

2016 Environmental Benchmarks Report

SEPTEMBER 2017



Environmental and Growth Management Department
ENVIRONMENTAL PLANNING AND COMMUNITY RESILIENCE DIVISION
| CLIMATE, ENERGY & SUSTAINABILITY PROGRAM

TABLE OF CONTENTS

- EXECUTIVE SUMMARY 1
- INTRODUCTION 2
- HOW TO USE THIS REPORT 6
- CLIMATE BENCHMARKS**
- CLIMATE RESOURCES**
- Global average carbon dioxide8
- Change of annual average sea level in Key West from the 1920 baseline8
- PRESSURES ON CLIMATE**
- Greenhouse gas emissions generated in Broward County.....9
- Deviation from annual average temperature in Fort Lauderdale from 1950-1970 baseline9
- RESPONSES TO PRESSURES ON CLIMATE**
- Broward County government operations greenhouse gas emissions reduction9
- Broward County Climate Change Task Force.....9
- AIR BENCHMARKS**
- AIR RESOURCES**
- Percentage of days when outdoor air quality was good10
- Average annual ozone concentration (ppm)10
- Average annual particulate concentration (ug/m³).....10
- PRESSURES ON AIR QUALITY**..... 11
- PRESSURES ON AIR QUALITY - Mobile Sources**
- Total mobile source emissions (tons/year)12
- Percentage of over-capacity roadway segments12

Vehicle miles traveled per day per 1,000 people	12
Vehicle miles traveled per day (millions).....	12

RESPONSES TO PRESSURES ON AIR QUALITY- Mobile Sources

Number of people reached through air quality outreach events	13
Number of air quality outreach events	13
Number of mass transit passenger trips (million trips/year)	13
Community shuttle ridership (million trips/year).....	13

PRESSURES ON AIR QUALITY - Regulated Stationary Sources

Number of regulated stationary sources.....	14
Emissions from power plants, totals (tons/year)	14
Total electricity consumption (billion kilowatt-hours/year)	14
Per capita power consumption (kilowatt-hours/year).....	14
Emissions from power plants, CO	14
Emissions from power plants, NOx.....	14
Emissions from power plants, PM	14
Emissions from power plants, SO2	14
Emissions from power plants, VOCs	14

RESPONSES TO PRESSURES ON AIR QUALITY- Regulated Stationary Sources

Number of compliance inspections of regulated stationary sources.....	15
Changes in stationary source regulations.....	15
Percent regulated stationary sources inspected and found to be in compliance.....	15

PRESSURES ON AIR QUALITY - Other Sources

Number of days air quality was impacted by an unusual event	16
---	----

RESPONSES TO PRESSURES ON AIR QUALITY- Other Sources

Open burning regulations	17
--------------------------------	----

WATER BENCHMARKS

WATER RESOURCES	18
------------------------------	-----------

WATER RESOURCES - Surface Water Quality	
Everglades - phosphorus at the S-9 pump station (ppb).....	19
PRESSURES ON WATER RESOURCES - Surface Water Quality	
Building permits - new structures/non-residential addition approvals issued	19
Percent of developed land not subject to surface water management regulation	19
RESPONSES TO WATER RESOURCE PRESSURES - Surface Water Quality	
Urban runoff	20
Miles of streets swept.....	20
Total number of certified Naturescape sites	20
Number of educational programs delivered	20
Active construction sites within BC jurisdiction with surface water management licenses	21
Total surface water management construction licenses issued since 1989	21
Number of Broward County issued surface water management renewal licenses	21
Number of construction site inspections performed in the areas of BC jurisdiction.....	21
WATER RESOURCES - Ground Water Quality and Quantity	
Percentage of monitoring wells with changing ground water levels	22
Gallons saved - Naturescape Irrigation Service (million gallons/year).....	22
PRESSURES ON WATER RESOURCES - Ground Water Quality	
Percent saltwater monitoring wells with changing chloride concentrations (Year 2000 baseline).....	23
Percent Broward County where central domestic sewer service is not available	23
Total solid waste produced (million tons/year).....	23
Solid waste produced (tons/year/person).....	23
Number of contaminated wells	24
Number of hazardous material and storage tank licenses	24
Amount hazardous materials hauled (million gallons).....	24
Number of new reported discharges.....	24
RESPONSES TO WATER RESOURCE PRESSURES - Ground Water Quality	
Local surface water management	25
Net gain/loss in septic system wastewater flow	25
Percent of solid waste recycled	25

Percentage of contaminated sites cleaned up to state standards26
 Number of licensed hazardous material sites inspected26
 Percent licensed hazardous material sites inspected and found to be in compliance26

PRESSURES ON WATER RESOURCES - Ground Water Quantity

Annual rainfall (inches)27
 Potable wellfield withdrawals from the Biscayne Aquifer (million gallons/day)27
 Percent of regulated wellfield source water wells without regulated substances27
 Regional surface water management through IWRP participation27

RESPONSES TO WATER RESOURCE PRESSURES - Ground Water Quantity

Maintenance of urban ground water levels28
 Alternative water supply development28
 Water Matters Day attendance28

LAND BENCHMARKS

LAND RESOURCES..... 29

LAND RESOURCES - Natural Land Quantity..... 30

Acres of protected land31
 Acres of unprotected (developable) land31
 Everglades Water Conservation Areas31

PRESSURES ON LAND RESOURCES - Natural Land Quantity

Broward County population32
 Building permits - new structure/non-residential addition approvals issued.....32
 Wetlands licensed for development (acres).....32
 Mitigation in Broward County (acres)32

RESPONSES TO LAND RESOURCE PRESSURES - Natural Land Quantity

Public dollars spent to preserve natural land.....33
 Environmental review33
 Mitigation on public lands33

LAND RESOURCES - Natural Lands Quality	34
PRESSURES ON LAND RESOURCES - Natural Land Quality	
Invasive exotic vegetation	35
Natural lands under hydrologic stress.....	35
Fire suppression on natural lands.....	35
RESPONSES TO LAND RESOURCE PRESSURES - Natural Land Quality	
Percent of municipal natural land sites with management plans	36
Land Stewardship.....	36
Comprehensive Everglades Restoration Plan.....	36
Restoring hydrologic function to natural lands.....	37
Controlled burn or alternative management methods.....	37
LAND RESOURCES - Urban Landscape	38
PRESSURES ON LAND RESOURCES - Urban Landscape	
Number of tropical storms	39
Reduction of wildlife habitat	39
Emerging pest problems.....	39
Tree related complaints and licensed for removal.....	39
RESPONSES TO LAND RESOURCE PRESSURES - Urban Landscape	
Public education	40
Trees planted in Broward County parks after storm events	40
Number of Naturescape Broward educational programs delivered.....	40
Number of Certified Naturescape sites	40
Number of tree related complaints.....	41
Educational events to reduce pest problems.....	41
Tree canopy coverage in Broward County	41
Active tree trimmer licenses.....	42
Tree related enforcement actions.....	42
Replacement trees required by licensing.....	42

MARINE BENCHMARKS

MARINE RESOURCES	43
MARINE RESOURCES - Reef Quality	
Percent healthy coral.....	44
Number of fish species observed on the reef	44
MARINE RESOURCES - Reef Quantity	
Percent live coral coverage.....	45
Octocoral and sponge density	45
Number of fish surveyed on the reef	45
PRESSURES ON REEF RESOURCES	
Saltwater fishing licenses issued in Broward County	46
Percent of reef monitoring sites impacted by algae	46
Number of times ship damage impacted Broward’s reefs.....	46
RESPONSES TO PRESSURES ON REEF RESOURCES	
Marine debris clean-up campaigns: pounds of litter collected, number of participants.....	47
Number of mooring buoys.....	47
MARINE RESOURCES - Beach Quality and Quantity	
Percent of beach water quality results rated “Good”	48
Average beach width at high tide (feet)	48
Percent of non-critically eroded beaches.....	48
PRESSURES ON BEACH RESOURCES	
Presence of inlets.....	49
Number of visitors to Broward County (millions).....	49
Over development	49
Trash on the beach	49
RESPONSES TO PRESSURES ON BEACH RESOURCES	
Sand bypass	50

Beach nourishment.....	50
Monitoring the condition of the beach	50
MARINE RESOURCES – Marine Wildlife	
Number of sea turtle nests by species	51
Percent of sea turtle nesting success	51
PRESSURES ON MARINE WILDLIFE – Sea Turtles	
Beaches without turtle-friendly lighting.....	52
Number of obstructed nesting attempts.....	52
Number of sea turtle hatchling disorientation events	52
Number of juvenile or adult sea turtles found injured or dead	52
Number of sea turtle nests destroyed by predators	53
Percent of surveyed sea turtle nests left in-situ.....	53
RESPONSES TO PRESSURES ON MARINE WILDLIFE – Sea Turtles	
Beach nourishment.....	54
Regulatory comment on beach resources.....	54
PRESSURES ON MARINE WILDLIFE – Manatees	
Florida West Indian manatee population	55
Manatee mortality in Broward County.....	55
Number of dock slips in Broward County	55
RESPONSES TO PRESSURES ON MARINE WILDLIFE – Manatees	
Manatee protection.....	56

EXECUTIVE SUMMARY

Today, and into the future, the Broward County Board of Commissioners recognizes the importance of environmental quality as part of the Commission’s Goal to have and maintain a pristine and healthy environment. The Environmental Protection and Growth Management Department through the Environmental Planning and Community Resilience Division collected, tracked, and reported on over 120 data points that make up the Environmental Benchmarks Report. The Environmental Benchmarks Report was used to track and demonstrate environmental improvements and impacts to Broward County’s natural environment. The benchmark data points were broken down into five resource categories: Climate, Air, Water, Land, and Marine. The benchmarks represented pressures on those resources and the responses that reflect how changes in natural resource management initiatives translate into improvements in the environment. One can think of the Environmental Benchmarks Report as a “report card” on the state of the five natural resources for Broward County. The general trends in the benchmarks are shown the table below. A green arrow represented a healthy resource, orange represented pressures of concern, and red represented an unhealthy resource.

Status	Resource	Overview of trends in measured benchmarks
Pressures of Concern	Climate	Climate pressures increased. Sea level continued to rise. Significant rise in temperature did not occur. Local planning and response efforts continued.
Healthy Resource	Air	Outdoor air quality was good. Personal vehicle use increased, mass transit ridership declined, and energy consumption was steady. Emissions from power plants continued to decline.
Healthy Resource	Water	Water quality goals were met. Education and outreach expanded. Groundwater contamination continued to decrease in response to regulation. Water conservation efforts continued, saving significant amounts of water. Increased pressure from solid waste production and a decline in recycling demonstrated a need for attention.
Pressures of Concern	Land	Population and development pressures increased. The number of wetlands permitted for development increased since 2012. No funds were dedicated to preserving natural lands (since 2011). All natural lands were in compliance with management plans.
Healthy Resource	Marine	The reefs were healthy and abundant despite increasing pressure from fishing and damage from ship groundings. The majority of beaches were wide and healthy, drawing an increasing number of visitors annually. Successful turtle nesting continued to increase since 2007. Manatee mortality was at its lowest since 2007 and the population nearly doubled since then.

Introduction

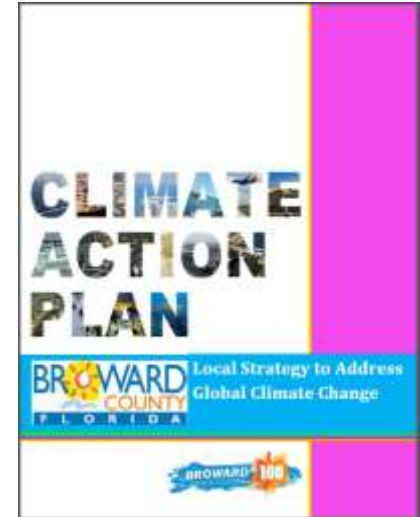
In 1999, one of the County Commission's *New Vision* goals was to review efforts to protect the environment and develop a comprehensive environmental strategy. The Broward County Environmental Protection and Growth Management Department (formerly the Environmental Protection Department) initiated the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

Climate

Globally, the level of greenhouse gas, a major contributor to climate change, continued to increase. Locally, Broward County experienced both warmer and colder weather. The long term trend at the Key West tide gauge showed 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 Commissioners worked at the internal, community-wide and regional level to mitigate the causes and adapt to the consequences of climate change. The Government Operations Workgroup continued to implement projects and initiatives aimed at reducing the County's operational 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 addressed climate issues across the County and the four-county region. In January 2016, the Board of Commissioners unanimously passed an updated Climate Action Plan.

Air

Outdoor air quality was 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 2016 was 82.2%, down from 89.6% in 2014, but still less than recorded bests observed in 2000 (97%) and 2011 (95.1%). In 2016, there were 10 days in which the air quality was affected by "an unusual event" (e.g. wildfire 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 increased vehicle miles traveled and decreased mass transit ridership since 2013.



Review and download the Broward Climate Change Action Plan at Broward.org/Climate

The percentage of over-capacity roadway segments had decreased steadily since 2002, reaching 13% in 2015. In 2016, over-capacity roadway segments increased to 17%. The use of control equipment by power plants (i.e., electrostatic precipitators (ESPs) and low NOx burners) continued to contribute to reductions in emissions in 2015 by over 80%, compared to 2005. Broward County valued 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 continued to develop public outreach events such as Air Awareness Month and Car Care Month which increased community awareness and empowered citizens to take personal action to protect air quality. Broward County partnered with the Broward County School Board in coordinating educational programs for all public schools. The number of people reached through outreach events nearly doubled over the past decade from 15,123 people in 2007 to 30,032 people in 2016.

Water

The water quality status of Broward County's surface water resources was generally good. However, recent water quality data revealed that the phosphorus concentration of discharges leaving the C-11 West Basin via the S-9 pump station was at 15 ppb, which is above the goal of 11 ppb. Since 2007, phosphorus concentrations have generally fluctuated between 12 and 15 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 to support Everglades water quality protection and restoration. On a countywide basis as of 2016, the latest data available, 19.4% of the County area remained dependent on septic systems, 66% of developed land was subject to surface water management regulation, and the number of miles of streets swept more than doubled since 2010. These activities provided for regional water quality benefits.

Countywide water conservation efforts strengthened in 2016 with a total of 161 NatureScape landscape certifications being completed to achieve a year-to-date total of 4,080 certifications countywide. The NatureScape Irrigation Service program saved 103 million gallons of water through irrigation system evaluations and education. Annual rainfall was below the two-decade average in 2014-2016; potable wellfield withdrawals were also below the two-decade average, but the gallons withdrawn per day has increased since 2014. These water conservation efforts served to further reduce consumptive use pressures on the Biscayne Aquifer, Broward County's principle source of drinking water. However, despite the increased water conservation efforts, a greater percentage of groundwater monitoring wells showed increases in chloride levels, indicating further progression of saltwater intrusion into the Biscayne Aquifer. The County continued its efforts to

Green Infrastructure Map Series – NatureScape Sites



As of 2016, there were 4,080 Certified NatureScape sites in Broward County.

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 also took 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 a better understanding of the water resource constraints and opportunities faced by the 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 two years 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.

Land

Prior to development, Broward County was a rich mixture of uplands and wetlands. The western two-thirds of Broward County were designated as Water Conservation Areas and are being restored through the Comprehensive Everglades Restoration Plan. The eastern portion of Broward County, approximately 440 square miles, supported approximately 1.9 million people, which placed tremendous stress on the remaining natural lands and pervious areas that serve as 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 the park system and acquisition of natural lands and open spaces. As of 2016, the County had 26,320 acres of protected lands and 1,303 acres of unprotected developable lands.

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

The environmental features of Broward County's land resources were approached in two ways. One was the quantity and quality of natural lands, which are those lands that preserve habitat for indigenous plants and animals in historically existing community types. The other significant land resource was the urban landscape. These resources were under significant pressure from a variety of sources including physical development, hydrologic stress, exotic plants and animals, fire suppression, littering, dumping, contamination, and weather events. The County,

Green Infrastructure Map Series – Urban Forest



As of 2010 there was 19.4% tree canopy countywide, Broward County goal is 40%.

as well as many other organizations, has taken a variety of steps to respond to these pressures and maintain the value of the County's land resources as high as possible.

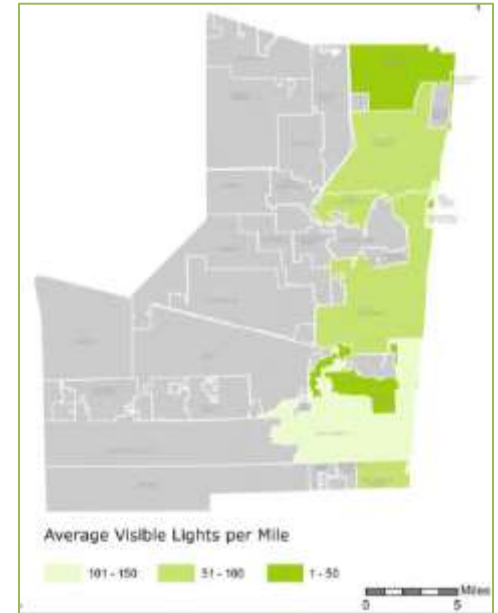
Marine

Broward County's marine resources are fundamental to the area's economy, environment, and quality of life. For the purposes of these benchmarks, the County's marine resources included 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 marine resources, and to enable actions in support of protection, restoration, and enhancement of the resources, the County monitored and actively managed the reefs, beaches, and listed wildlife. The number of turtle nests have steadily increased from 2011 to 2016, where there were 3,567 nests observed. In 2016, loggerheads nested in record-breaking numbers with 3,400. Also, the Florida manatee population has been greater the last four years than in the recent past, with 6,250 manatees in 2016.

High population density, resource use, and coastal build-out resulted in a number of pressures on the marine resources. These pressures included 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. Marine resources were also affected by the naturally occurring cycles of storms, temperature extremes, water quality fluctuations, and harmful algae blooms. Quantitative trends were 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. In some cases, attributing a single cause of damage to a particular resource may be difficult. In response to these real and potential risks and damages, the County pursued 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.

Find the full Green Infrastructure Map Series in the Climate Toolbox at Broward.org/Climate.

Green Infrastructure Map Series – Coastal Artificial Lighting



Broward County's goal was to decrease artificial lighting along the beach during sea turtle nesting season, March 1st to October 31st. As of 2016, 100% of coastal cities had a sea turtle lighting ordinance in place.

How to use this report

The Environmental Benchmarks Report used flow charts to help demonstrate how a given resource was impacted by specific pressures and the responses that directly address those pressures. Narrative benchmarks discussed resources where quantitative data was not available.

INDICATORS AND PERFORMANCE MEASURES

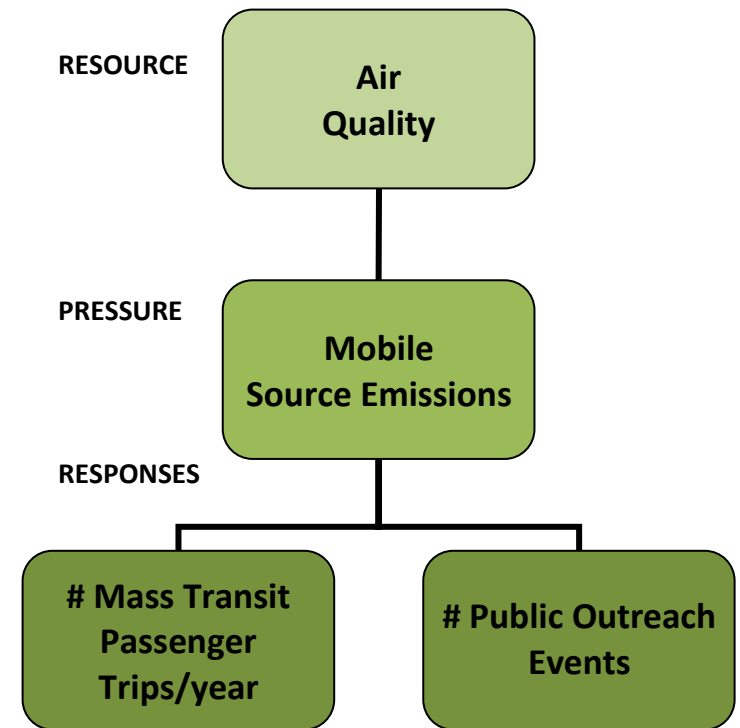
Broward County selected a variety of “indicators” to evaluate the state of the environment. For instance, “ambient air quality” was an indicator of the health of the County’s air resources. For each indicator, the County developed one or more “performance measures” to assess changes in the indicator. In this example, “the percentage of days when the air quality was rated as ‘good’,” was the performance measure for “ambient air quality.”

RESOURCE-PRESSURE-RESPONSE CONCEPT

The example performance measure above was useful for tracking the condition of the air **resource**. From a resource management perspective, however, awareness of the **pressures** or driving forces that influence air quality were important. By maintaining awareness of the pressures that influence the resource and how they are changing, Broward County strived 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, since vehicle emissions were one of the most significant sources of air pollution. As a result, the County 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. Thus, the impact of vehicle emissions on air quality led to response-type performance measures such as “the number of mass transit trips per year.”

NATURAL RESOURCE CATEGORIES

The Benchmarks Program concentrated on four primary natural resource categories: **climate**, **air**, **water**, **land** and **marine**. For each of these resources, Broward County identified one or more resource, pressure and response benchmark measure. When available, the County tracked historical data to show trends. For newly formulated performance measures, historical data may not have



Example of a Benchmark Flow Chart

been available. In these cases, the County plotted first year baseline data, and trends may become evident in future reports. Narratives explained trends in policies, regulation, or issues that could not 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, provided a visual representation of how the responses and pressures are connected to a specific resource.

DATA COLLECTION INTERVALS

When available, Broward County presented 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, was not available on an annual basis.

INDICATOR OVERLAP

Sometimes an indicator reflected upon more than one resource. For instance, development pressure as measured by the number of building permits, affected both land and water resources. When such overlap occurs, the indicator was shown in both sections.

ENDNOTES

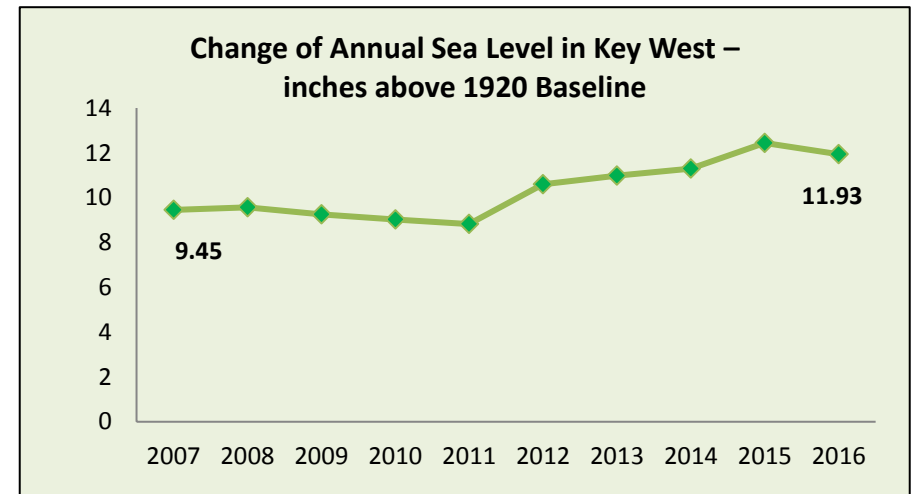
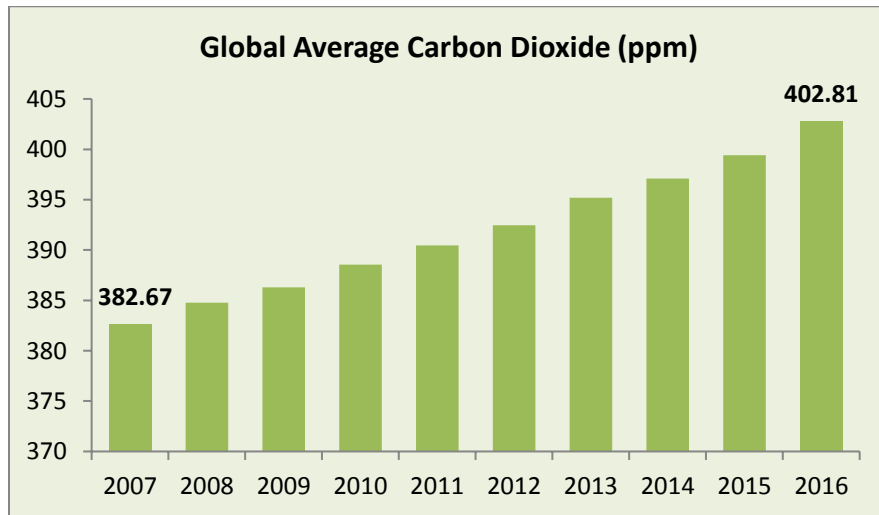
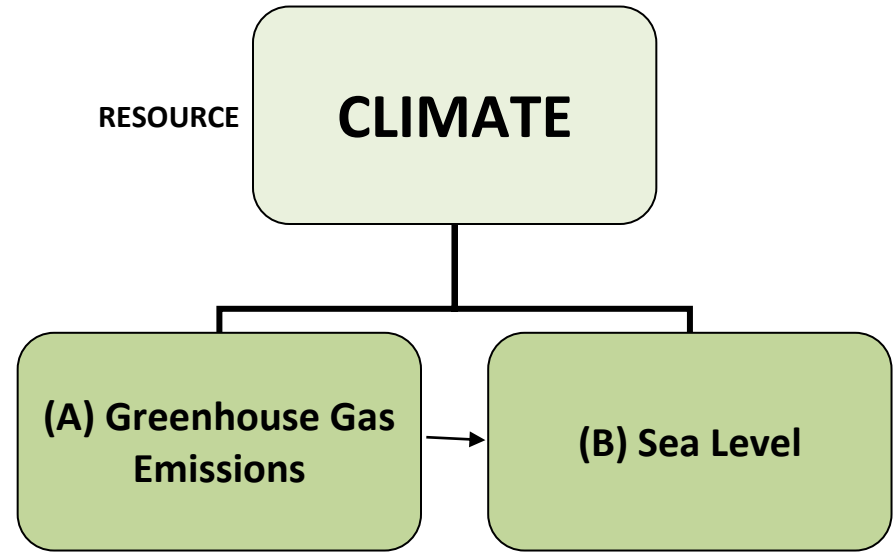
The appendix of the report was the *Endnotes*. Each benchmark had an associated set of endnotes comprised of four sections: (1) *measurement or narrative*, (2) *explanation*, (3) *trends* and (4) *data source*. The *measurement* section provided some detail on how the County calculated the specific performance measure or why it was included as a narrative. The *explanation* section described the significance of the performance measure with respect to how it might have impacted the resource. The *trends* section commented on how and why the benchmark changed over time. Finally, the *data source* provided contact information for readers wanting additional information on the performance measure.

This document may also be found on the Broward County web page under the [Environmental Protection and Growth Management Department](#). To obtain the data for any of the charts in this document, contact the Environmental Planning and Community Resilience Division at 954-519-1270 or resilience@broward.org.



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 was unmistakable; global concentrations of greenhouse gases (GHG) increased markedly as a result of human activities; global air and ocean temperatures increased; and average sea level rose globally. Climate change was very much a part of any discussion regarding the environment. Climate change was a global phenomenon with significant regional impacts. This section described local indicators of the climate change, local contributors of greenhouse gases and ways that Broward County Government responded to this growing environmental concern.



