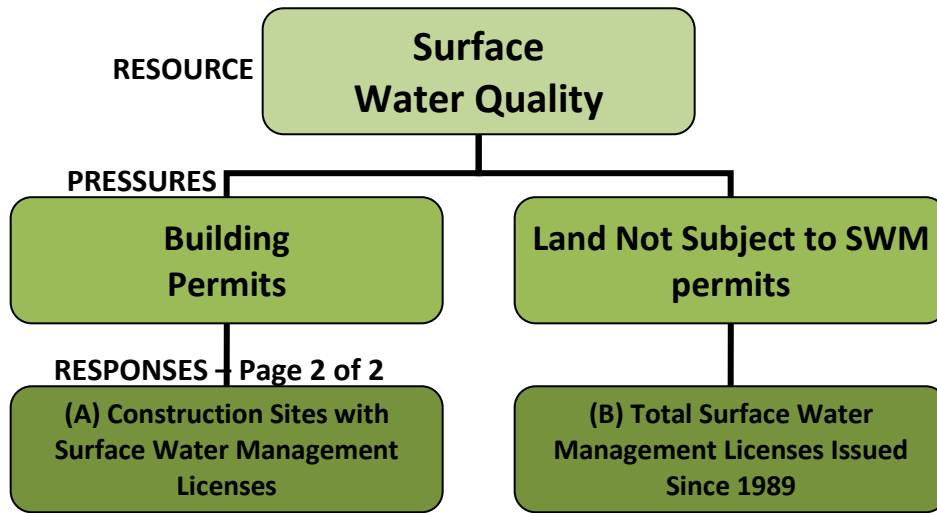
Urban Runoff

**Urban Runoff** is water moving over the ground as a result of rainfall or excess irrigation. As the runoff moves, it picks up and carries natural and human-made pollutants, eventually depositing them in rivers, canals, and coastal waters.

RESPONSES- Page 1 of 2

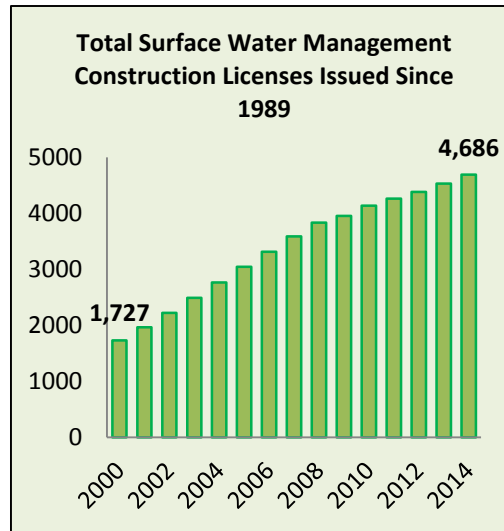
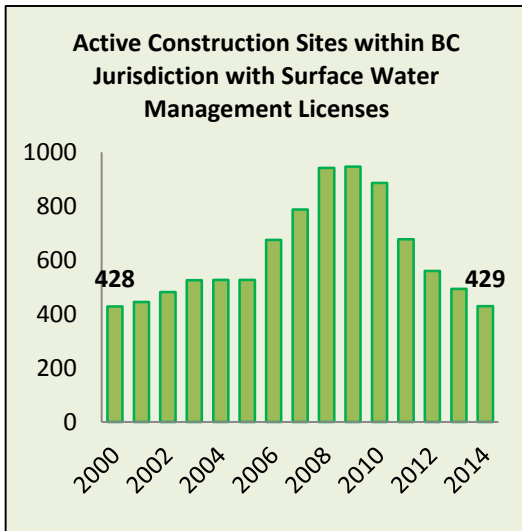


# RESPONSES TO PRESSURES ON WATER QUALITY – Surface Water

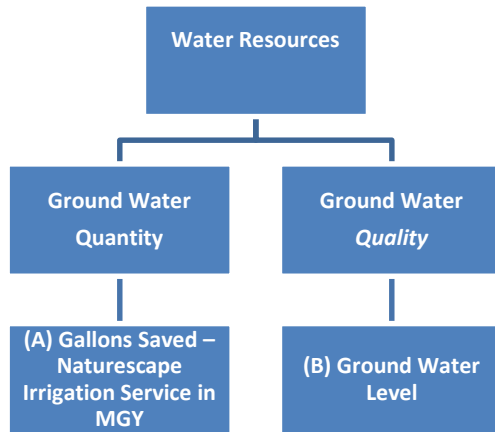


- The Number of Broward County issued surface water management renewal licenses, in 2014, 455.
- Number of construction site inspections performed in areas of BC jurisdiction, 329 in 2014.

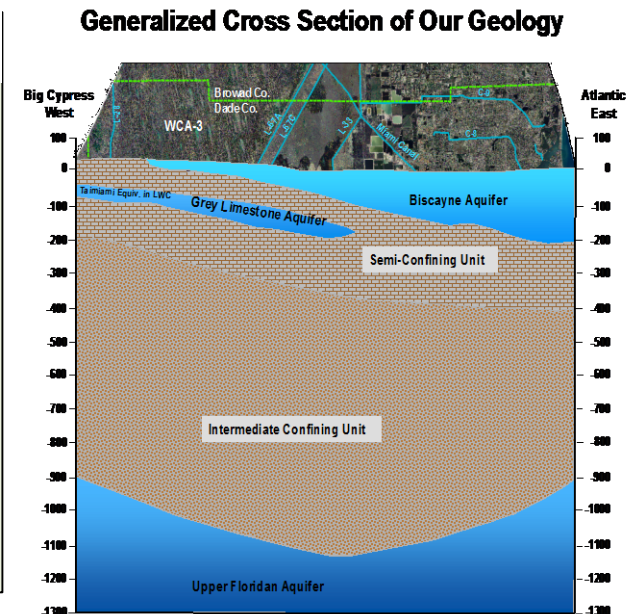
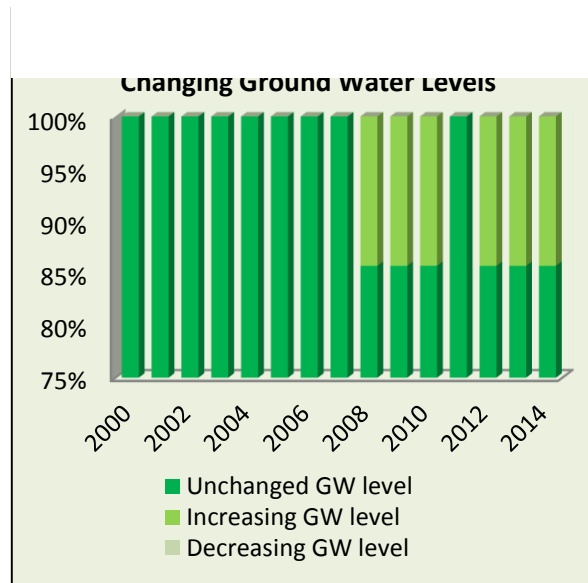
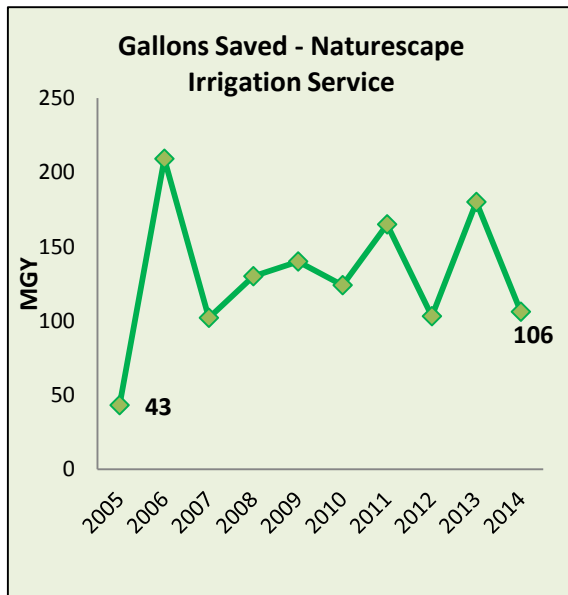
**Construction Activities and Surface Water Management (SWM) Licenses** – Inspection of sites during construction ensures that muddy runoff does not end up in our waterways. The SWM license ensures that only pre-treated storm water leaves the site after construction.



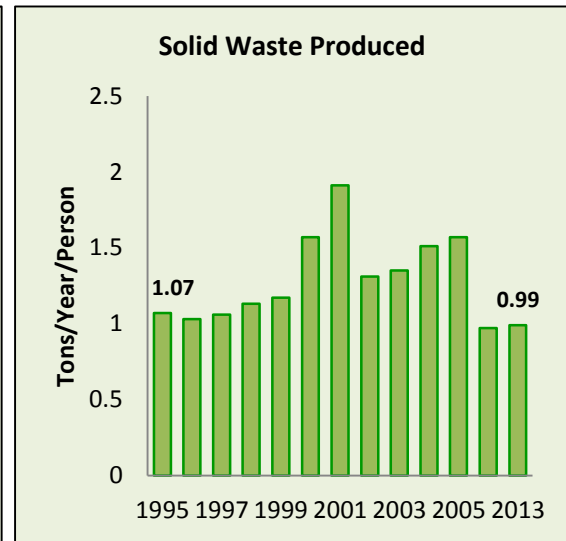
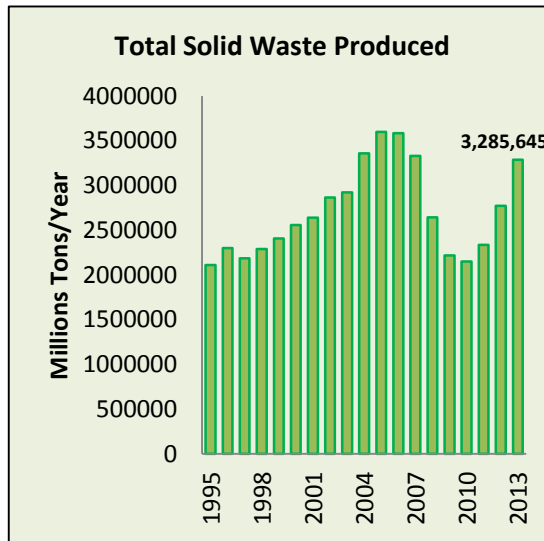
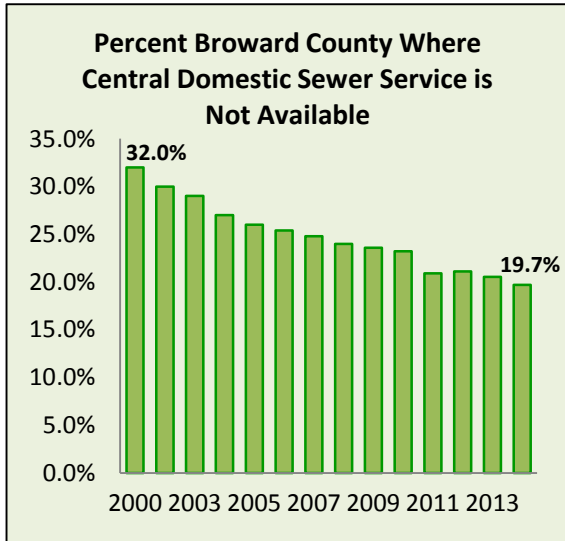
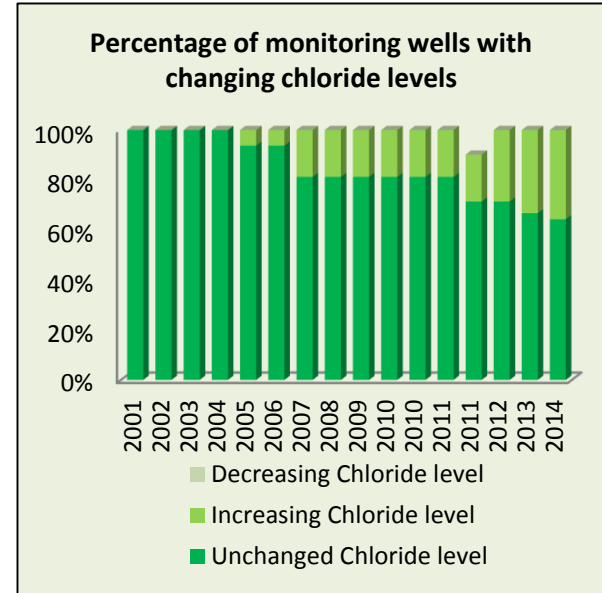
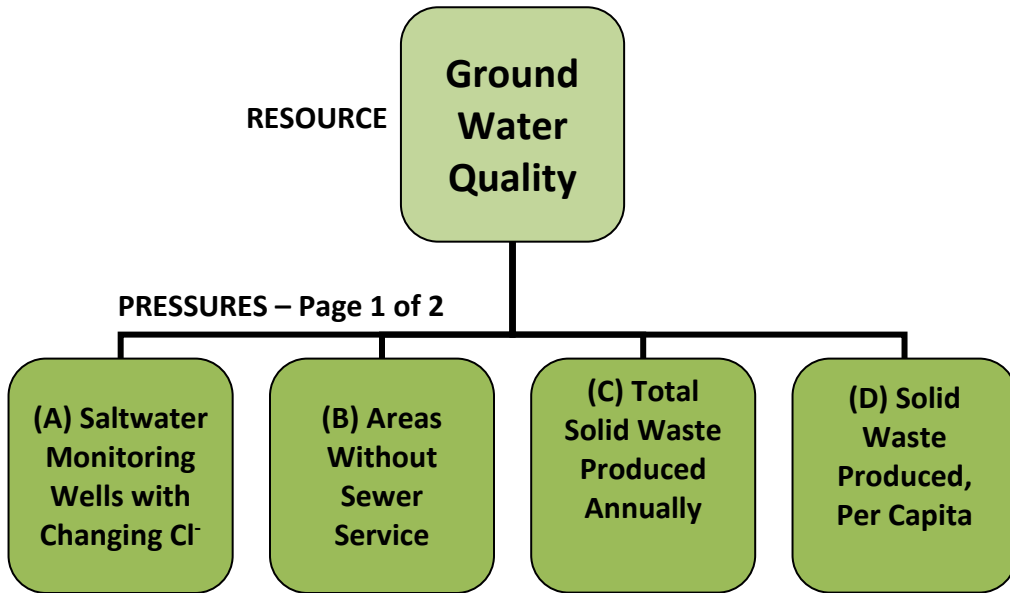
# RESPONSES TO WATER RESOURCES – Ground Water



**Ground Water** - The overwhelming majority of our drinking water comes from the Biscayne Aquifer. Protecting the quality of that drinking source from hazardous materials and other pollutants is paramount. Ground water levels must be maintained to prevent impacts to wetlands, to hold back salt water intrusion and to meet design elevation for canals and lakes.

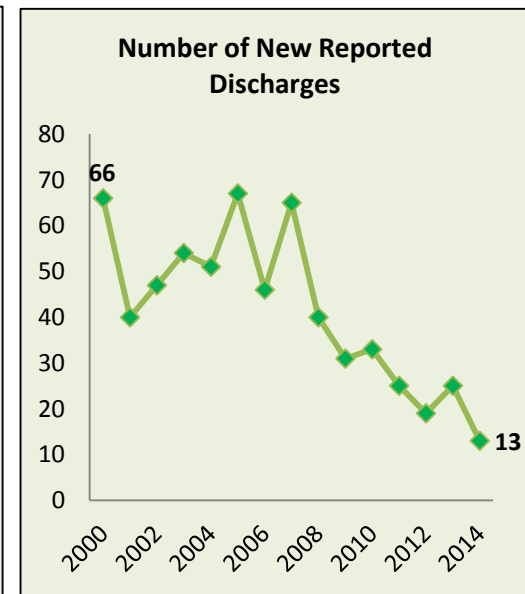
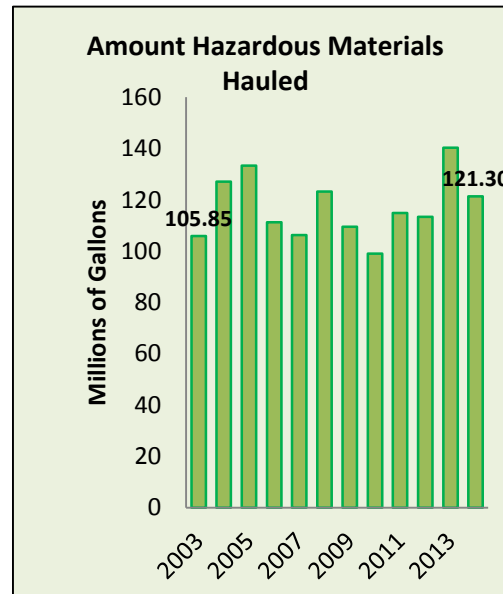
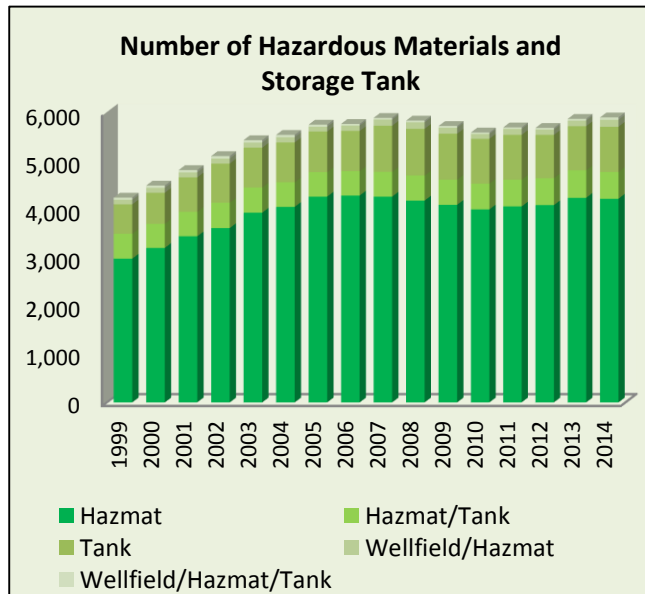
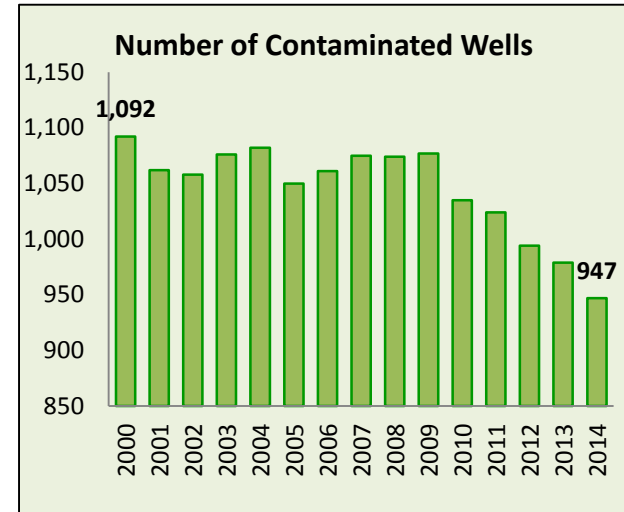
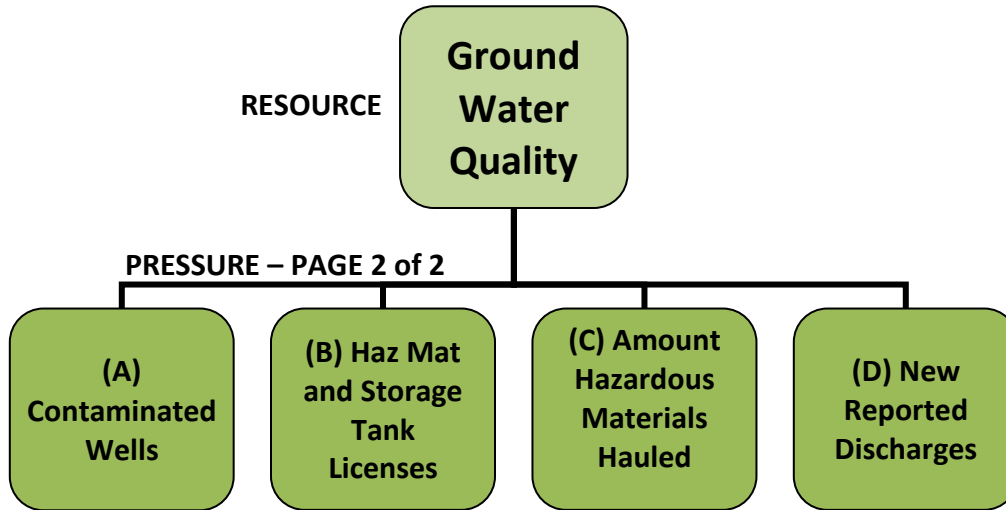


