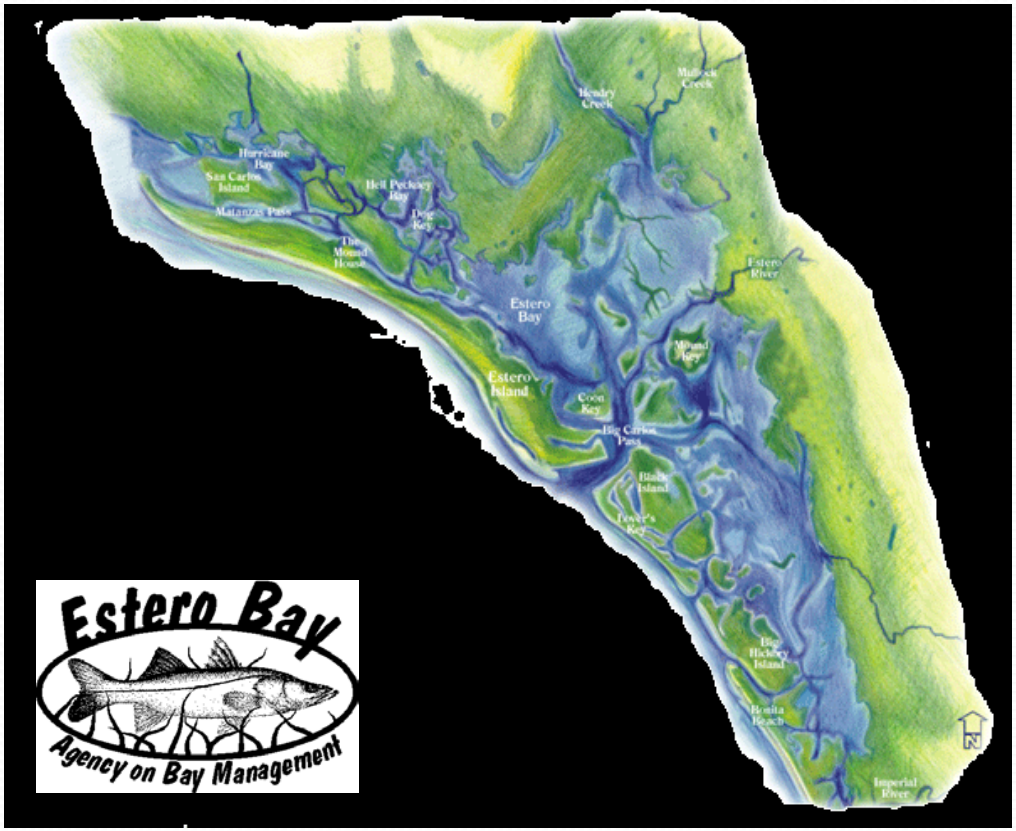
State of the Bay 2014



Funded by the City of Bonita Springs.

Prepared by the Southwest Florida Regional Planning Council and the Charlotte Harbor National Estuary Program.

City of Bonita Springs Florida
Small Town Charm. Big Bright Future.

Southwest Florida Regional Planning Council
Big Issues * Real Solutions

Charlotte Harbor National Estuary Program

Introduction with Principles
Human History of Estero Bay
Water Quality
Hydrology
Wildlife
Social
Discussion and Conclusions

Major Conclusions

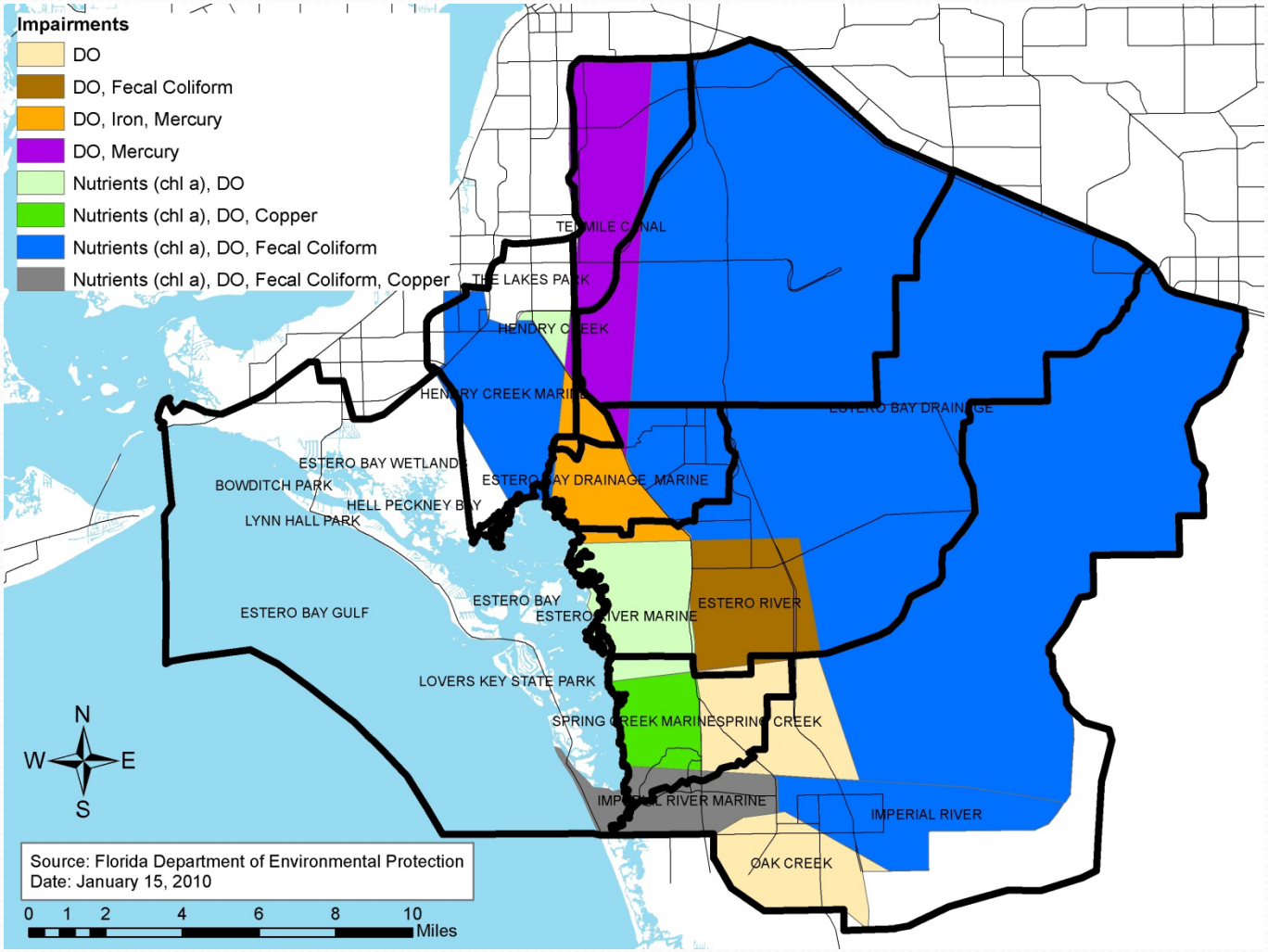
There are some significant areas in improvement in water quality associated principally with the adoption and implementation of strict local government fertilizer ordinances and construction of filter marshes in the headwaters of tributaries leading to nutrient reduction principally in phosphorous and chlorophyll-a; and increases in colonial bird nesting.