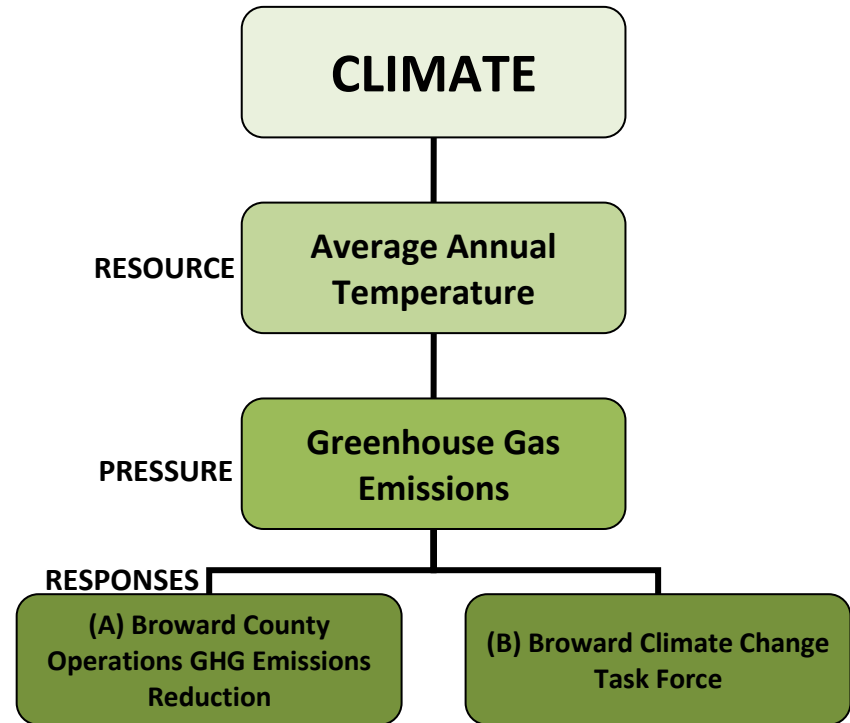
PRESSURES ON CLIMATE

Greenhouse Gas Emissions Generated in Broward County - Emissions from a variety of sources created carbon dioxide and other so called “greenhouse” gases (GHG). The ratio of these gases in the atmosphere changed in such a way as to increase global temperature. GHG emissions in Broward County came 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 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 reductions (<http://www.broward.org/NaturalResources/ClimateChange/Pages/GovernmentWorkgroup.aspx>). Values of GHG emissions are reported in metric tons (tonnes) of carbon dioxide equivalent (CO₂e).

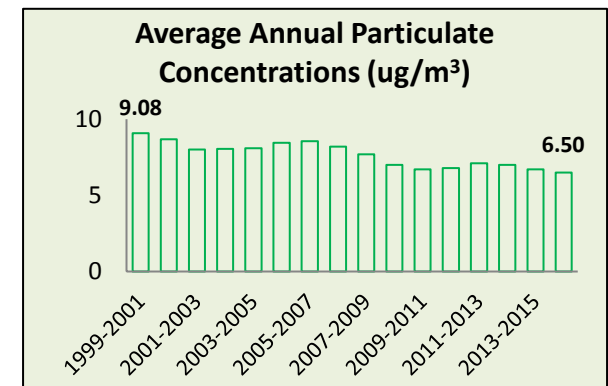
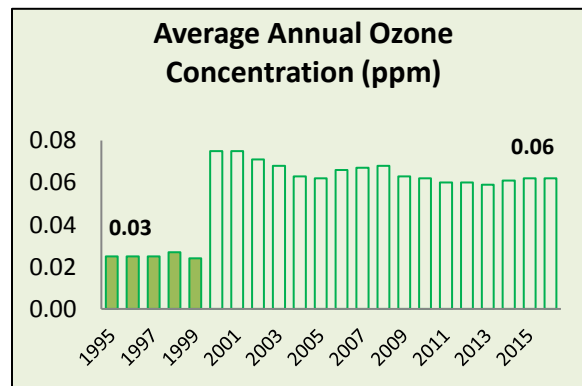
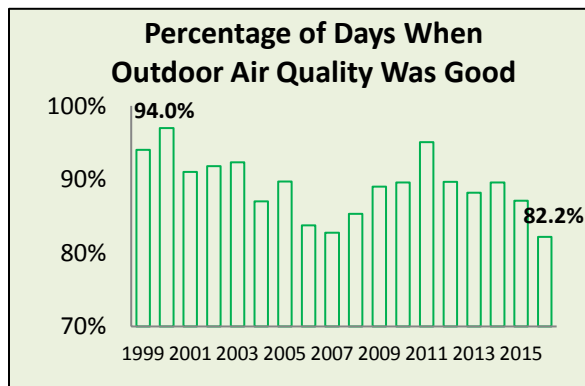
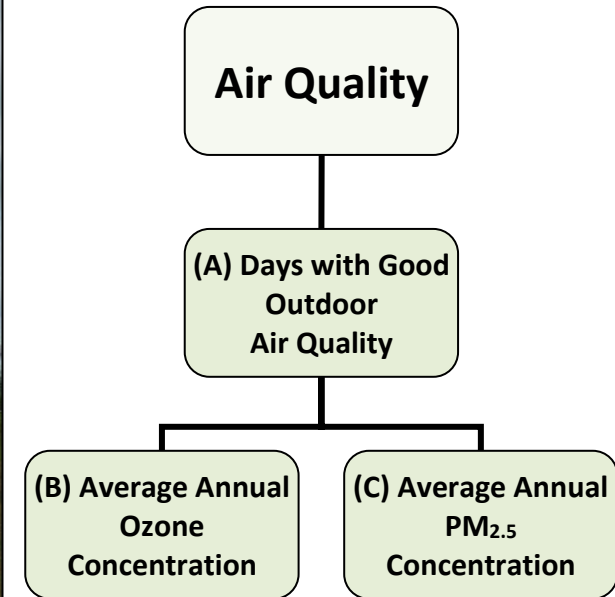
- Deviation from annual average temperature in Fort Lauderdale from 1950-1970 baseline, 1.66 degrees in 2016.
- Broward County government operations greenhouse gas emissions, 248,547 tonnes CO₂ equivalent in 2015.

(B) Broward County Climate Change Task Force - On June 24, 2008, the Broward County Board of 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.



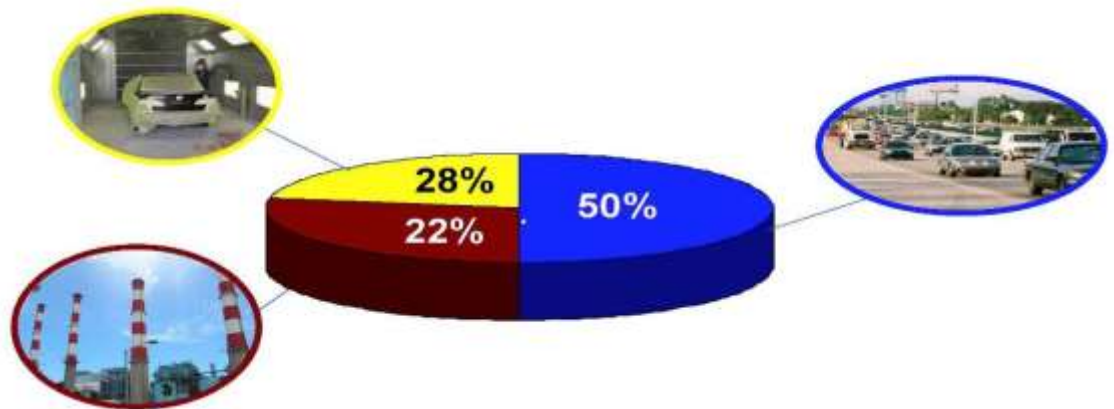
AIR RESOURCES

Air is essential for life. South Florida depended 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 determined the air quality by measuring parameters that have the potential to impact human health and the ecosystem around us. A number of different parameters were 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 that impacted the air quality index were the ambient concentrations of ozone gas (a byproduct of emissions, sunlight, and heat) and PM_{2.5} (particulate matter of aerodynamic diameters less than 2.5 mm which can travel deep into the lungs).



PRESSURES ON AIR QUALITY

What influenced air quality? In Broward County, the main culprits were 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 (e.g. large industries, power plants, and petroleum terminals) and small facilities (e.g. gas stations, dry cleaners, and auto body shops) also added to the pollution burden of the air in Broward County. Infrequently occurring extraordinary natural and anthropogenic events (e.g. Saharan dust, wild fires, and vegetative debris burning) could 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 were released and which did not move around.

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

Examples: power plants, petroleum terminals

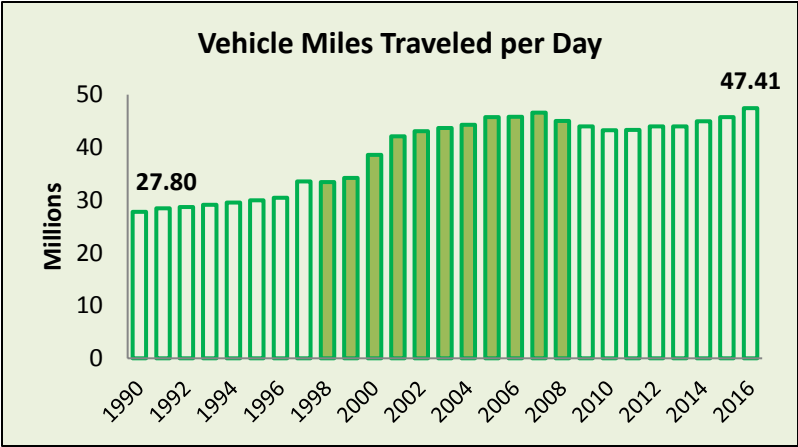
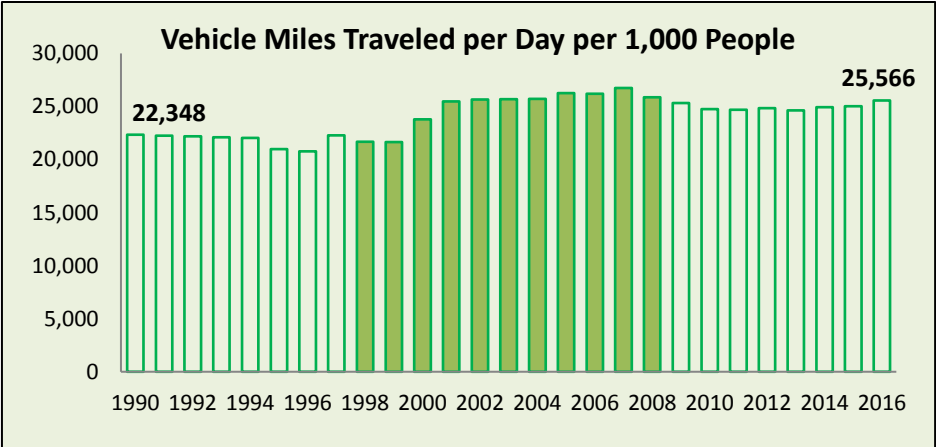
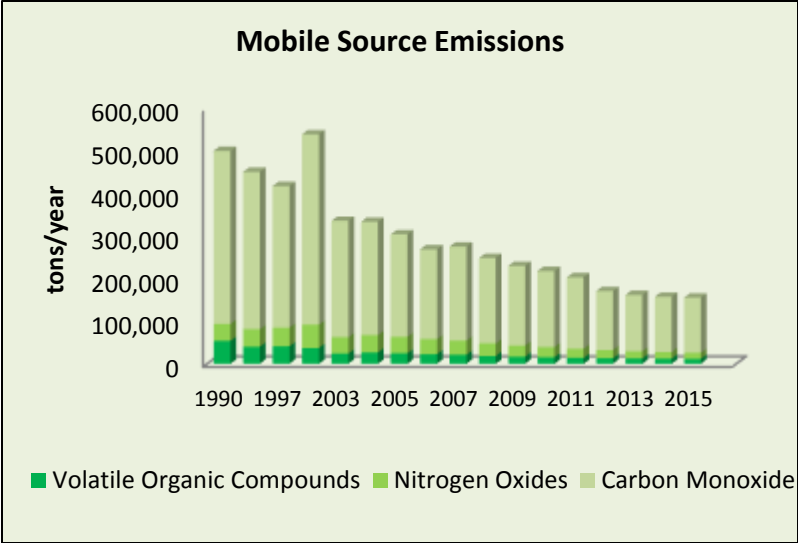
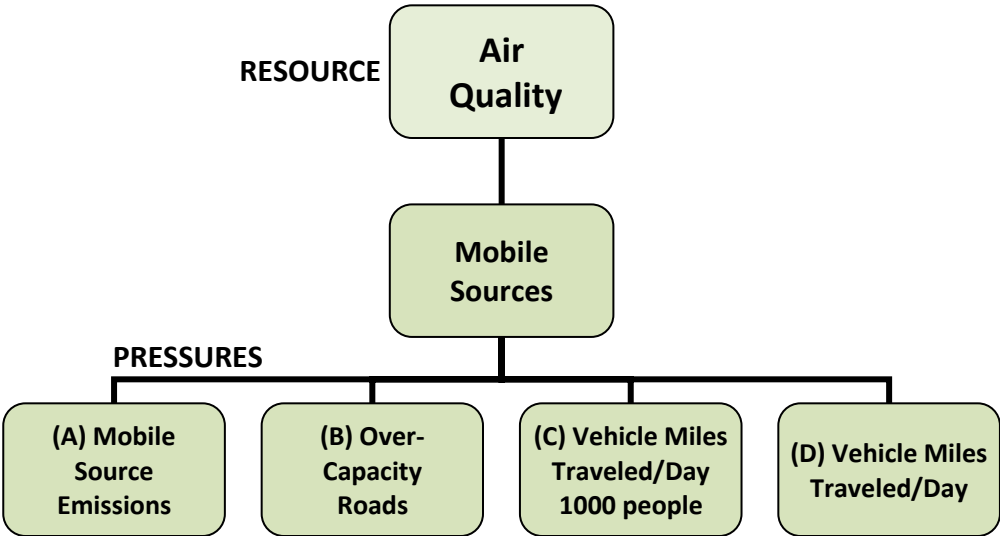
- **Small Operations:** A stationary source that emitted small amounts of air pollution.

Examples: dry cleaners, paint spray booths



Regulated Air Curtain Incineration of Debris from Hurricane Wilma

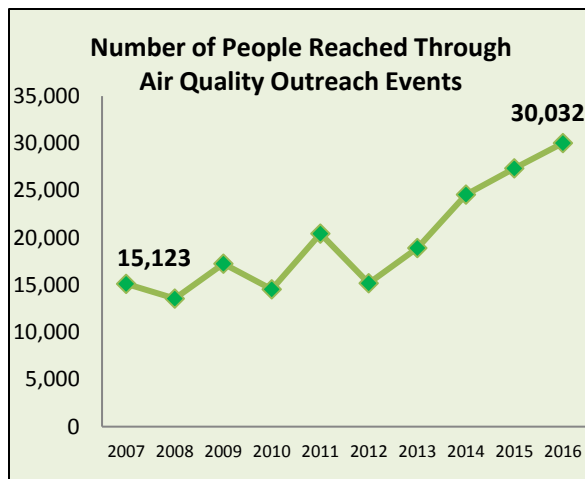
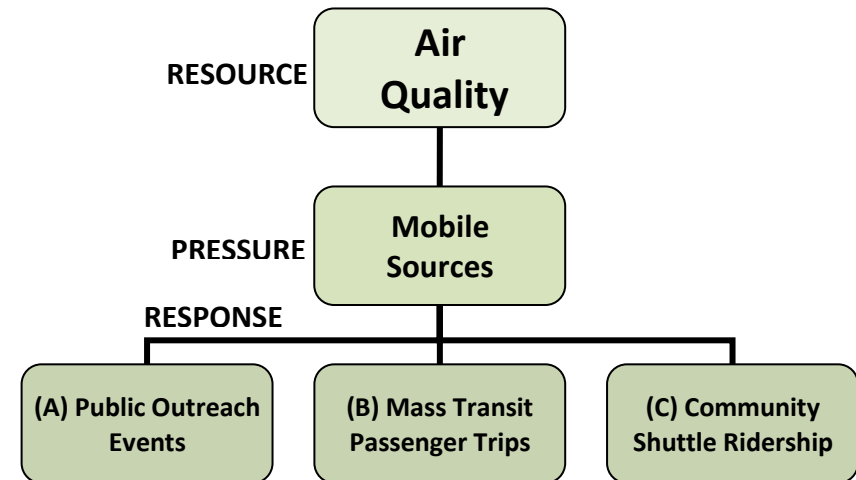
PRESSURES ON AIR QUALITY – Mobile Sources



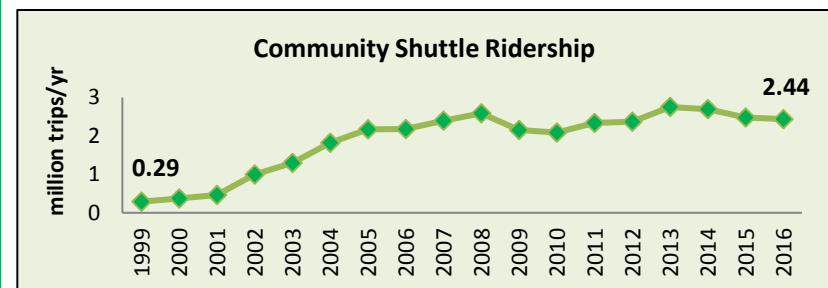
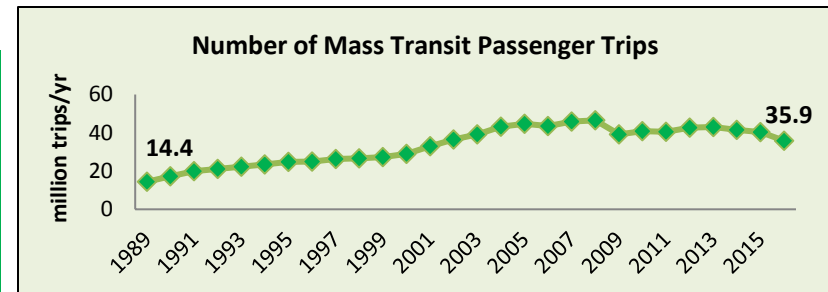
The over-capacity roadway segments metric provided a more comprehensive picture of how vehicular traffic and the adequacy of the roadway system can affect the environmental quality of life in a county experiencing continuing urbanization. The percentage of over-capacity roadway segments was 17 percent in 2016.

RESPONSES TO PRESSURES ON AIR QUALITY – Mobile Sources

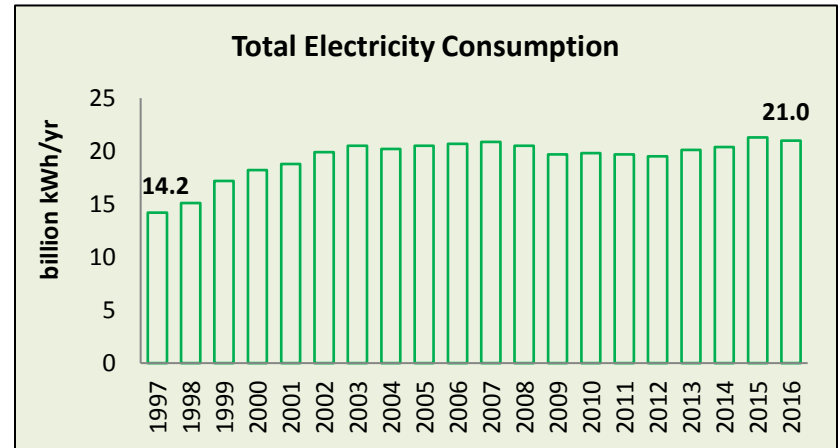
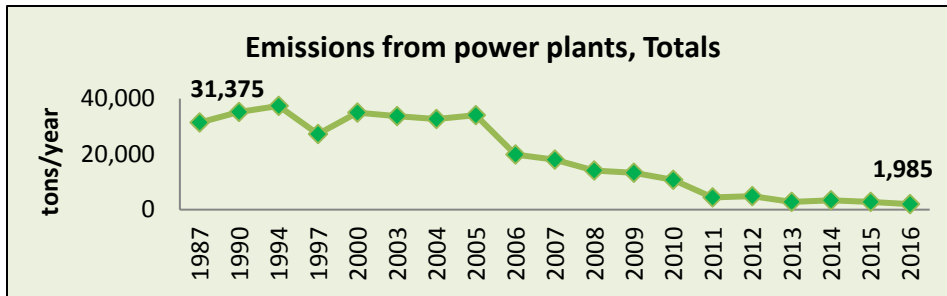
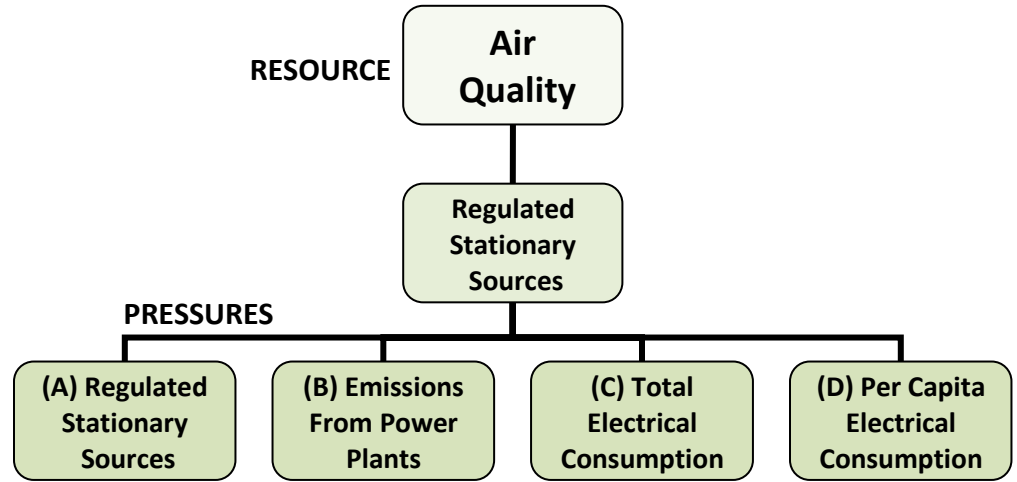
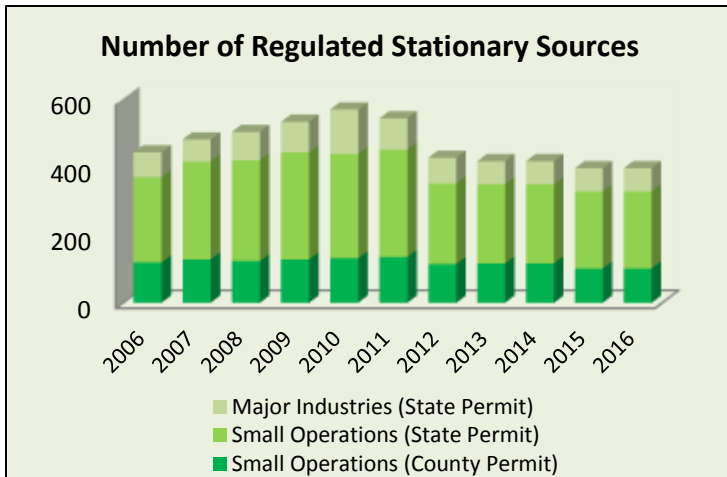
Mobile Sources - To reduce the impacts of mobile sources on air quality, development and implementation of strategies to reduce the number of vehicles on the road and their associated emissions were important to protect air quality. Actions that supported vehicle reduction included educating the public 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.



Year	Number of Air Quality Outreach Events
2002	50
2003	76
2004	78
2005	113
2006	116
2007	84
2008	106
2009	112
2010	110
2011	109
2012	128
2013	100
2014	108
2015	109
2016	112

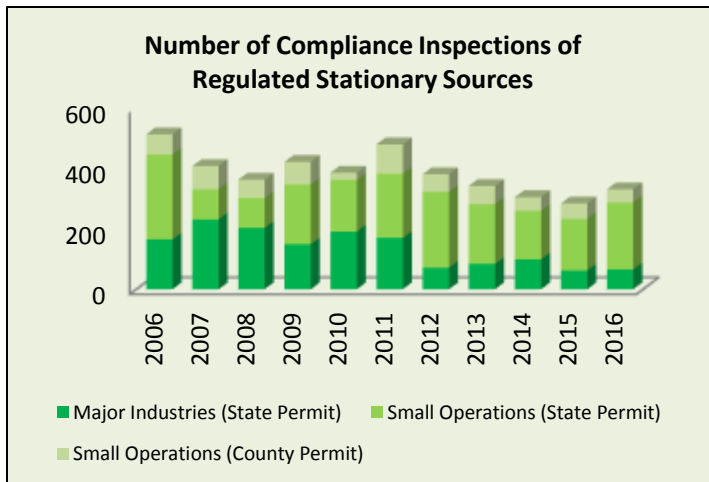
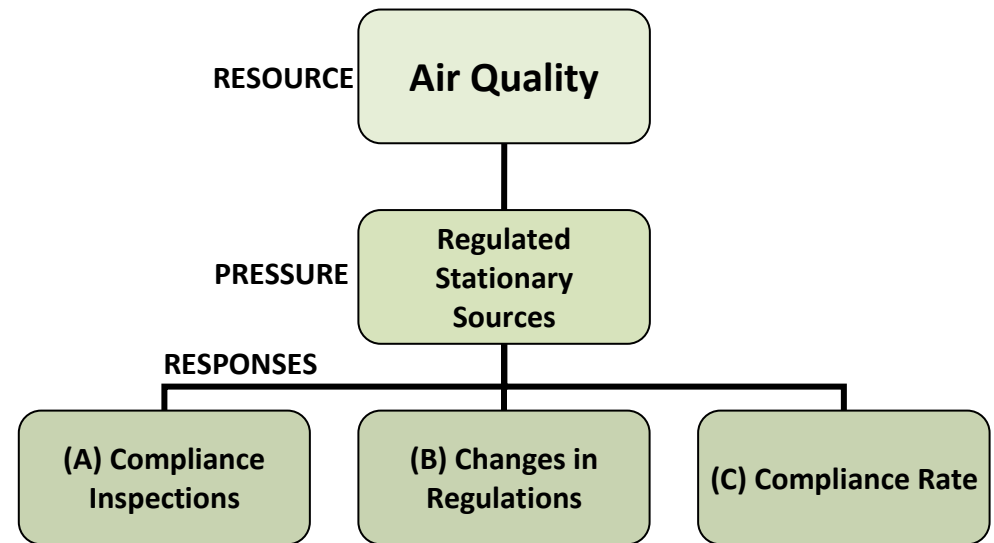


PRESSURES ON AIR QUALITY – Regulated Stationary Sources

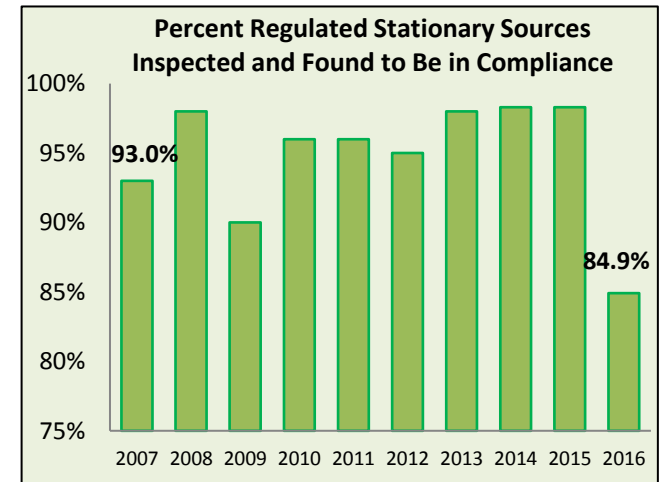


- **Per Capita Electrical Consumption**, in 2016, 9,272 kwh/yr.
- **Emissions from Power Plants, CO**, in 2016, 99.2 tons/year.
- **Emissions from Power Plants, NOx**, in 2016, 1670.9 tons/year.
- **Emissions from Power Plants, PM**, in 2016, 65.8 tons/year.
- **Emissions from Power Plants, SO2**, in 2016, 97.8 tons/year.
- **Emissions from Power Plants, VOCs**, in 2016, 51.4 tons/year.
- **Mobile Source Emissions, totals**, in 2015, 153,420 tons/year.