# PRESSURES ON WATER QUALITY – Ground Water

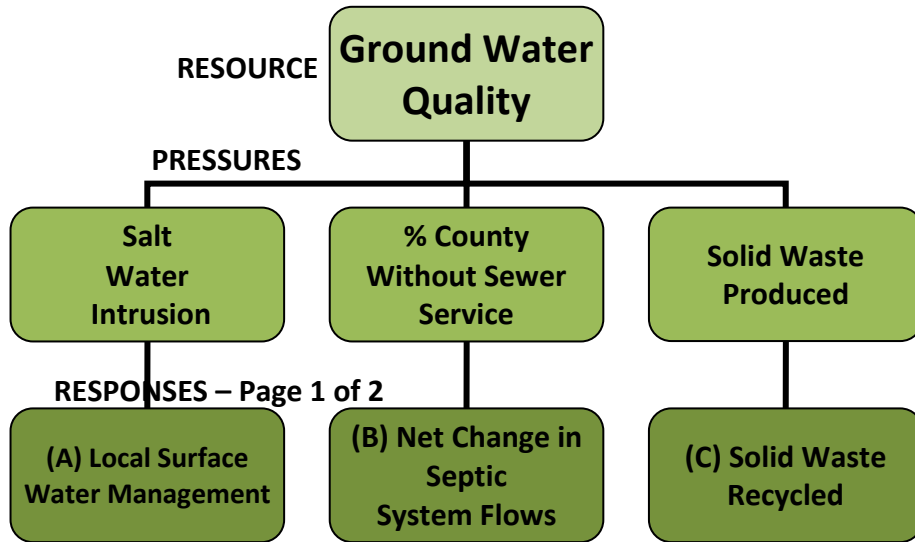




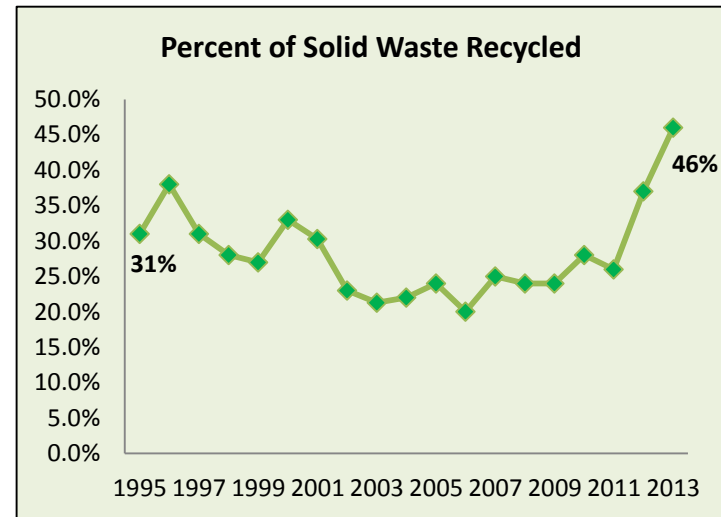
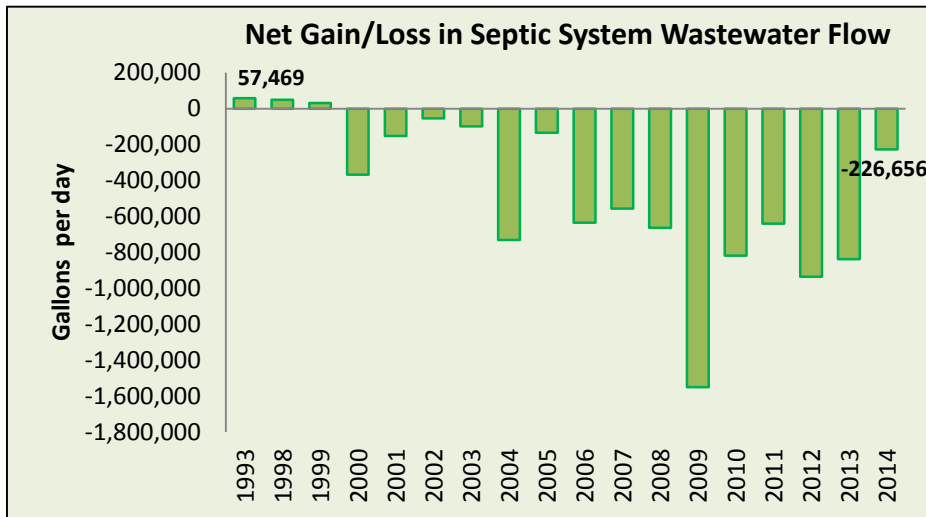
# PRESSURES ON WATER QUALITY – Ground Water



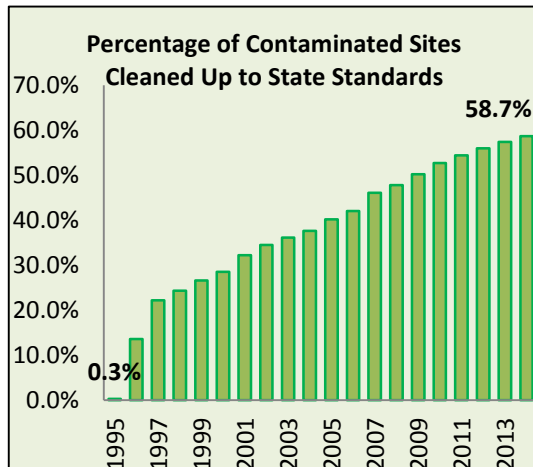
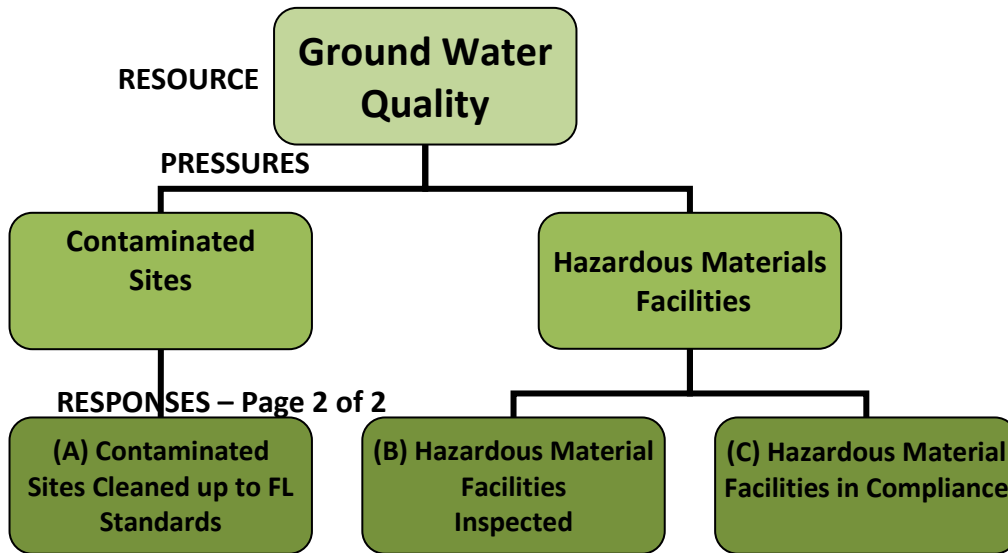
# RESPONSES TO PRESSURES ON WATER QUALITY – Ground Water



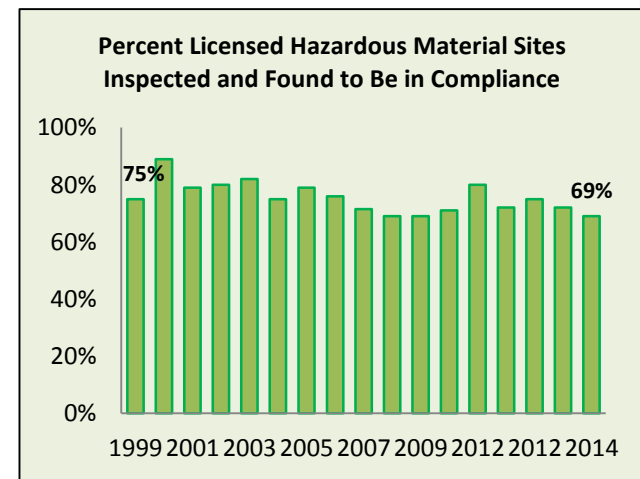
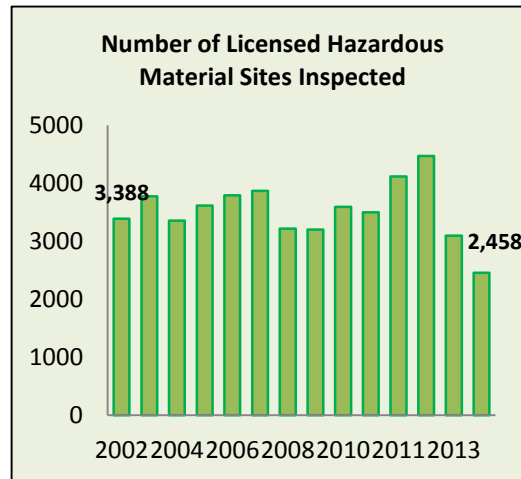
**(A) Local Surface Water Management** - Broward County has been investigating innovative ways to improve surface water management to increase storage and water quality treatment within the secondary canal system. Such improvements reduce pollutant loads to the Everglades and coastal ecosystems and serve to increase aquifer recharge.



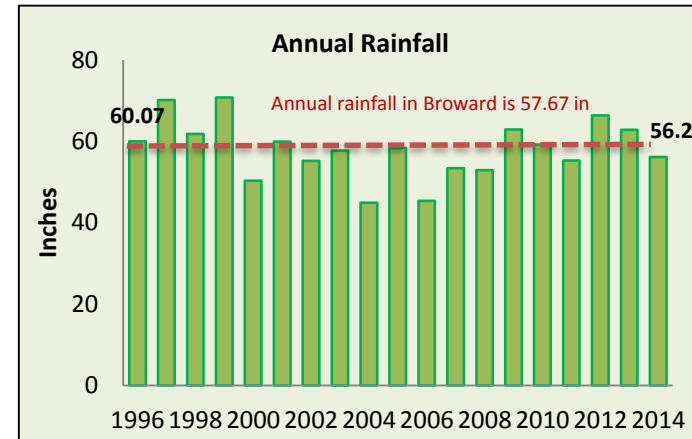
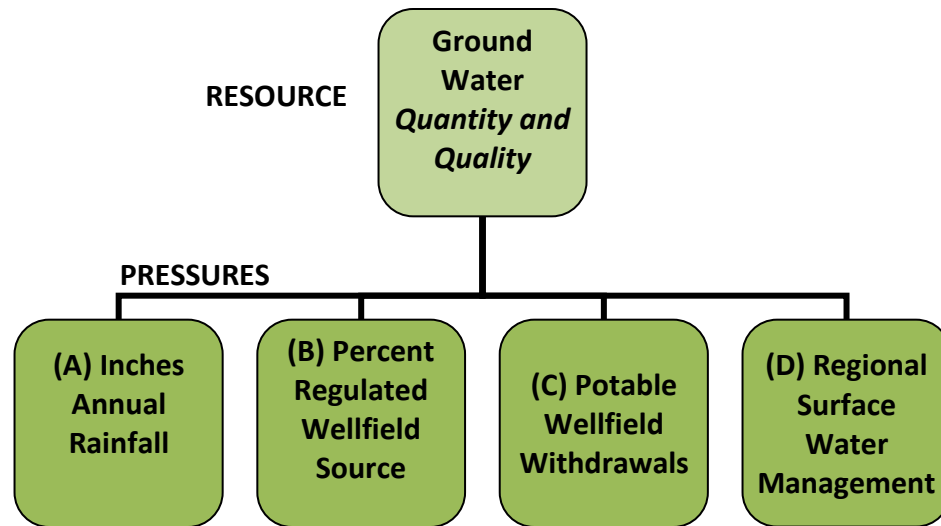
# RESPONSES TO PRESSURES ON GROUND WATER QUALITY



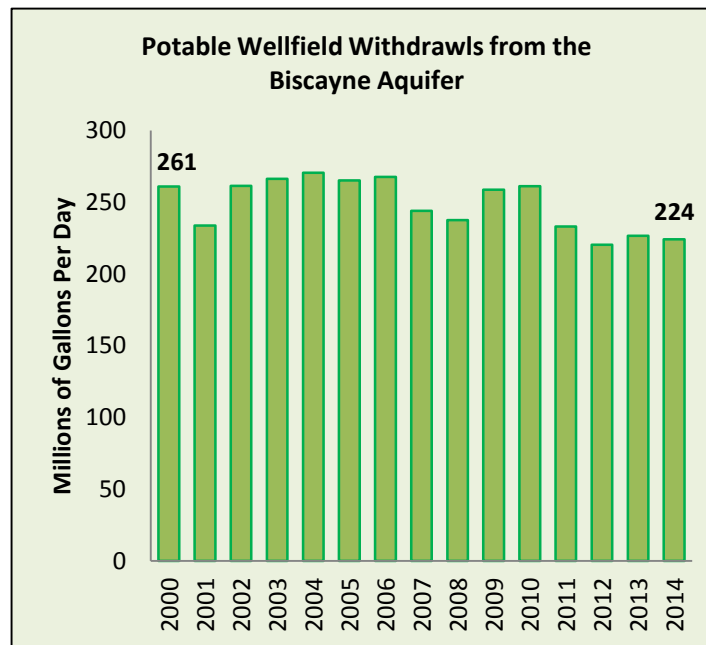
Note: The 2014 goal of 60% of contained sites cleaned up to state standards was not met. The 2014 percentage was 58.7%.



# PRESSURES ON WATER QUANTITY – Ground Water

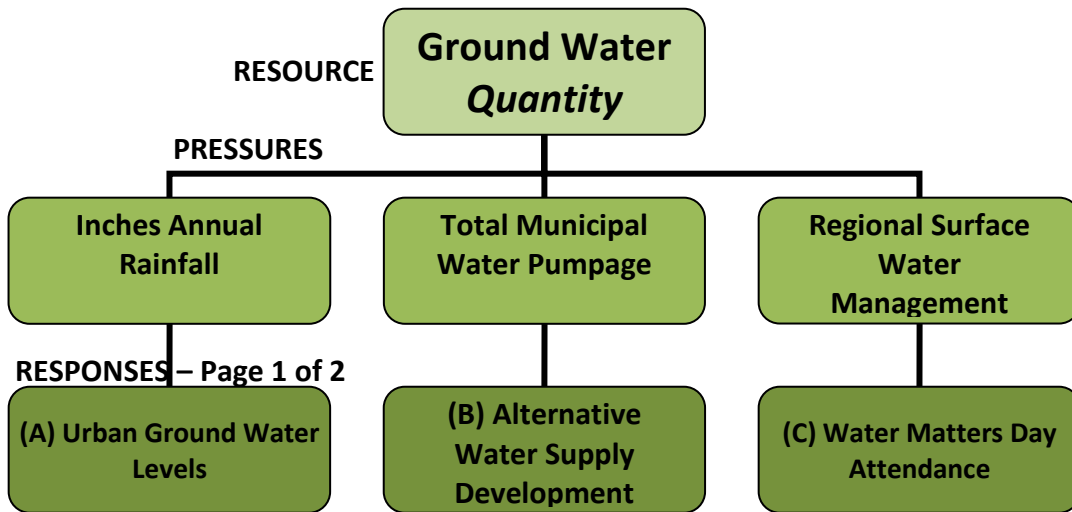


- Percent of Regulated Wellfield Source Water Wells without regulated substances above drinking water standards, 100% in 2014.



**(D) Regional Surface Water Management through IWRP Participation** - Elements of the IWRP include water resource assessments; development of technical tools to aid in planning and management decisions; development and implementation of diverse traditional and nontraditional water management strategies; a comprehensive water conservation outreach and education program; and projects that are multi-jurisdictional in nature and that have multiple water resource benefits. A principle water management strategy of the IWRP has been to better utilize its existing canal infrastructure to move water to areas where it can be used for a number of beneficial uses, including recharge of our existing groundwater supplies, rehydrating urban wetlands, and preventing saltwater from intruding into our coastal wellfield areas.