2013 Water Quality Status

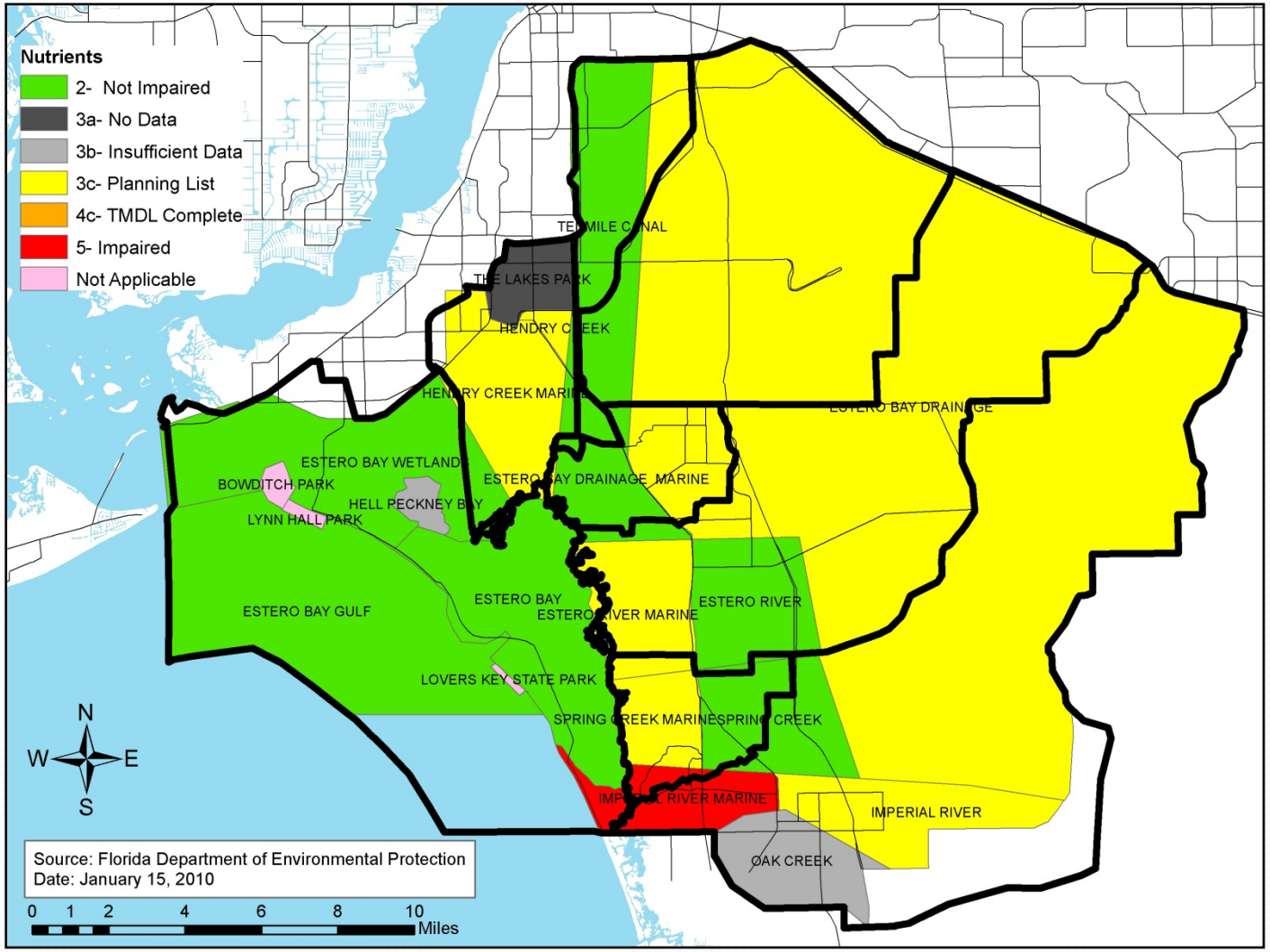
	Chlorophyll -a	DO	Fecal Coliform	Total Nitrogen	Total Phosphorus	Turbidity	Total Met
Estuarine							
Estero Bay							**6**
Hendry Creek		V	V				**4**
Mullock Creek		V					**6**
Estero River		V					**4**
Spring Creek		V					**4**
Imperial River	V	V	V				**4**
Fresh							
6-Mile Cypress		V	V				**4**
10-Mile Canal		V					**5**
Hendry Creek		V					**5**
Mullock Creek		V	V				**4**
Spring Creek		V					**4**
Imperial River		V	V				**3**
Total Met	**12**	**2**	**9**	**10**	**12**	**12**	

	Appears to have not met standards in 2013, based on Lee County Environmental Lab data*
	Appears to have not met standards in both 2008 and 2013*
	Appears to have not met standards in 2008 but met them in 2013*
V	Verified as Impaired in 2010 by Florida Department of Environmental Protection

Impaired Waters

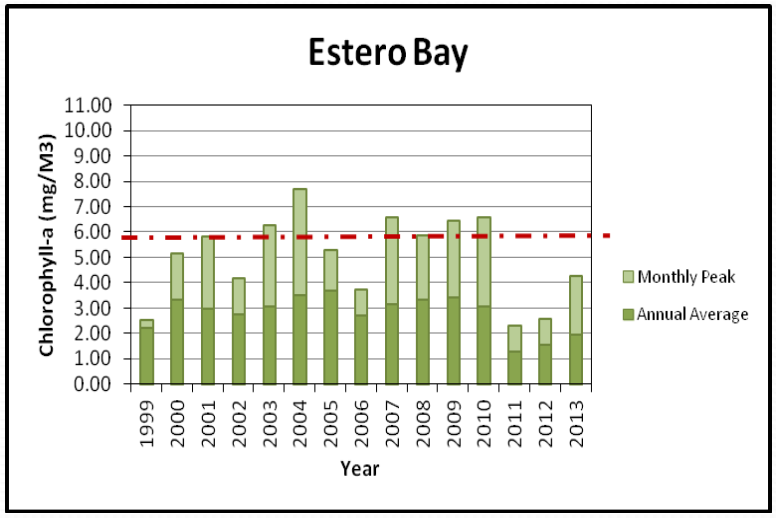


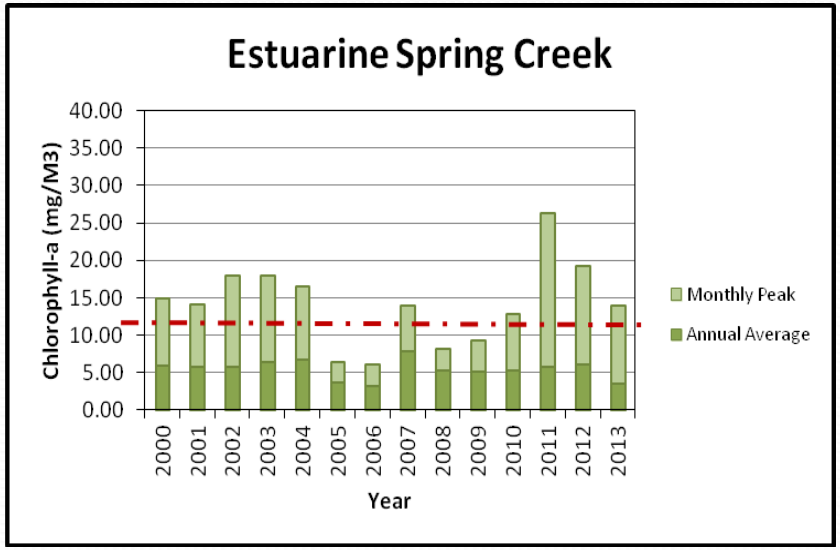
The Lee County Environmental Laboratory provided the data for all chlorophyll-a analysis.



Chlorophyll-a in Estuarine Systems

Between 2009 and 2013, average annual chlorophyll-a dropped in all estuarine segments.
The average reduction was 39%.
The peak monthly chlorophyll-a dropped in all estuarine segments but one, for an average of 38% reduction.