RESPONSES TO PRESSURES ON AIR QUALITY – Regulated Stationary Sources

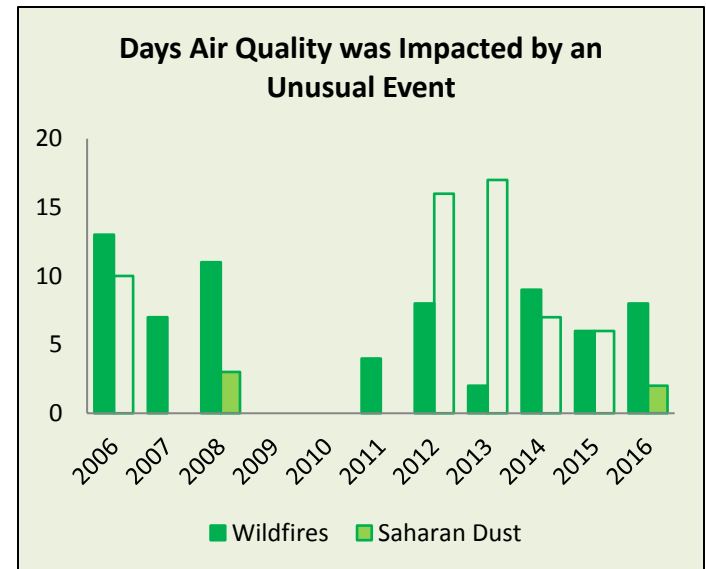
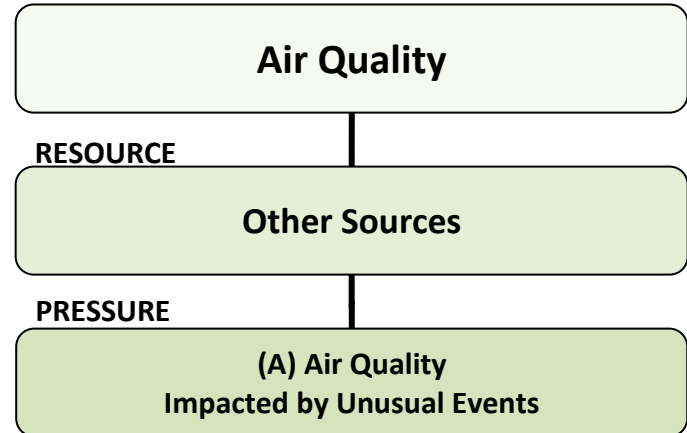
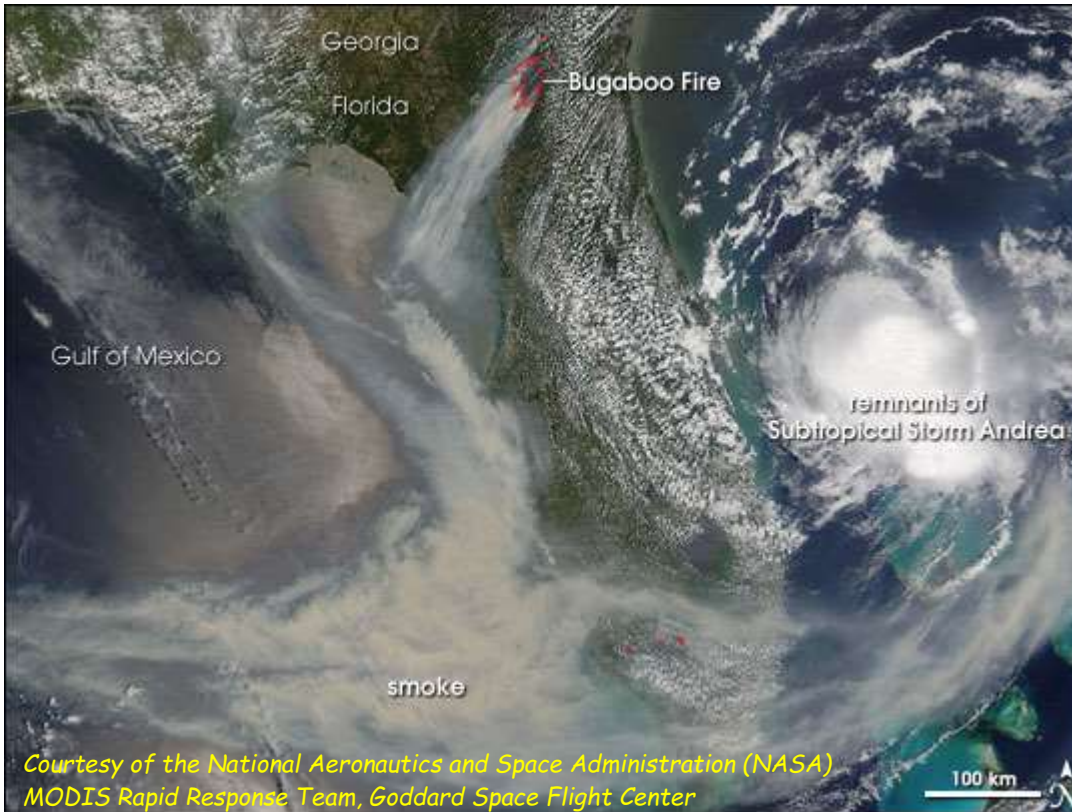


(B) Changes in Stationary Source Regulations – The Federal, State, and local regulations governing air quality were frequently updated, as needs changed.



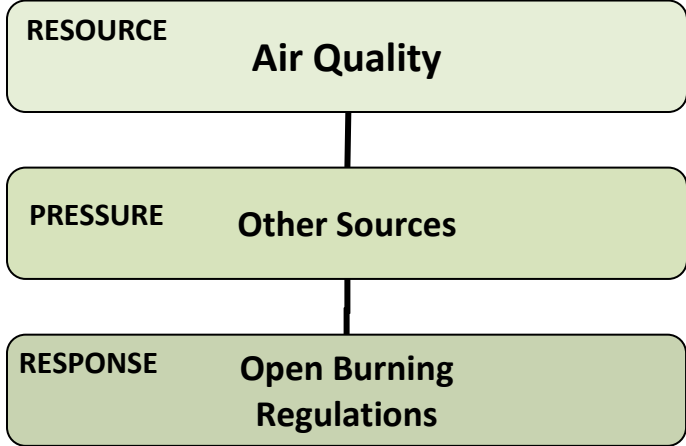
PRESSURES ON AIR QUALITY – Other Sources

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

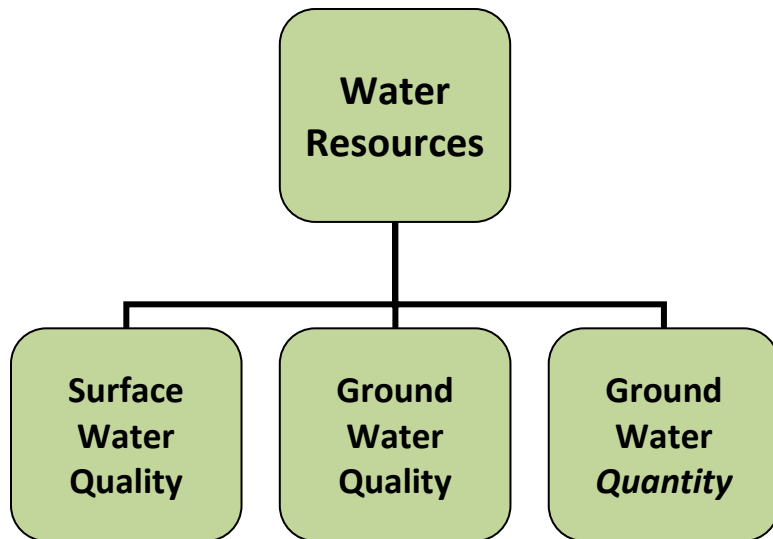


RESPONSES TO PRESSURES ON AIR QUALITY – Other Sources

Open Burning Regulations: In Broward County, open burning was regulated under Broward County Code Chapter 27, Article IX. To reduce the impact of smoke from open burning operations in Broward County, open burning was subject to required operational practices including minimum set-back distances and prohibitions on certain materials. Broward County also coordinated 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 issued public health advisories through the Air Quality Index, EnviroFlash, and local press releases.



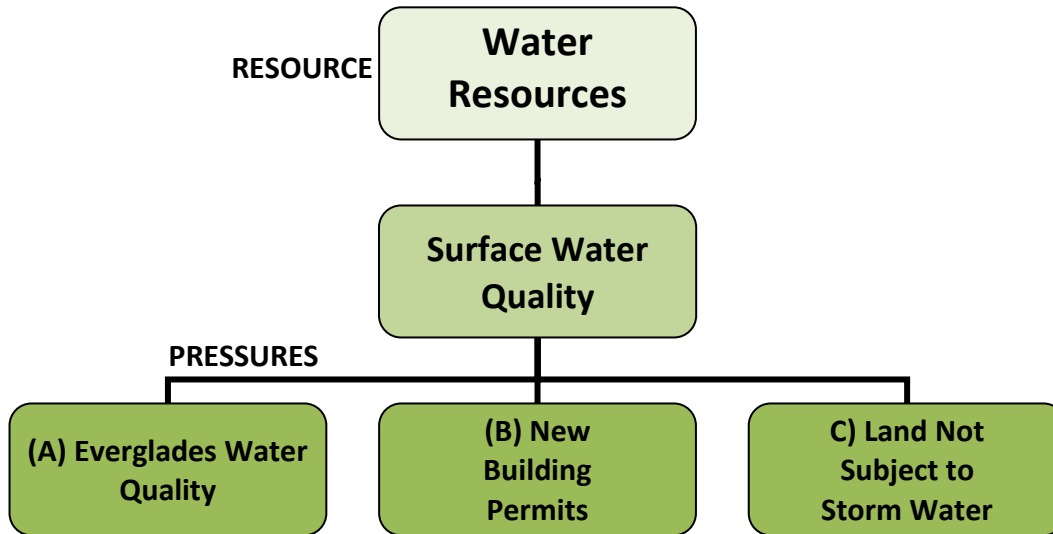
WATER RESOURCES



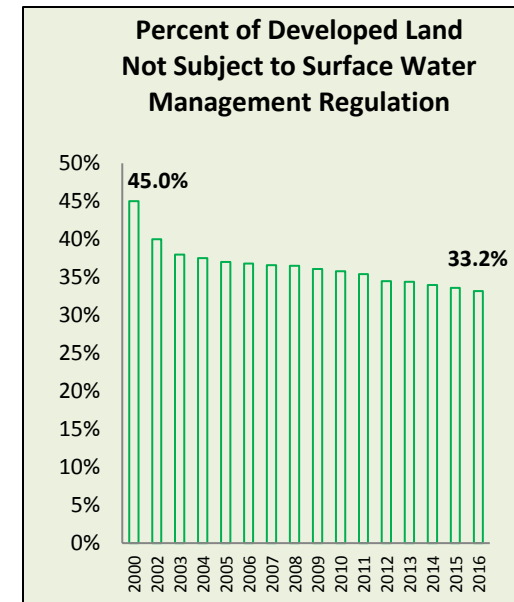
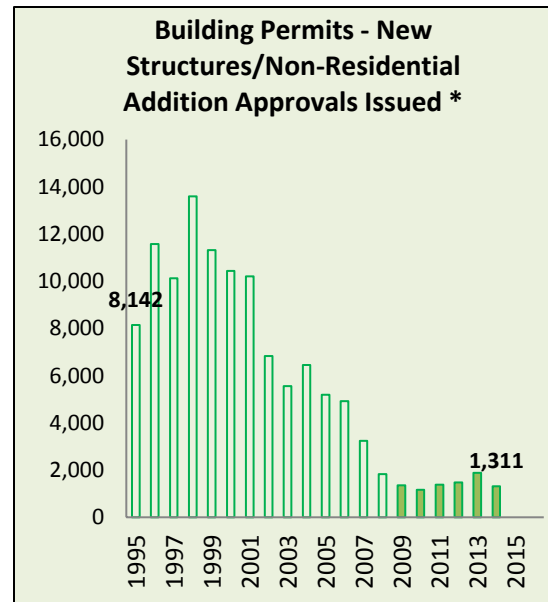
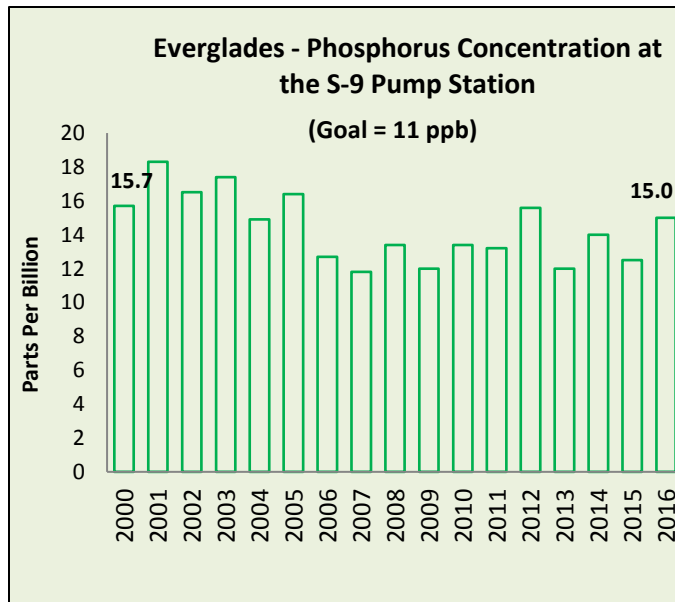
Water is what makes the Earth unique. The availability of an adequate supply of clean water was one of the primary criteria that allows human and ecological communities to exist in a given location. South Florida hosted a network of canals, an underground source of drinking water called the Biscayne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



PRESSURES on WATER RESOURCES – Surface Water

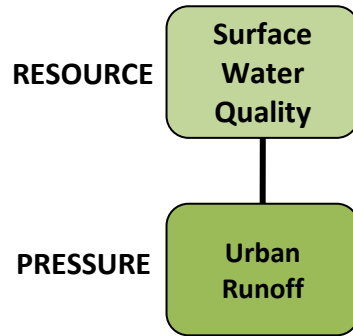


Surface Water - Surface water included Broward County's vast network of urban canals and lakes, brackish estuarine waters of tidal rivers, the Intracoastal Waterway, and natural areas that encompass the Everglades ecosystem. The water quality requirements and standards differed among these environments. This section compared the existing water quality to the 2010 goal.



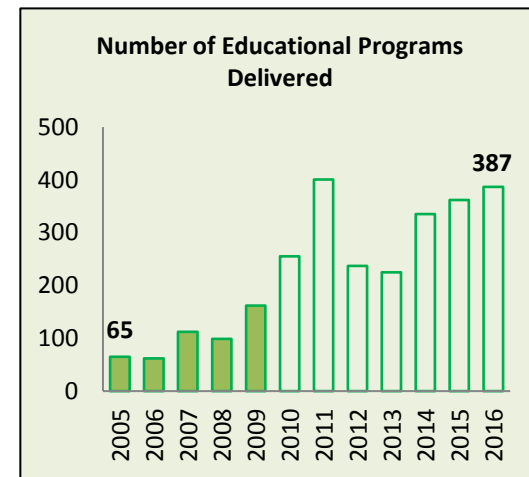
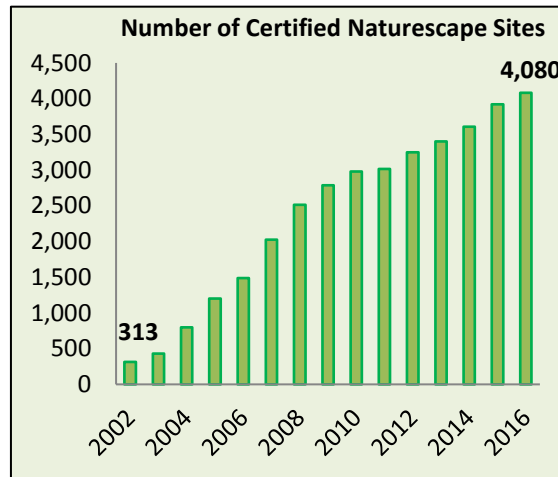
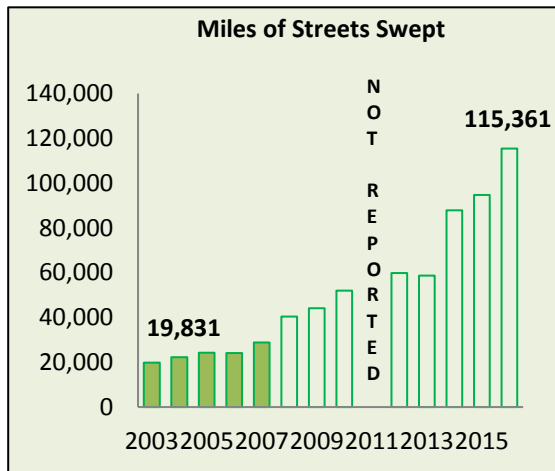
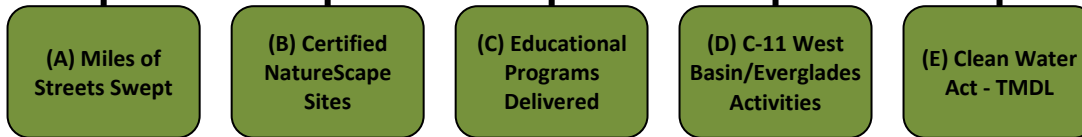
19 *Data for 2015-2016 not yet available

RESPONSES TO PRESSURES ON SURFACE WATER QUALITY

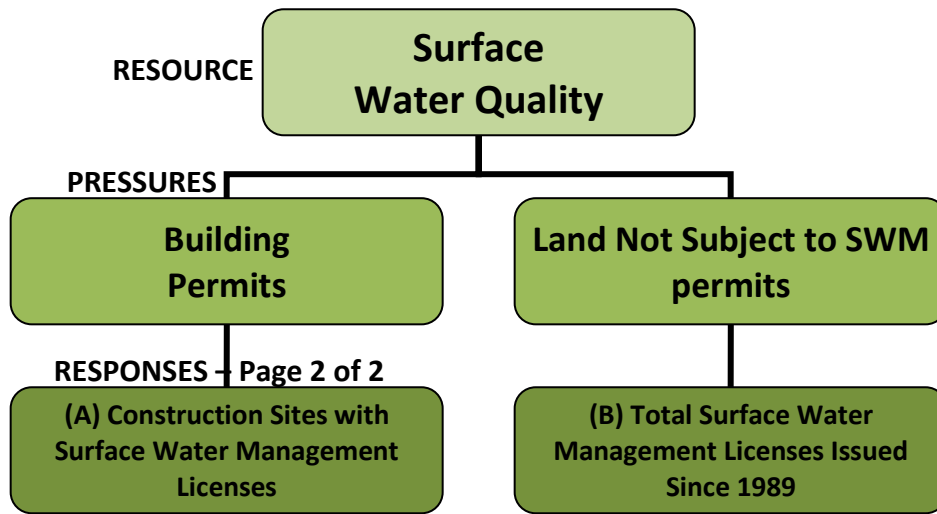


Urban Runoff is water moving over the ground as a result of rainfall or excess irrigation. As the runoff moves, it picks up and carries natural and human-made pollutants, eventually depositing them in rivers, canals, and coastal waters.

RESPONSES- Page 1 of 2

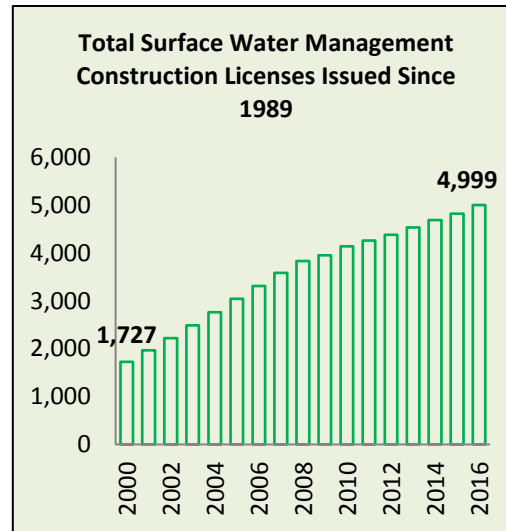
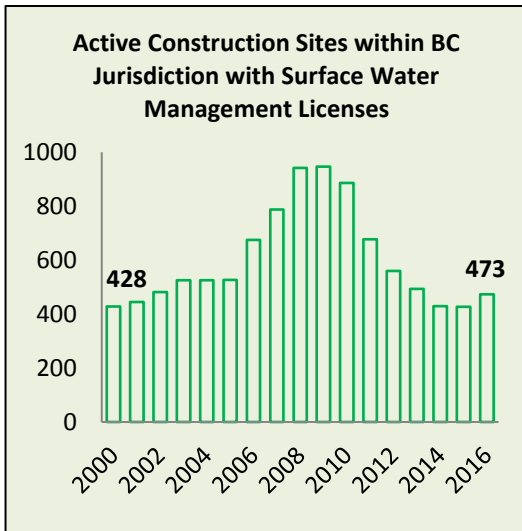


RESPONSES TO PRESSURES ON WATER QUALITY – Surface Water

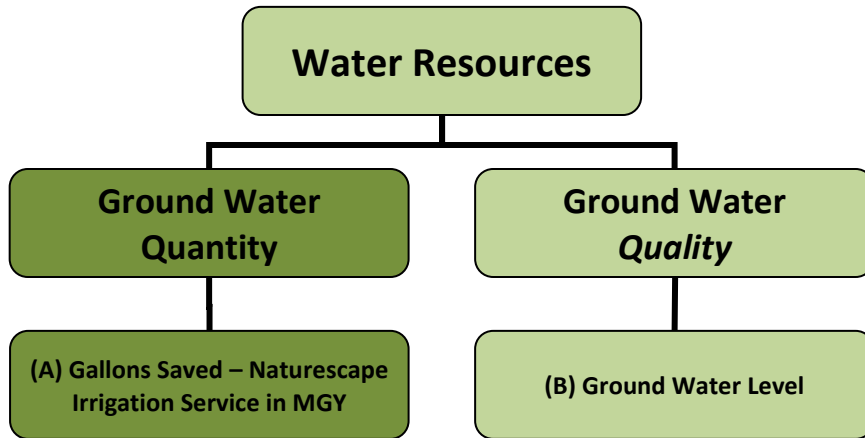


- The Number of Broward County issued surface water management renewal licenses, in 2016, 428.
- Number of construction site inspections performed in areas of BC jurisdiction, 121 in 2016.

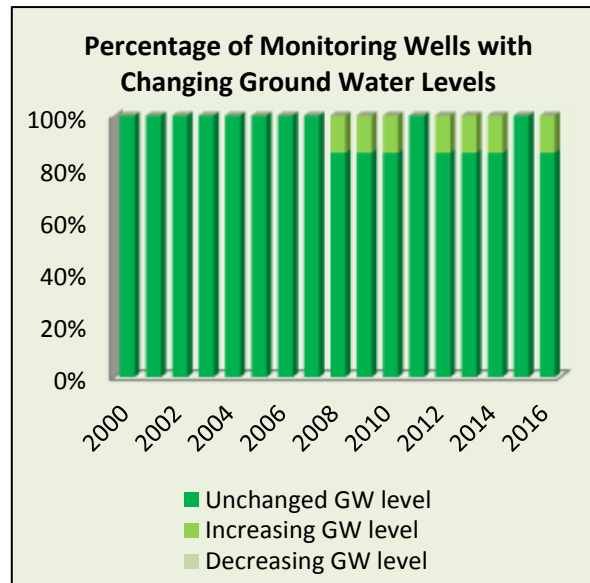
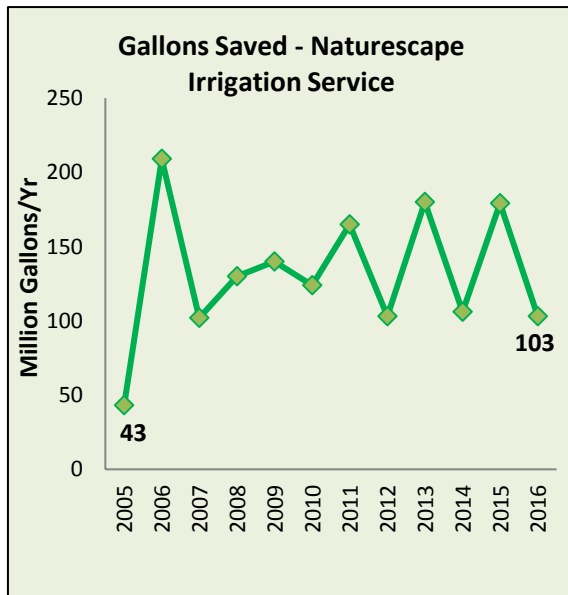
Construction Activities and Surface Water Management (SWM) Licenses – Inspection of sites during construction ensured that muddy runoff did not end up in Broward County’s waterways. The SWM license ensured that only pre-treated storm water leaves the site after construction.