# RESPONSES TO PRESSURES ON GROUND WATER QUANTITY

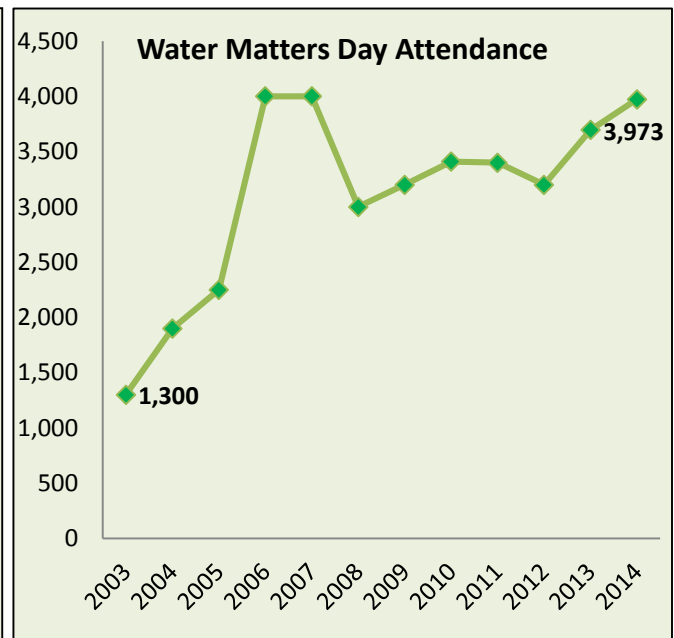


Water Matters Day

RESPONSES – Page 1 of 2

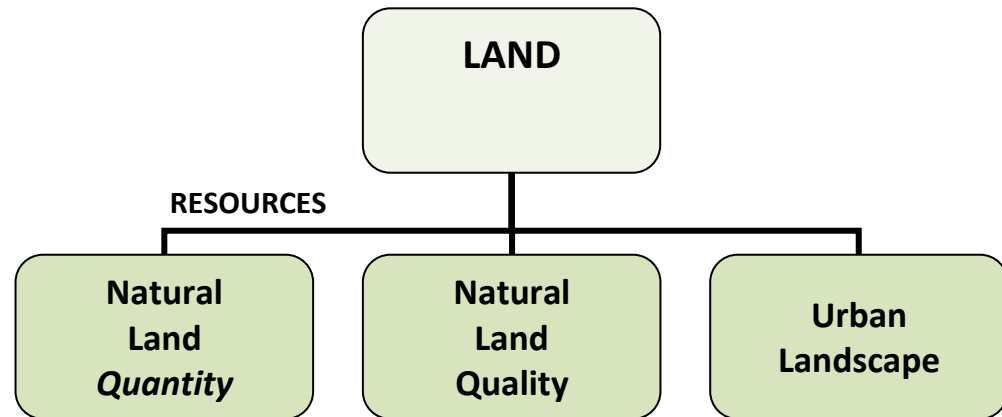
**(A) Maintenance of Urban Ground Water Levels** - Urban ground water levels are directly connected to the integrity of the Biscayne Aquifer, the health and function of urban wetlands, the operation of drainage infrastructure, and Everglades restoration.

**(B) Alternative Water Supply Development** - Broward County will need a source of water to deliver an additional 100 million gallons of water each day to meet water demands projected for 2025. Due to the pressing need to reduce urban reliance on the Everglades system as a source of water, future water needs will not be met through traditional water supplies. As such, local water utilities are being urged to develop alternative water supplies, independent of the Biscayne Aquifer and the Everglades.



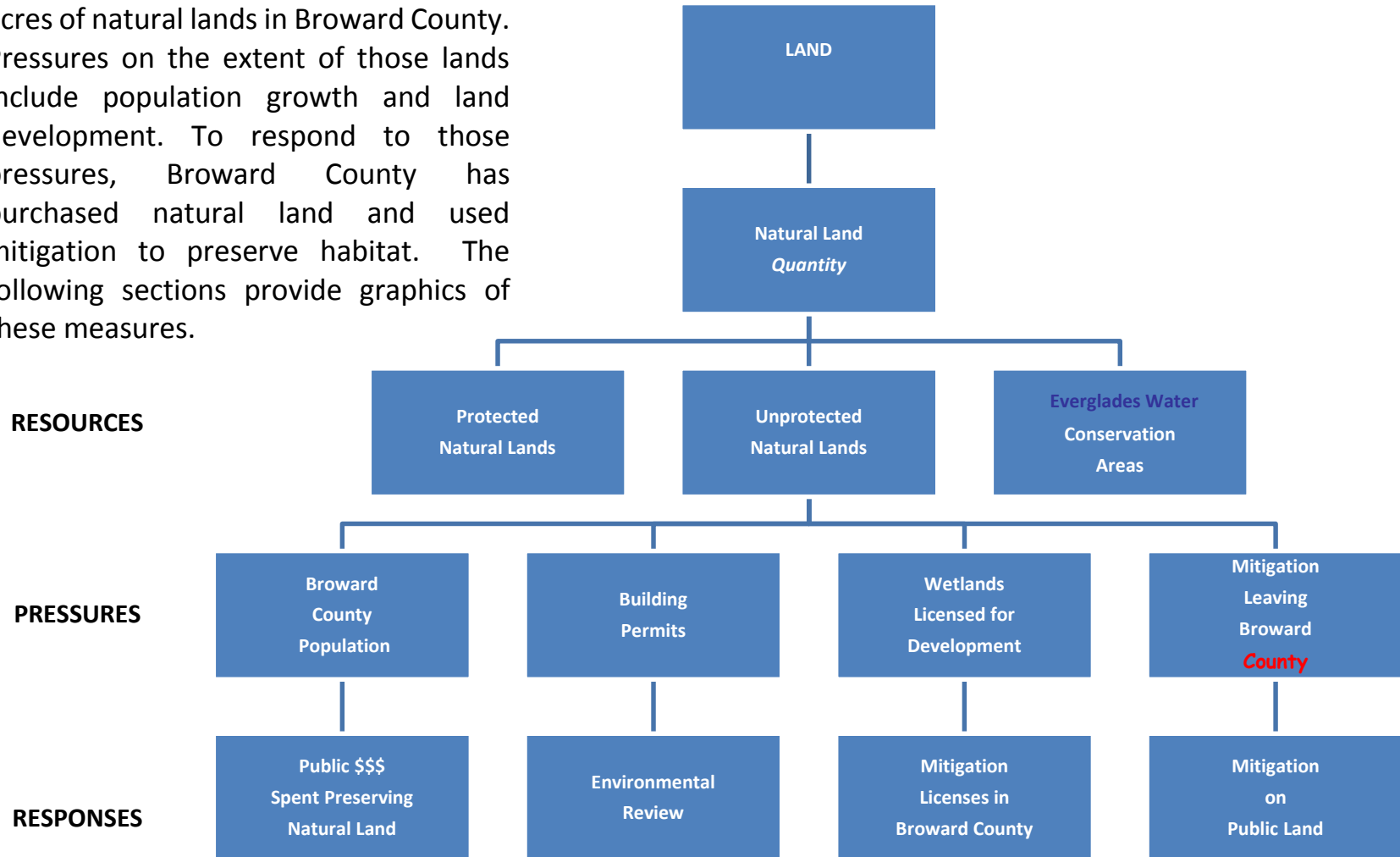
# LAND RESOURCES

**Land Resources** – Our critical land resources include natural areas which preserve habitat (Quantity), the extent to which those lands reflect indigenous Florida plants and animals (Quality) and the Urban Landscape. This last resource encompasses how public and private entities create human and natural habitats integrated into the urban area.

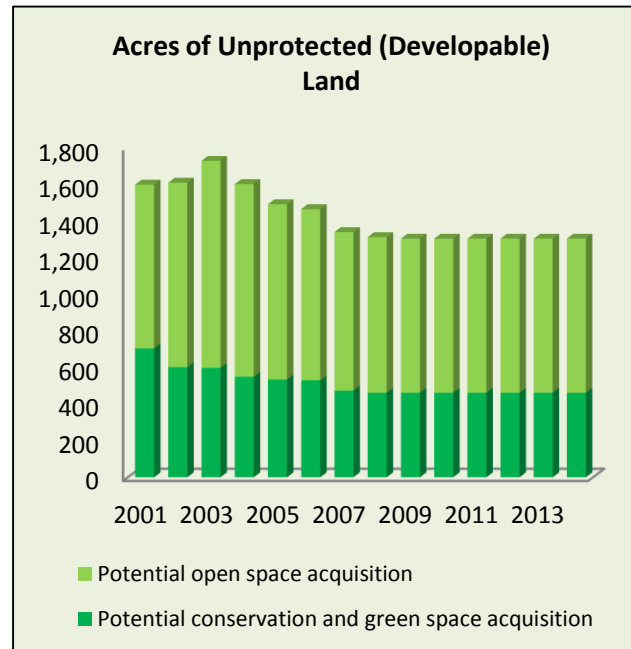
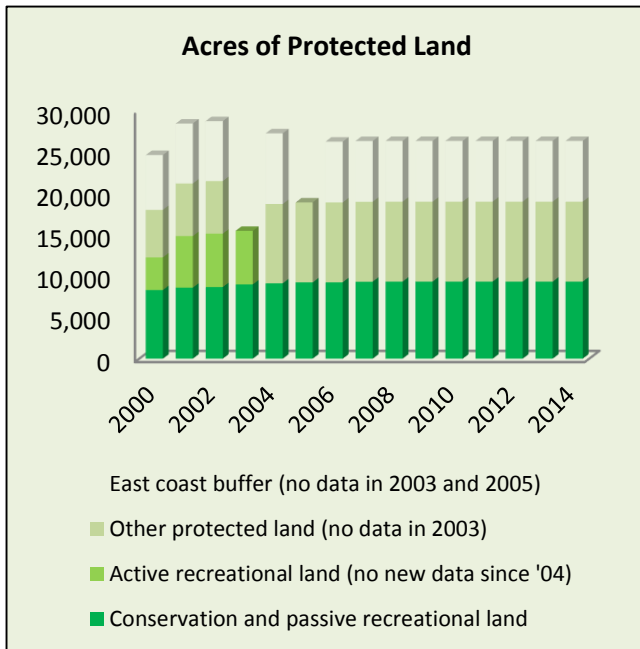
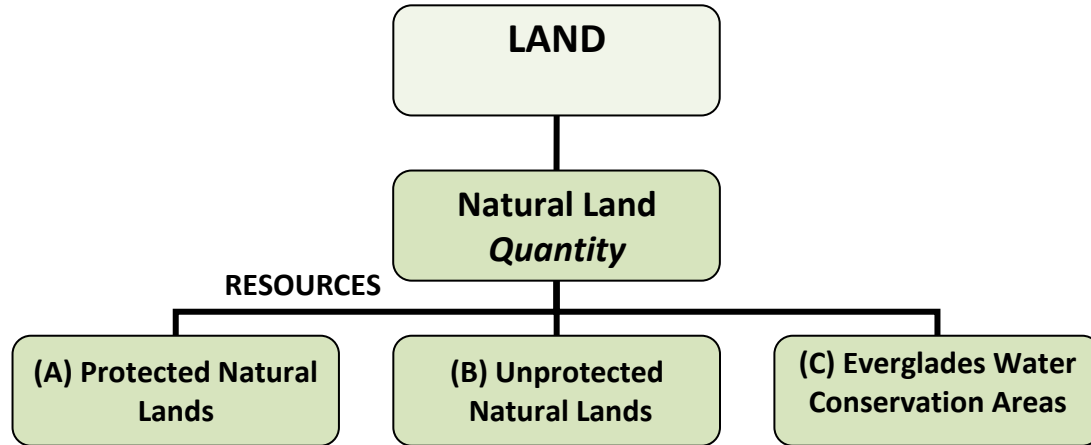


# LAND RESOURCES – Natural Land *Quantity*

**Natural Land Quantity** – This environmental resource is measured in acres of natural lands in Broward County. Pressures on the extent of those lands include population growth and land development. To respond to those pressures, Broward County has purchased natural land and used mitigation to preserve habitat. The following sections provide graphics of these measures.



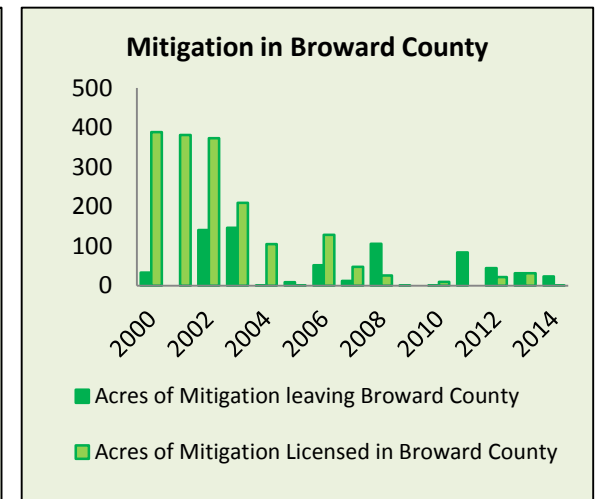
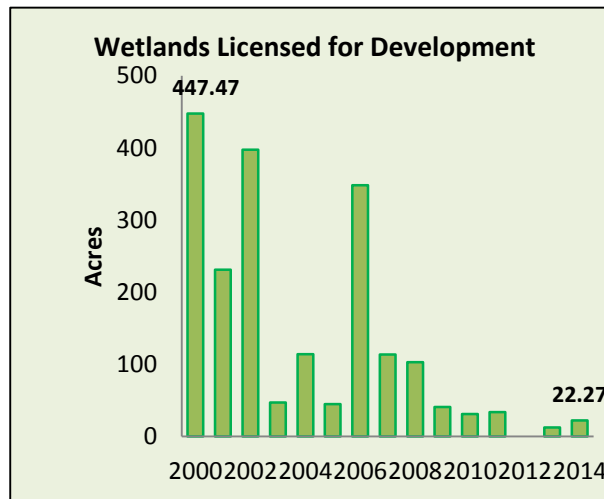
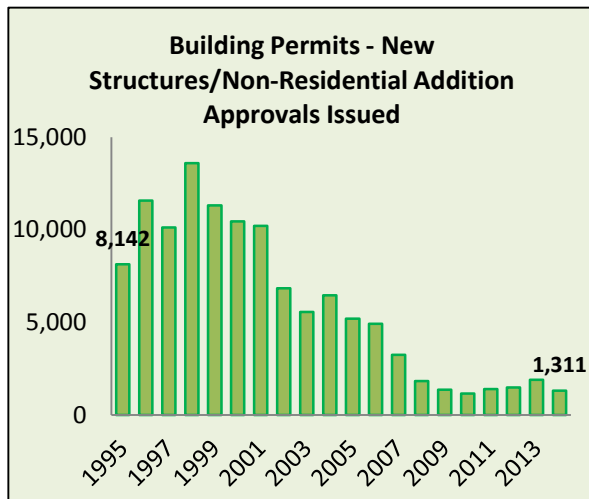
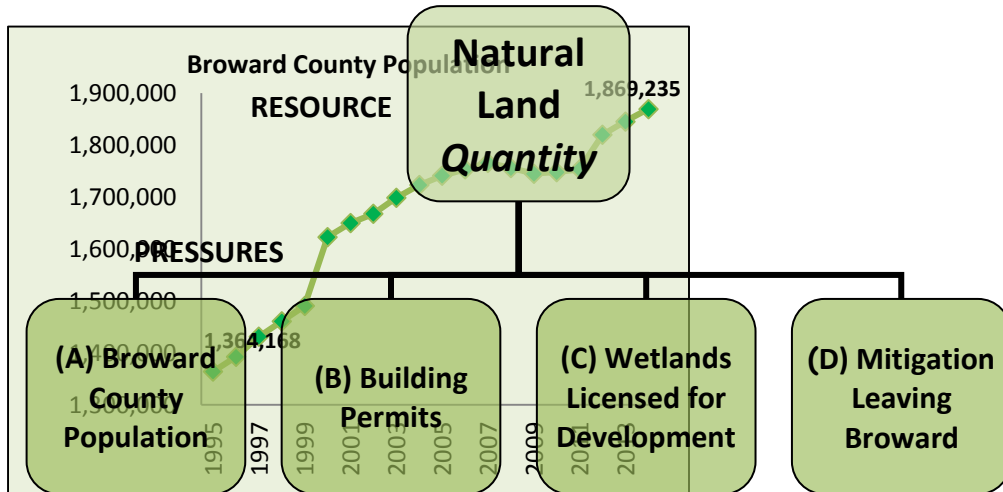
# LAND RESOURCES – Natural Land *Quantity*



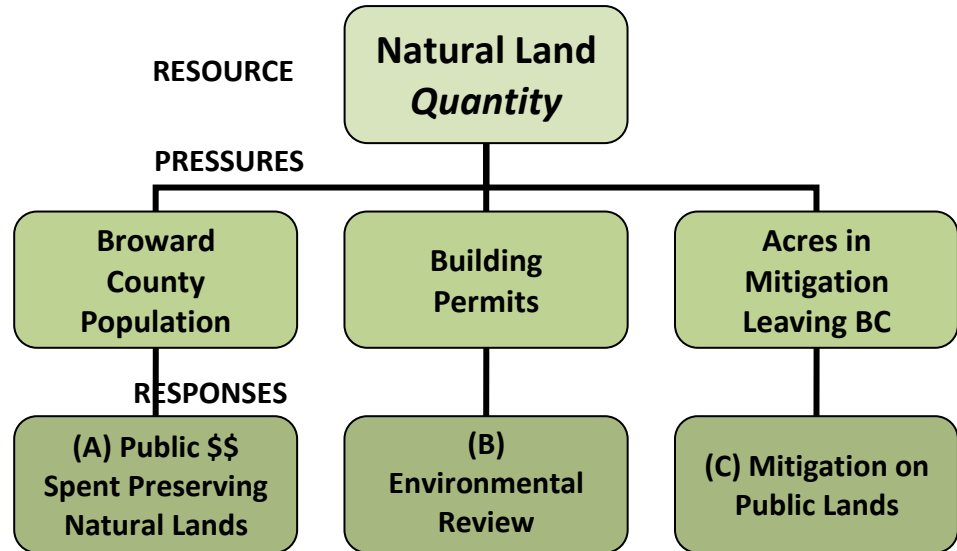
**(C) Everglades Water Conservation Areas** - Approximately two-thirds of Broward County lands exist as Water Conservation Areas (WCA's) in the Everglades. Four WCA's serve as a buffer between developed regions and the Everglades