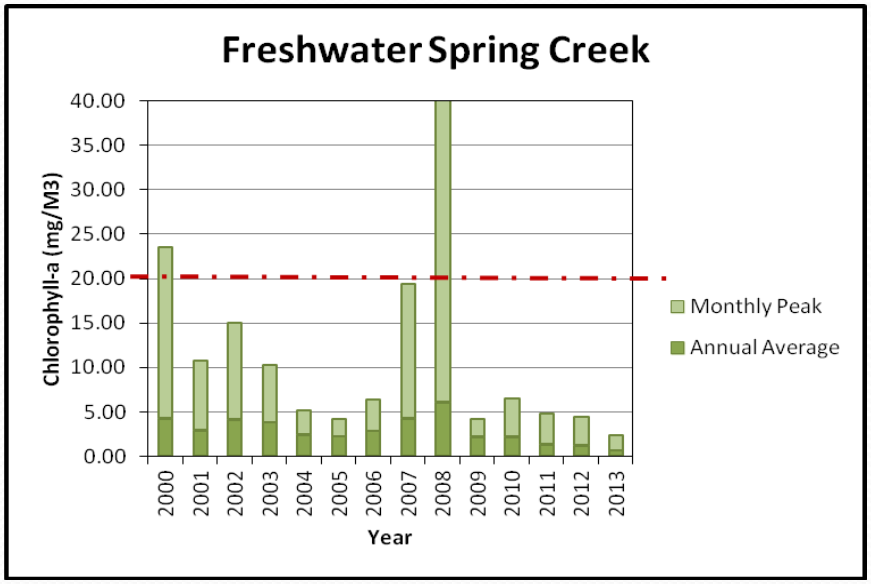
average	-43%
peak	-34%

average	-31%
peak	49%

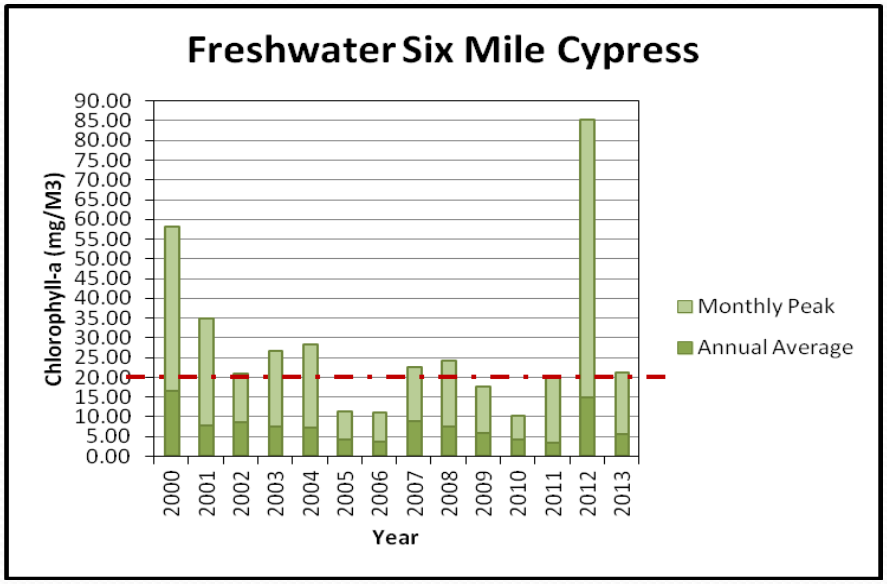
Chlorophyll-a in Fresh Systems

Between 2009 and 2013, average annual chlorophyll-a dropped in all freshwater segments. The average reduction was 46%. The peak monthly chlorophyll-a dropped in all estuarine segments but one, for an average of 34% reduction.

The most common peak month was May (30%), followed by June (17%). These probably represent first flush events. All months except July and October were represented.

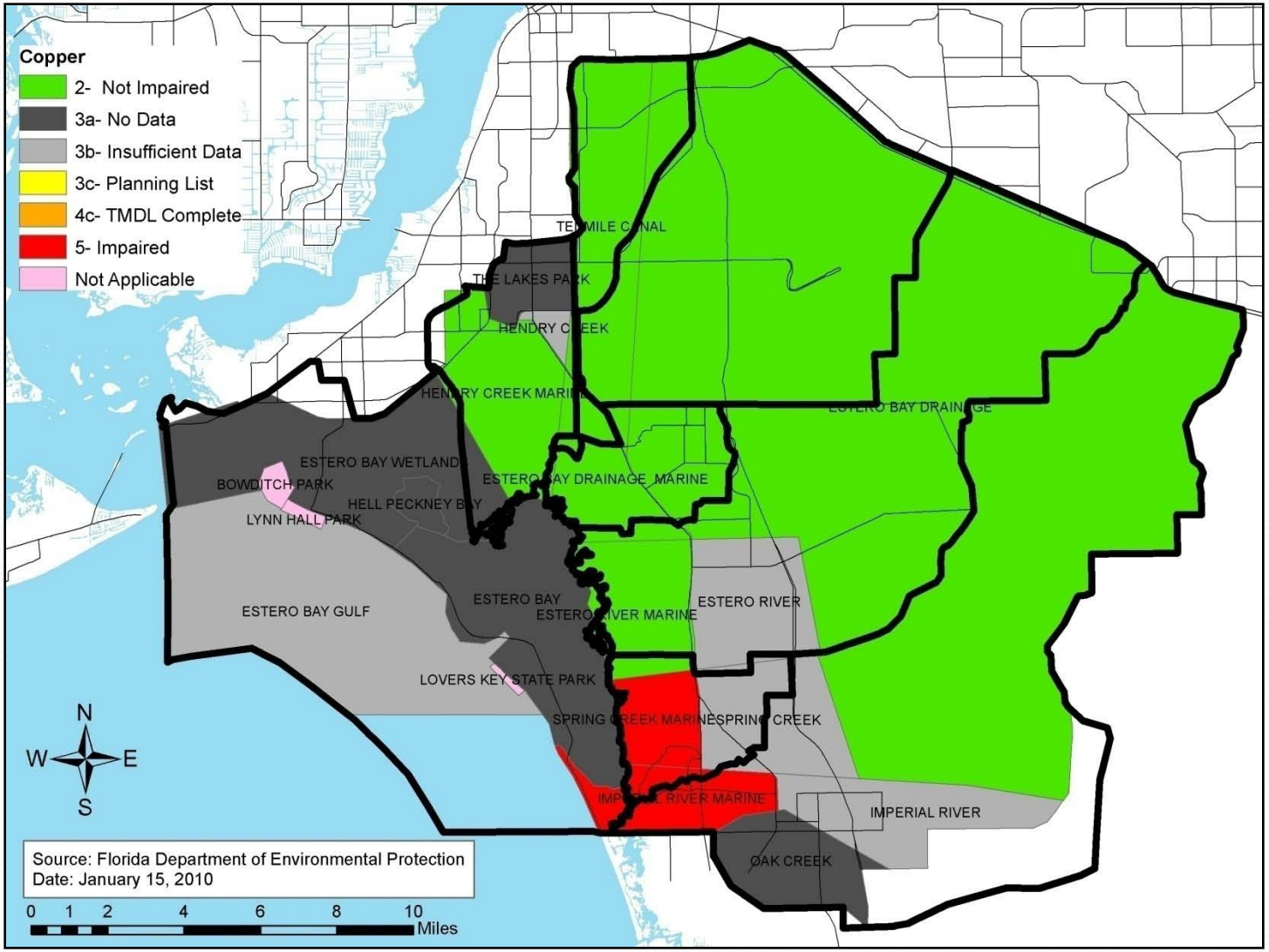


average	**-69%**
peak	**-45%**



average	**-9%**
peak	**21%**

Marine Imperial River and marine Spring Creek are the two verified impairments for copper within the Estero Bay basin.