RESPONSES TO WATER RESOURCES – Ground Water

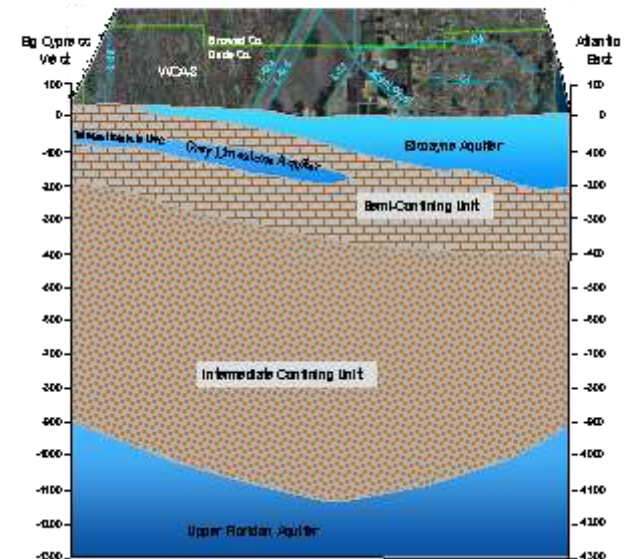


Ground Water - The overwhelming majority of Broward County’s drinking water came from the Biscayne Aquifer. Protecting the quality of that drinking source from hazardous materials and other pollutants was paramount. Ground water levels must be maintained to prevent impacts to wetlands, to hold back salt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

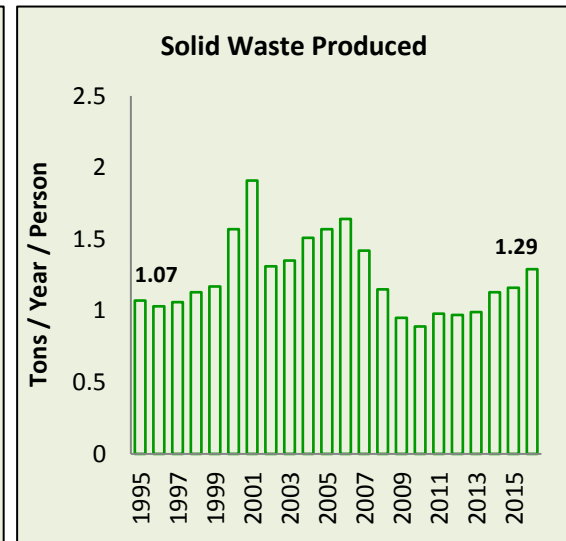
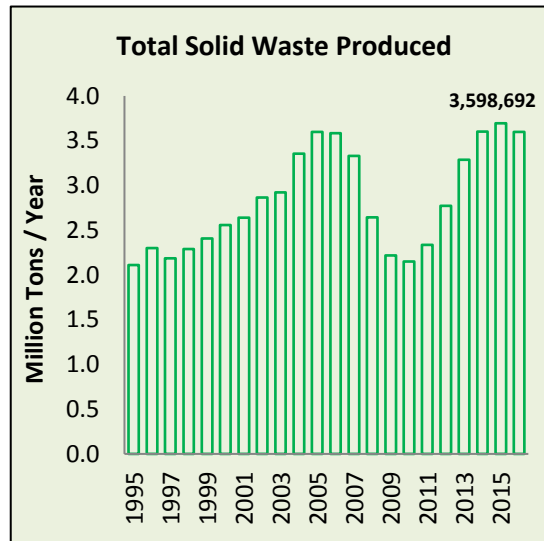
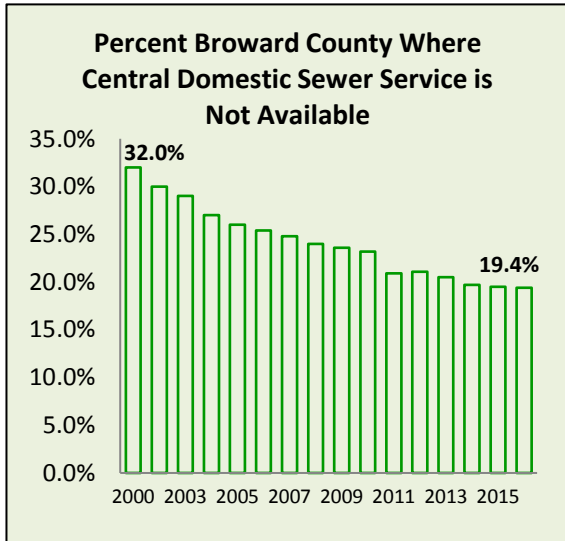
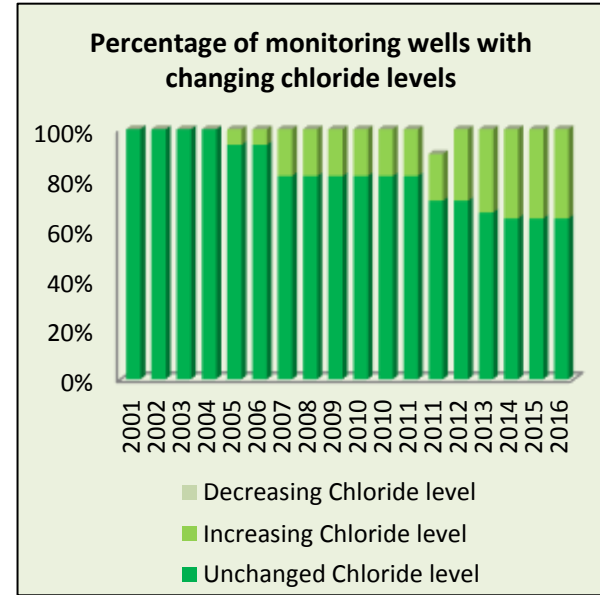
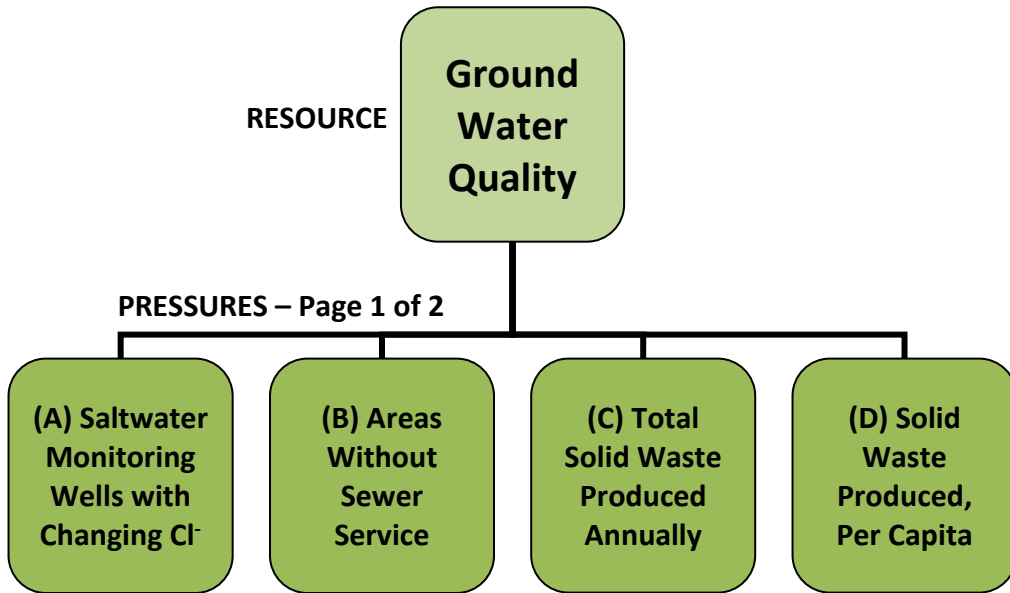


Note: Broward County uses control elevations for flood infrastructure when monitoring changing ground water levels.

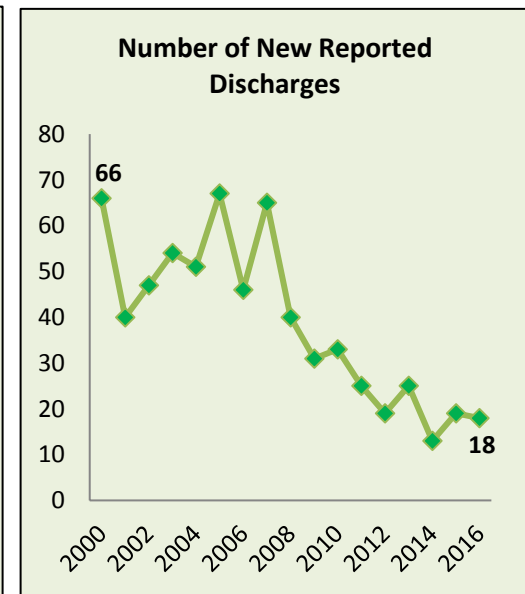
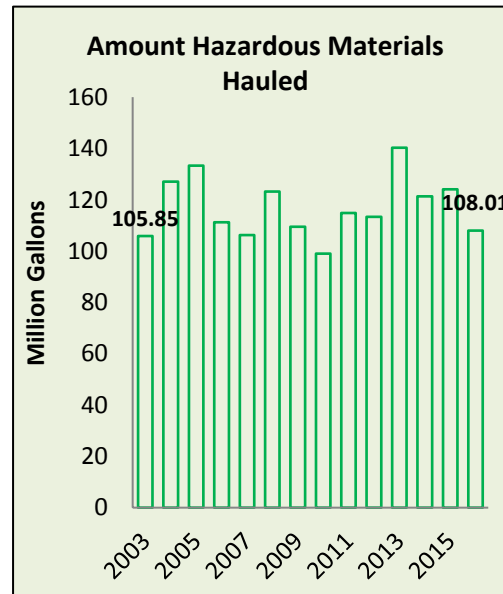
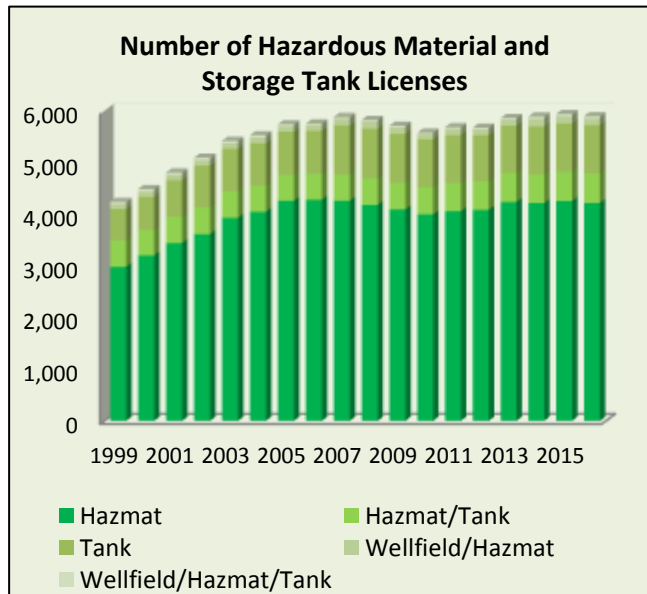
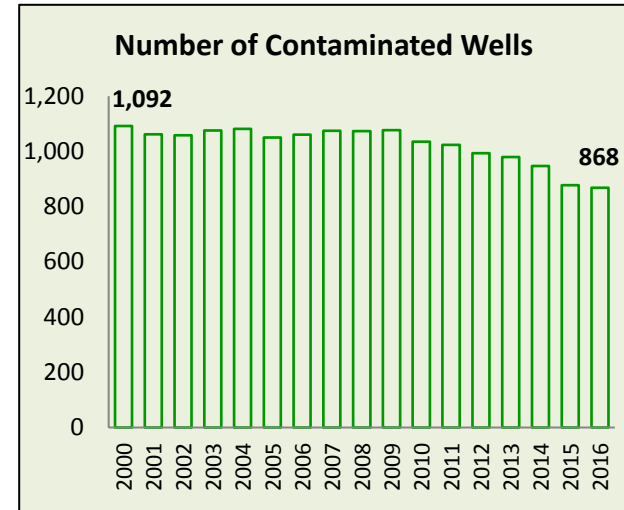
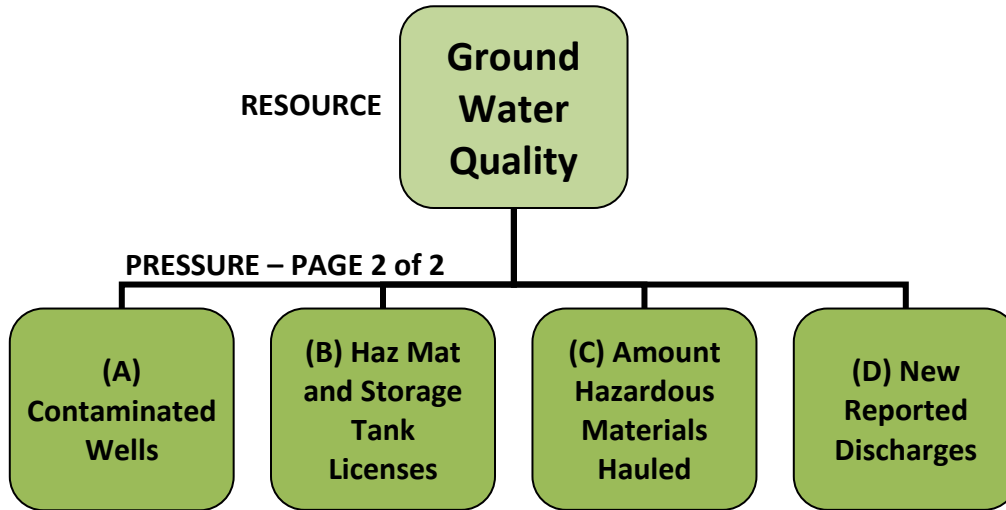
Generalized Cross Section of Our Geology



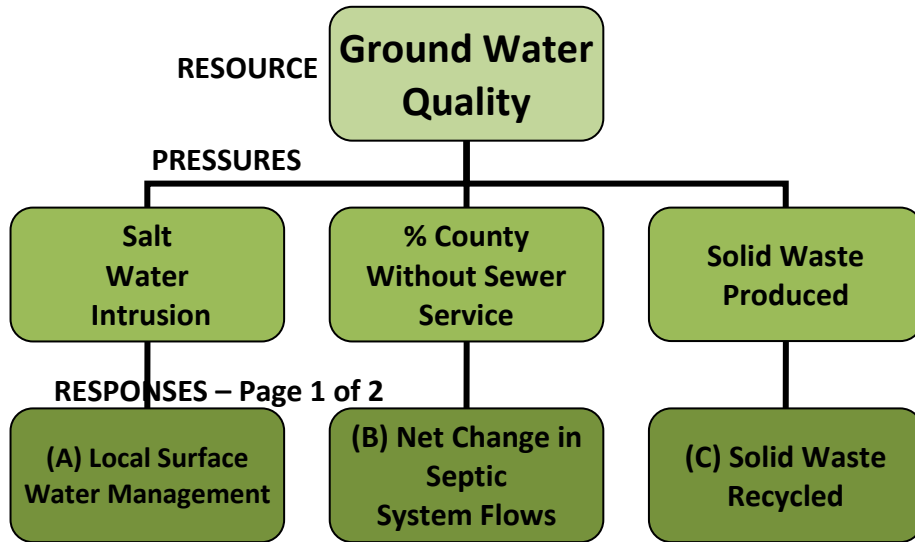
PRESSURES ON WATER QUALITY – Ground Water



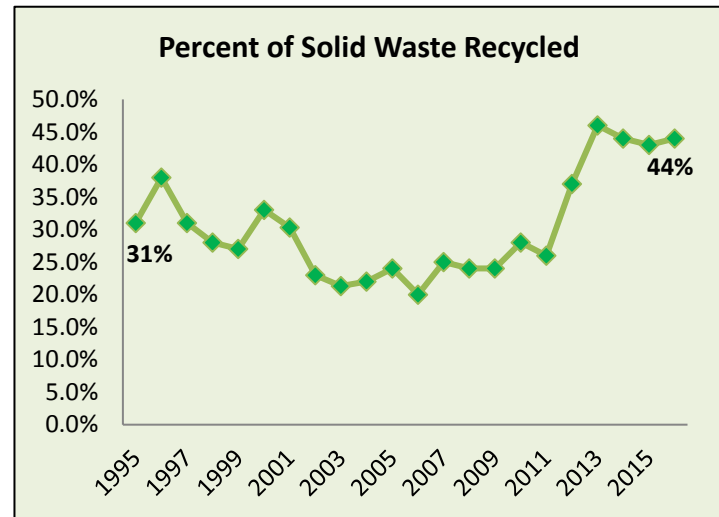
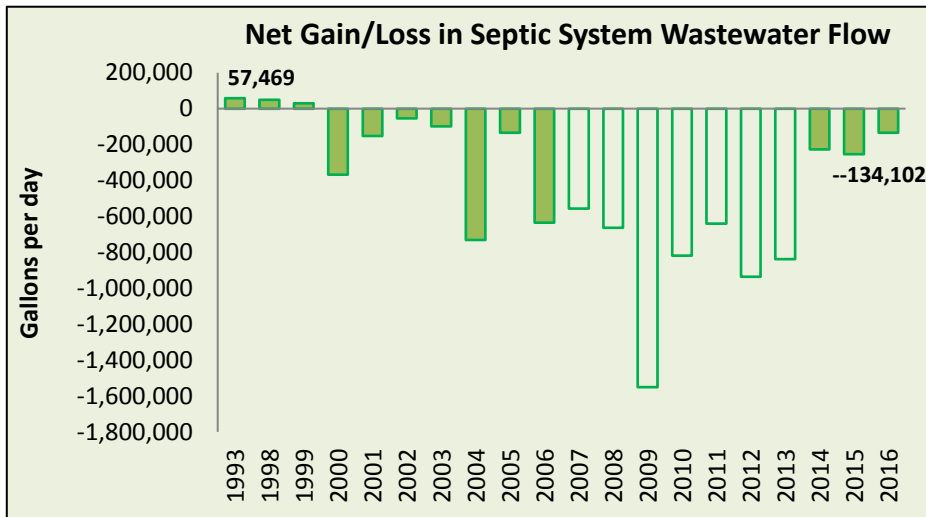
PRESSURES ON WATER QUALITY – Ground Water



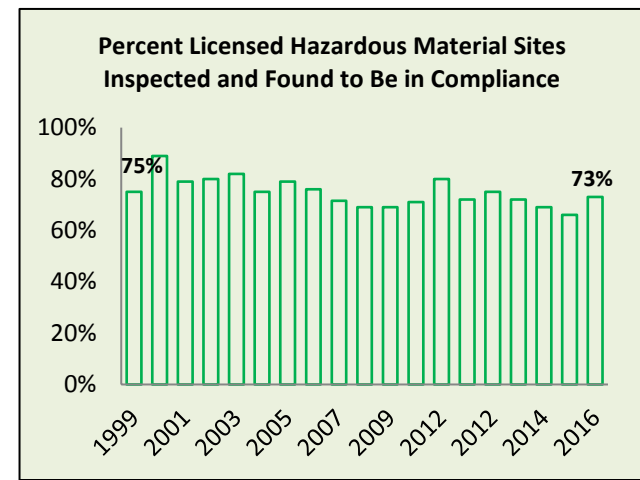
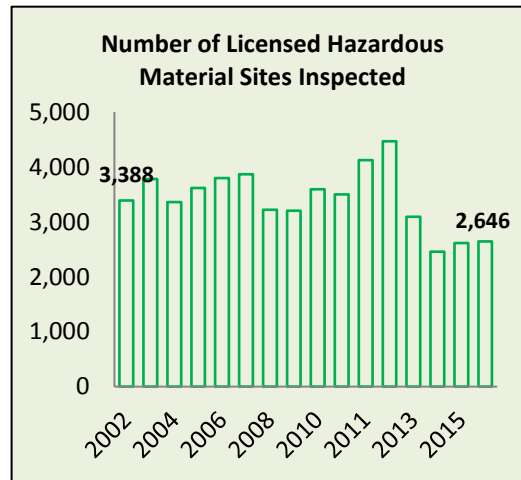
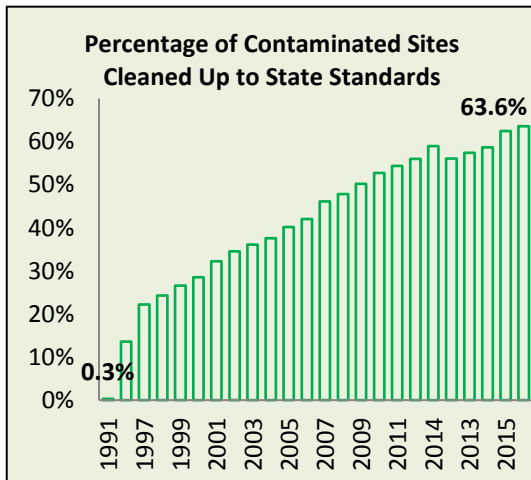
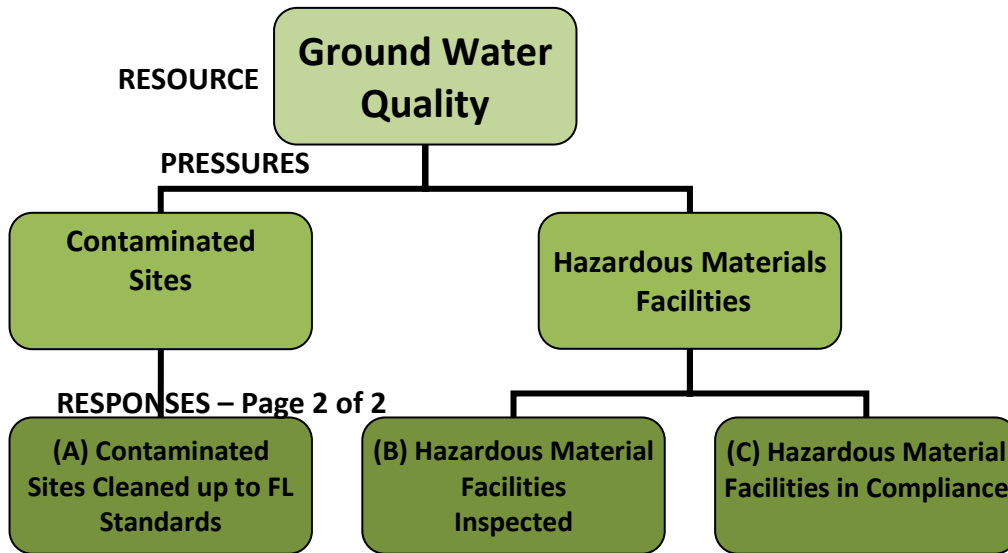
RESPONSES TO PRESSURES ON WATER QUALITY – Ground Water



(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 reduced pollutant loads to the Everglades and coastal ecosystems and served to increase aquifer recharge.

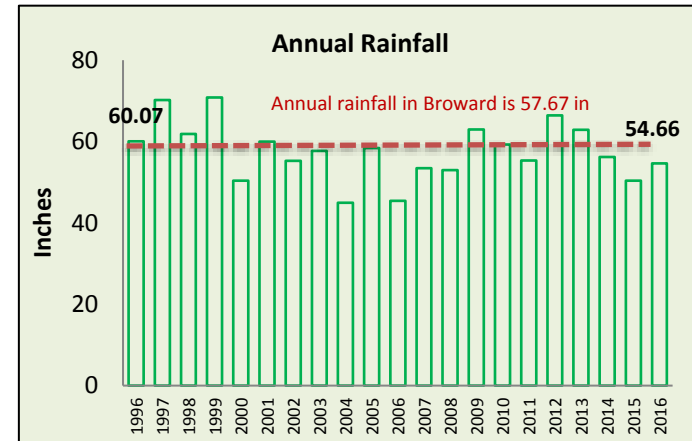
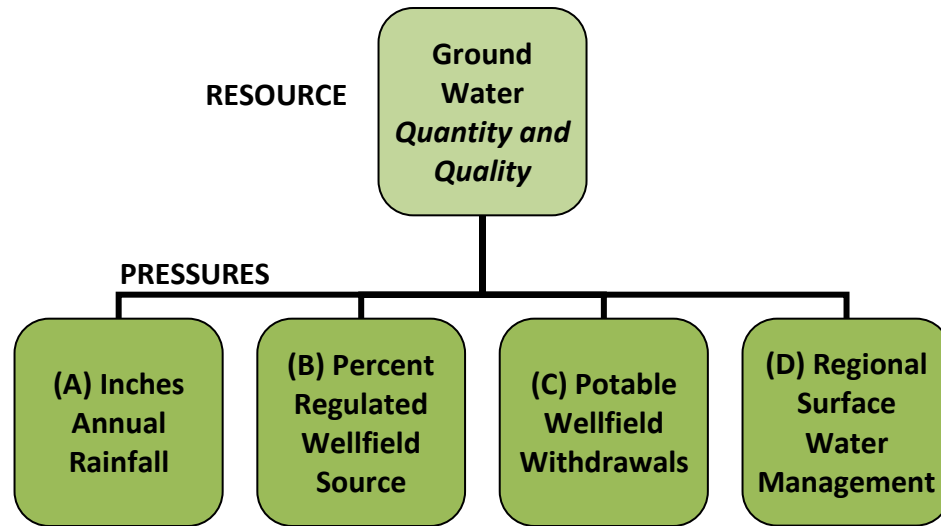


RESPONSES TO PRESSURES ON GROUND WATER QUALITY

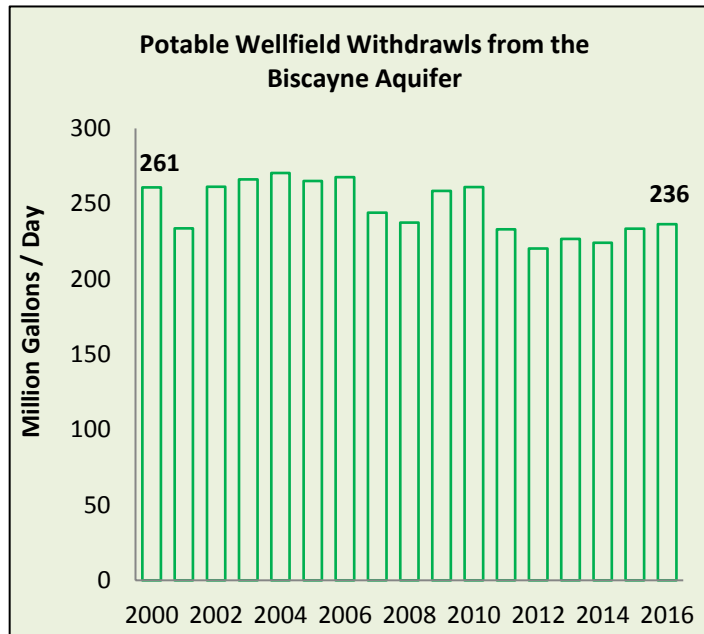


Note: The 2014 goal of 60% of contained sites cleaned up to state standards was not met. In 2016, the goal was met at 63.6%.

PRESSURES ON WATER QUANTITY – Ground Water

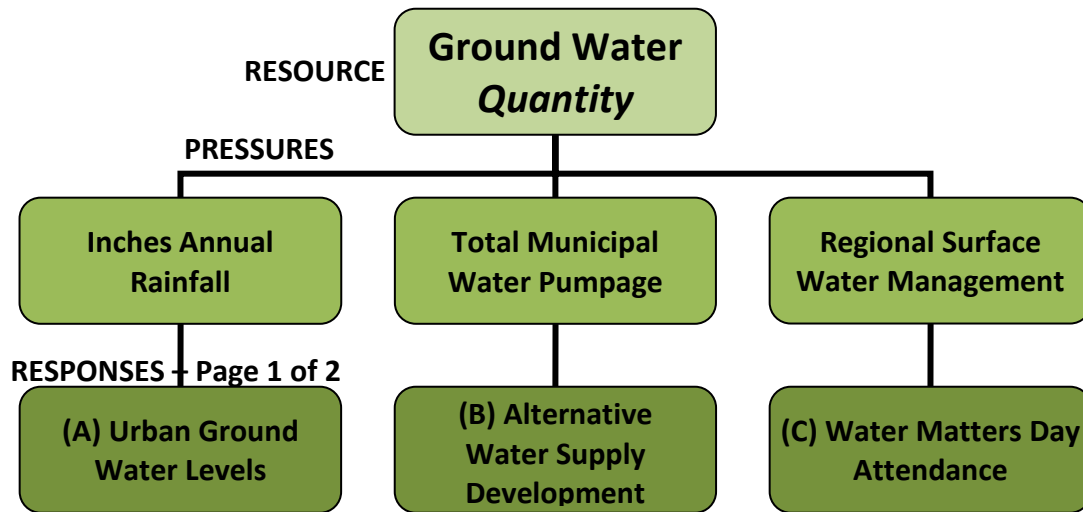


- Percent of Regulated Wellfield Source Water Wells without regulated substances above drinking water standards, 100% in 2016.



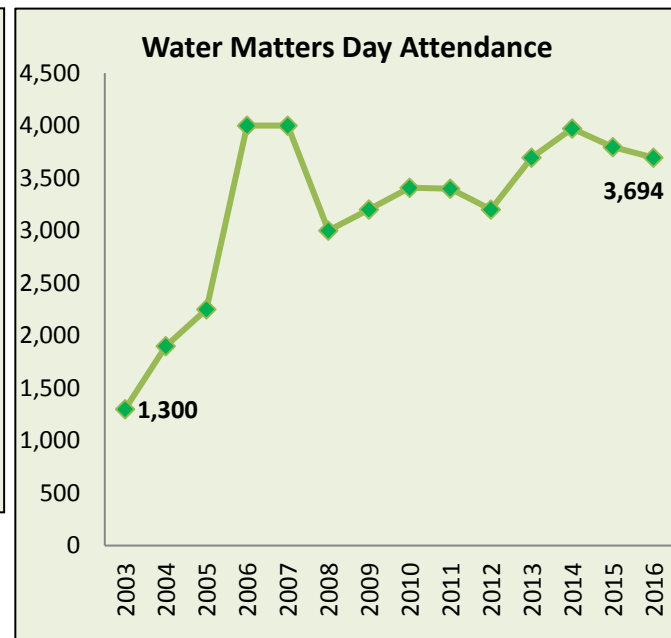
(D) Regional Surface Water Management through IWRP Participation - Elements of the IWRP included water resource assessments; development of technical tools to aid in planning and management decisions; development and implementation of diverse traditional and nontraditional water management strategies; a comprehensive water conservation outreach and education program; and projects that were multi-jurisdictional in nature and had 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 existing groundwater supplies, rehydrating urban wetlands, and preventing saltwater from intruding into coastal wellfield areas.