# PRESSURES ON NATURAL LAND QUANTITY



# RESPONSES TO PRESSURES ON NATURAL LAND QUANTITY



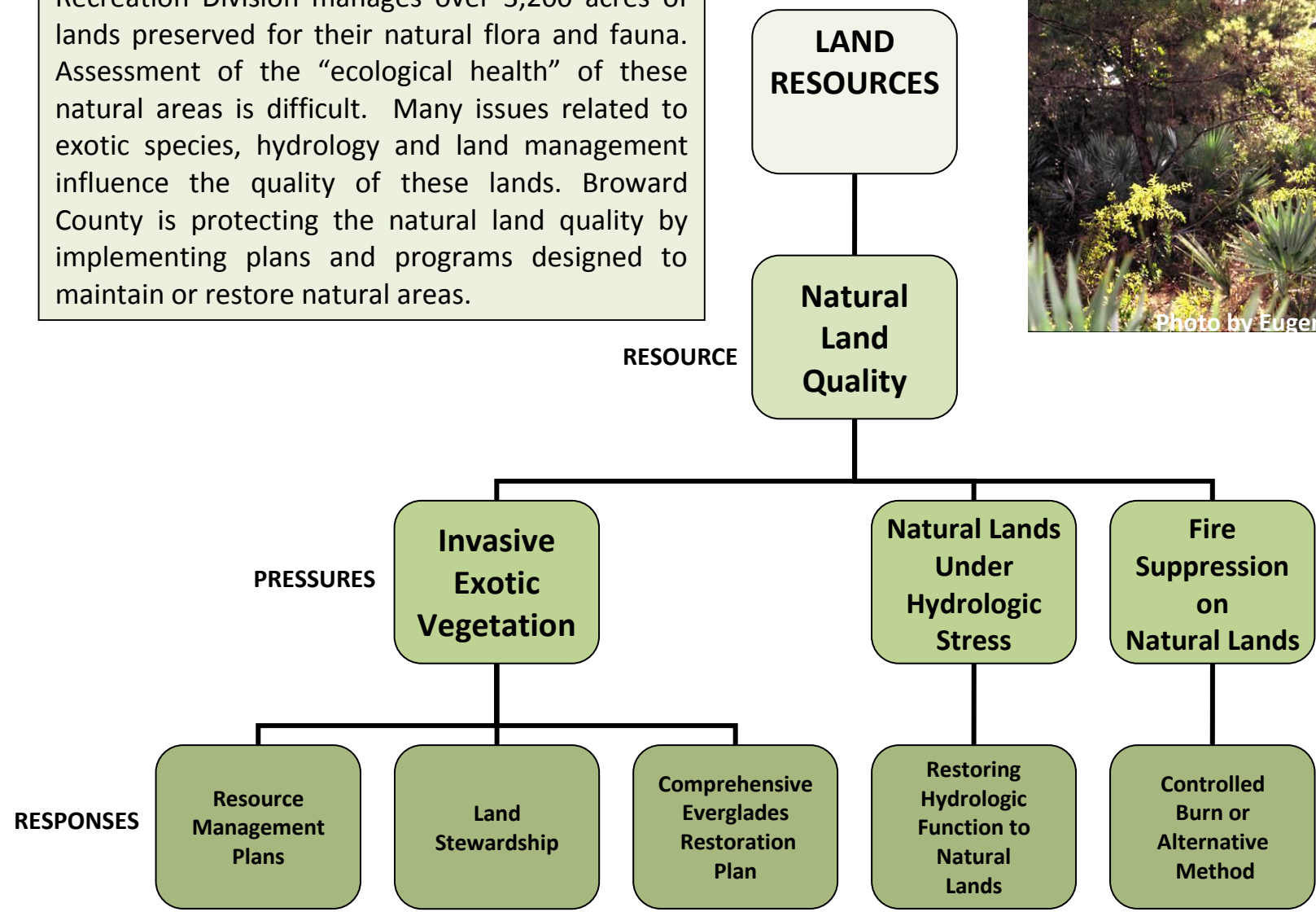
**(B) Environmental Review** – All proposed developments are reviewed to ensure proper land use and to protect natural land resources from impacts. Wetland permitting ensures that mitigation for impacts is kept within Broward.

**(C) Mitigation on Public Lands** - Wetlands provide recreation, habitat, water filtration and storage values that no other ecosystem can. Because of these values, Broward County tries to retain mitigation for impacts to wetlands as close to the impact as possible. Due to increasing limited mitigation areas, the County is attempting to utilize public lands as sites for wetland mitigation projects. There were zero acres of mitigation on public lands in 2014.

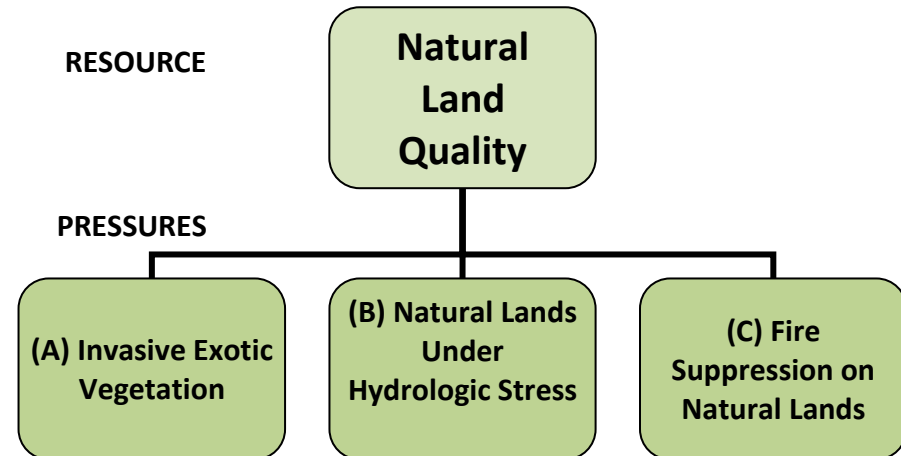
Public Dollars Spent to Preserve Natural Lands													
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
\$15,986,950	\$12,646,112	\$12,225,761	\$15,900,573	\$8,984,242	\$3,421,890	\$9,374,378	\$9,704,250	\$3,274,125	\$40,000	\$0	\$0	\$0	\$0

# LAND RESOURCES – Natural Land Quality

**Natural Lands Quality** - Broward County Parks and Recreation Division manages over 3,200 acres of lands preserved for their natural flora and fauna. Assessment of the “ecological health” of these natural areas is difficult. Many issues related to exotic species, hydrology and land management influence the quality of these lands. Broward County is protecting the natural land quality by implementing plans and programs designed to maintain or restore natural areas.



# PRESSURES ON NATURAL LAND QUALITY



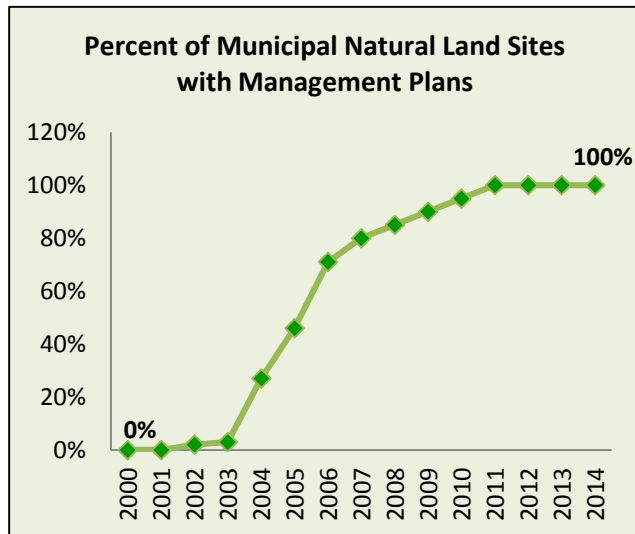
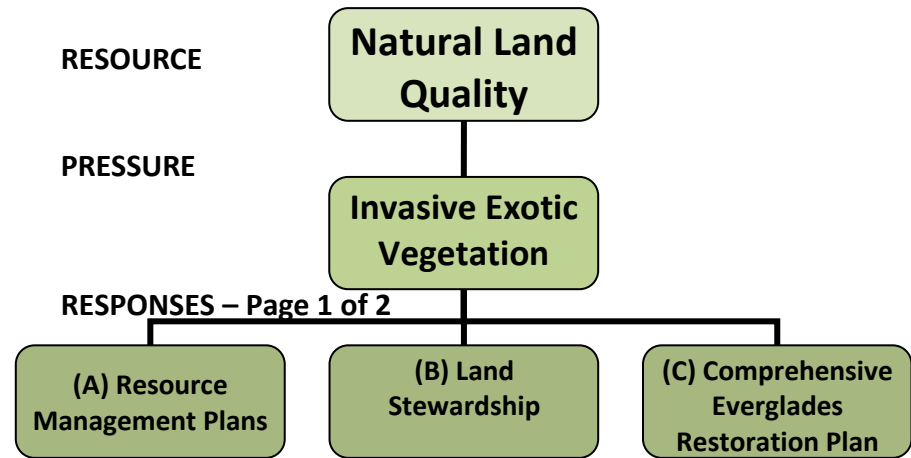
**(A) Invasive Exotic Vegetation** – Many species of plants from other countries have naturalized in Florida’s subtropical climate. These non-native, invasive exotic plants provide less benefit to our ecosystem than do our native plants. The exotics have a high potential to crowd out indigenous vegetation that native Florida wildlife relies on for food and shelter. The problem is widespread from your backyard throughout the Everglades.

**(B) Natural Lands Under Hydrologic Stress** – Many natural wetland areas in Broward County have been altered by historical development and drainage practices. The construction of the canal systems altered the ground water level. While this provided flood protection for residents, it also impacted wetlands by depressing water levels necessary for maintaining wetland plant species.

**(C) Fire Suppression on Natural Lands** – Fire has long been a factor in maintaining a healthy balance in certain South Florida ecosystems. However, prescribed burning in urban areas is difficult to accomplish without impacting local residents. Areas that have been without fire for long periods of time may accumulate a high fuel load and begin succession to a different type of habitat.

# RESPONSES TO PRESSURES ON NATURAL LAND QUALITY

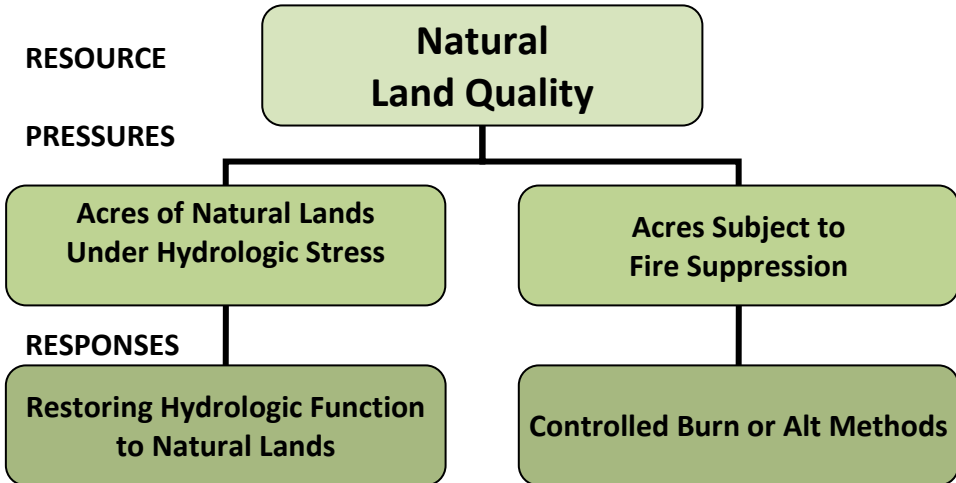
**Resource Management Plans** – For all acquired natural lands, Resource Management Plans are created to direct how the resources should be managed to ensure that they remain viable natural communities. These plans include securing the site, removing trash and debris, removing invasive exotic species, replanting native vegetation, and providing for public access. The resource management plans may include ecological restoration, re-watering of impacted wetland, or plans for burning fire dependent communities. Many sites already have plans in place (see graphic below).



**(B) Land Stewardship** – Resource Management Plans are a small part of a larger effort to provide stewardship for the land. Other efforts include the initiation of two new grant programs “Parks for People” and “Partners in Preservation”. The County recently created a land stewardship program.

**(C) Comprehensive Everglades Restoration Plan** – While two-thirds represents a large quantity of Broward County lands established as conservation areas, the issue of quality must be considered. The function and water quality of WCA’s are being addressed through projects undertaken as a part of the Comprehensive Everglades Restoration Plan.

# RESPONSES TO PRESSURES ON NATURAL LAND QUALITY



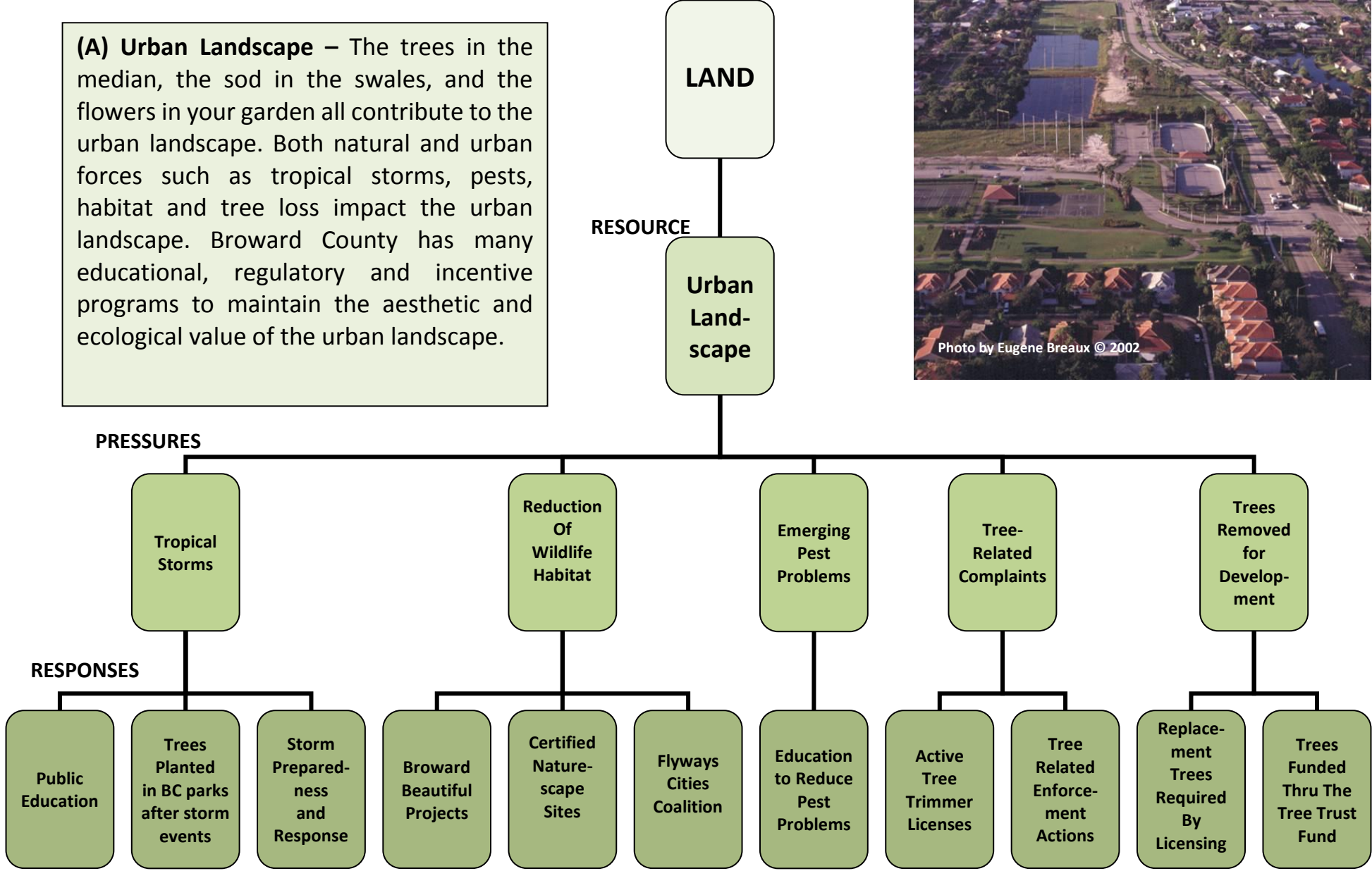
**Restoring Hydrologic Function to Natural Lands** - Many natural wetland areas in Broward County have been altered by historical development practices and other drainage alterations. Broward County has undertaken efforts to restore hydrologic function to some of the damaged wetlands. Pumps are been installed to increase water flow to the wetlands and raise ground water levels to support native wetland plants.



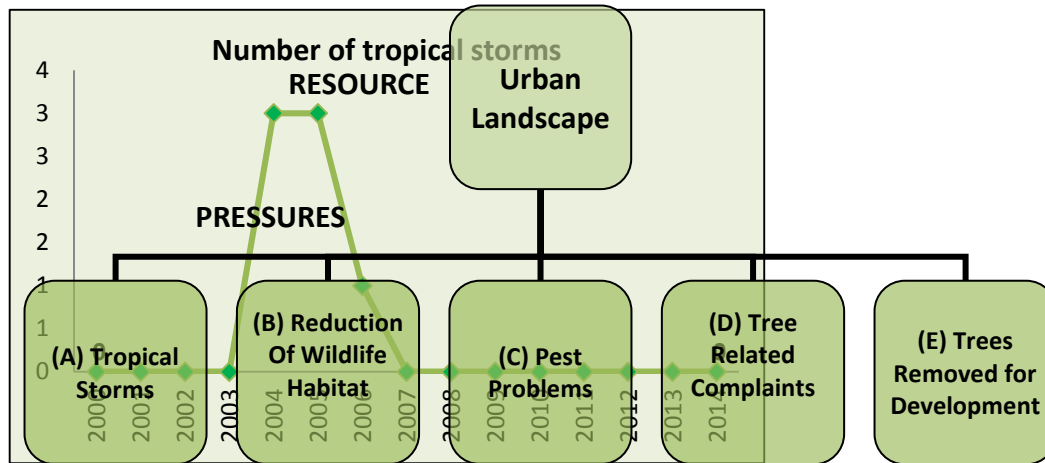
**Controlled Burn or Alternative Management Methods** - Prescribed burning accomplishes many land management objectives including reducing the risk of wildfires while recycling nutrients into the soil. Native fire-tolerant species, including wildflowers and grasses, become established in open areas created by fires thus increasing the overall diversity of the plant community.

# LAND RESOURCES – URBAN LANDSCAPE

**(A) Urban Landscape** – The trees in the median, the sod in the swales, and the flowers in your garden all contribute to the urban landscape. Both natural and urban forces such as tropical storms, pests, habitat and tree loss impact the urban landscape. Broward County has many educational, regulatory and incentive programs to maintain the aesthetic and ecological value of the urban landscape.