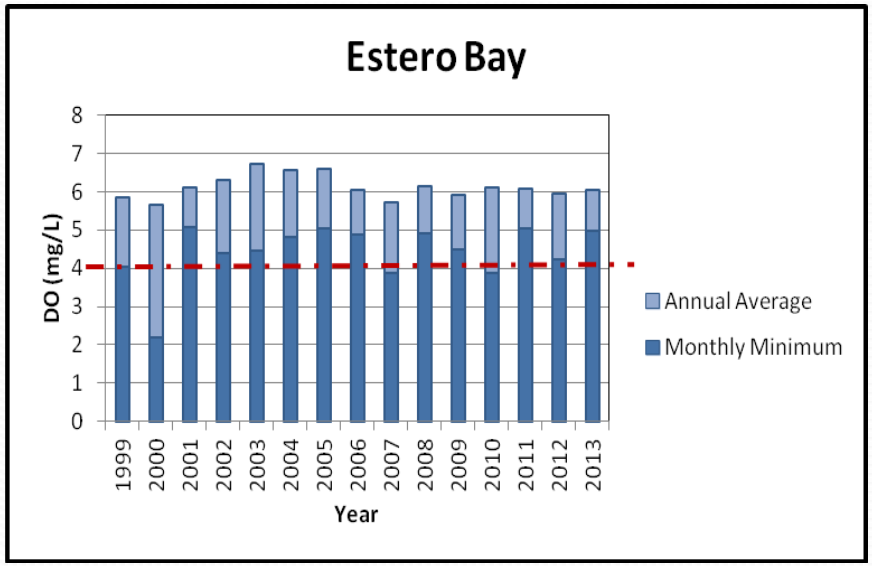
Dissolved Oxygen in Estuarine Systems

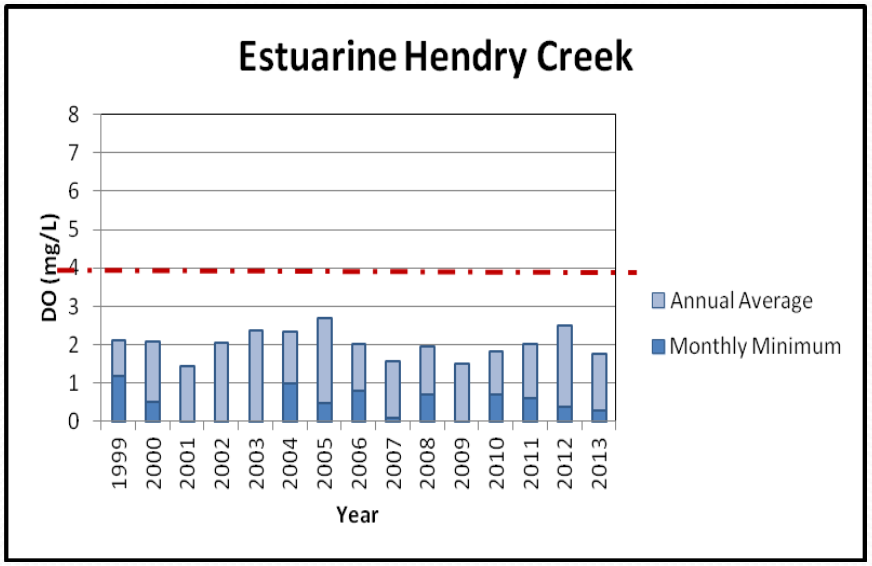
Between 2009 and 2013, average Dissolved Oxygen decreased in all estuarine segments but two: Estero Bay and Hendry Creek. The average decrease was negligible at 3%.

The monthly minimum Dissolved Oxygen increased in all estuarine segments but two: Estero River and Spring Creek.

The average increase could not be determined because of a 2009 anoxic event in Hendry Creek.

The most common minimum month was August (30%), however, all months except January, February, and March were represented.



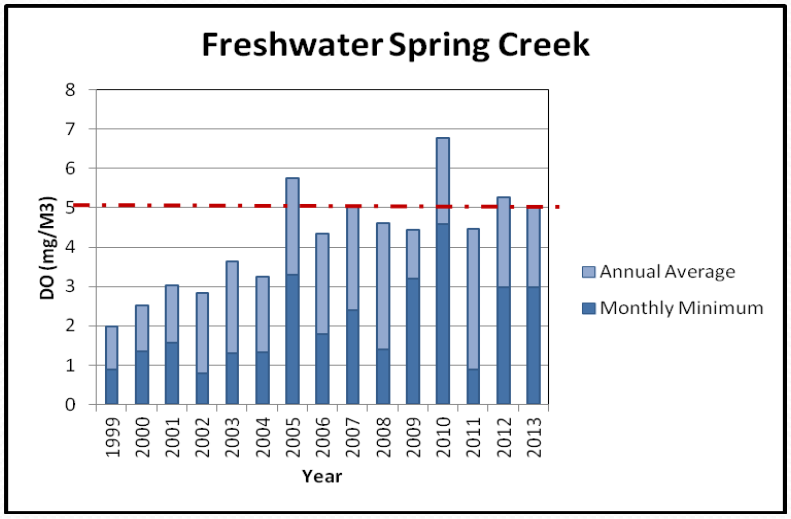


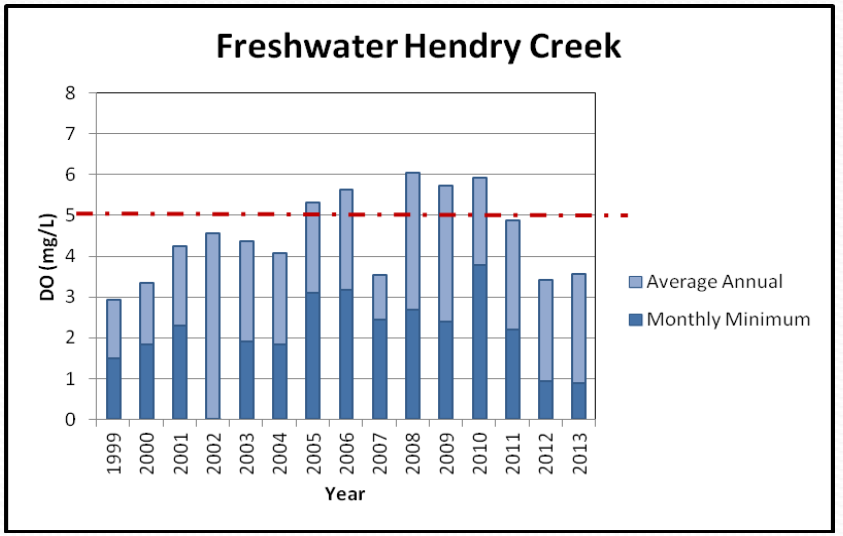
average	2%
minimum	10%

average	18%
minimum	>100%

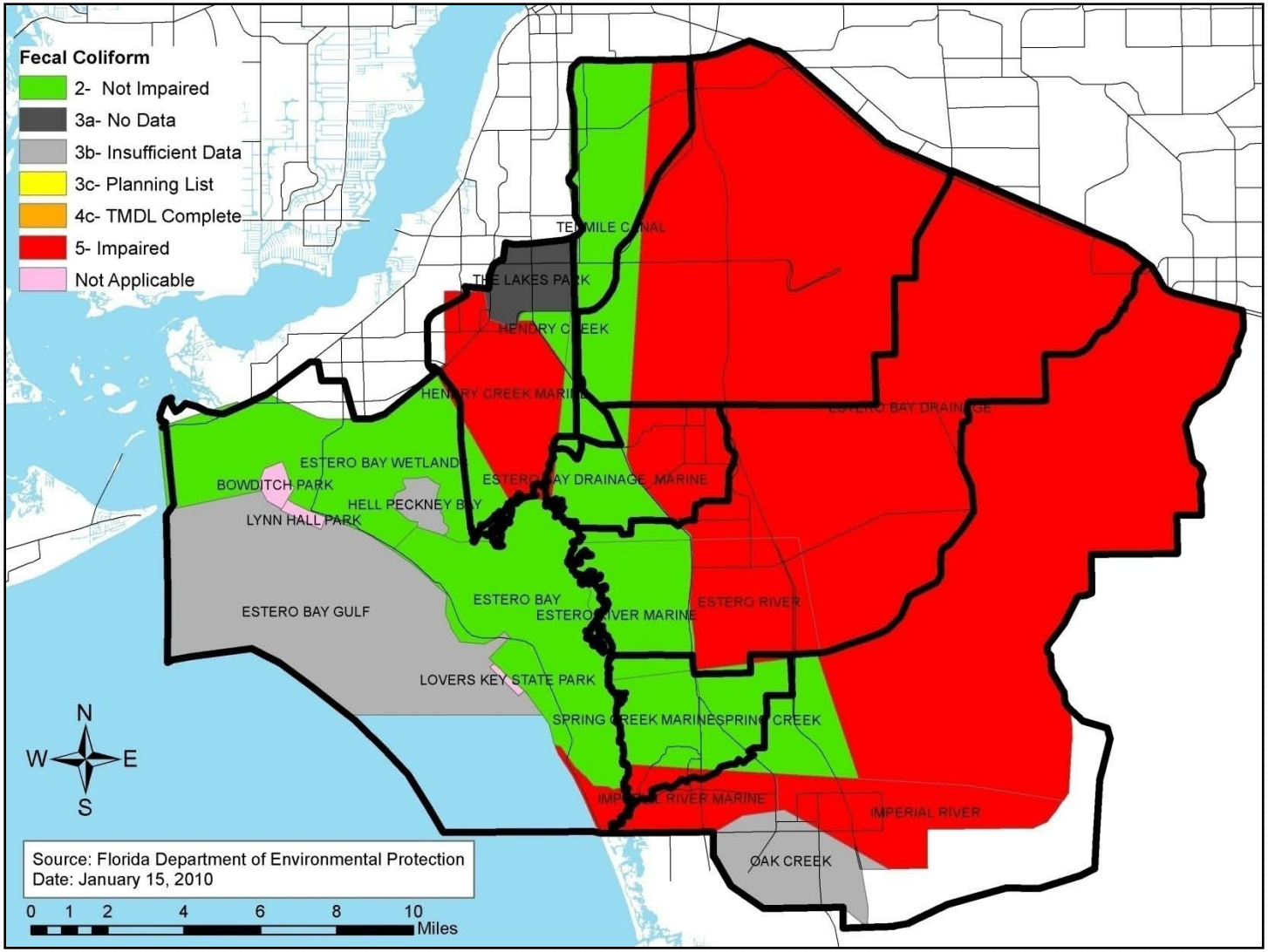
Dissolved Oxygen in Fresh Systems

Between 2009 and 2013, average annual Dissolved Oxygen decreased in all freshwater segments but two:
Mullock Creek and Spring Creek. The average decrease was 10%.
The monthly minimum Dissolved Oxygen decreased in all freshwater segments but one:
Six Mile Cypress. The average decrease was 20%.
The most common minimum months were July (23%) and September (23%),
however, all months except January, March, October and November were represented.