RESPONSES TO PRESSURES ON GROUND WATER QUANTITY



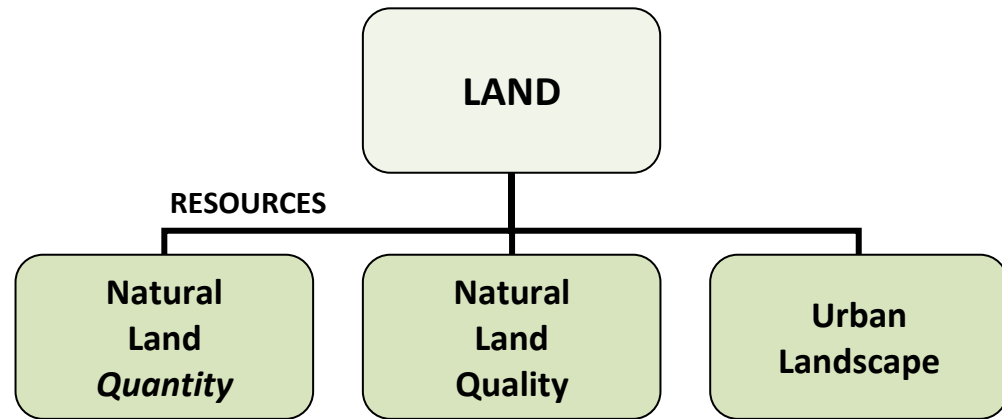
(A) Maintenance of Urban Ground Water Levels - Urban ground water levels are directly connected to the integrity of the Biscayne Aquifer, the health and function of urban wetlands, the operation of drainage infrastructure, and Everglades restoration.

(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 a result, local water utilities were urged to develop alternative water supplies, independent of the Biscayne Aquifer and the Everglades.



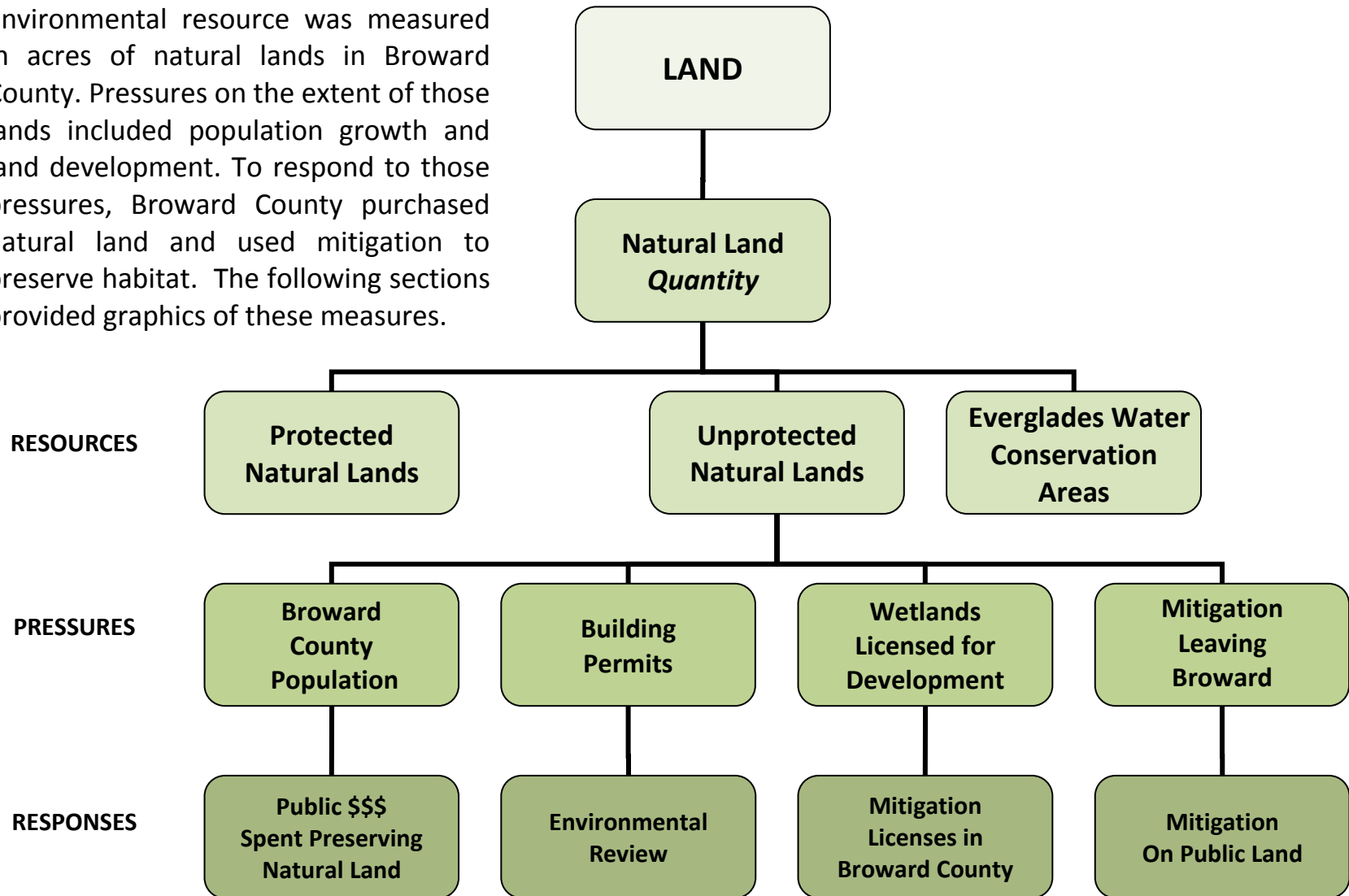
LAND RESOURCES

Land Resources – Broward County’s critical land resources included natural areas which preserve habitat (Quantity), the extent to which those lands reflect indigenous Florida plants and animals (Quality), and the Urban Landscape. The Urban Landscape encompassed how public and private entities created human and natural habitats integrated into the urban area.

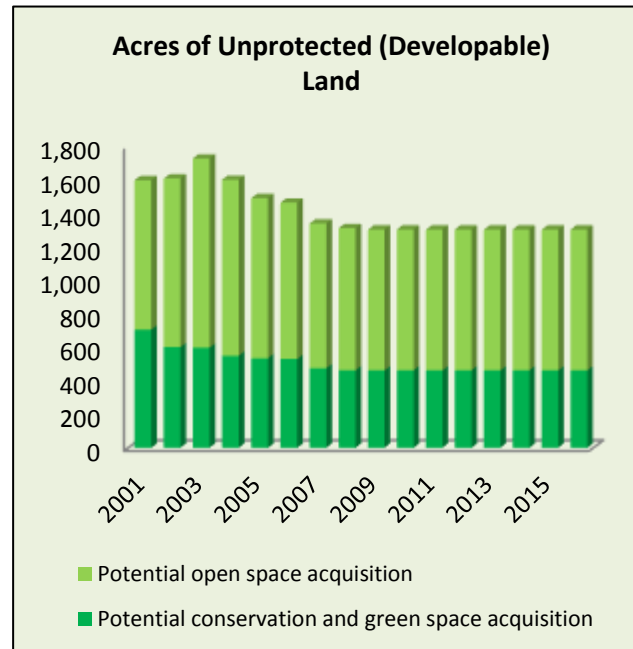
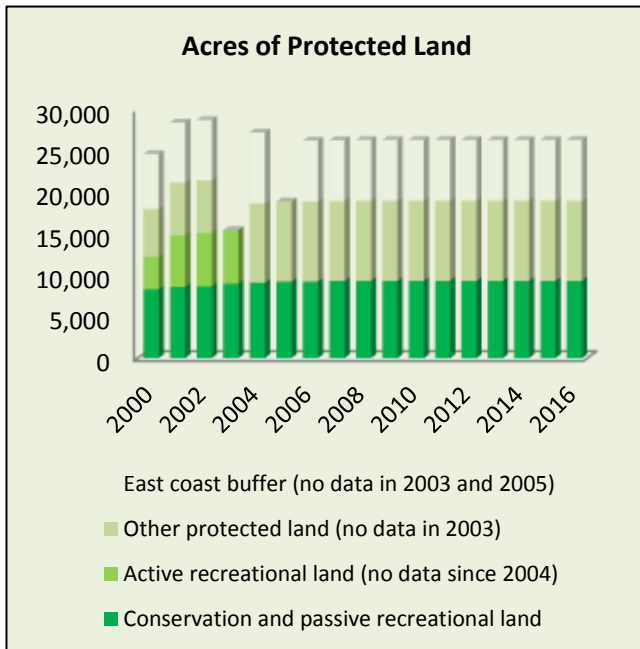
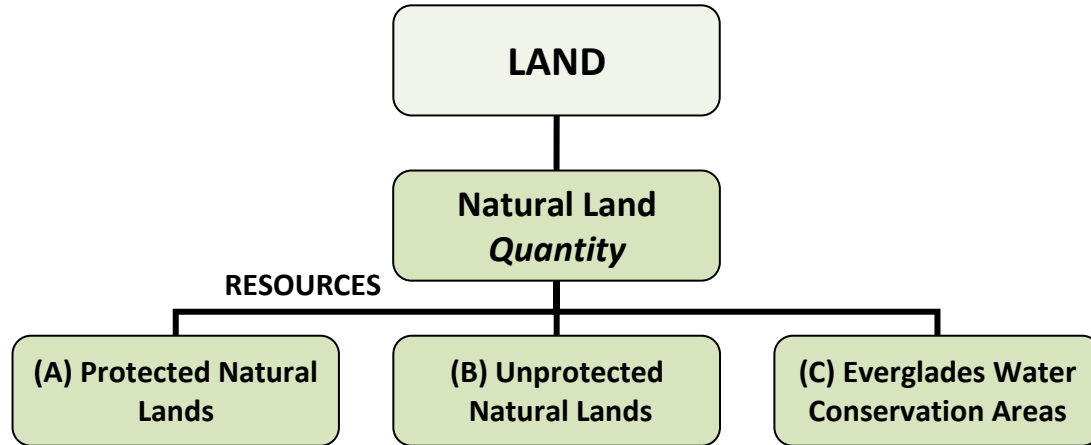


LAND RESOURCES – Natural Land *Quantity*

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

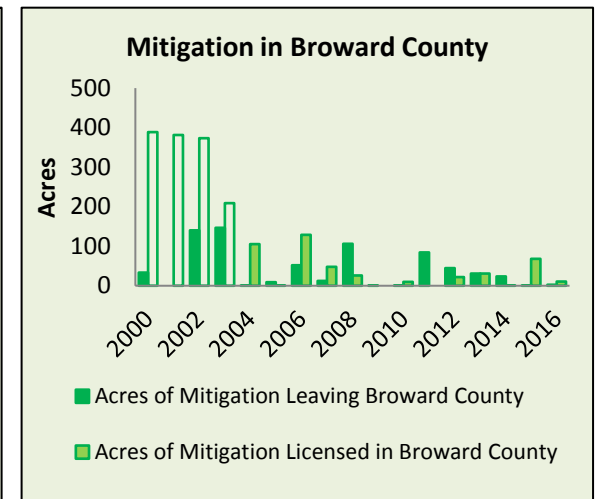
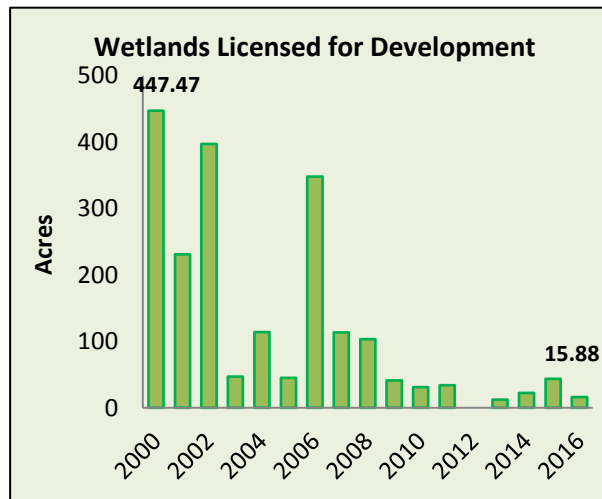
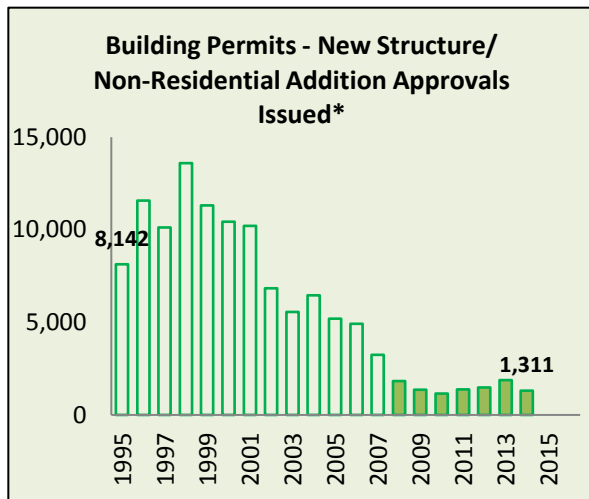
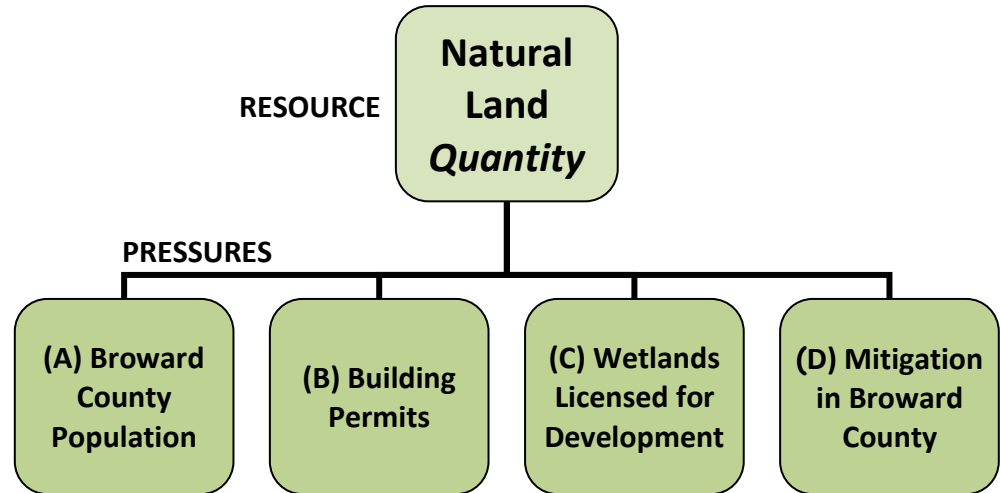
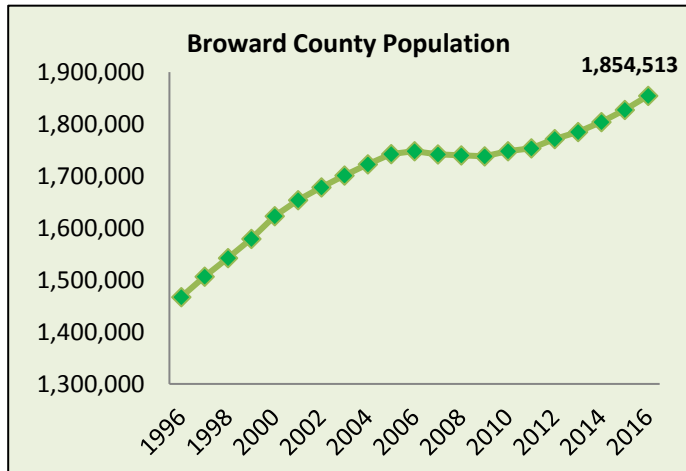


LAND RESOURCES – Natural Land *Quantity*



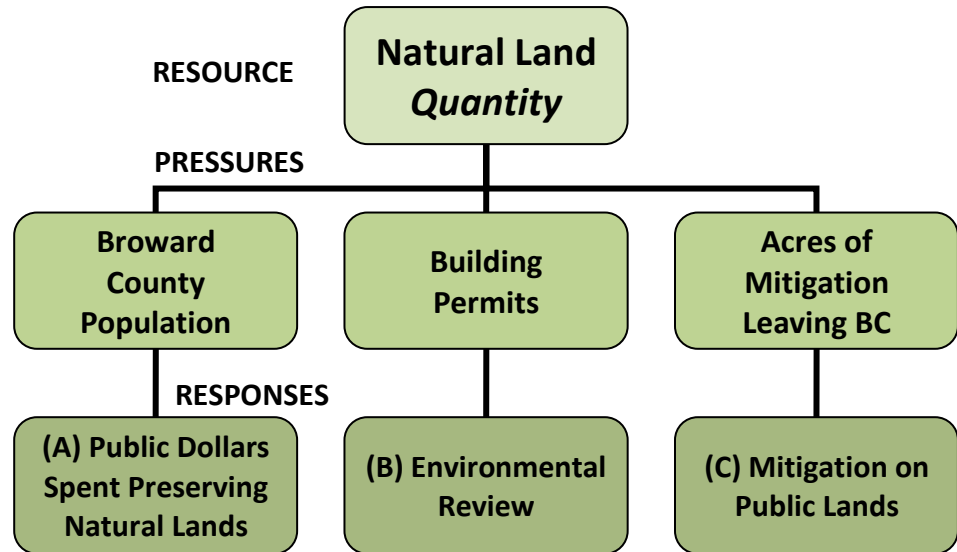
(C) Everglades Water Conservation Areas -
 Approximately two-thirds of Broward County lands existed as Water Conservation Areas (WCA's) in the Everglades. Four WCA's served as a buffer between developed regions and the Everglades while providing wetland habitat.

PRESSURES ON NATURAL LAND QUANTITY



*Data for 2015-2016 not yet available

RESPONSES TO PRESSURES ON NATURAL LAND QUANTITY



(B) Environmental Review - All proposed developments were reviewed to ensure proper land use and to protect natural land resources from impacts. Wetland permitting ensured that mitigation for impacts was kept within Broward County.

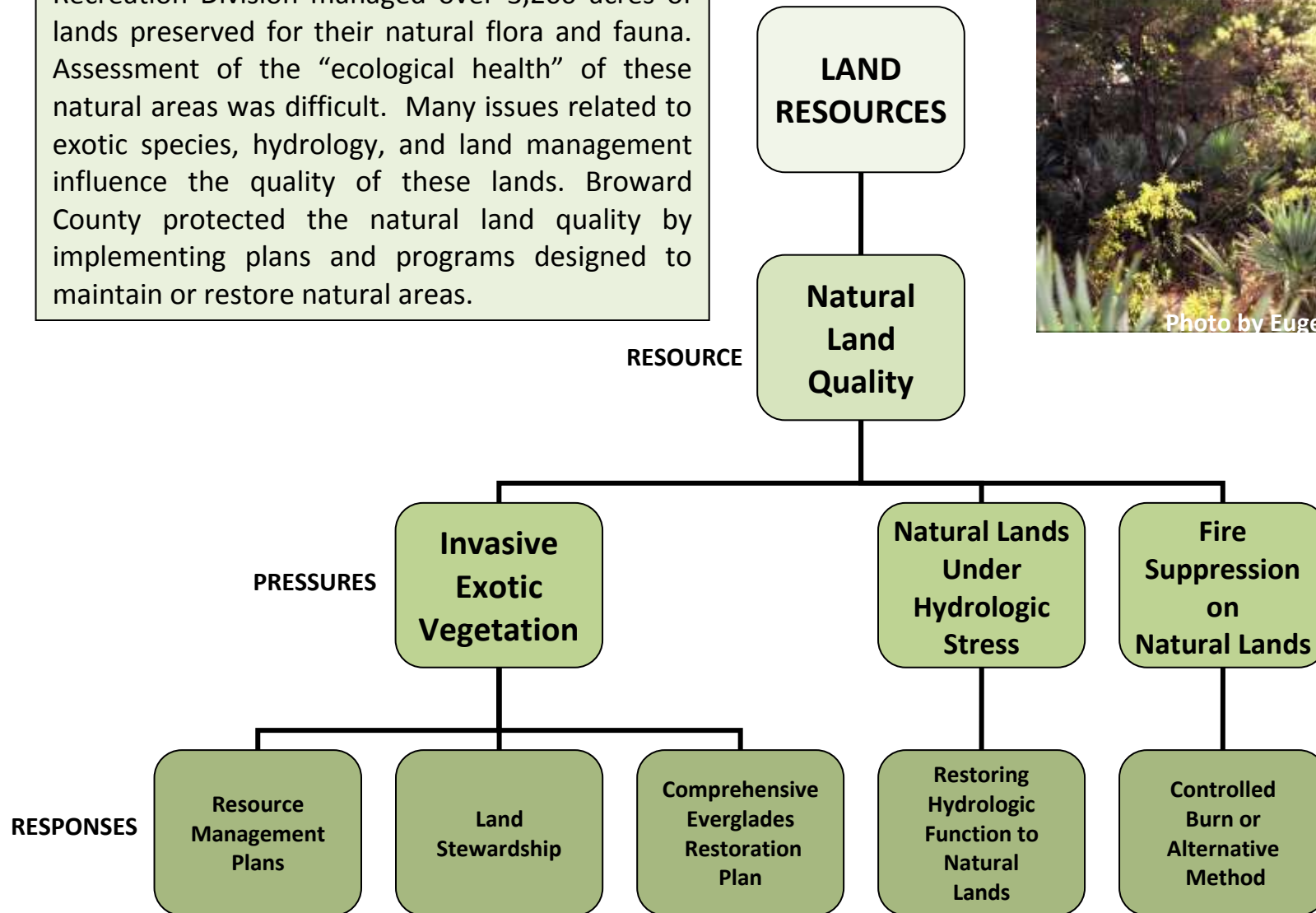
(C) Mitigation on Public Lands - Wetlands provided recreation, habitat, water filtration and storage values that no other ecosystem can. Because of these values, Broward County tried to retain mitigation for impacts to wetlands as close to the impact as possible. Due to increasing limited mitigation areas, the County attempted to utilize public lands as sites for wetland mitigation projects. There were zero acres of mitigation on public lands in 2016.

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

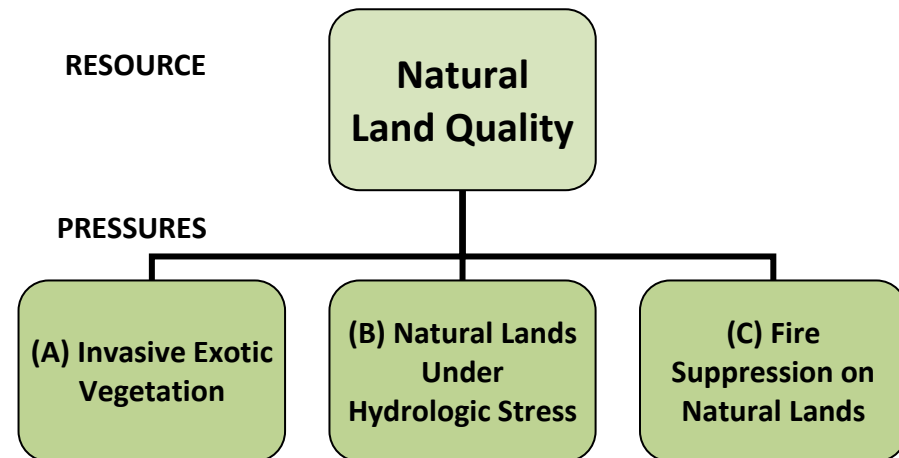
Note: As of 2014, public dollars spent to preserve natural lands is no longer tracked. The initial bond funding has been depleted.

LAND RESOURCES – Natural Land Quality

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



PRESSURES ON NATURAL LAND QUALITY



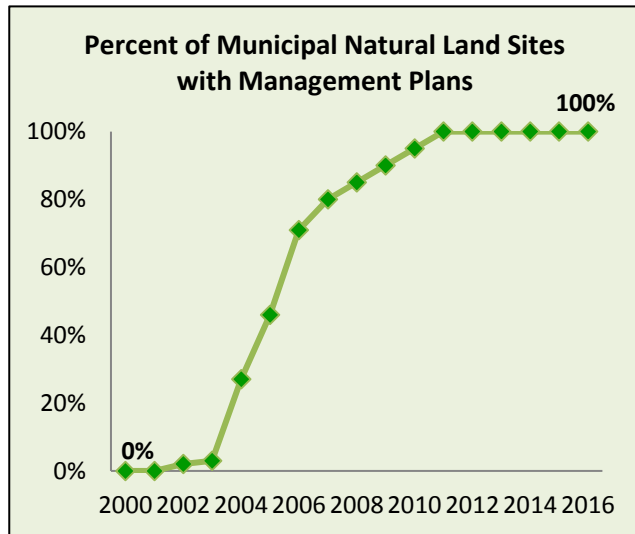
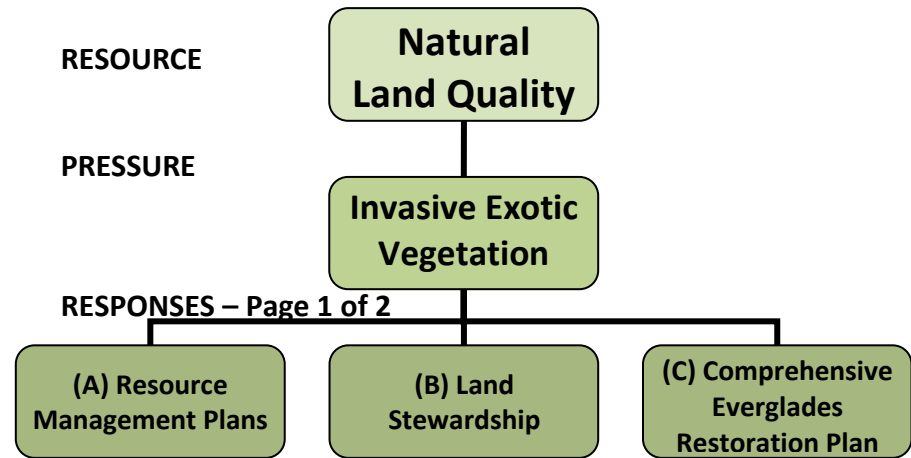
(A) Invasive Exotic Vegetation – Many species of plants from other countries have naturalized in Florida’s subtropical climate. These non-native, invasive exotic plants provided less benefit to local ecosystems than do native plants. The exotics had a high potential to crowd out indigenous vegetation that native Florida wildlife relies on for food and shelter. The problem was widespread in the County, from backyards to 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 the canals provided flood protection for residents, they 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 was difficult to accomplish without impacting local residents. Areas that have been without fire for long periods of time may have accumulated a high fuel load and began succession to a different type of habitat.

RESPONSES TO PRESSURES ON NATURAL LAND QUALITY

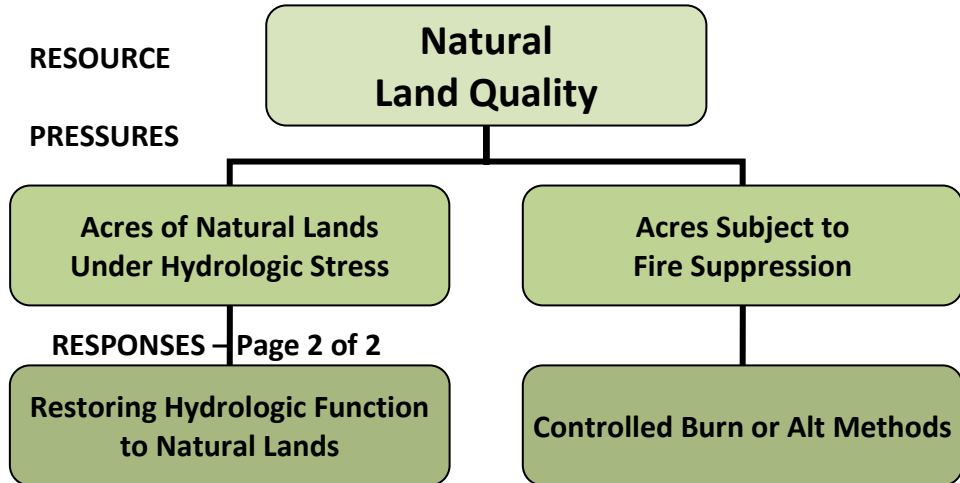
Resource Management Plans – For all acquired natural lands, Resource Management Plans were created to direct how the resources should be managed to ensure that they remain viable natural communities. These plans included securing the site, removing trash and debris, removing invasive exotic species,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



(B) Land Stewardship – Resource Management Plans were a small part of a larger effort to provide stewardship for the land. Other efforts included 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 – The Comprehensive Everglades Restoration Plan (CERP) established two-thirds of Broward County land as conservation areas (WCAs). The function and water quality of WCAs were being addressed through projects undertaken as a part of the CERP.