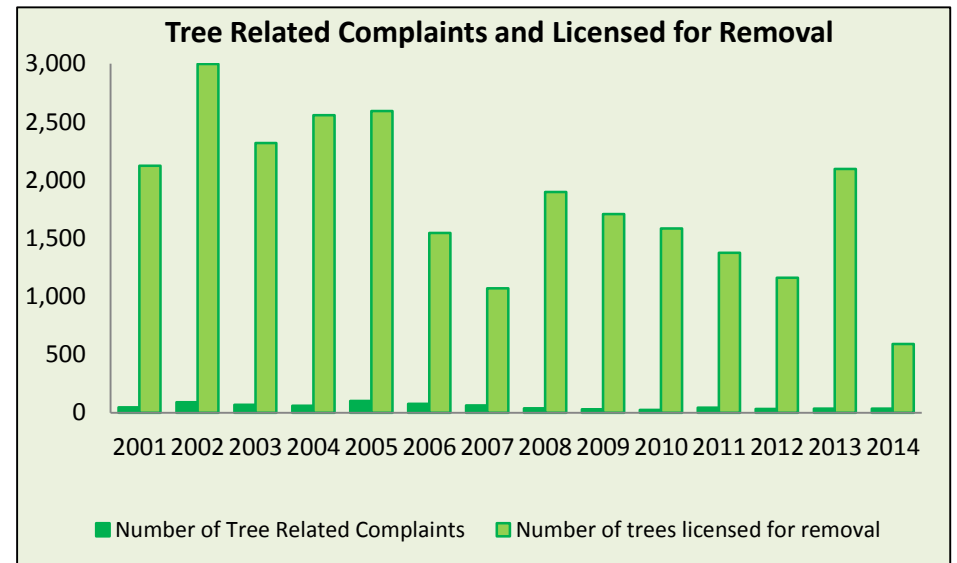


# PRESSURES ON URBAN LANDSCAPE



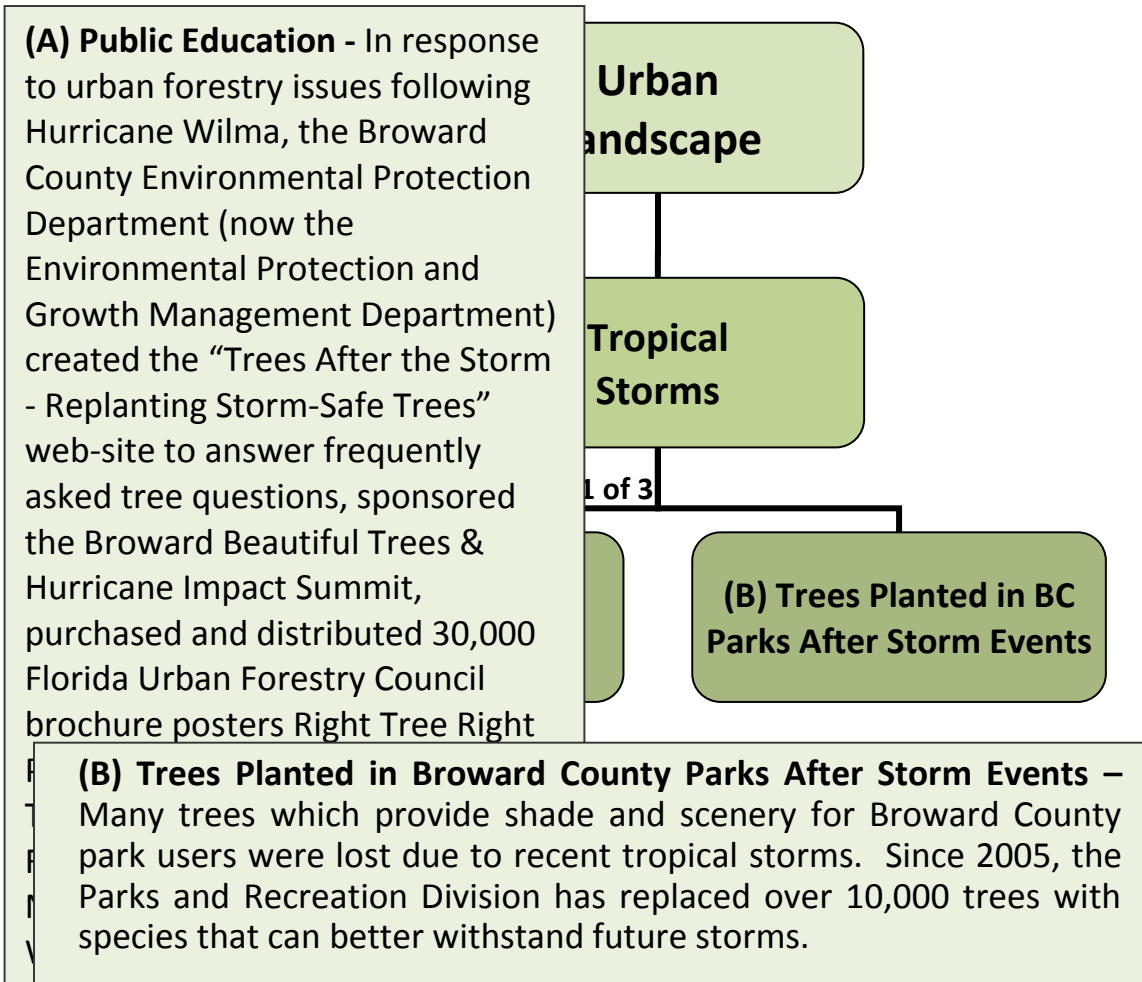
**(B) Reduction of Wildlife Habitat** – Continued development across Broward County reduces natural lands and vacant areas needed to provide habitat for wildlife. The indirect consequences of habitat loss and fragmentation may carry grave consequences for animal welfare and for conservation.

**(C) Emerging Pest Problems** – Exotic insects, lac scale and other infestations upon the health of the urban landscape have been increasing in recent years. Native vegetation often has no natural defenses against these introduced pests.





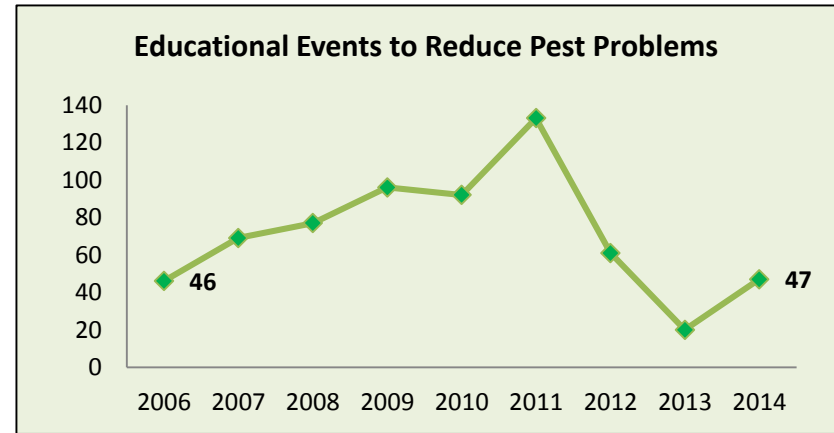
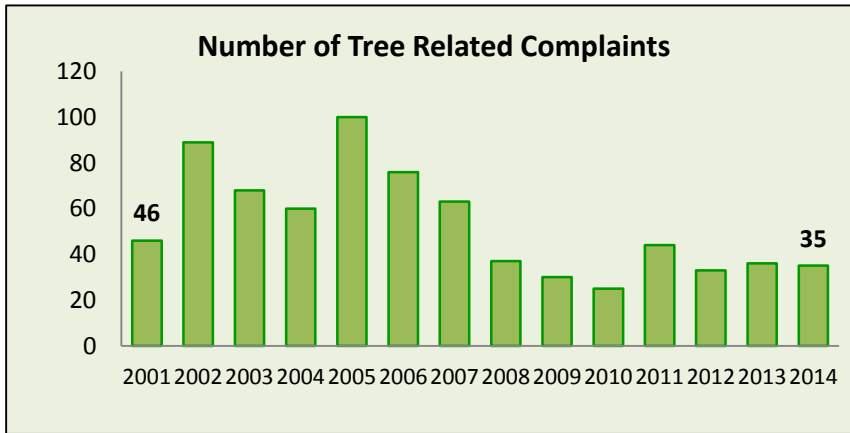
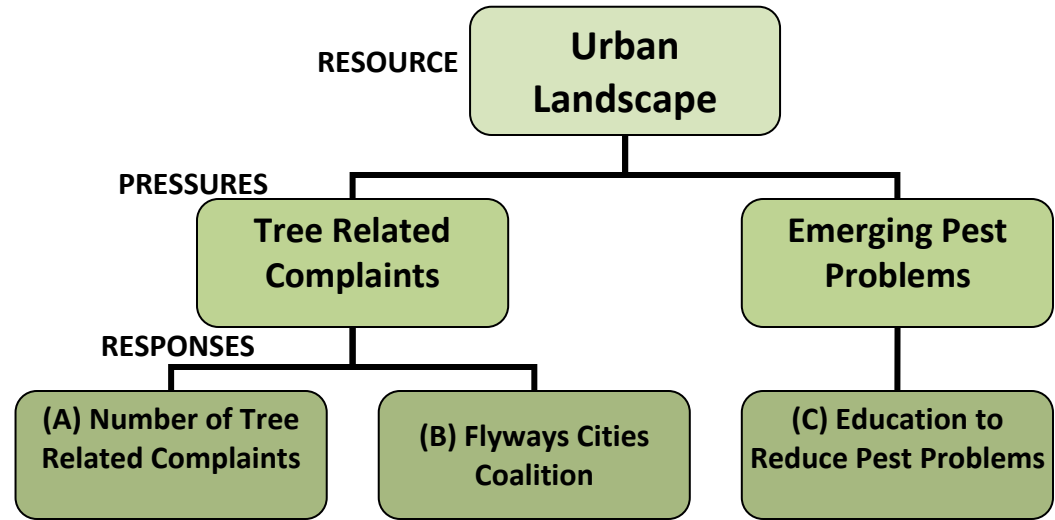
# RESPONSES TO PRESSURES ON URBAN LANDSCAPE



**Urban Broward educational programs delivered, 335 programs in 2014.**

**Urban Landscape Sites, 3,606 sites in 2014.**

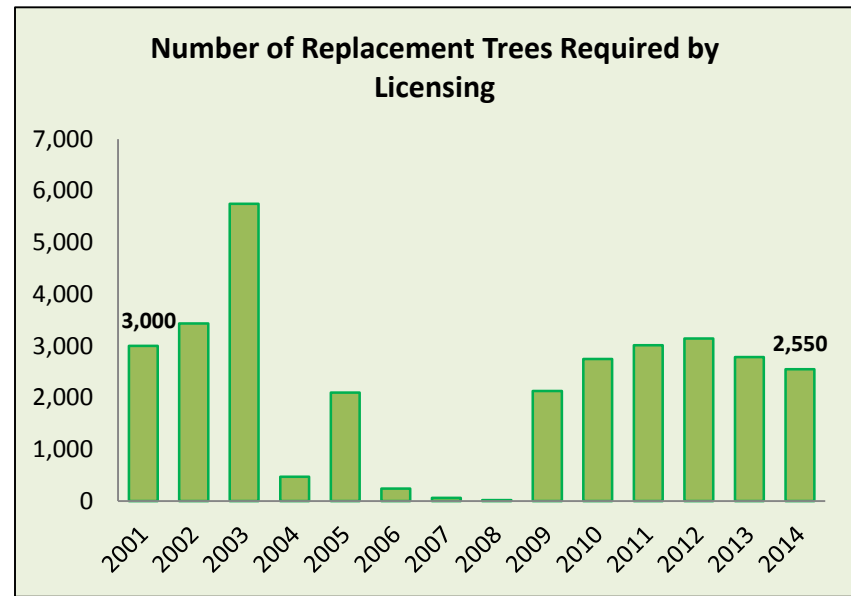
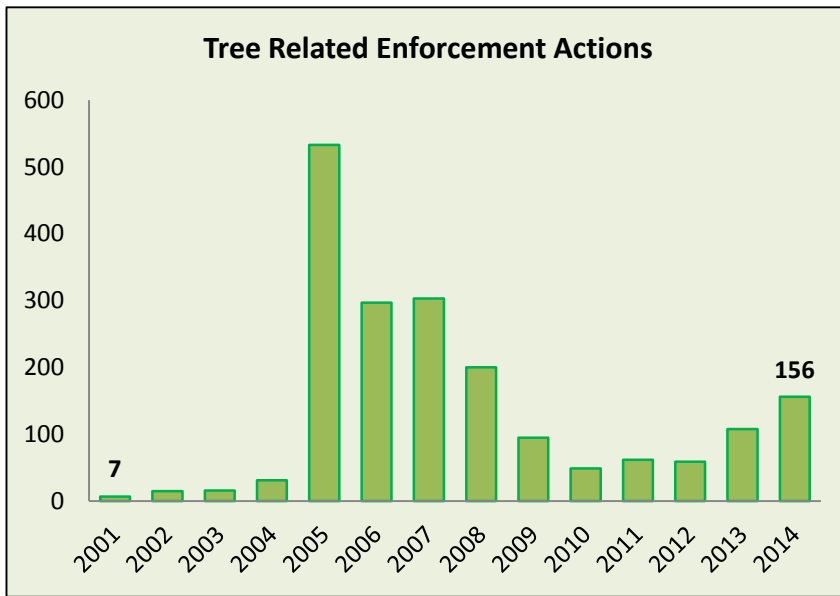
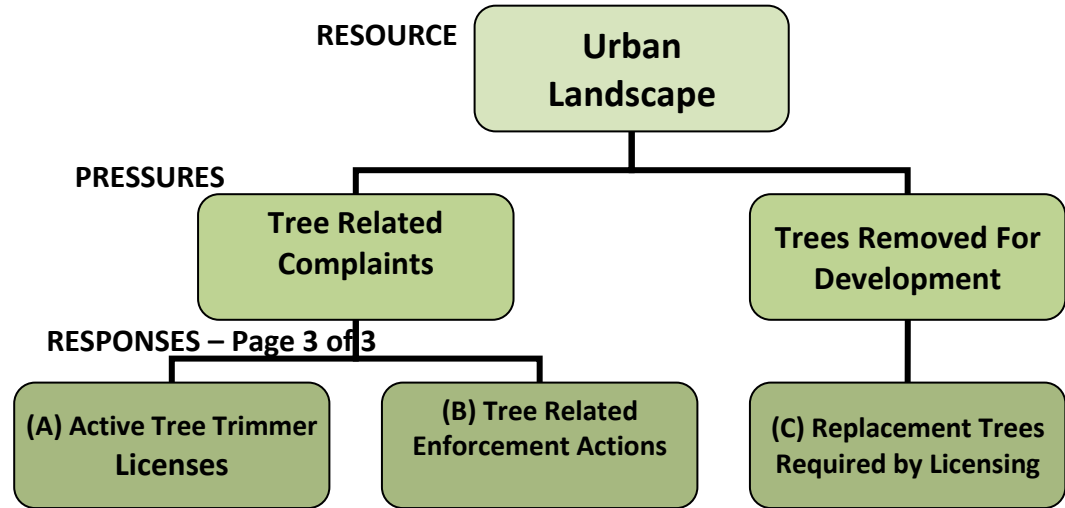
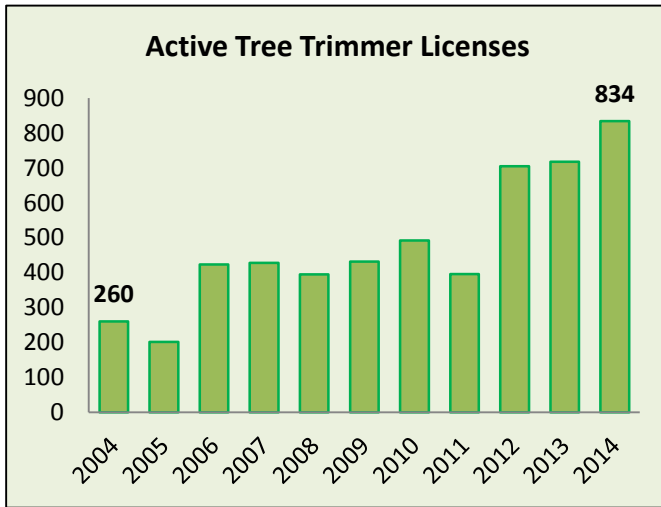
# RESPONSES TO PRESSURES ON URBAN LANDSCAPE



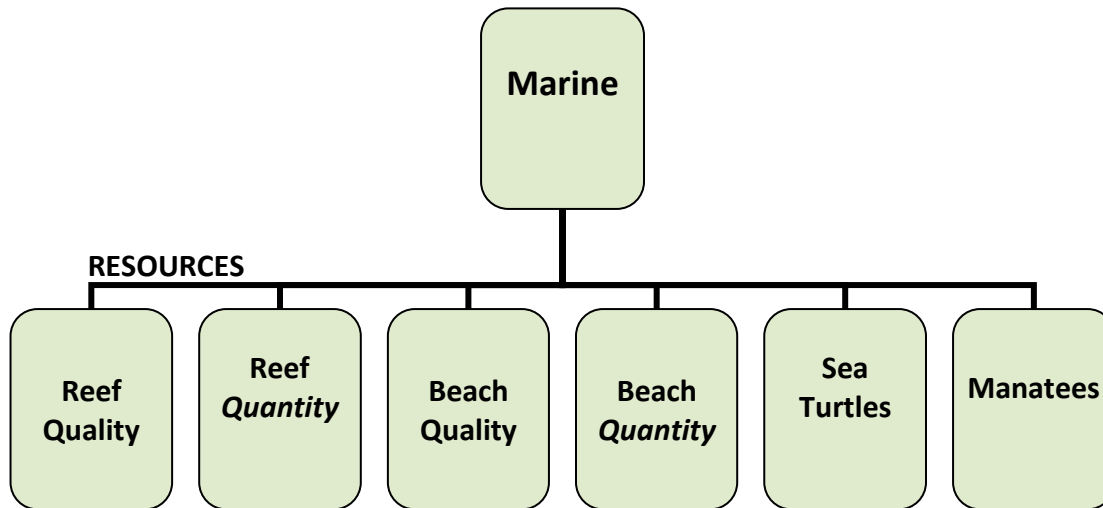
- Number of trees licensed for removal, 592 in 2014.

- Percent tree canopy coverage in county, 19% coverage in 2012.