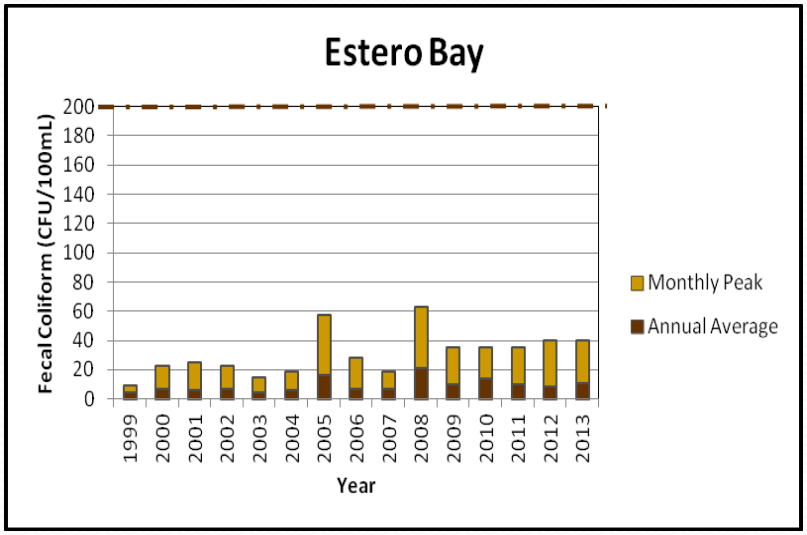


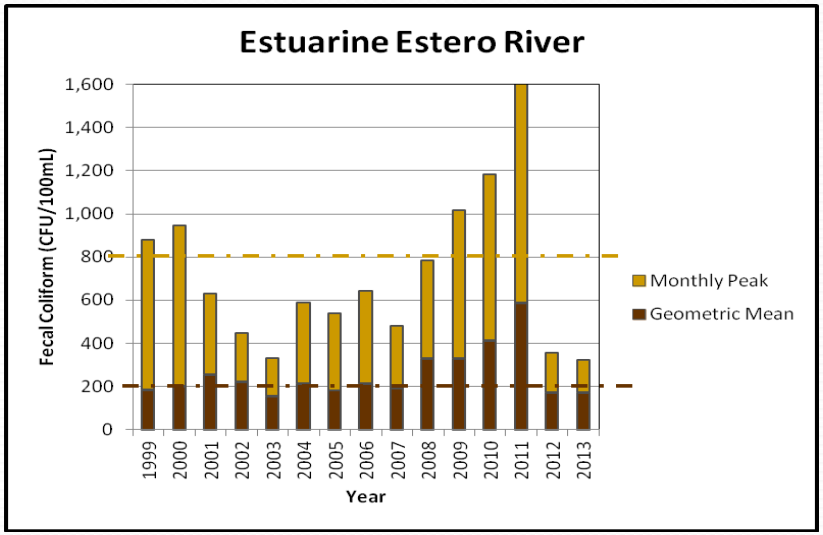
average	**14%**	**average**	-38%
minimum	**-6%**	**minimum**	-63%


Fecal Coliform
2- Not Impaired
3a- No Data
3b- Insufficient Data
3c- Planning List
4c- TMDL Complete
5- Impaired
Not Applicable
THE LAKES PARK
HENDRY CREEK
ESTERO BAY WETLAND
BOWDITCH PARK
HELL PECKNEY BAY
LYNN HALL PARK
ESTERO BAY GULF
ESTERO BAY
ESTERO RIVER
LOVERS KEY STATE PARK
SPRING CREEK
IMPERIAL RIVER
OAK CREEK
N
W
E
S
Source: Florida Department of Environmental Protection
Date: January 15, 2010
0 1 2 4 6 8 10
Miles

Fecal Coliform in Estuarine Systems

Between 2009 and 2013, average fecal Coliform increased in all estuarine segments but two:
Mullock Creek and Estero River. The average increase was negligible at 2%.
The peak monthly fecal Coliform also increased in all estuarine segments but two:
Estero River and Spring Creek. The average reduction was negligible at 3%.
The most common peak month was June (20%), however, all months except January were represented.





average	6%
peak	12%

average	-48%
peak	-68%

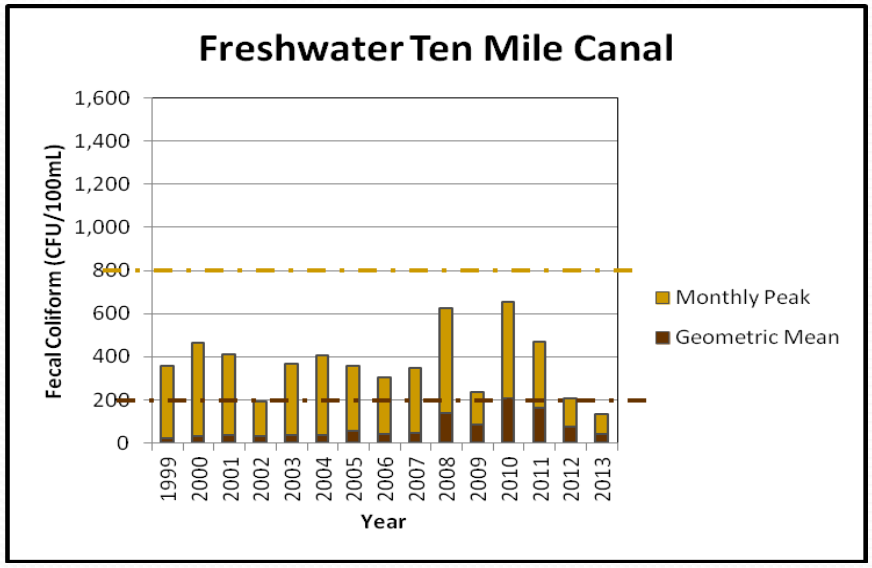
Fecal Coliform in Fresh Systems

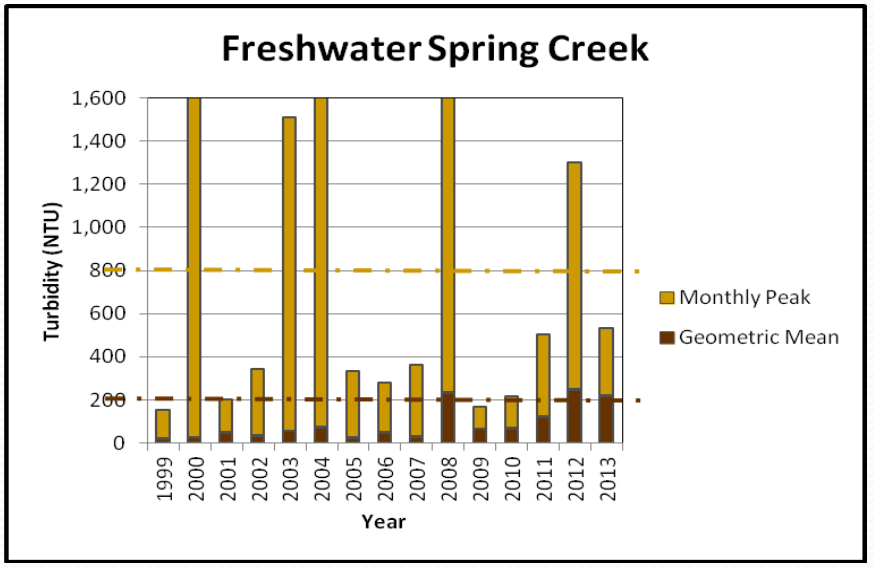
Between 2009 and 2013, average annual fecal Coliform decreased in all freshwater segments but two: Mullock Creek and Spring Creek. The average increase was 23%.