RESPONSES TO PRESSURES ON NATURAL LAND QUALITY



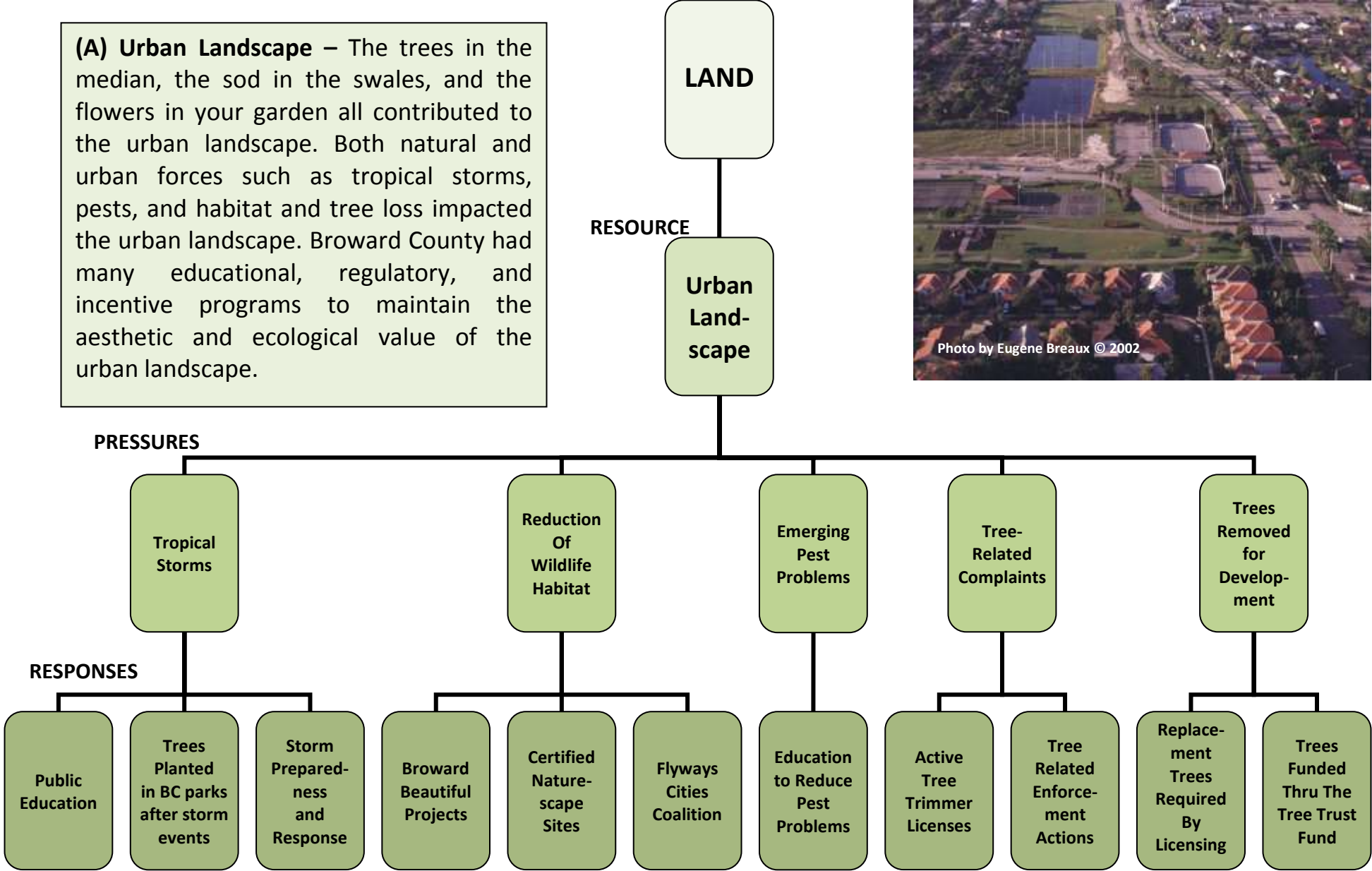
Restoring Hydrologic Function to Natural Lands - Many natural wetland areas in Broward County have been altered by historical development practices and other drainage alterations. Broward County has undertaken efforts to restore hydrologic function to some of the damaged wetlands. Pumps have been installed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



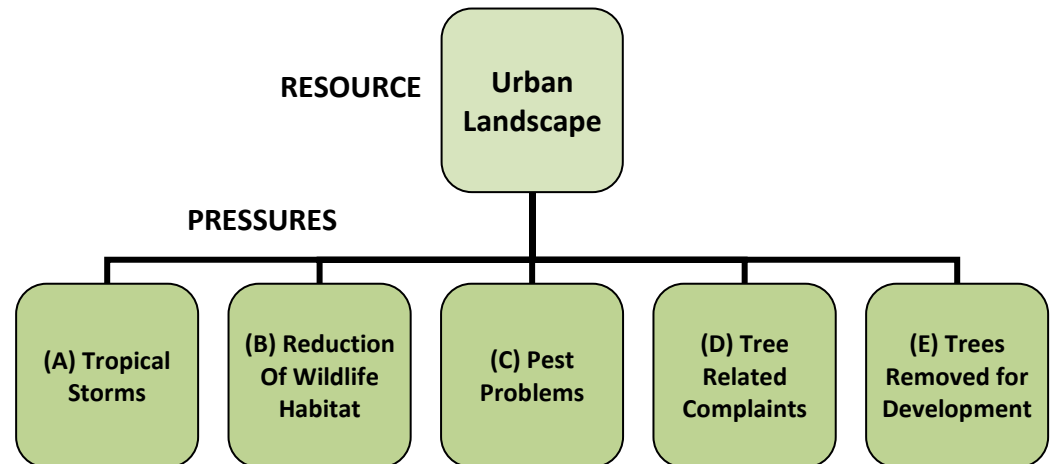
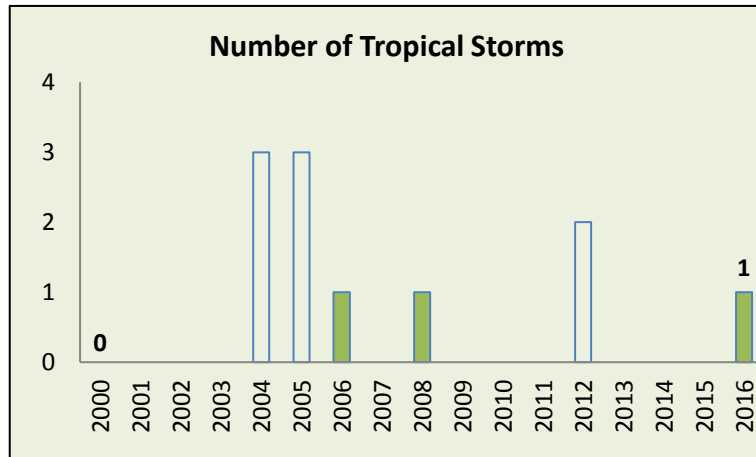
Controlled Burn or Alternative Management Methods - Prescribed burning accomplished many land management objectives, including reducing the risk of wildfires, while recycling nutrients into the soil. Native fire-tolerant species, including wildflowers and grasses, became established in open areas created 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 contributed to the urban landscape. Both natural and urban forces such as tropical storms, pests, and habitat and tree loss impacted the urban landscape. Broward County had many educational, regulatory, and incentive programs to maintain the aesthetic and ecological value of the urban landscape.

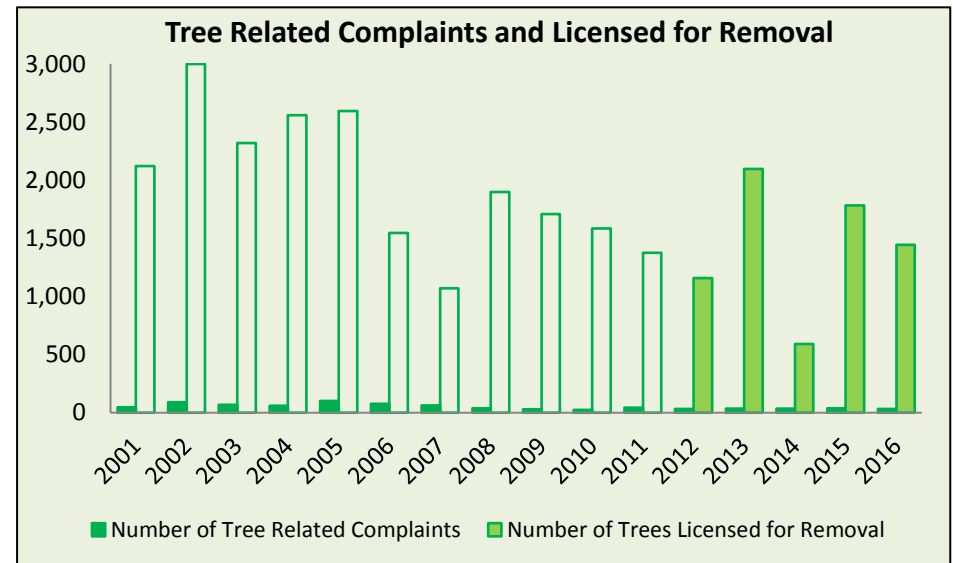


PRESSURES ON URBAN LANDSCAPE



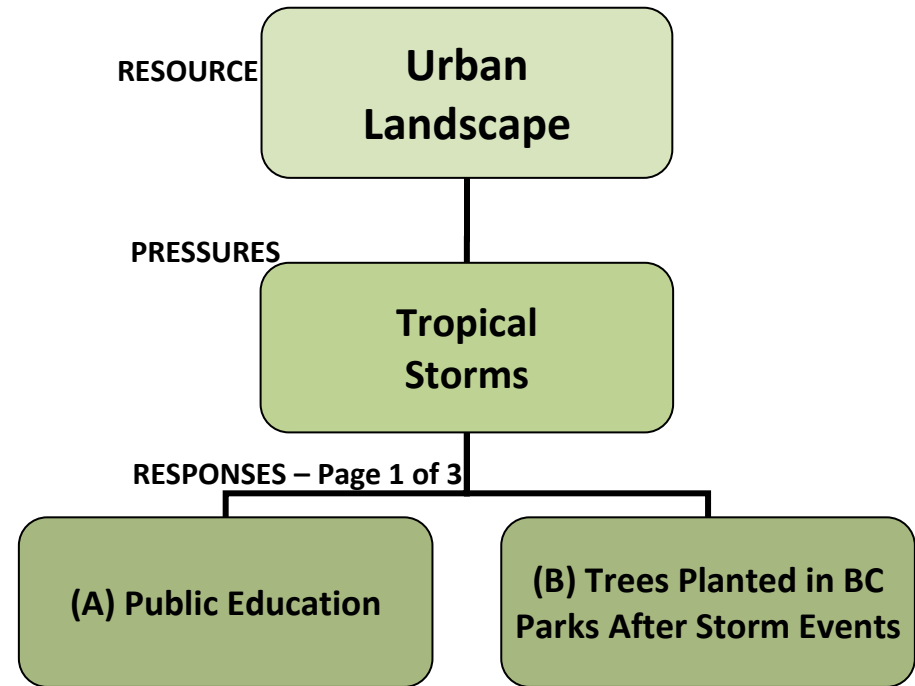
(B) Reduction of Wildlife Habitat – Continued development across Broward County reduced natural lands and vacant areas needed to provide habitat for wildlife. The indirect consequences of habitat loss and fragmentation may carry grave consequences for animal welfare and for conservation.

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



RESPONSES TO PRESSURES ON URBAN LANDSCAPE

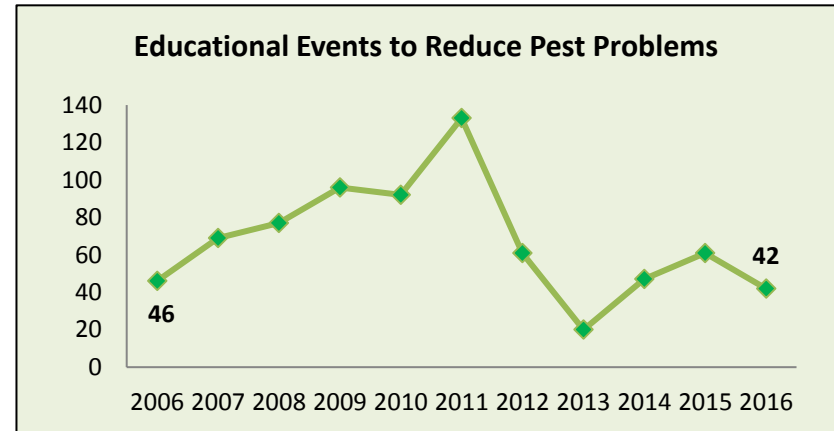
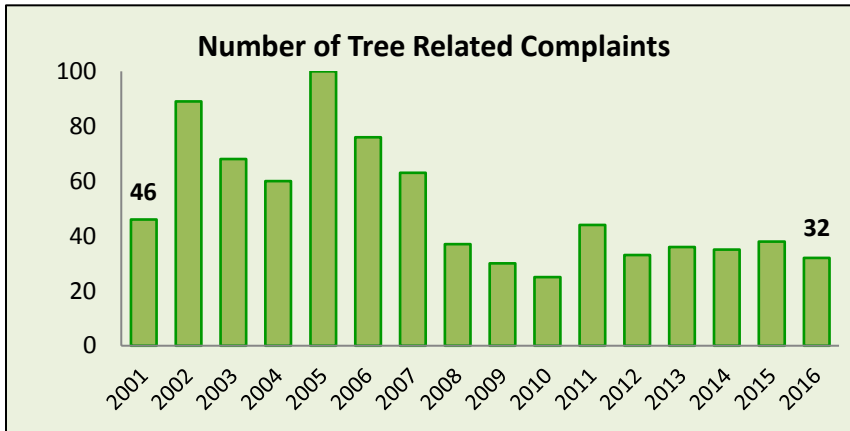
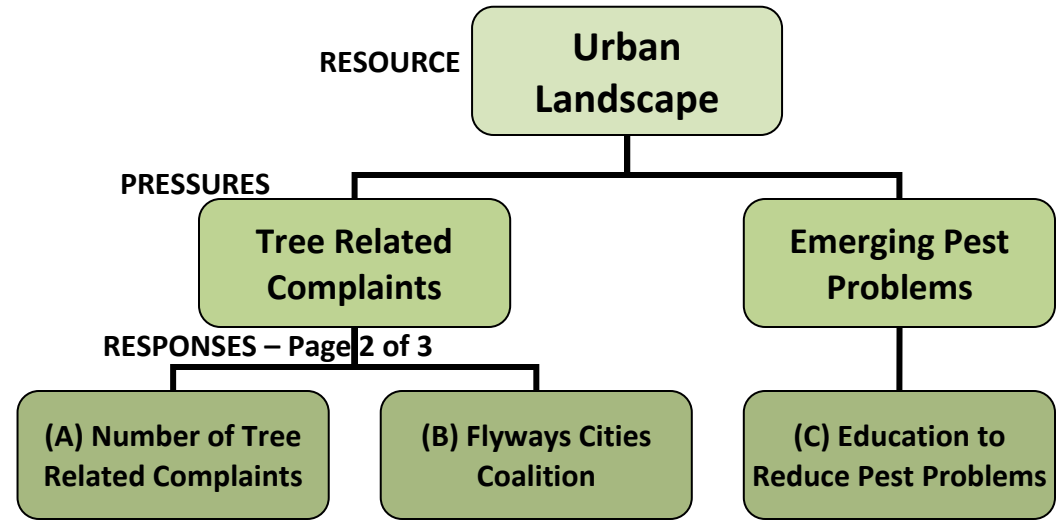
(A) Public Education - In response to urban forestry issues following Hurricane Wilma, the Broward County Environmental Protection and Growth Management Department created the “Trees After the Storm - Replanting Storm-Safe Trees” web-site to answer frequently asked tree questions, sponsored the Broward Beautiful Trees & Hurricane Impact Summit, purchased and distributed 30,000 Florida Urban Forestry Council brochure posters Right Tree Right Place – Selecting and Planting Trees for the South Florida Urban Forest Brochures, and created the NatureScape publication “Gone With The Wind...Storm.”



(B) Trees Planted in Broward County Parks After Storm Events – Many trees which provide shade and scenery for Broward County park users were lost due to recent tropical storms. Since 2005, the Parks and Recreation Division has replaced over 10,000 trees with species that can better withstand future storms.

- **The number of NatureScape Broward educational programs delivered:** 385 programs in 2016.
- **Number of certified NatureScape Sites:** 4,080 sites in 2016.

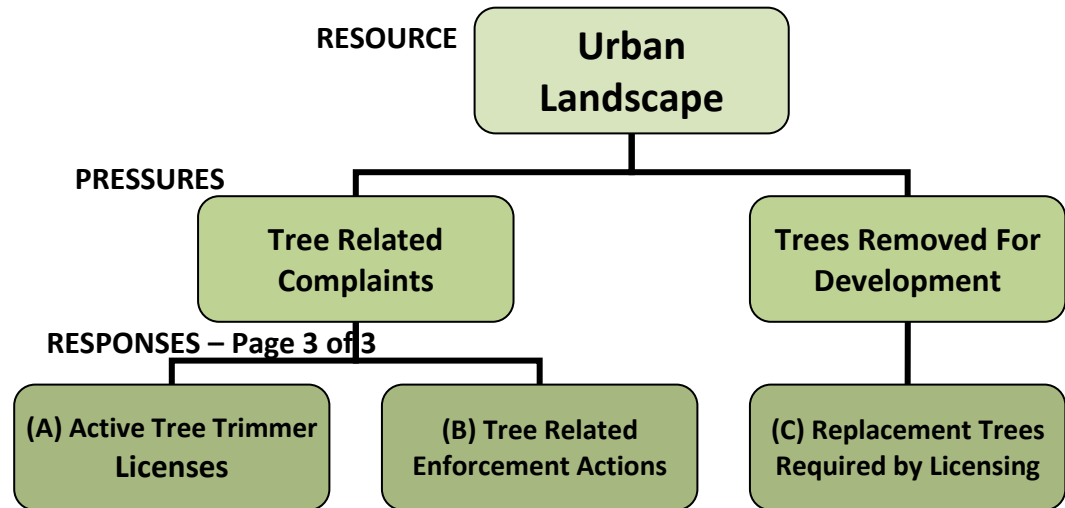
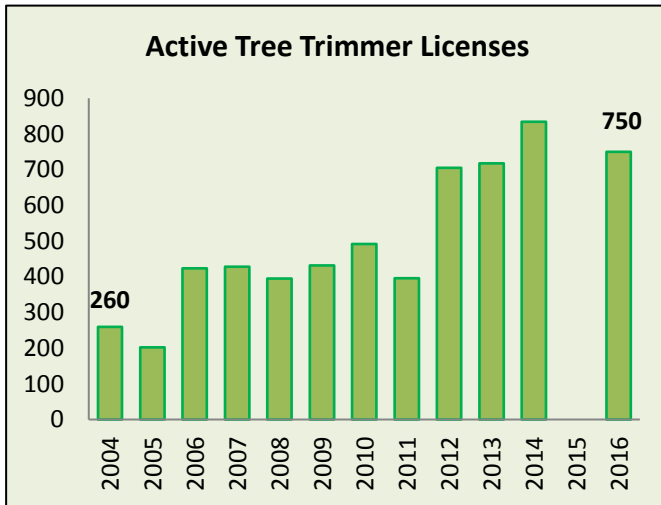
RESPONSES TO PRESSURES ON URBAN LANDSCAPE



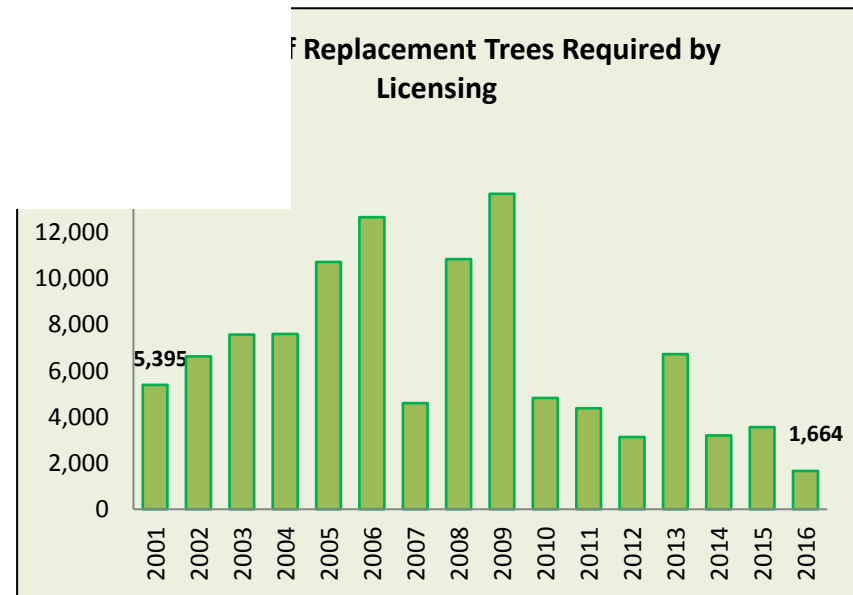
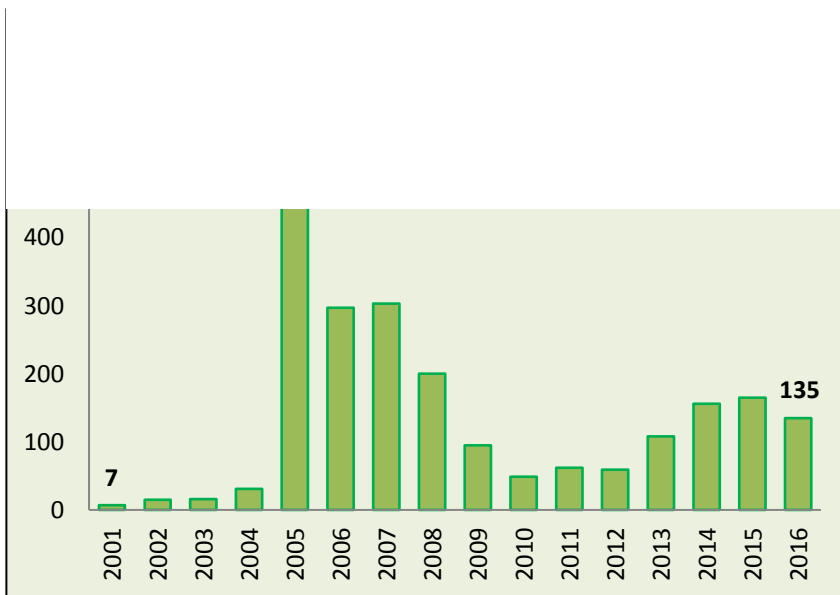
Number of trees licensed for removal, 1445 in 2016.

Tree canopy coverage in Broward County was 19% (based on a 2012 tree inventory).
Broward County's goal was 40%.

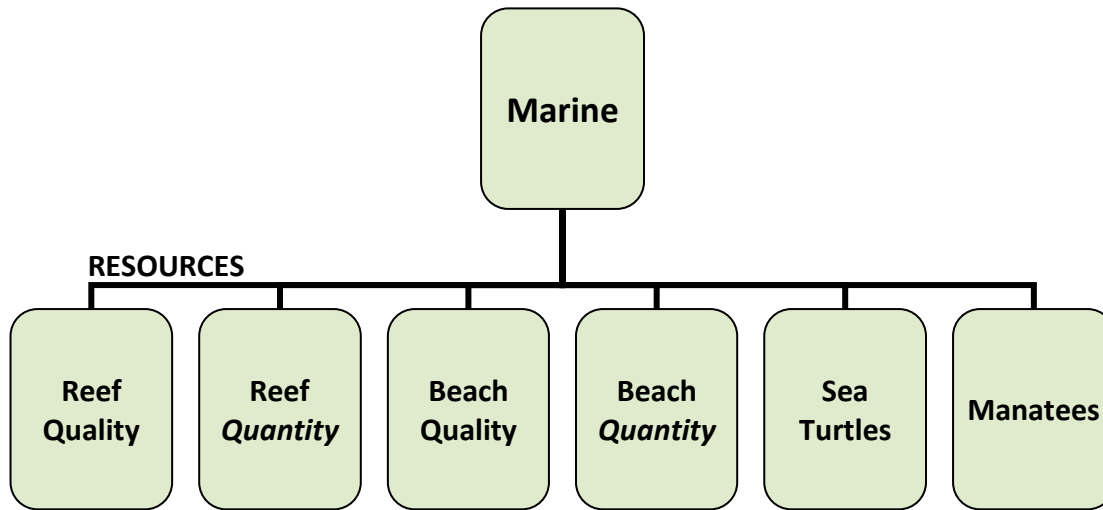
RESPONSES TO PRESSURES ON URBAN LANDSCAPE



Note: The Contractor Licensing Section under the Building Code Services Division were unable to provide an estimate of the active Tree Trimmer Licenses for 2015.



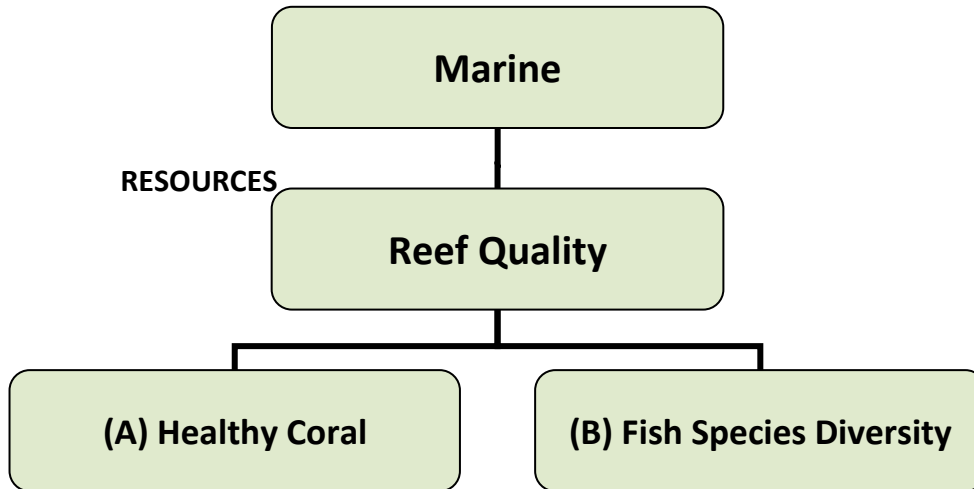
MARINE RESOURCES



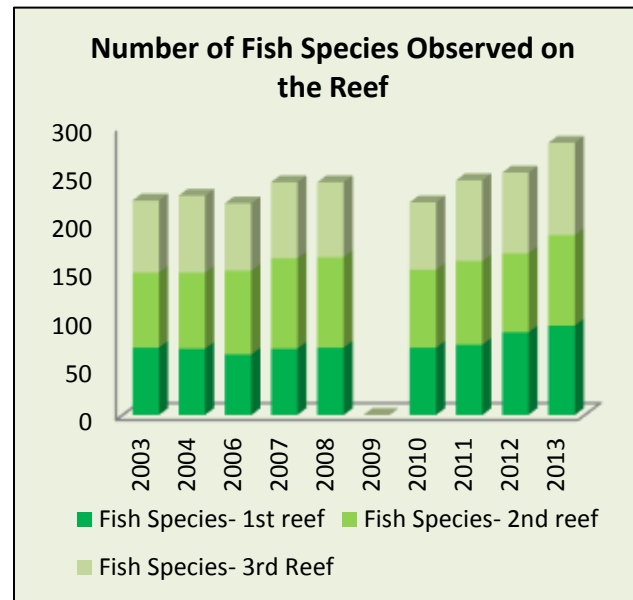
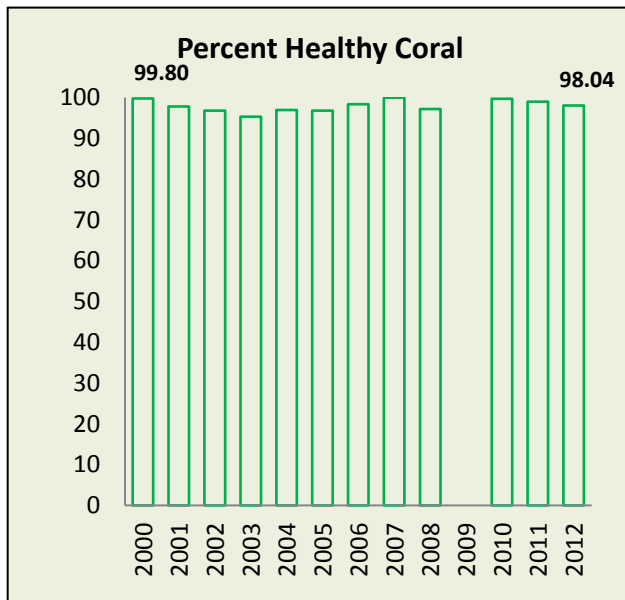
Marine Resources - The coastal environment was a major contributor to Broward County's quality of life and economy. The beach and coral reefs provided natural habitat, tourism destinations, and protection from storms. These marine resources included endangered sea turtles and manatees.