# RESPONSES TO PRESSURES ON URBAN LANDSCAPE



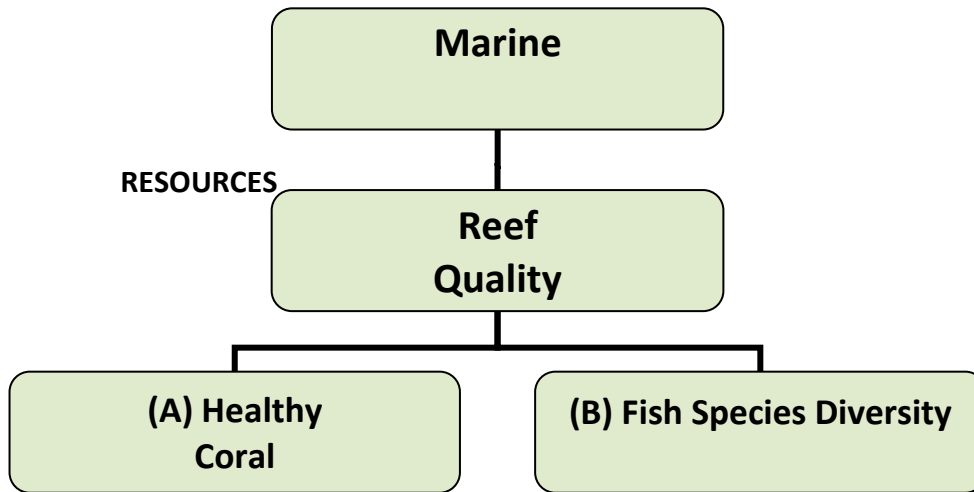
# MARINE RESOURCES



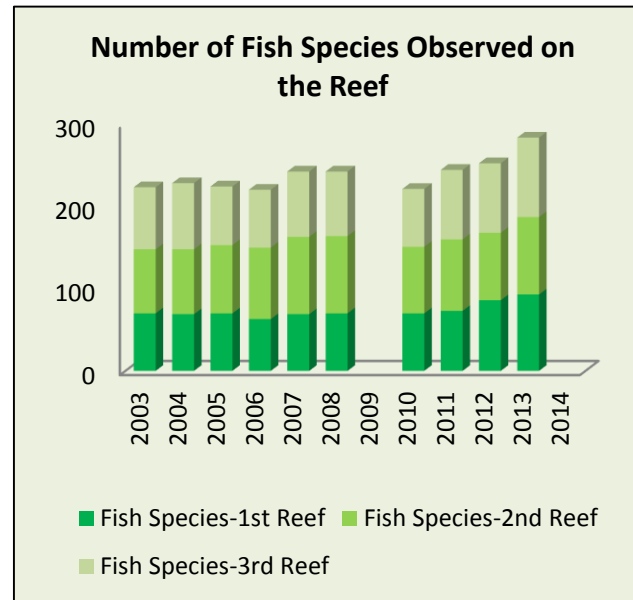
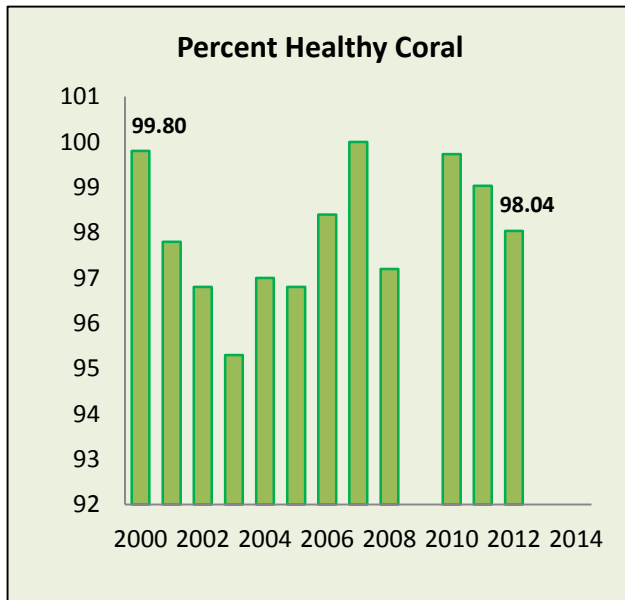
**Marine Resources** - The coastal environmental of Broward County is a major contributor to our quality of life and our economy. The beach and coral reefs provide natural habitat, tourism destinations and protection from storms. These marine resources include endangered sea turtles and manatees.



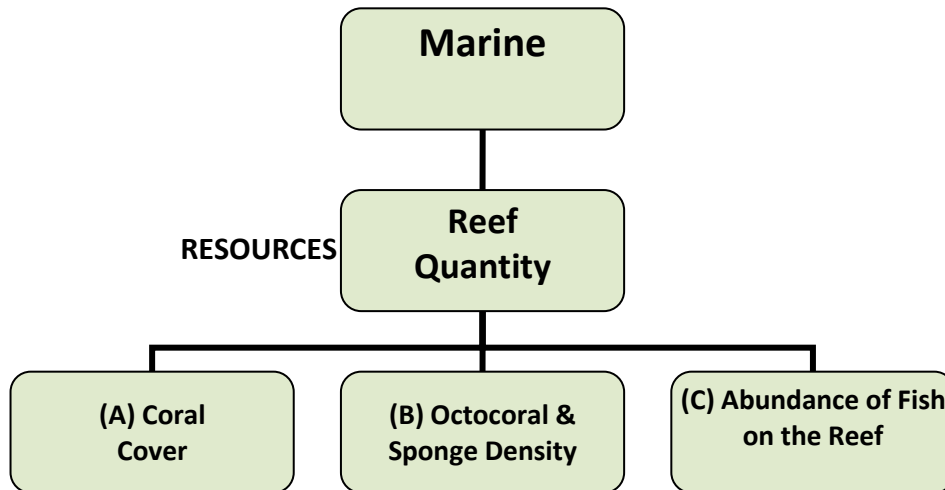
# MARINE RESOURCES – Reef Quality



**Coral Reefs** - Coral reefs and their associated sea life are important natural resources for recreational fishing and diving industries in Broward County. The sound ecological condition of the reef community is a key indicator of the general condition of all marine resources of the Broward coastline.

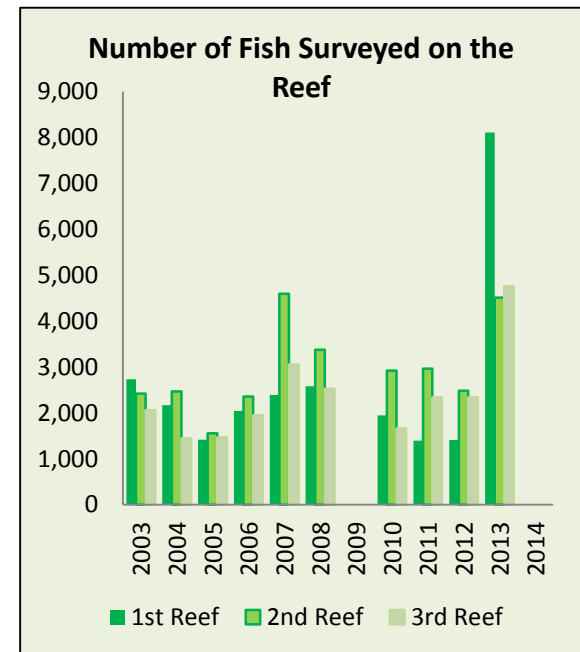
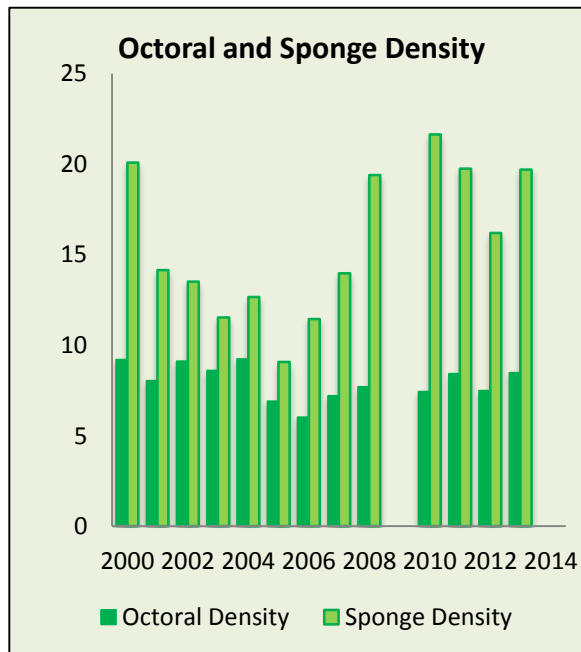
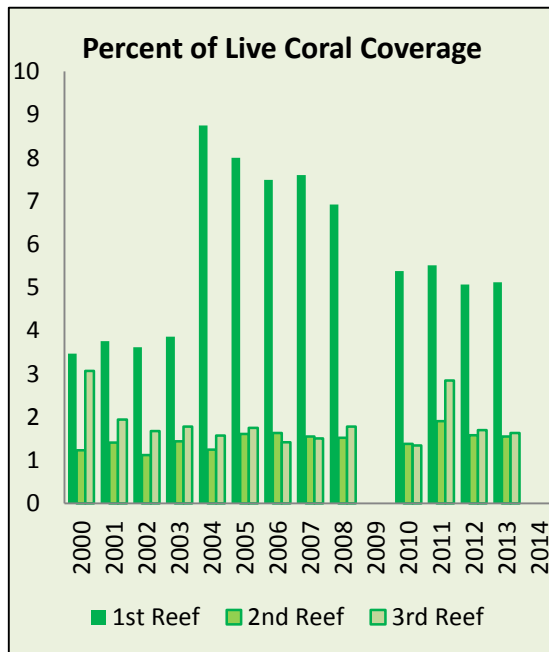


# MARINE RESOURCES – Reef Quantity

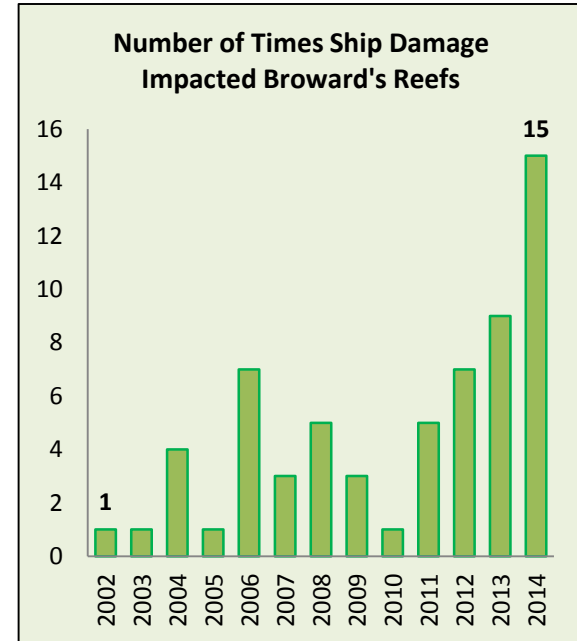
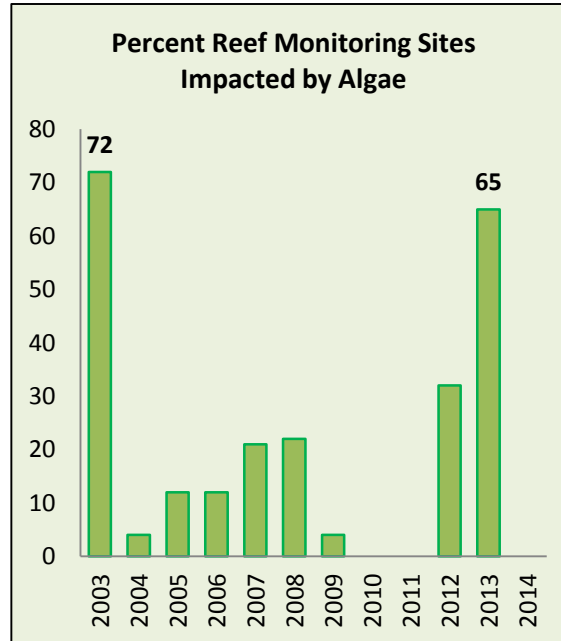
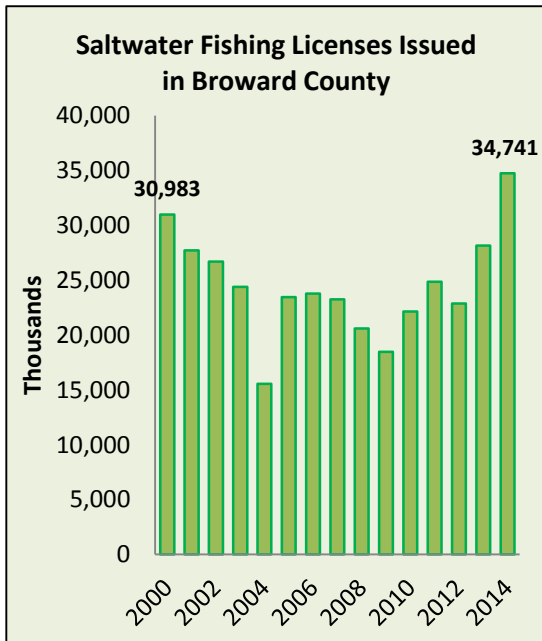
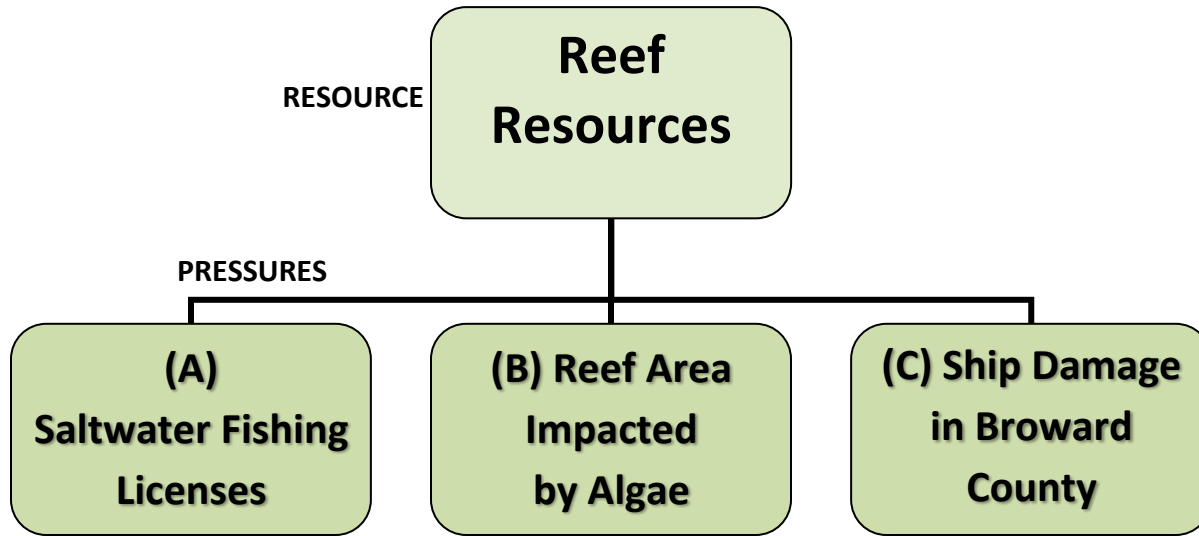


**Coral Reefs** – The abundance of corals, sponges, and fish are dependent upon the structure of the reef, the water quality and conditions around the reefs. All of these components are important to create a functional ecosystem. In Broward County, three reefs run parallel to the shoreline at various depths.

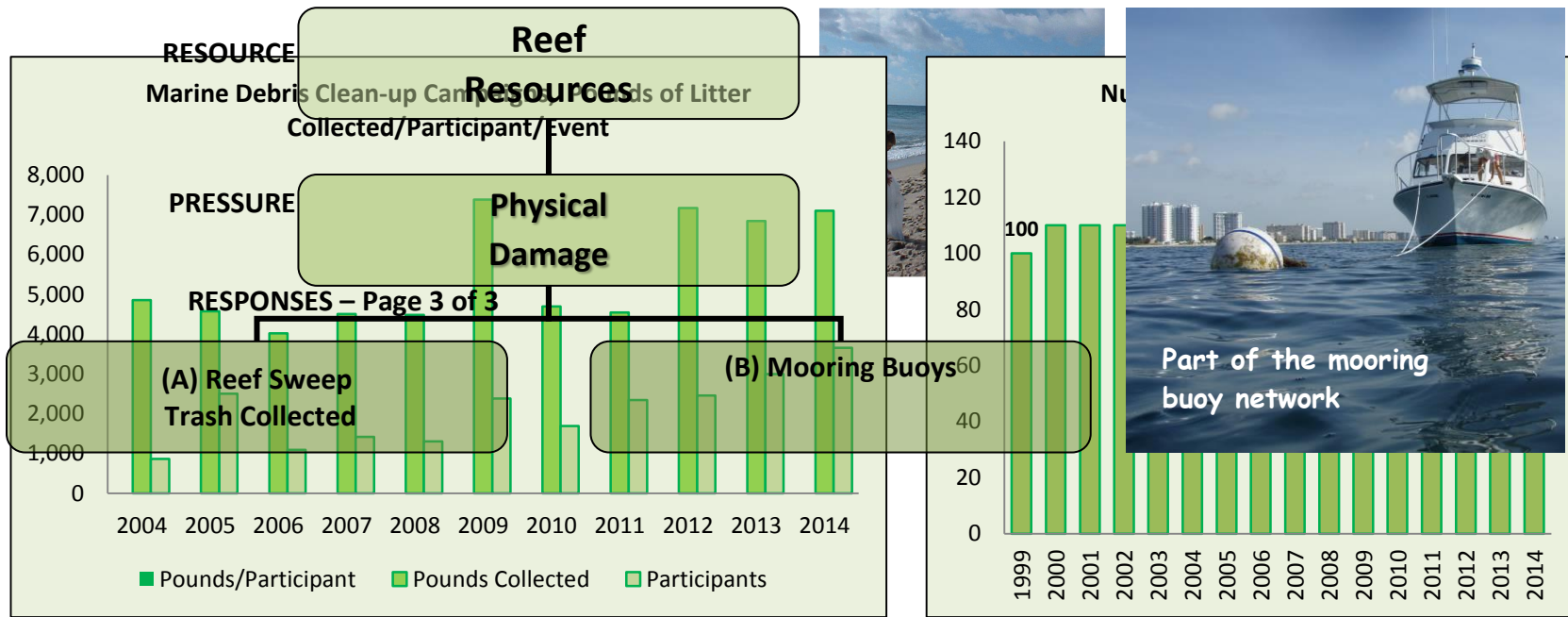
- **Sponge Density Average over All Three Reefs,** 19.69 colonies per square meter in 2013.