The peak monthly fecal Coliform increased in half of the freshwater segments, including Mullock Creek, Spring Creek and Imperial River. The average increase was 30%.

The most common peak month was August (20%), followed by July (17%).

All months except June were represented.



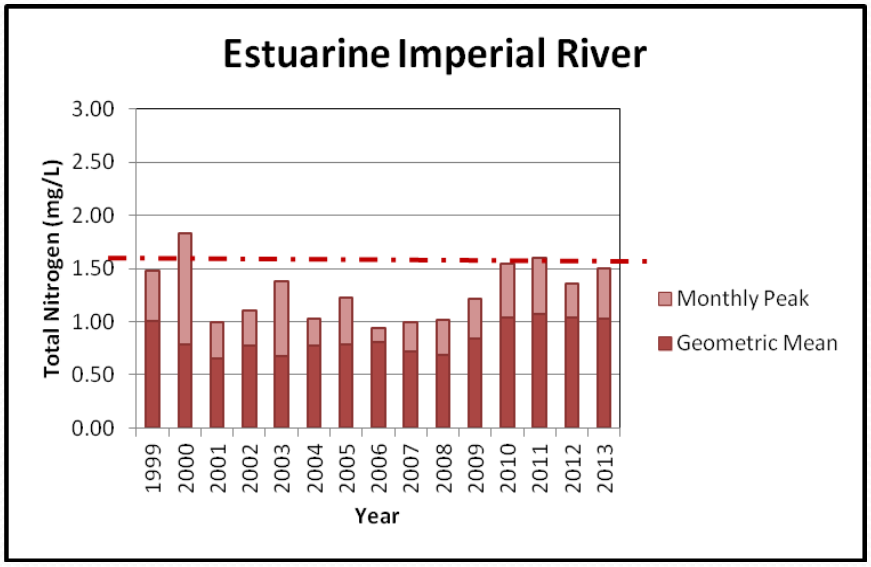


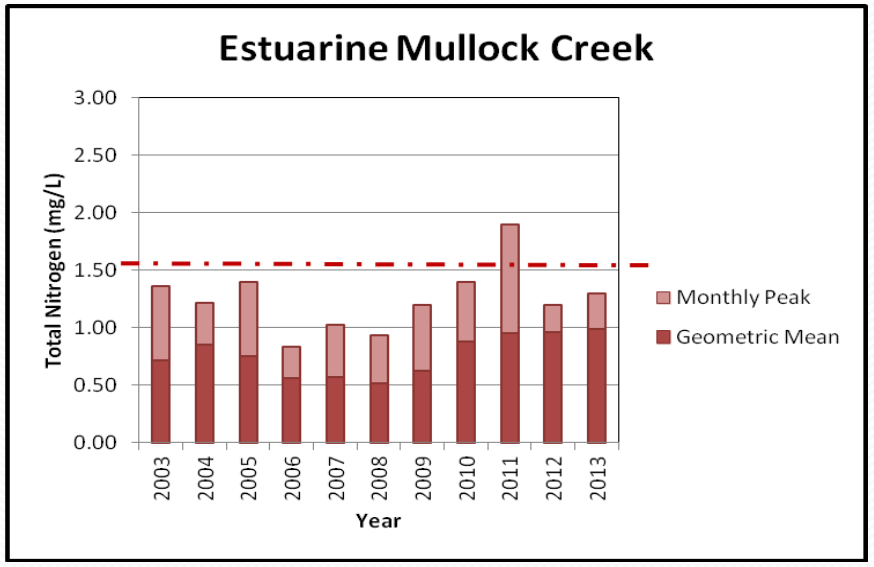
average	-51%
peak	-44%

average	**234%**
peak	**215%**

Total Nitrogen in Estuarine Systems

Between 2009 and 2013, average annual total nitrogen increased in all estuarine segments, however the geometric mean nitrogen standards were not exceeded. The average increase was 40%.
The peak monthly nitrogen increased in all estuarine segments, for an average of 23%.
The most common peak month was September (33%),
however, all months except March and April were represented.

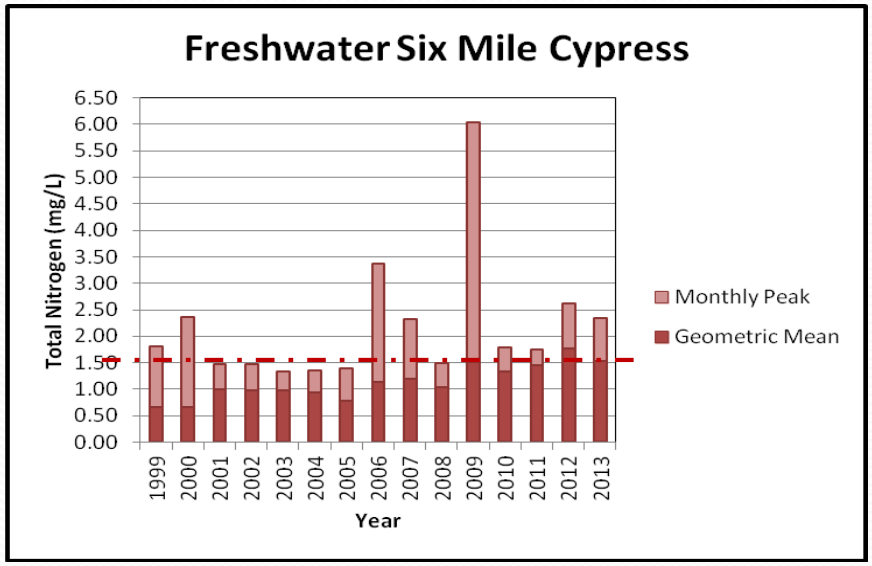




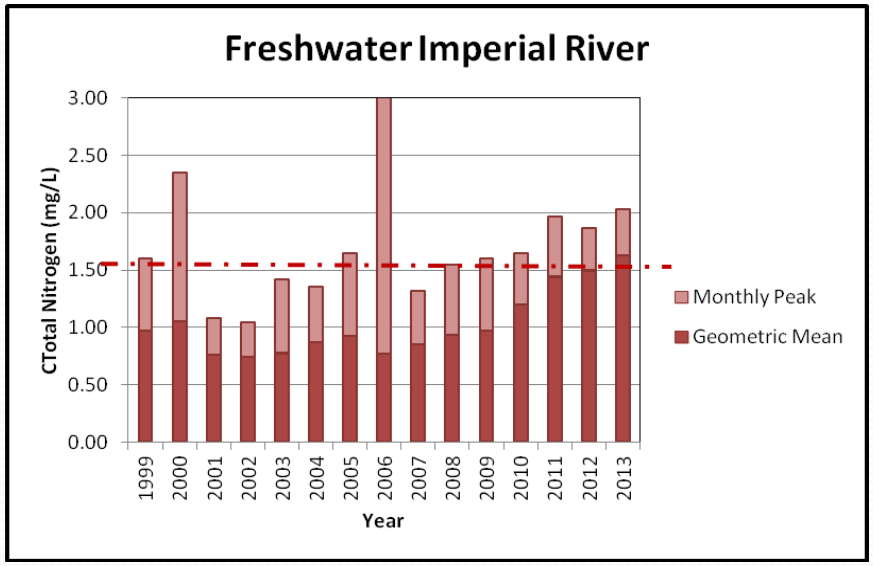
average	22%	average	58%
peak	24%	peak	8%

Total Nitrogen in Fresh Systems

Between 2009 and 2013, average annual total nitrogen increased in all freshwater segments.
The average increase was 30%. The peak monthly total nitrogen increased in all estuarine segments but two, for an average of 7% increase. Six-Mile Cypress reduced by 61%. Its increase was the least at 2%. Mullock Creek's peak reduced by 10%.
Only Six-Mile Cypress and Imperial River exceeded the geometric mean standard in one year. A decline is occurring between 2012 and 2013 but it will take more years to see if this is a trend.
The most common peak month was September (20%) and June (20%). All months except January, March and May were represented.