MARINE RESOURCES – Reef Quality

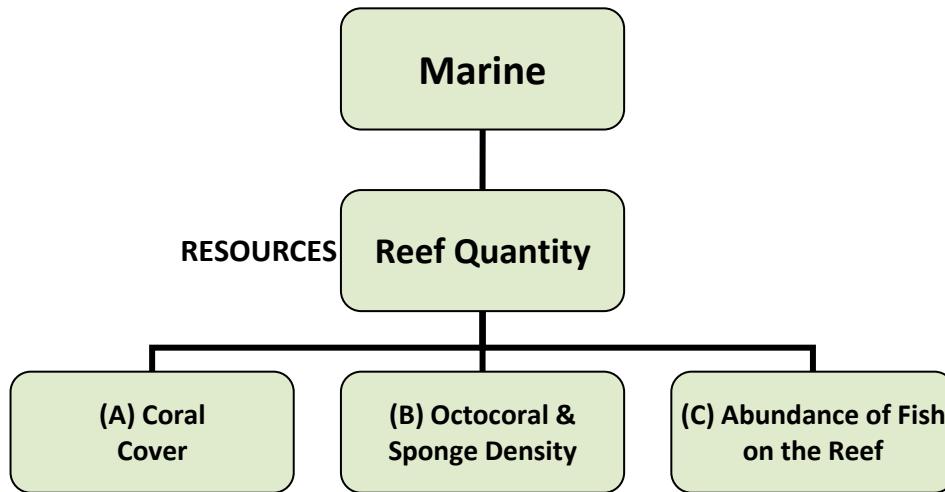


Coral Reefs - Coral reefs and their associated sea life were important natural resources for recreational fishing and diving industries in Broward County. The sound ecological condition of the reef community was a key indicator of the general condition of all marine resources of the Broward coastline. In 2017, the National Coral Reef Task Force held their annual meeting for the first time in Florida, in Broward County.

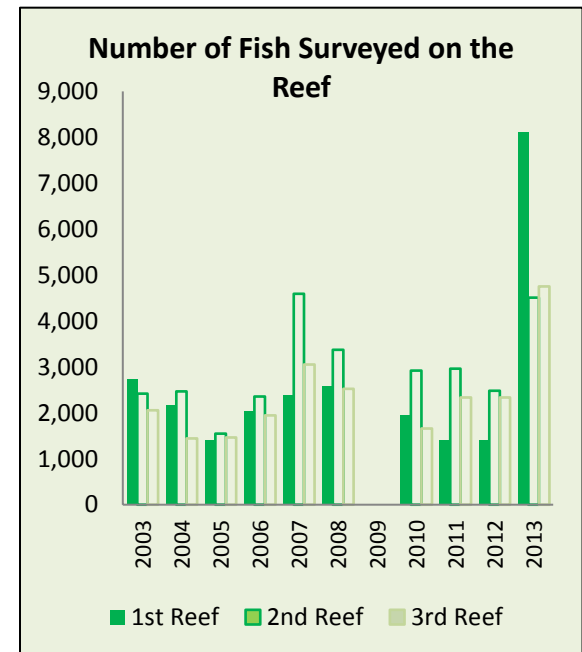
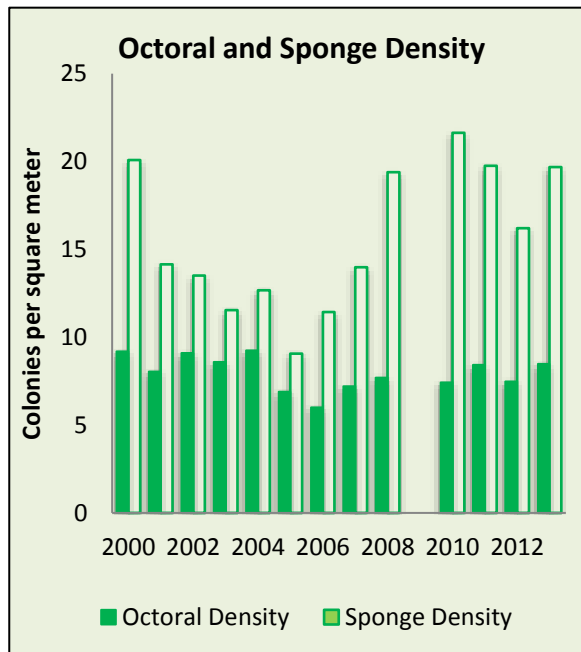
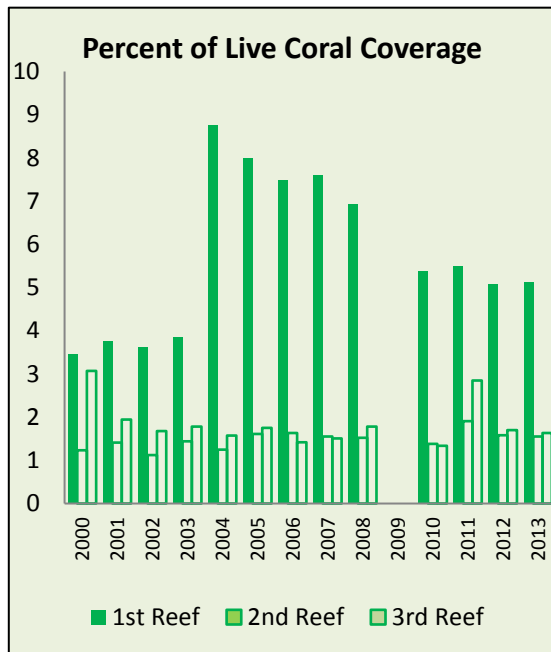


Note: Coral, sponge, and fisheries data will now be collected every four years due to budgetary conditions. Latest data points are presented.

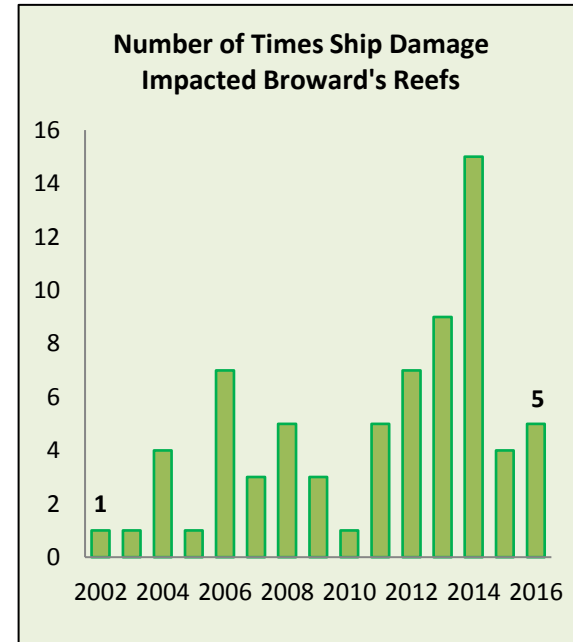
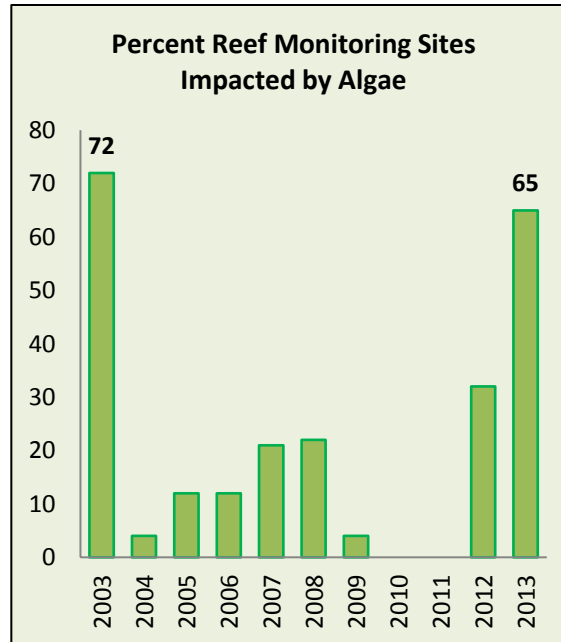
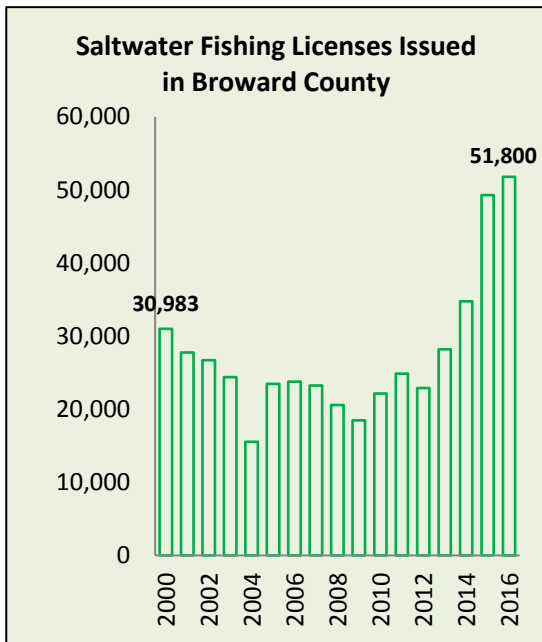
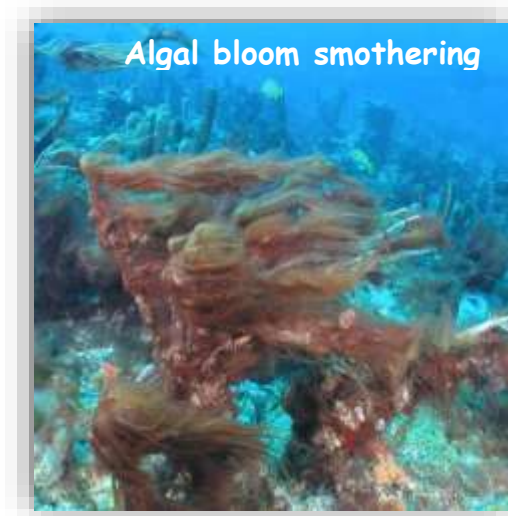
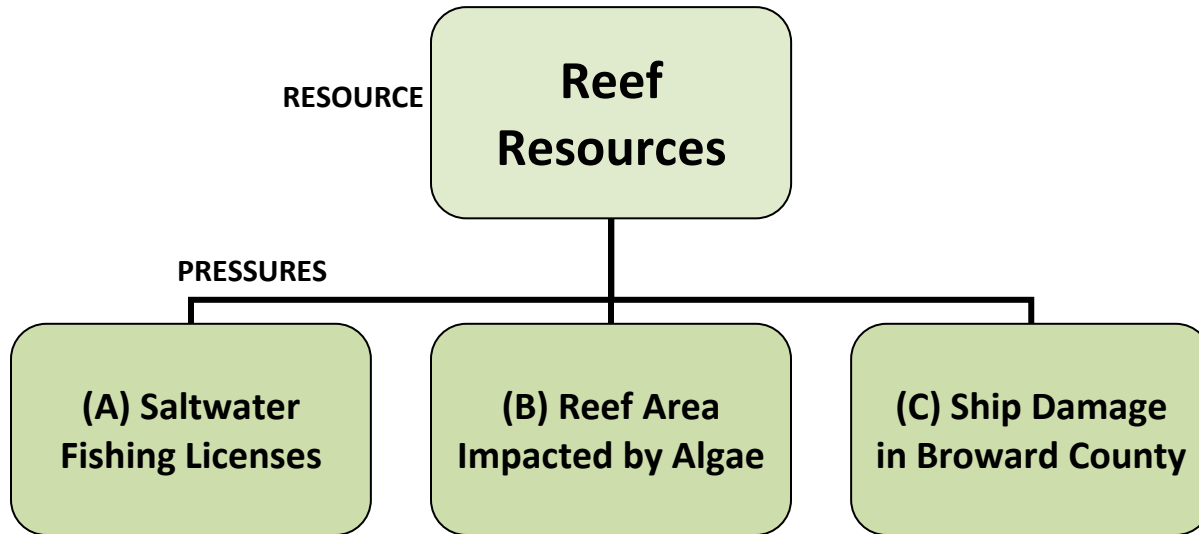
MARINE RESOURCES – Reef Quantity



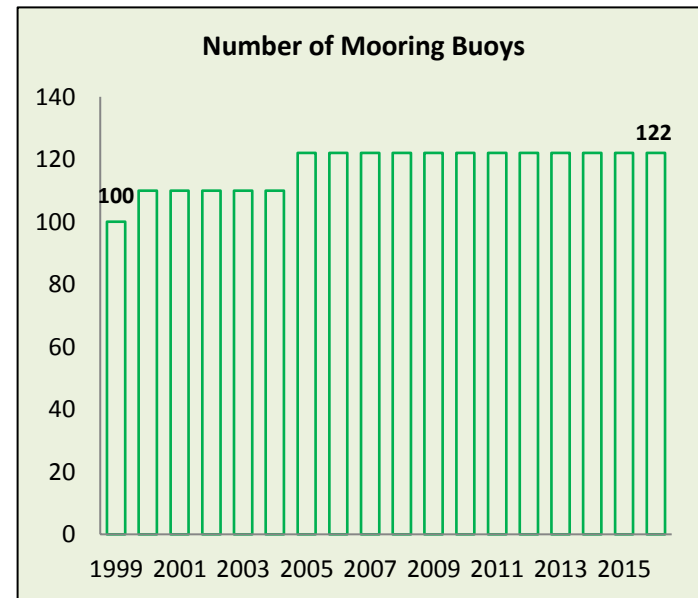
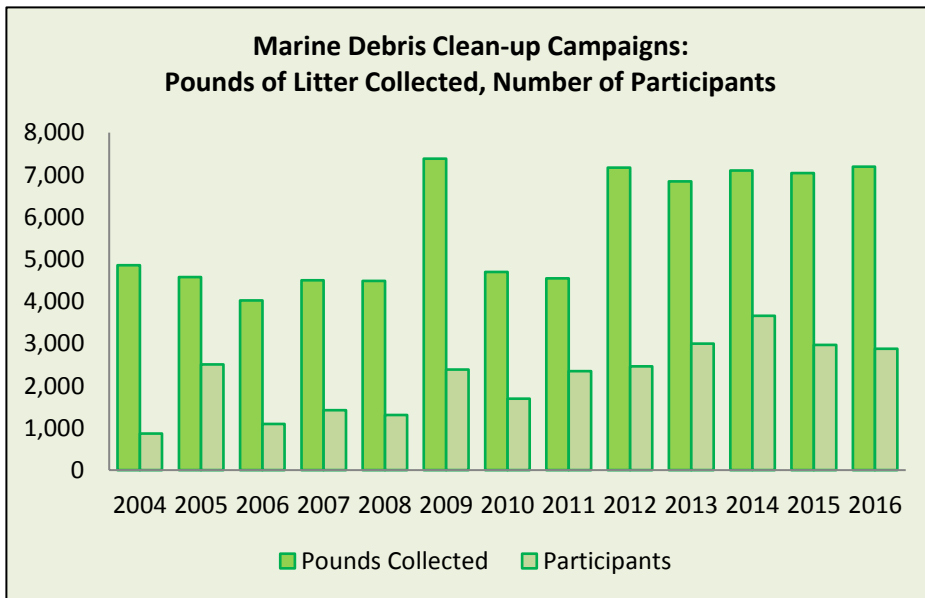
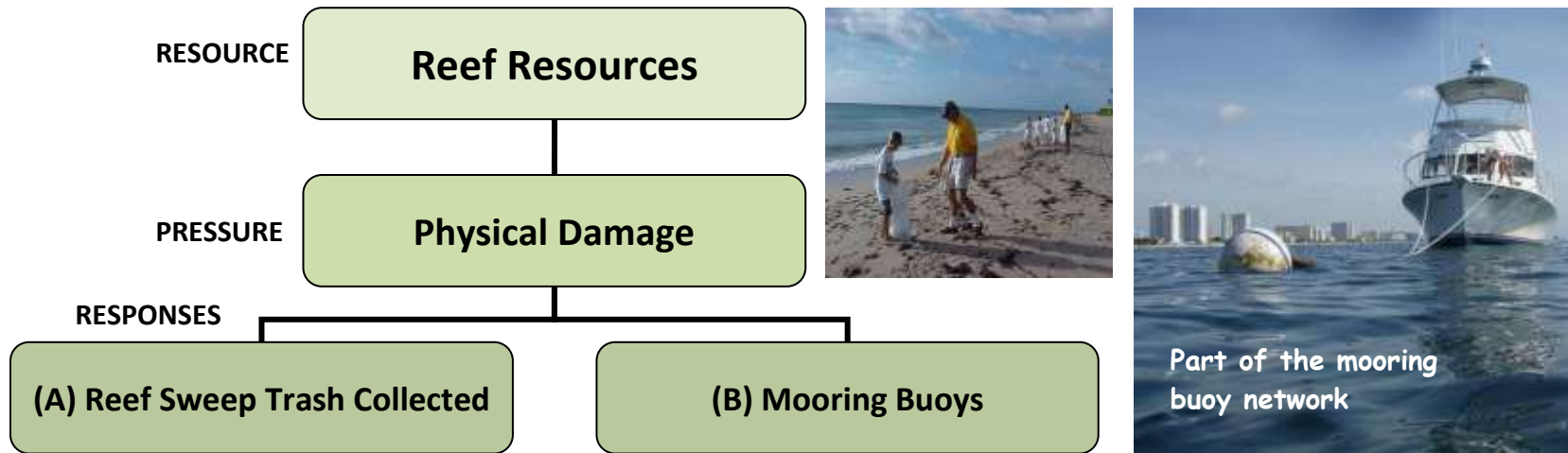
Coral Reefs – The abundance of corals, sponges, and fish were dependent upon the structure of the reef, the water quality, and conditions around the reefs. All of these components were important to create a functional ecosystem. In Broward County, three reefs ran parallel to the shoreline at various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



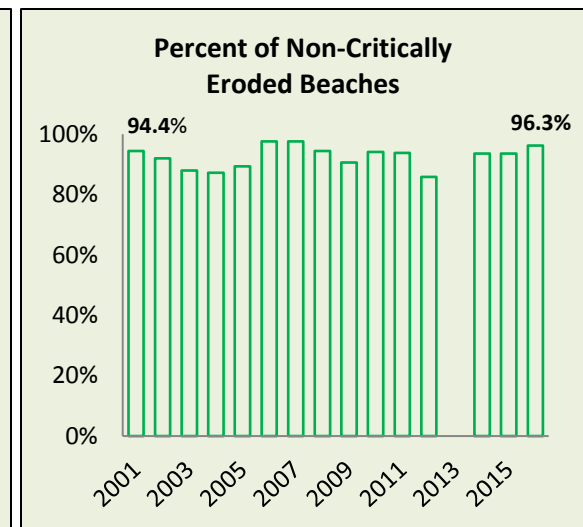
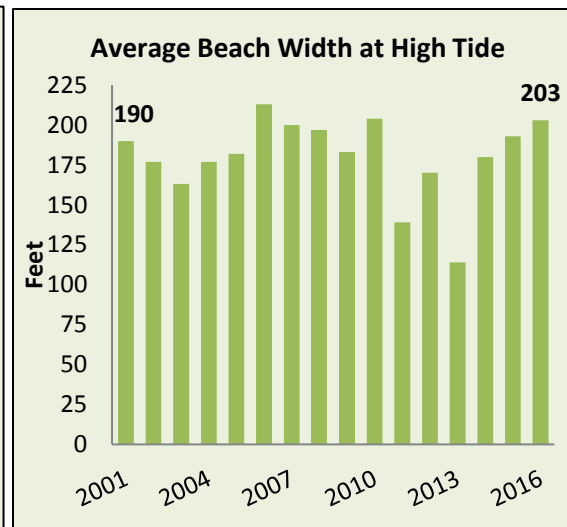
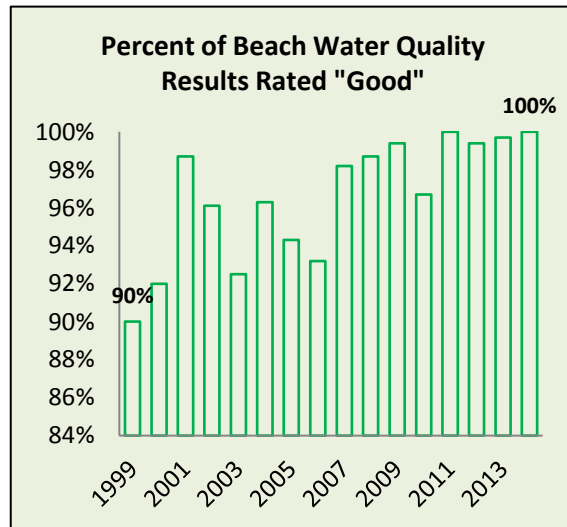
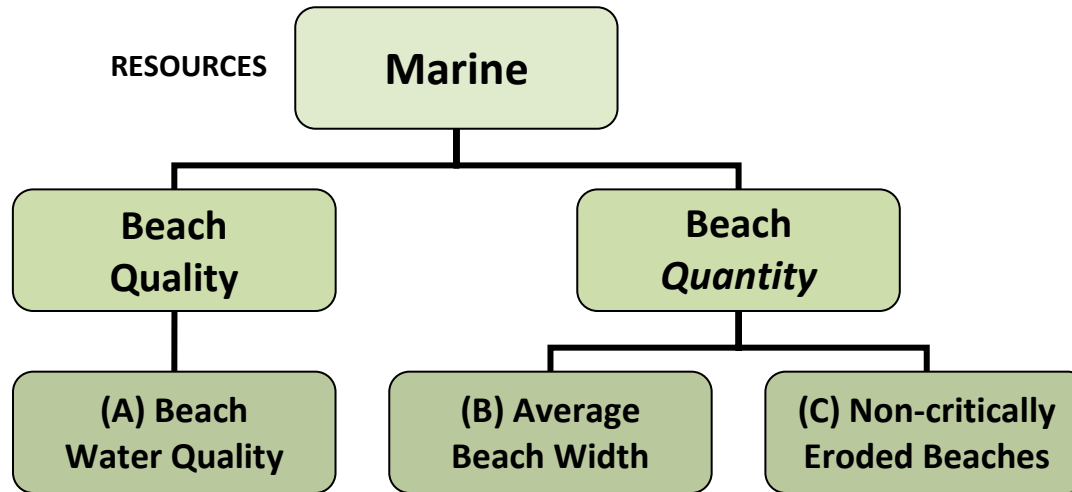
PRESSURES ON REEF RESOURCES



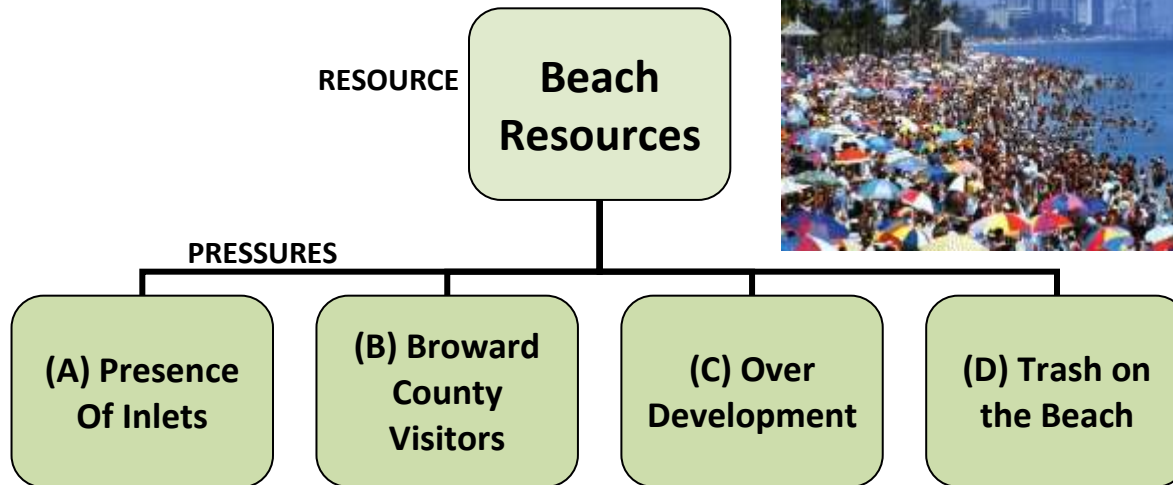
RESPONSES TO PRESSURES ON REEF RESOURCES



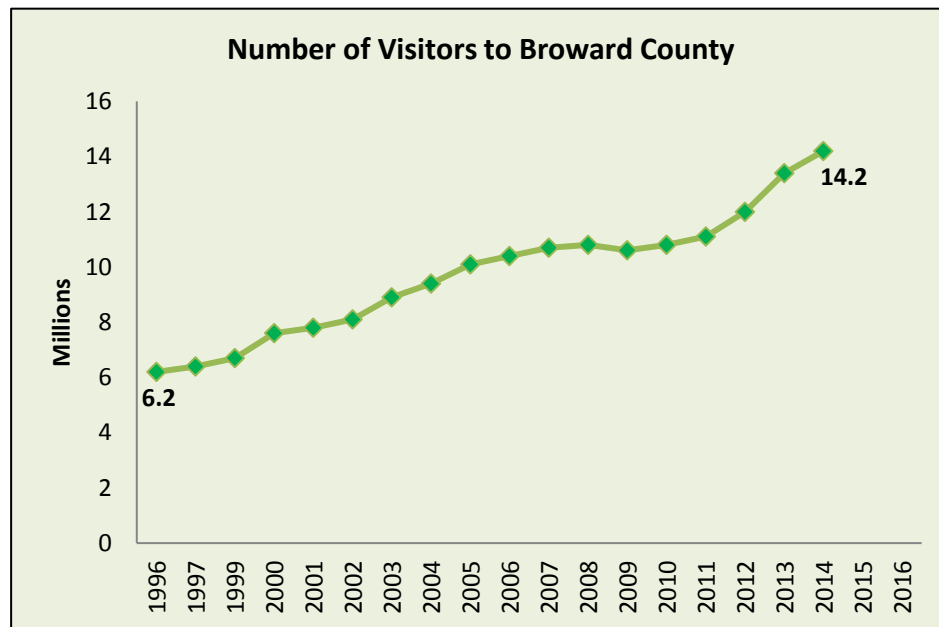
MARINE RESOURCES- Beach Quality and Quantity



PRESSURES ON BEACH RESOURCES



(A) Presence of Inlets - Inlets, composed of jetties and dredged channels, interrupted the movement of sand, causing buildup to the north and erosion to the south of the channel.