# PRESSURES ON REEF RESOURCES

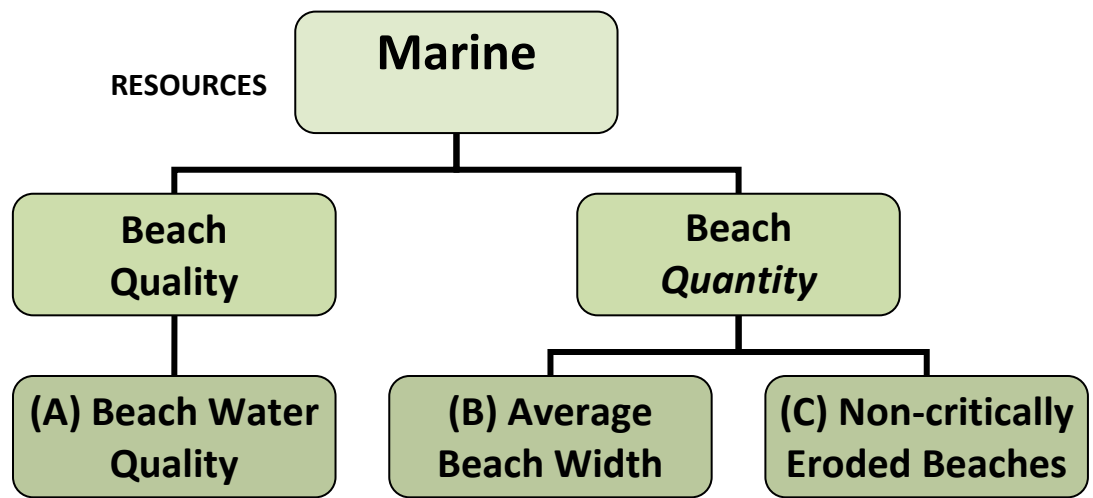


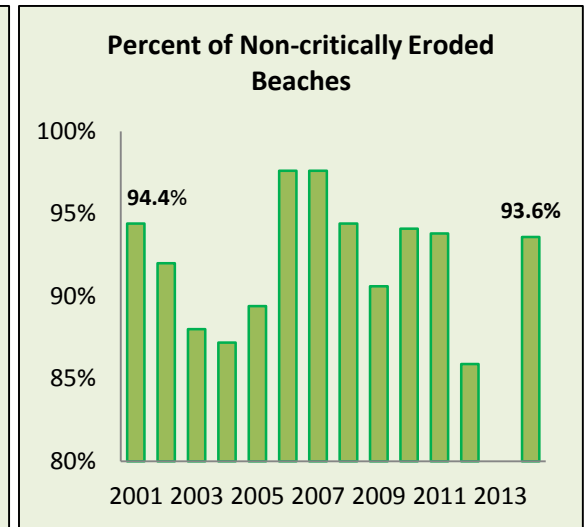
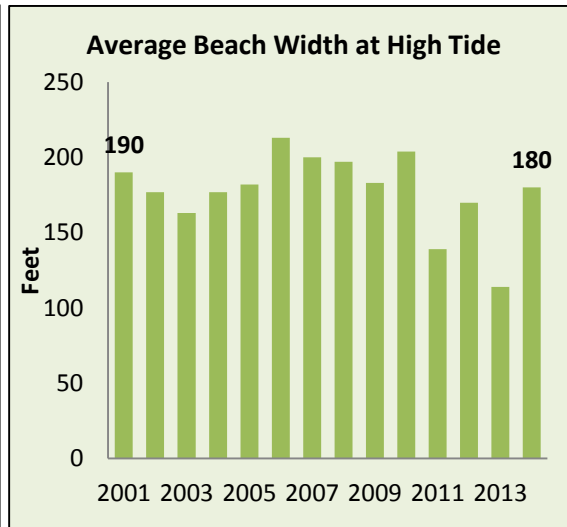
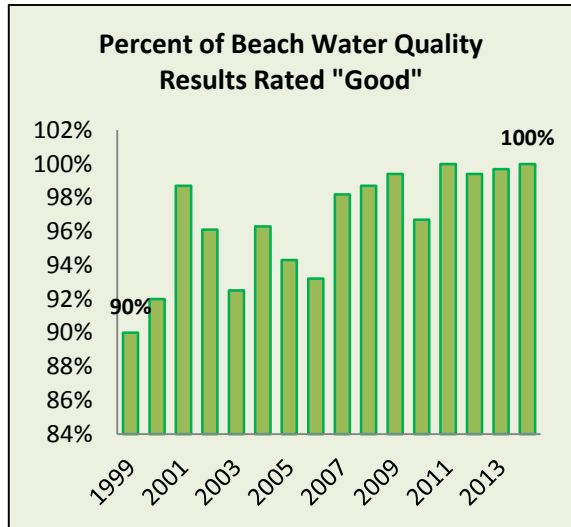
# RESPONSES TO PRESSURES ON REEF RESOURCES



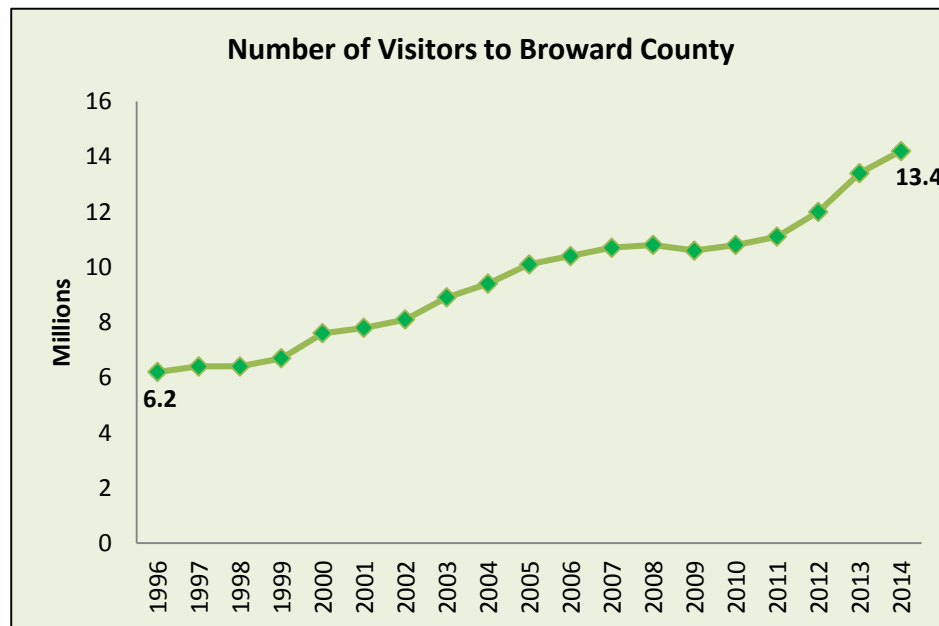
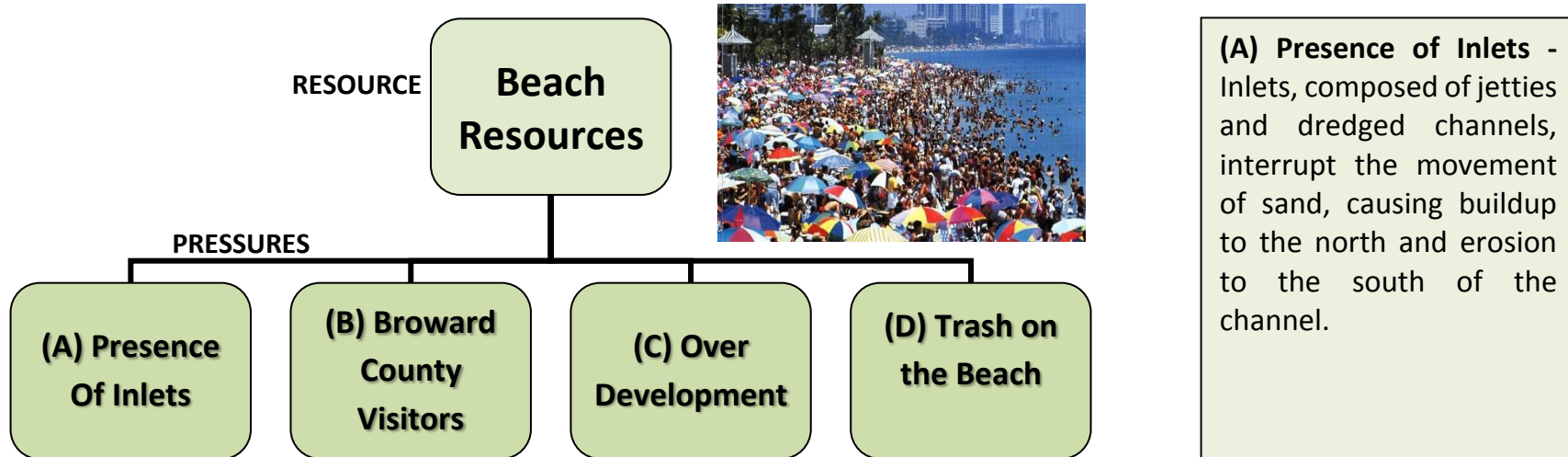
## MARINE RESOURCES- Beach Quality and Quantity







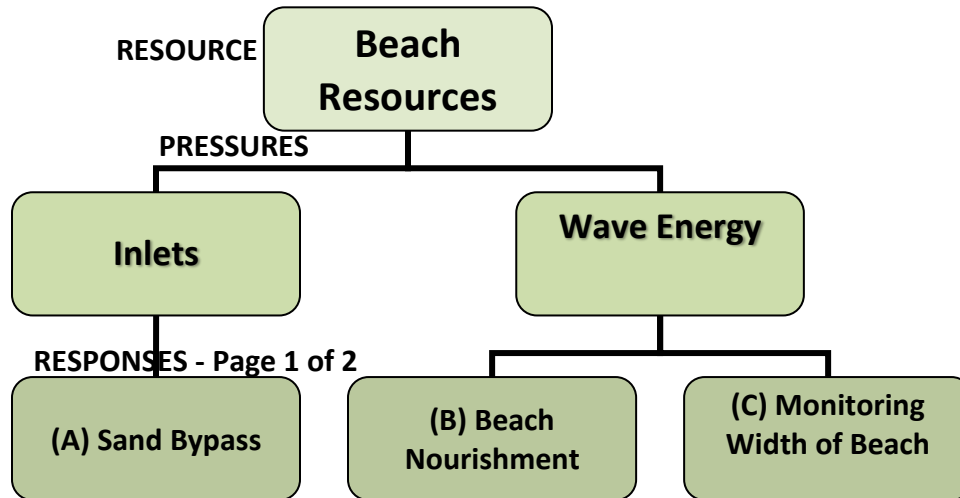
# PRESSURES ON BEACH RESOURCES



**(C) Over Development –** Coastal development, in areas prone to tropical storms, can place lives and property at risk and stress natural resources. Properly controlling beachfront development leads to more sustainable economies and environmental resources.

**(D) Trash on the Beach –** The coastline receives trash from careless people, upland sources like wind-blown trash and from the ocean side where vessels may throw or lose debris overboard.

# RESPONSES TO PRESSURES ON BEACH RESOURCES



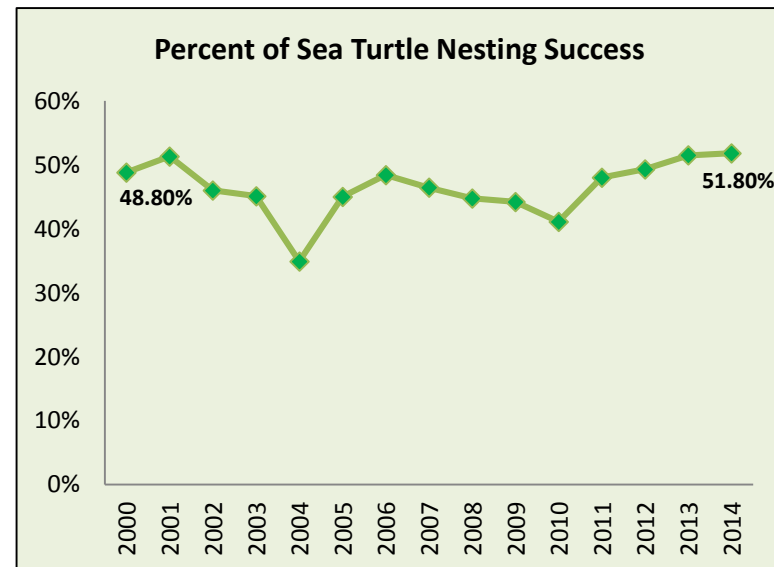
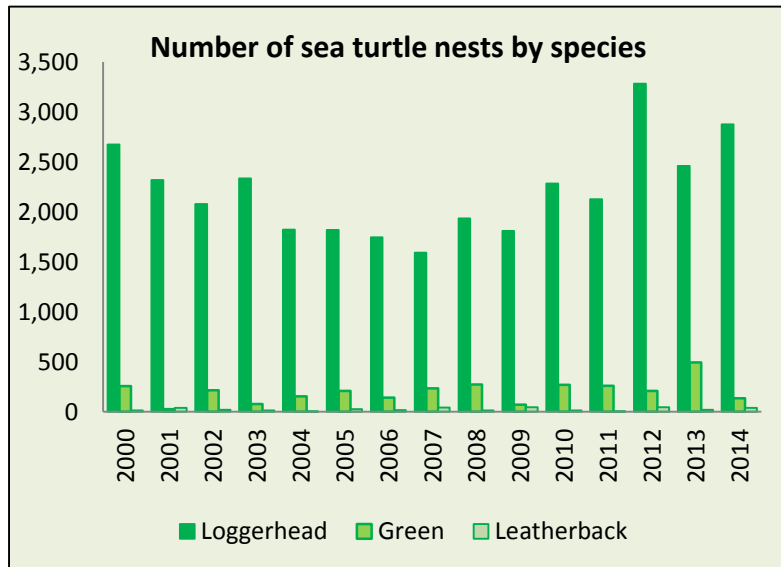
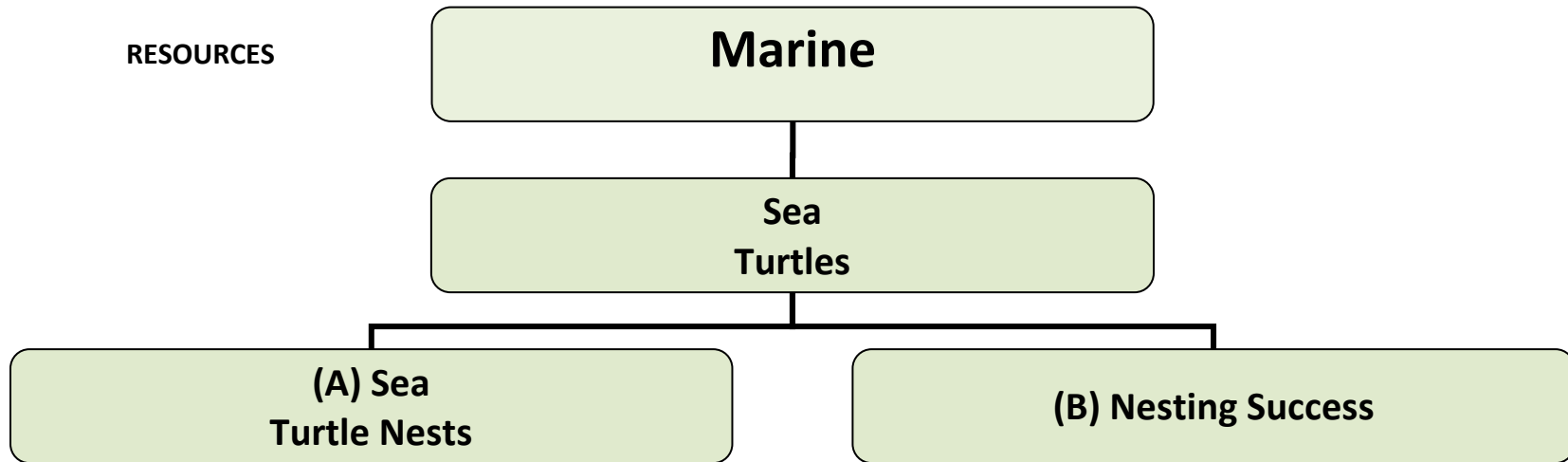
**(A) Sand Bypass** – Sand bypassing is conducted to reduce erosion of beaches which are impacted by stabilized inlets like Port Everglades. Sand bypassing captures sand which accumulates on the updrift side of a stabilized inlet or that might be lost into the channel and mechanically move the sand to the downdrift side.

**(B) Beach Nourishment** – By acquiring sand of a similar grain size, composition, and color, Broward County has been able to restore its eroding beaches to their historical width and slope. Beach nourishment is performed to increase storm damage prevention to coastal properties, to provide increased recreational opportunities and to restore sea turtle nesting habitat.

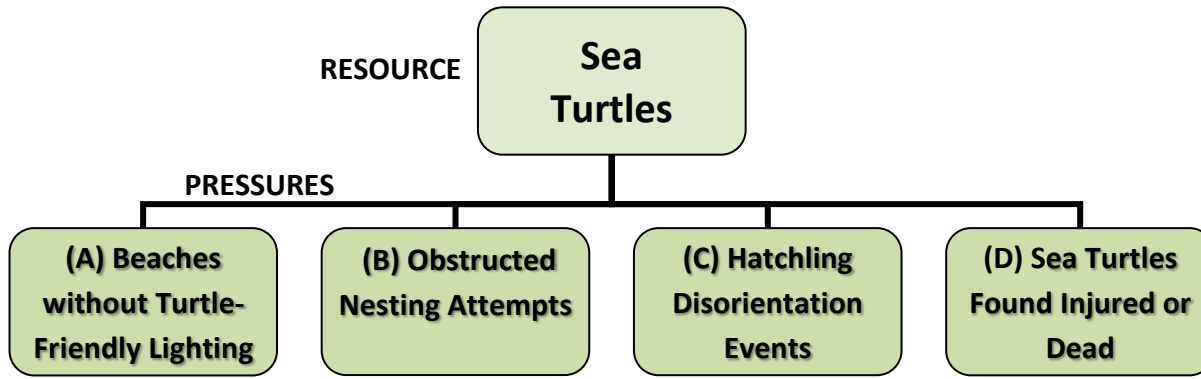
**(C) Monitoring the Condition of the Beach** – Monitoring the condition of the beach is essential to understanding how the beach behaves. Monitoring includes regular surveys of the extent and elevation of the sand. Aerial photos are often used for this purpose.