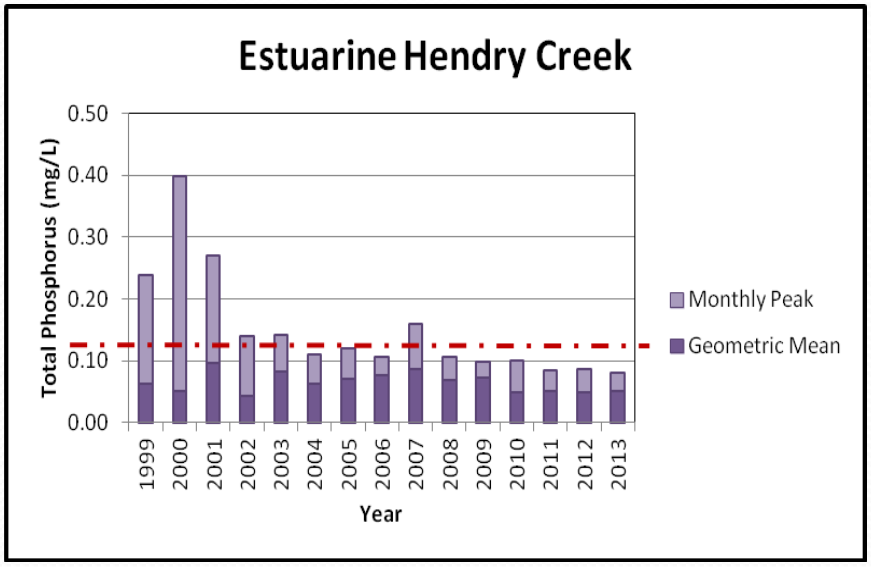
average	2%
peak	-61%

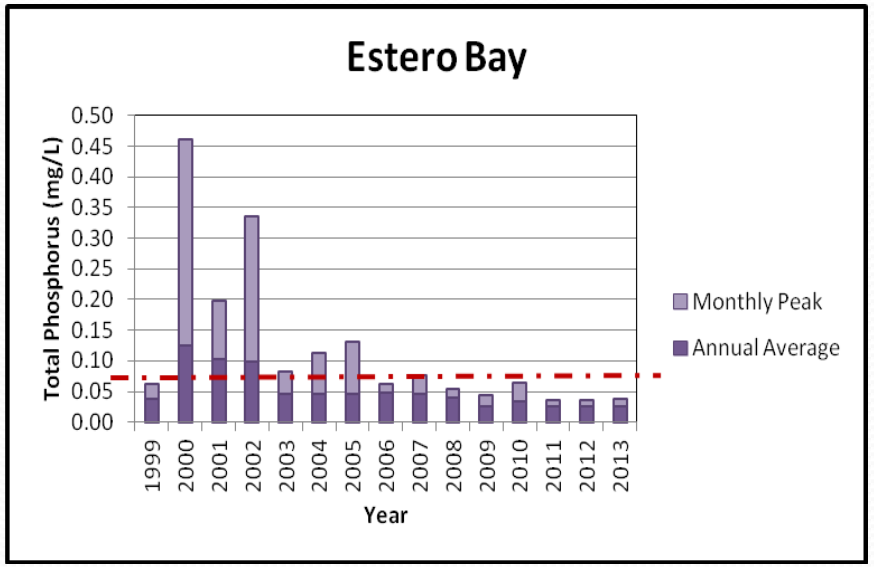


average	68%
peak	27%

Total Phosphorus in Estuarine Systems

Between 2009 and 2013, average annual total phosphorus dropped in all estuarine segments.
The average reduction was 14%.
The peak monthly total phosphorus dropped in all estuarine segments, for an average of 22% reduction.
The most common peak month was June (33%), followed by September (17%).
February, March, April and October were not represented.





average	-30%	average	-2%
peak	-19%	peak	-13%

Total Phosphorus in Fresh Systems

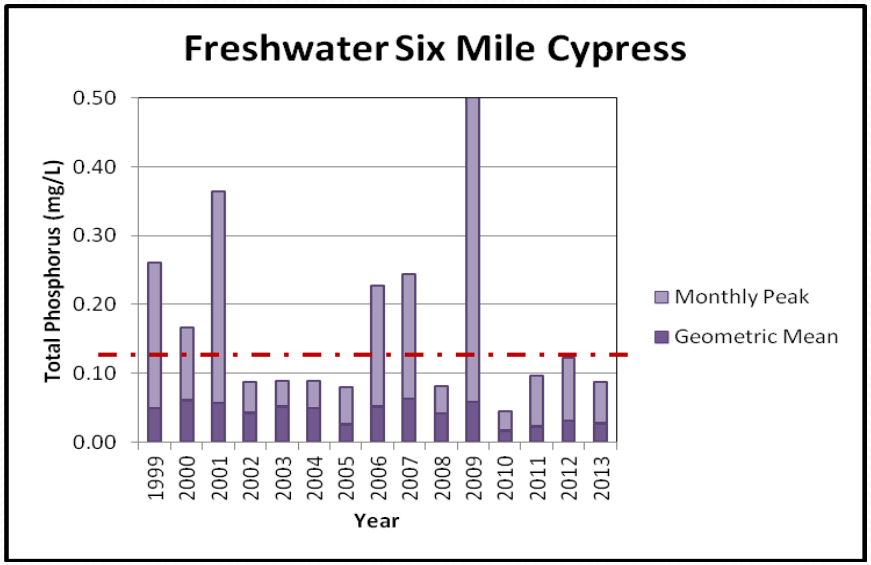
Between 2009 and 2013, average annual total phosphorus dropped in all freshwater segments except Hendry Creek.

In all tributaries the geometric mean standard was achieved after adoption of the fertilizer ordinances.

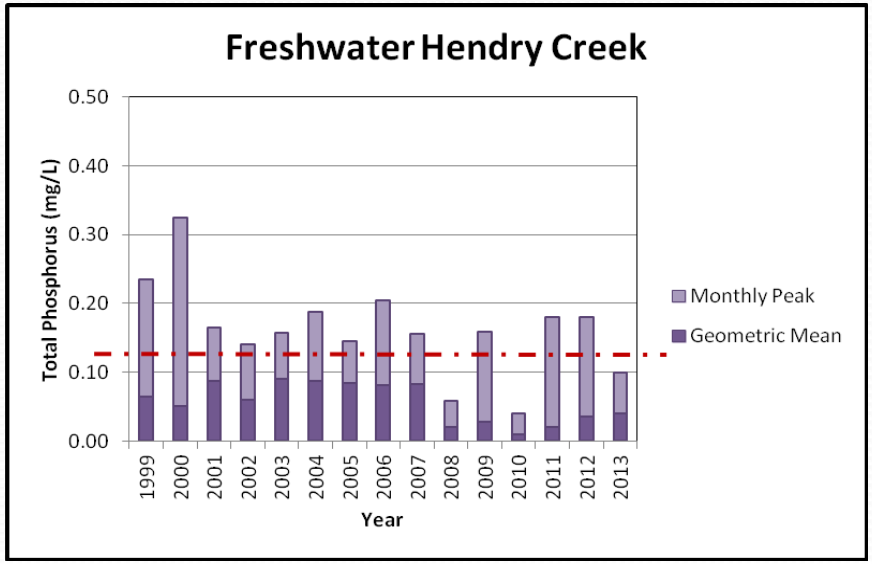
The average reduction was 13%.

The peak monthly total phosphorus dropped in all freshwater segments except Ten-Mile Canal and Imperial River, for an average of 12.5% reduction.

The most common peak month was May (23%), followed by June (20%). February and August were not represented.