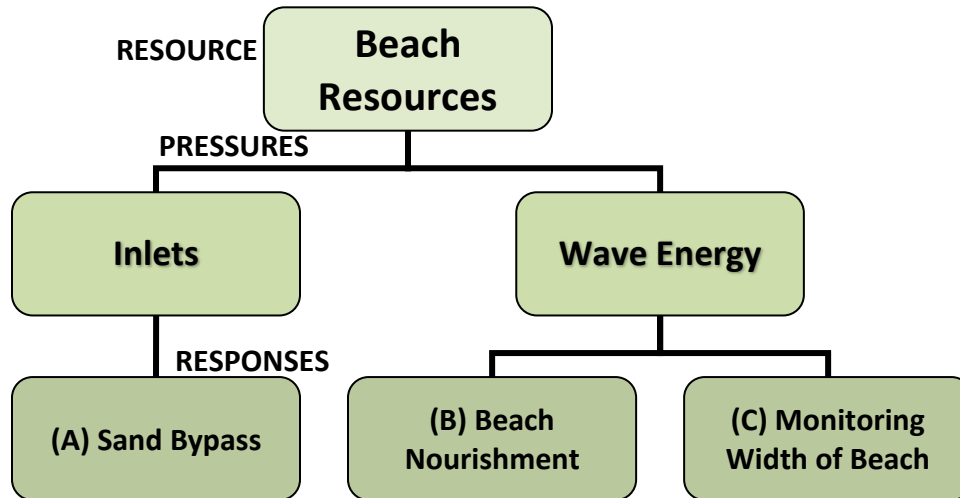


(C) Over Development - Coastal development, in areas prone to tropical storms, can place lives and property at risk and stress natural resources. Properly controlling beachfront development led to more sustainable economies and environmental resources.

(D) Trash on the Beach - The coastline received trash from careless people, upland sources like wind-blown trash, and from the ocean, where vessels threw or lost debris overboard.

Data was not available for Years 2015 and 2016

RESPONSES TO PRESSURES ON BEACH RESOURCES



Beach nourishment in progress

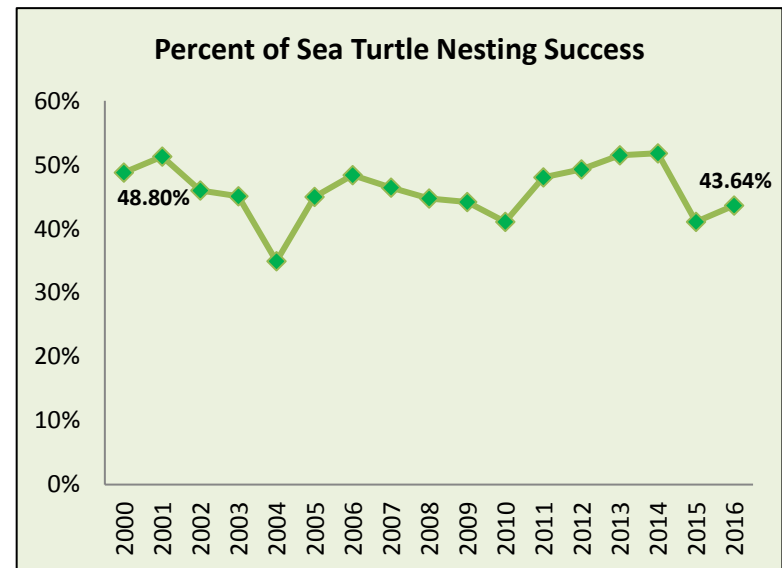
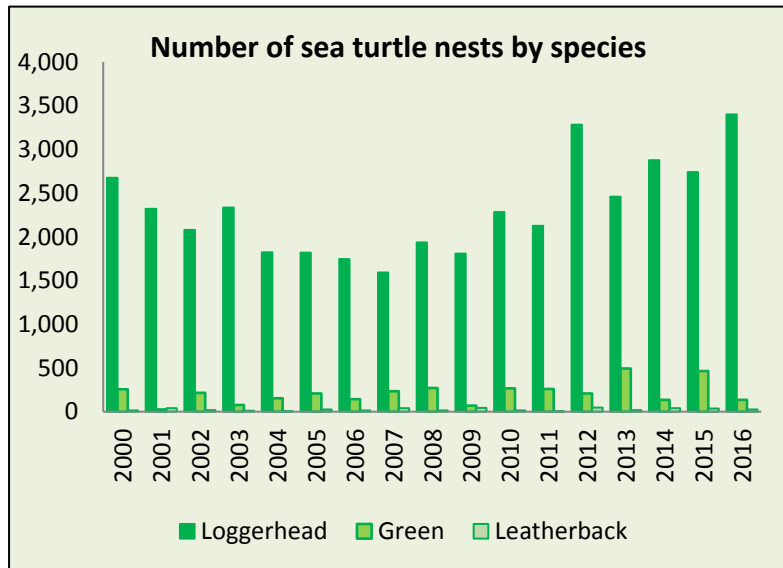
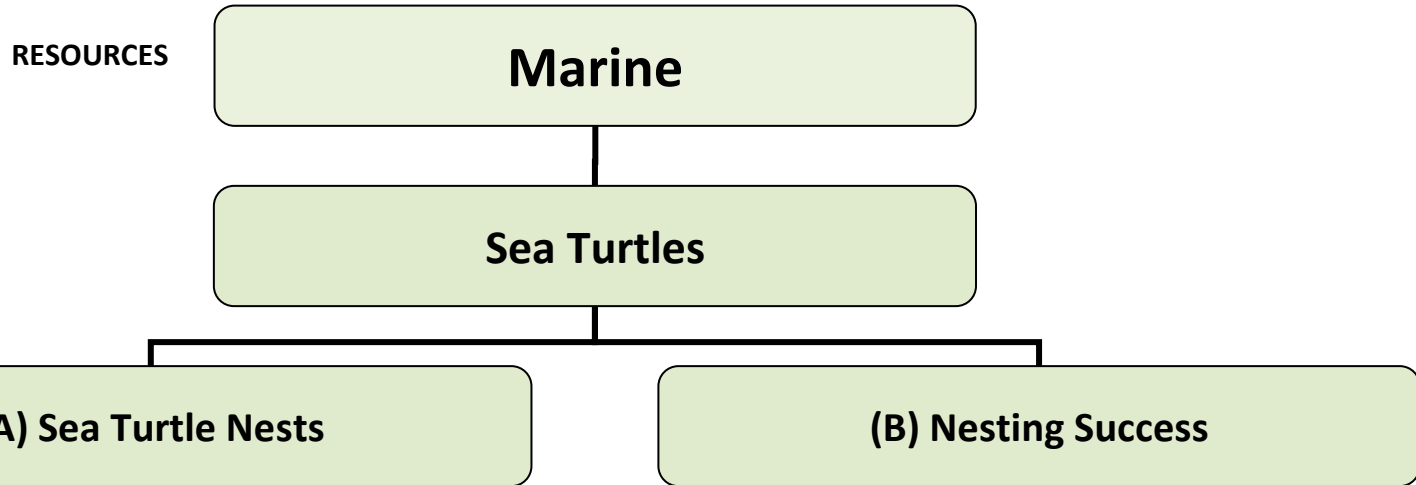
Recent projects have nourished 4.6 miles of shoreline and constructed 1.5 miles of dunes.

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

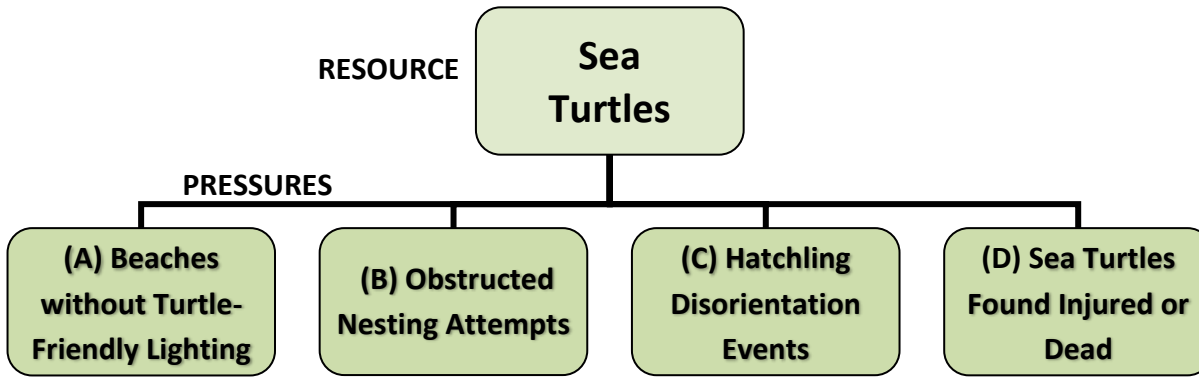
(B) Beach Nourishment – By acquiring sand of a similar grain size, composition, and color, Broward County has been able to restore its eroding beaches to their historical width and slope. Beach nourishment was performed to increase storm damage prevention to coastal properties, to provide increased recreational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

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

MARINE RESOURCES- Marine Wildlife

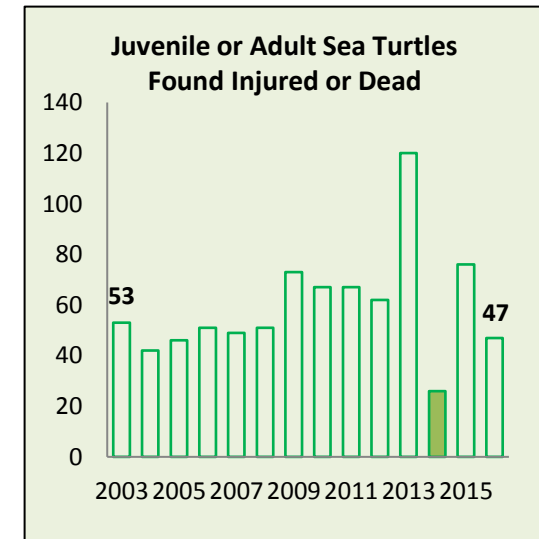
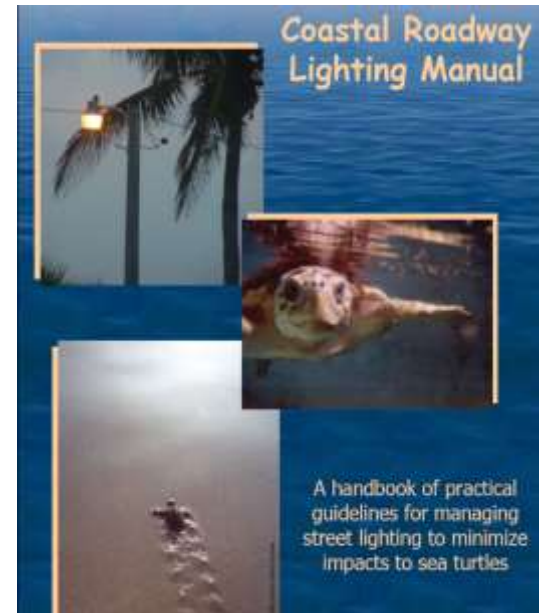
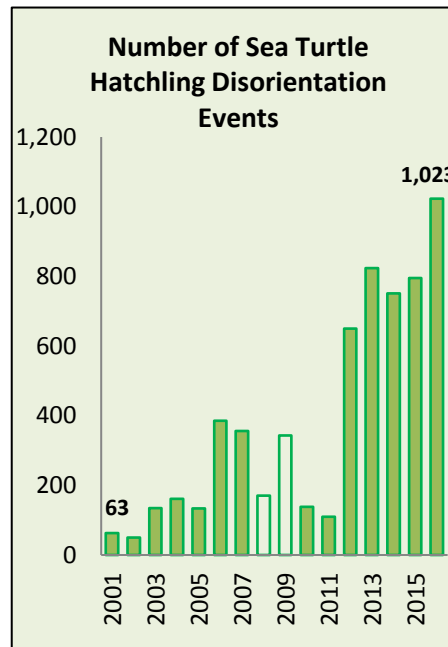
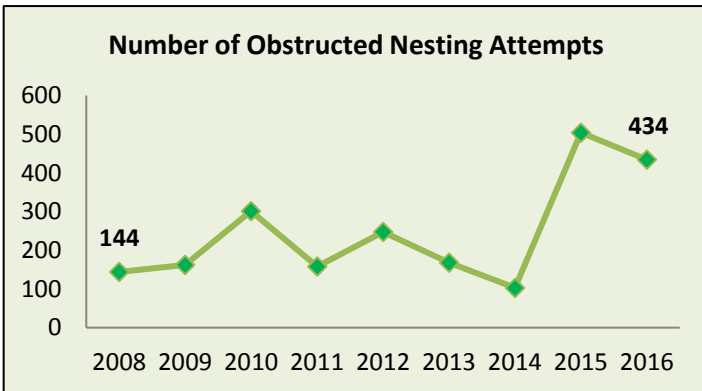


PRESSURES ON MARINE WILDLIFE – Sea Turtles

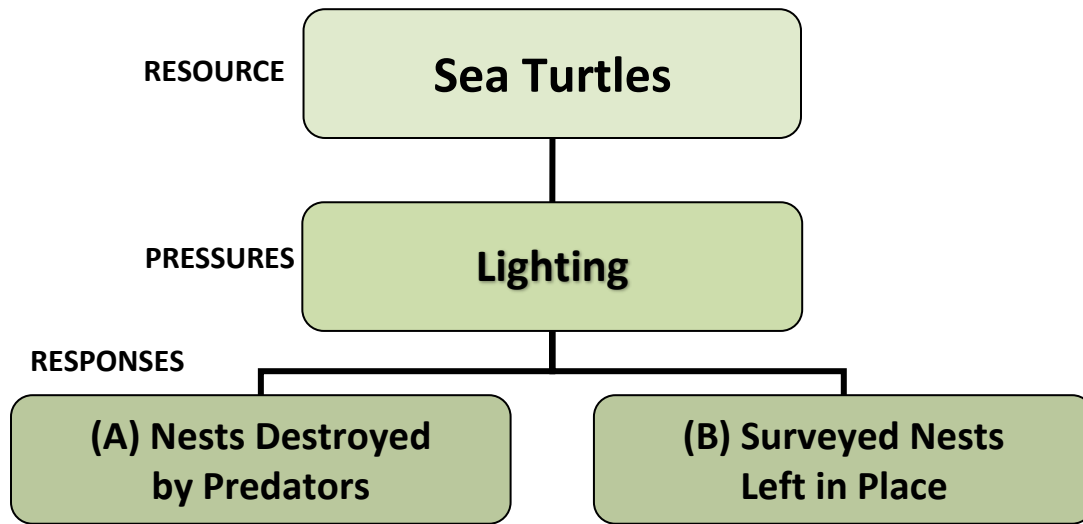


(A) Beaches without Turtle-Friendly Lighting - Even active enforcement of lighting ordinance enacted in all 8 coastal municipalities in Broward County has not resulted in enough light reduction to have areas of the beach considered “turtle friendly”.

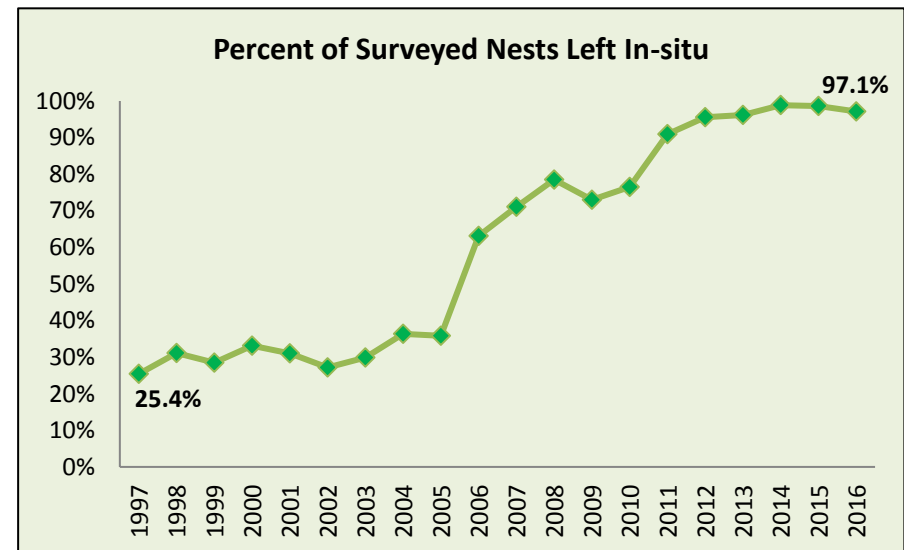
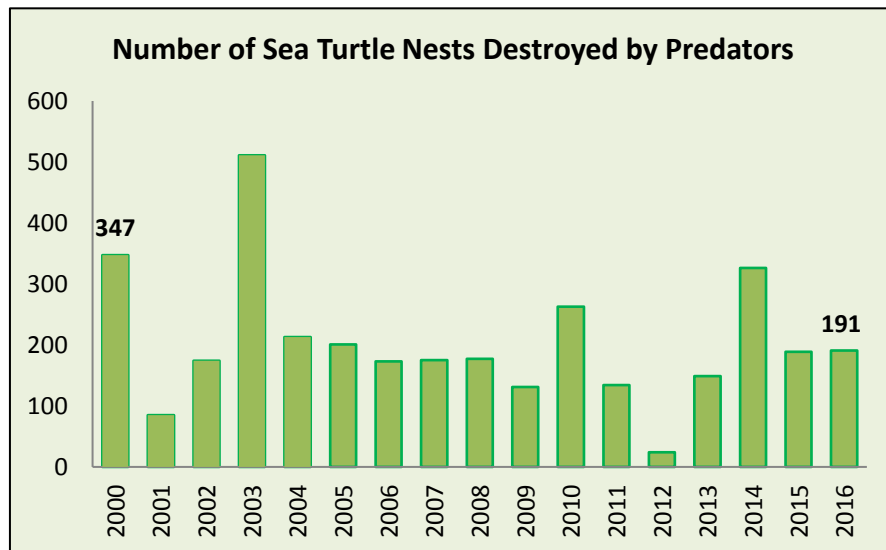
(B) Obstructed Nesting Attempts - Crawl marks left by the nesting female sea turtle can show whether she encountered any potential obstruction while attempting to nest. This information will begin to be collected this nesting season.



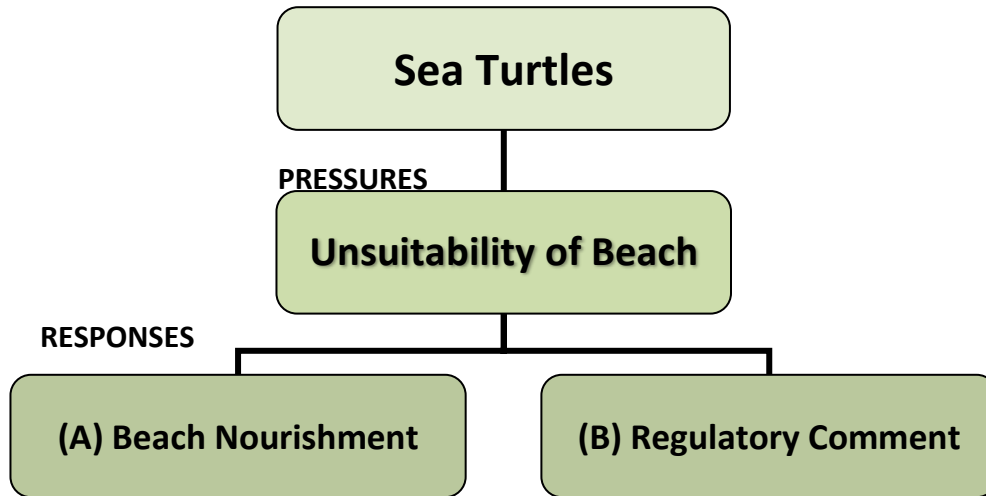
RESPONSES TO PRESSURES ON MARINE WILDLIFE – Sea Turtles



- Total Number of Sea Turtle Nests = 3,567 (in 2016)
- 100% of coastal municipalities in Broward County have enacted a Turtle Friendly Lighting Ordinance as of 2016.



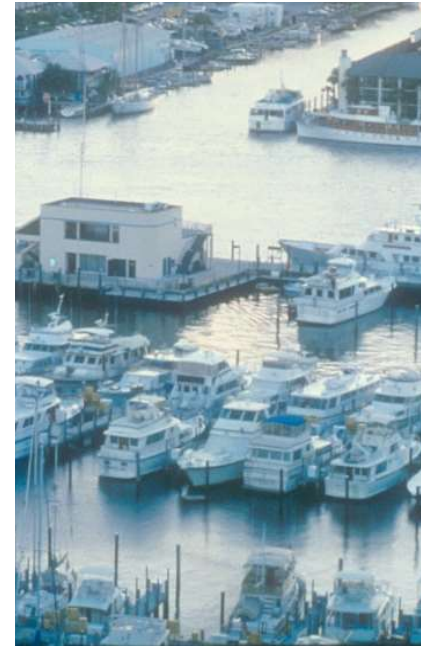
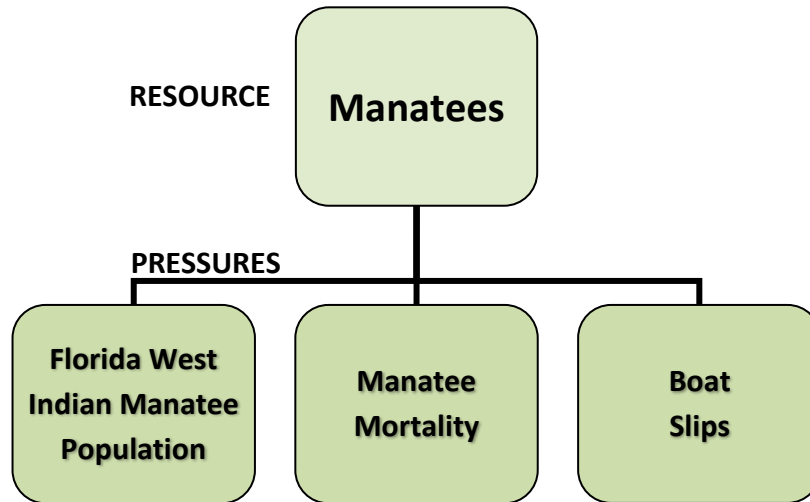
RESPONSES TO PRESSURES ON MARINE WILDLIFE – Sea Turtles



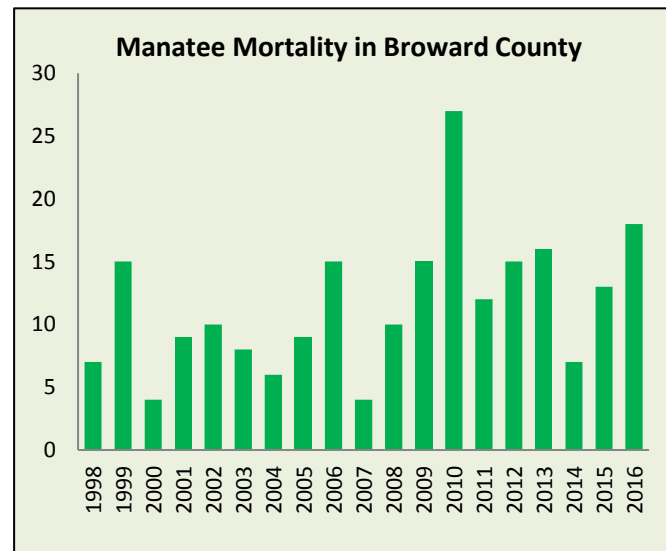
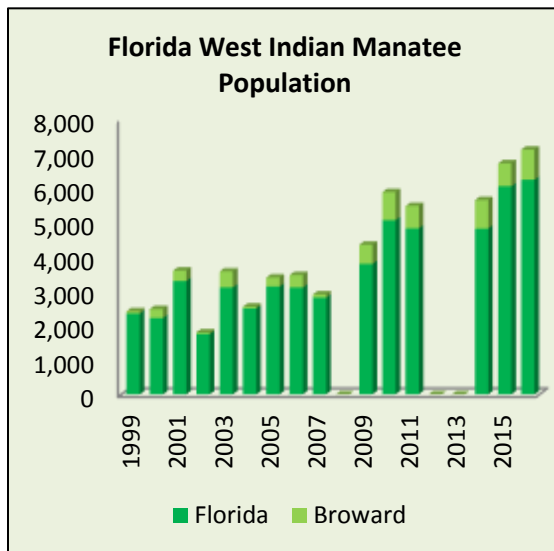
(A) Beach Nourishment – Adding sand to restore the historical width and slope of the beaches also served to preserve critical nesting habitat for sea turtles. Grain size and composition of the replacement sand was important.

(B) Regulatory Comment on Beach Resources – The statewide Coastal Construction Control Line Program included 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



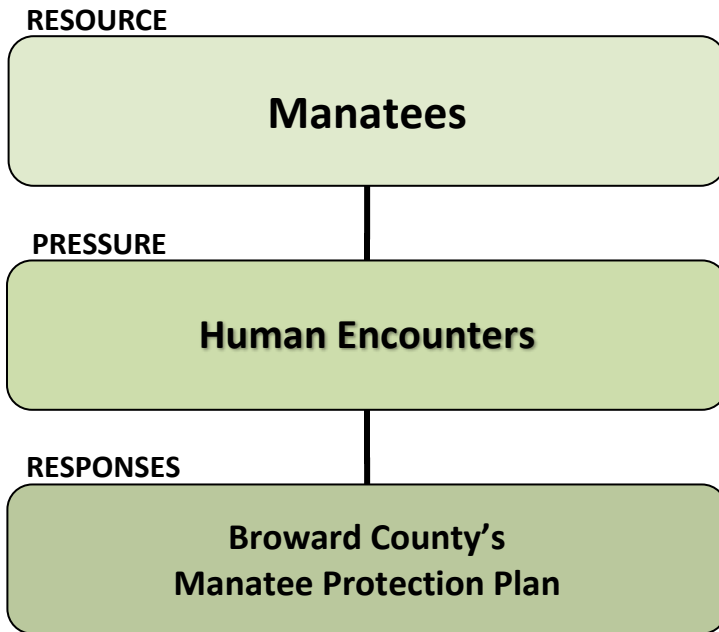
Year	Number of dock slips
2006	31,739
2007	30,739
2008	31,511
2009	31,055
2010	31,328
2011	31,295
2012	31,369
2013	31,633
2014	31,671
2015	31,699
2016	31,262



Since 1974, biologists have collected mortality statistics for Florida manatees. Researchers have determined both the number of manatee deaths in each Florida county and the probable cause of death for each carcass.

Manatee mortality can be caused by watercraft, cold stress, human contact, flood gate/canal lock, or natural causes. [Manatee Mortality Statistics](#)

RESPONSES TO PRESSURES ON MARINE WILDLIFE - Manatees



Photos taken in flight from staff, during an aerial manatee survey. Manatee season for Broward County begins in November and runs through March.

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 maintained numerous education and awareness efforts alone and in conjunction with other government and non-profit environmental agencies. The efforts included regular distribution of educational materials, public forums, informational kiosks, educator toolboxes, and a manatee webpage on the Broward County website. In 2017, Broward County will be releasing a manatee program smart phone app.