# MARINE RESOURCES- Marine Wildlife

RESOURCES

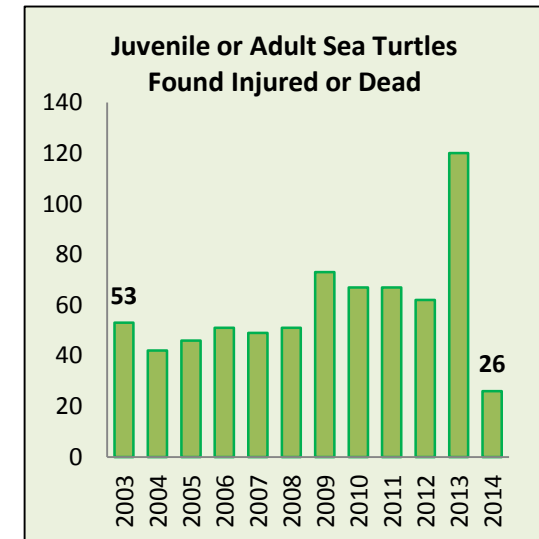
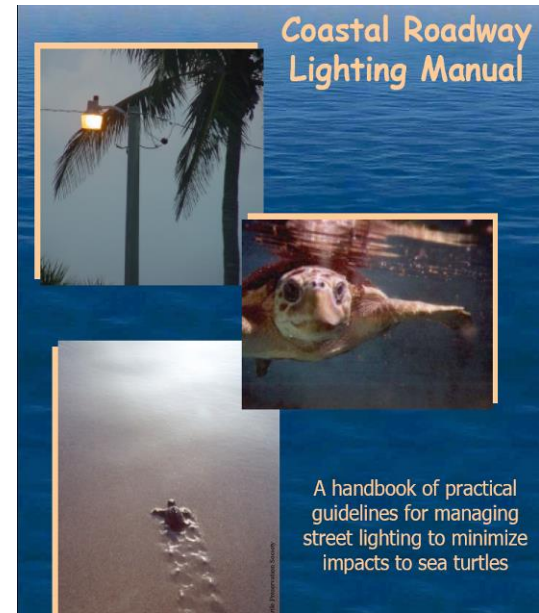
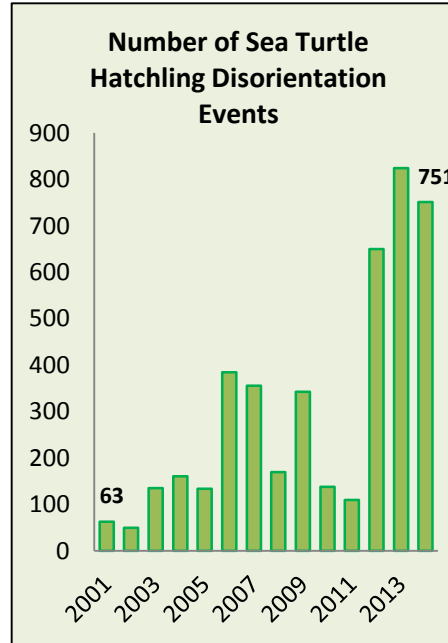
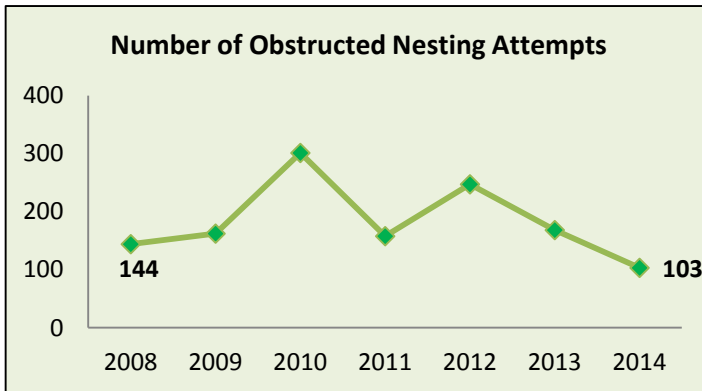


# PRESSURES ON MARINE WILDLIFE – Sea Turtles

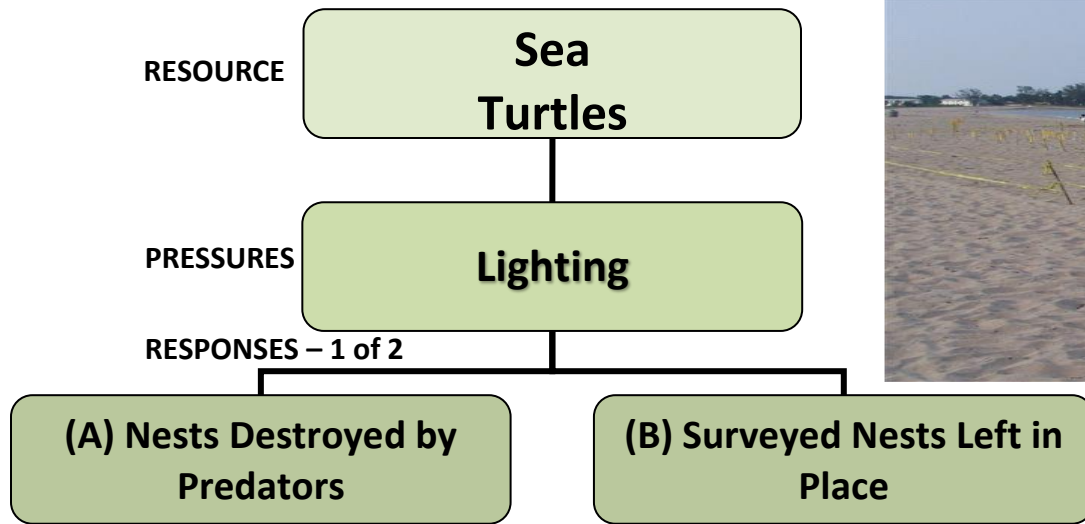


**(A) Beaches without Turtle-Friendly Lighting** - Even active enforcement of lighting ordinance enacted in 5 of the 8 coastal municipalities in Broward County has not resulted in enough light reduction to have areas of the beach considered “turtle friendly”.

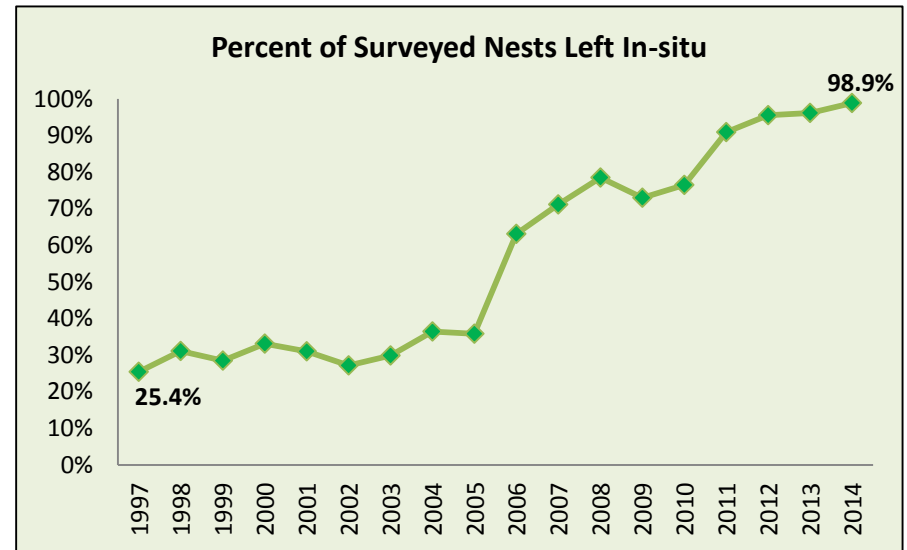
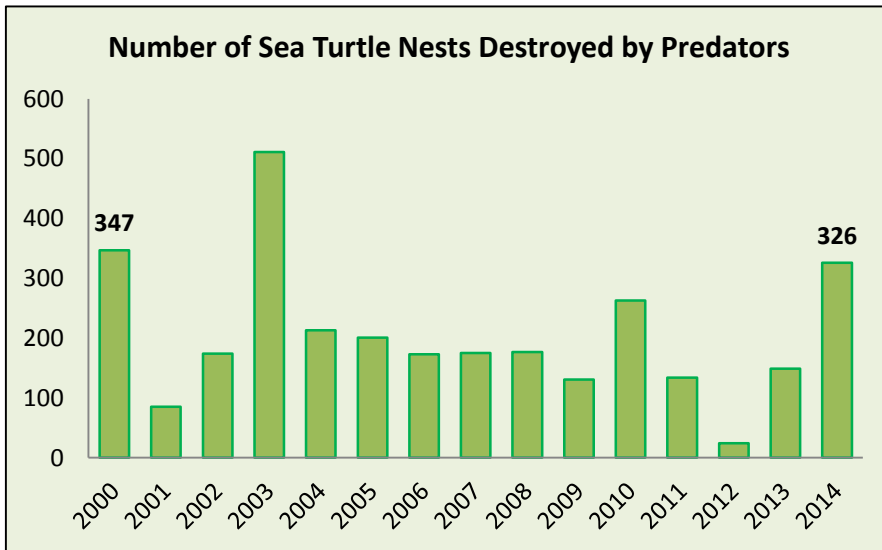
**(B) Obstructed Nesting Attempts** - Crawl marks left by the nesting female sea turtle can show whether she encountered any potential obstruction while attempting to nest. This information will begin to be collected this nesting season.



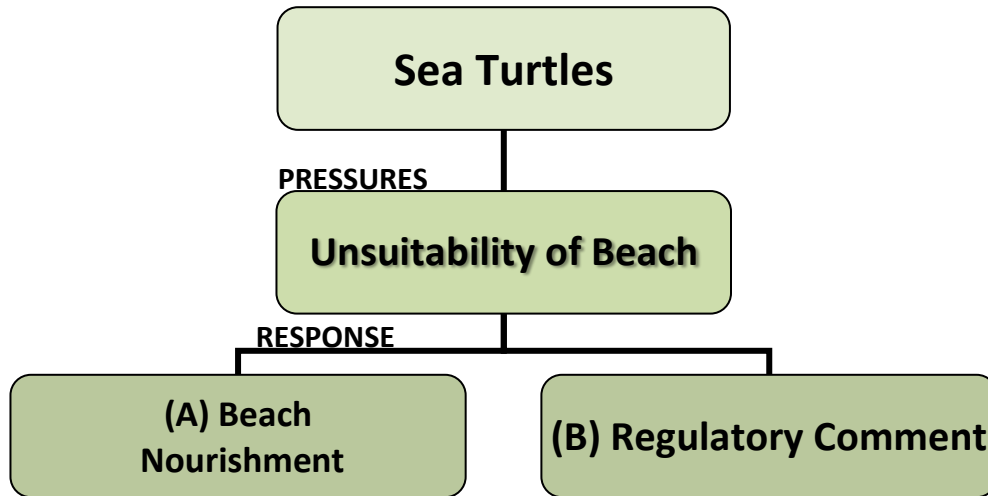
# RESPONSES TO PRESSURES ON MARINE WILDLIFE – Sea Turtles



- Number of Sea Turtle Nests (Total), in 2014, 3,049
- Percent of Beach without Turtle Friendly Lighting, in 2014, 15.6%



# RESPONSES TO PRESSURES ON MARINE WILDLIFE – Sea Turtles

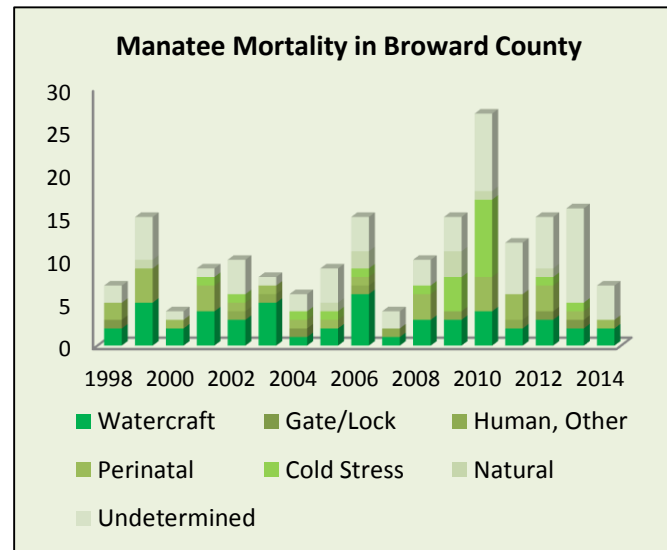
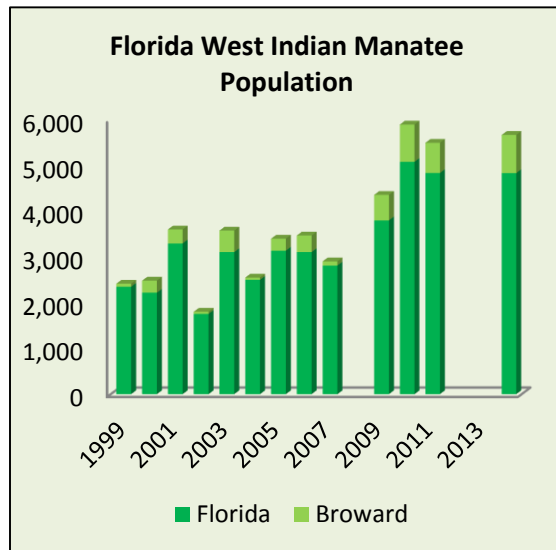
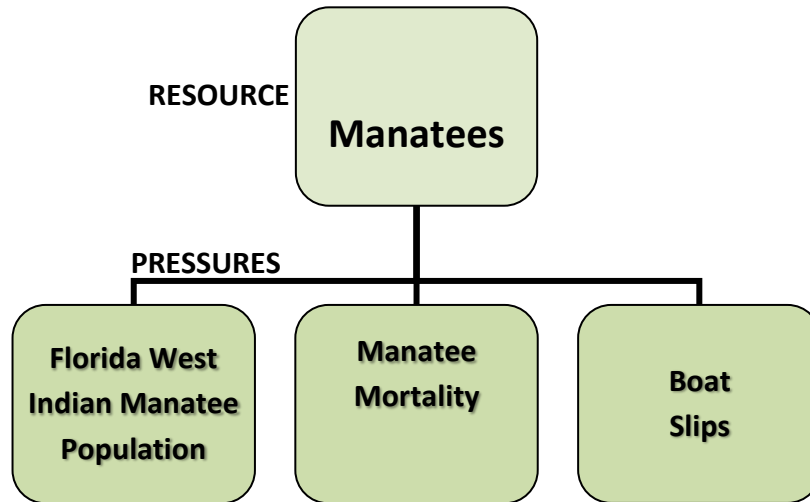


**(A) Beach Nourishment** – Adding sand to restore the historical width and slope of the beaches also serves to preserve critical nesting habitat for sea turtles. Grain size and composition of the replacement sand is important.

**(B) Regulatory Comment on Beach Resources** – The statewide Coastal Construction Control Line Program includes review of the application by the Florida Fish and Wildlife Conservation Commission for impacts to sea turtles and certain shorebirds. County staff may serve as liaison between the state and the applicant to protect sea turtles and their habitat.

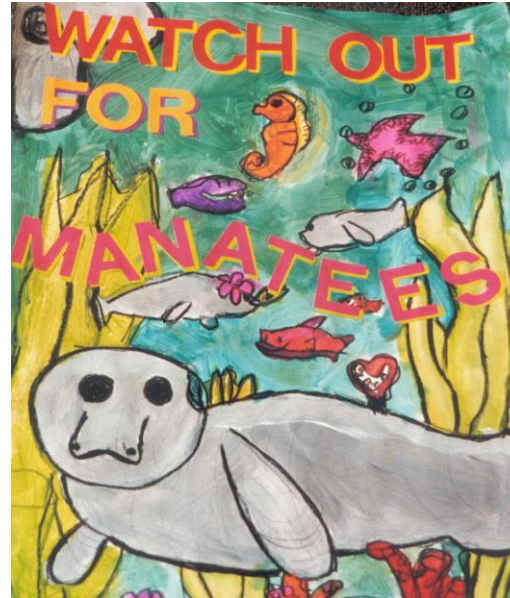
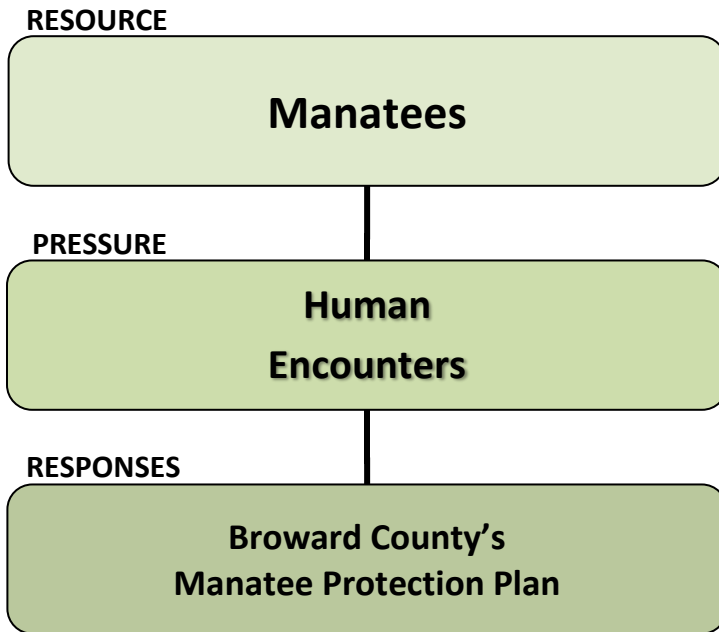


# PRESSURES ON MARINE WILDLIFE – Manatees



Year	Number of dock slips
2006	31,739
2007	30,739
2008	31,511
2009	31,055
2010	31,328
2011	31,295
2012	31,369
2013	31,633
2014	31,671

# RESPONSES TO PRESSURES ON MARINE WILDLIFE - Manatees



Manatee Poster Contest Winner 2003. First Place in the Beginner's Category, Jenin Mohammed from Sunshine Elementary.



**Manatee Protection** - Broward County has completed the Broward County's Boat Facility Siting Plan (BFSP) and incorporated it with the previously-approved Boating Safety and Manatee Education elements of the Manatee Protection Plan (MPP). In December 2007, the MPP received approval from the Florida Fish and Wildlife Conservation Commission (FWC) and the US Fish and Wildlife Service (FWS). Broward County maintains numerous education and awareness efforts alone and in conjunction with other government and non-profit environmental agencies. The efforts include regular distribution of educational materials, public forums, informational kiosks, educator toolboxes, and a manatee webpage on the Broward County website.