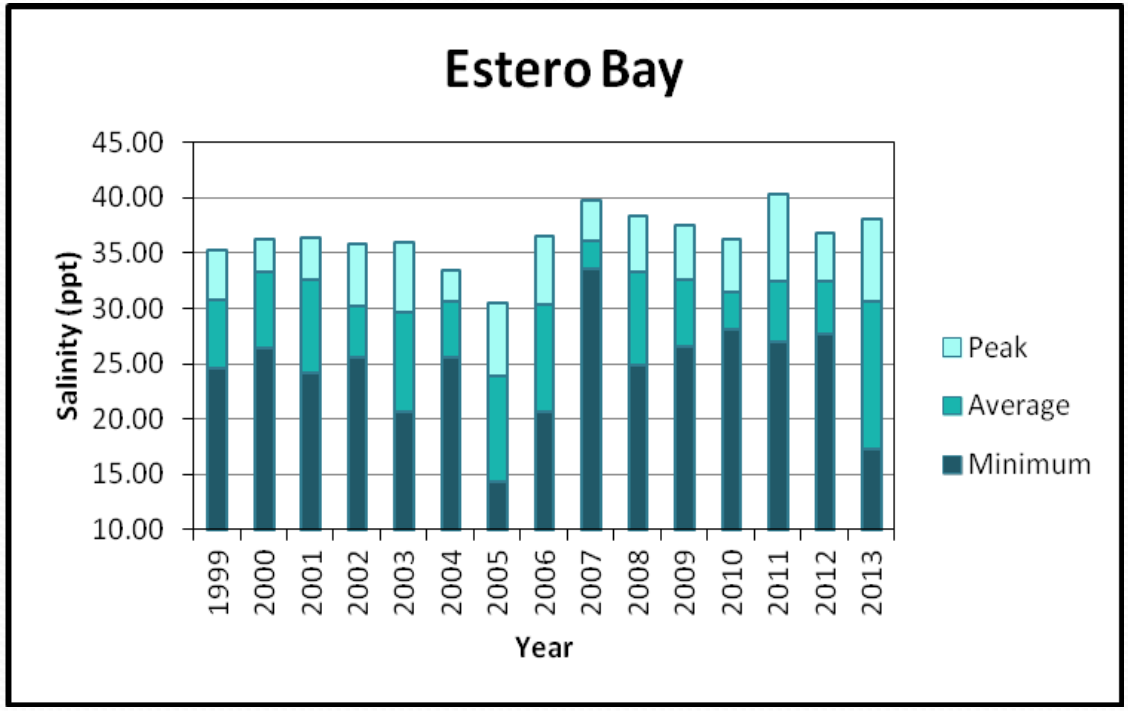
2009-2013 change	
average	-53%
peak	-84%



2009-2013 change	
average	41%
peak	-38%

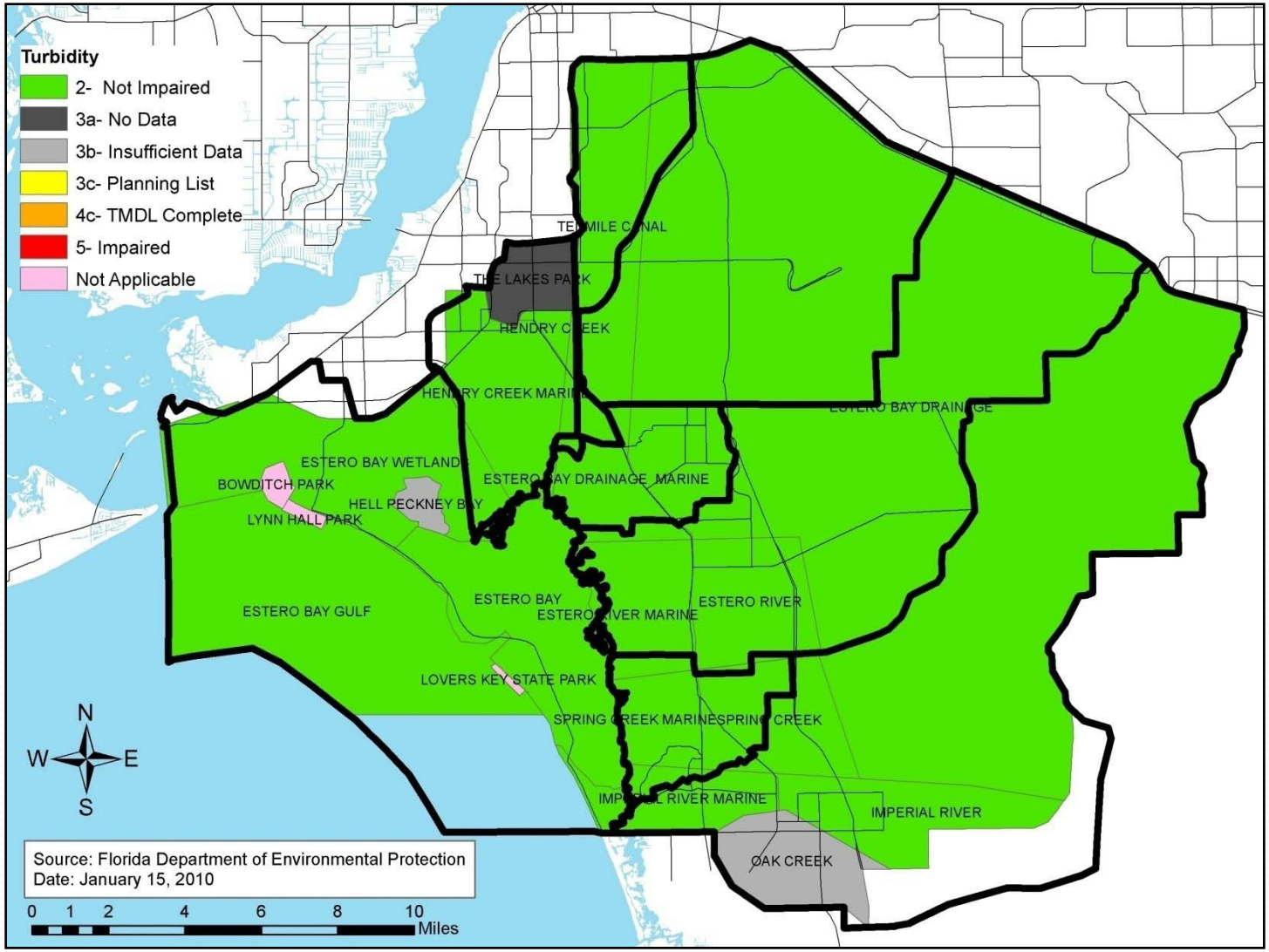
Salinity

In the period of record, 2005 had the lowest minimum and the lowest peak,
while 2007 had the highest minimum and the highest peak.
In the 2009 - 2013 period, the average salinity dropped by 5%, the peak increase by 1%
and the minimum was at its lowest since 2005, dropping 35% from 2009 values.



2009-2013 change	
average	-6%
peak	1%
minimum	-35%

Turbidity

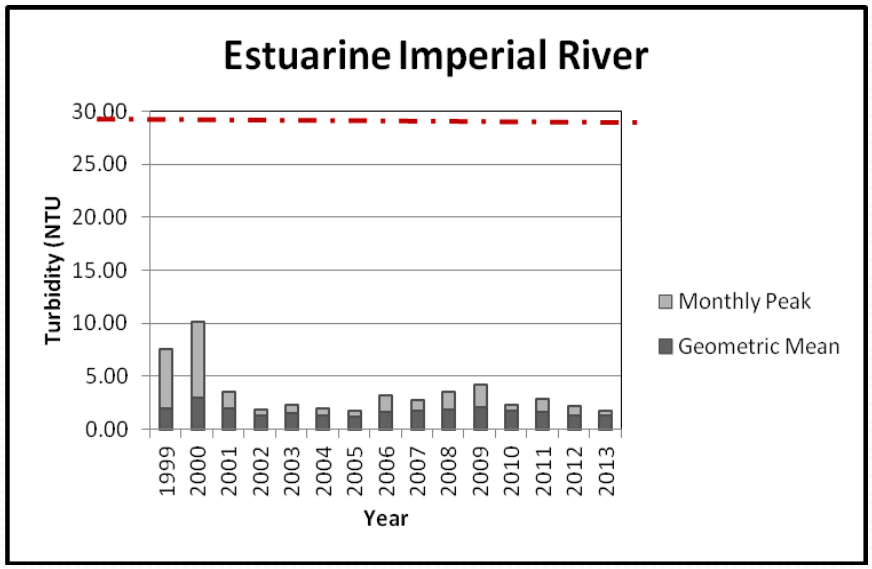

Turbidity
2- Not Impaired
3a- No Data
3b- Insufficient Data
3c- Planning List
4c- TMDL Complete
5- Impaired
Not Applicable
TEN MILE CANAL
THE LAKES PARK
HENDRY CREEK
HENDRY CREEK MARINE
ESTERO BAY DRAINAGE
ESTERO BAY WETLAND
BOWDITCH PARK
ESTERO BAY DRAINAGE MARINE
HELL PECKNEY BAY
LYNN HALL PARK
ESTERO BAY GULF
ESTERO BAY
ESTERO RIVER MARINE
ESTERO RIVER
LOVERS KEY STATE PARK
SPRING CREEK MARINE
SPRING CREEK
IMPERIAL RIVER MARINE
IMPERIAL RIVER
OAK CREEK
N
W
E
S
Source: Florida Department of Environmental Protection
Date: January 15, 2010
0 1 2 4 6 8 10
Miles

Turbidity in Estuarine Systems

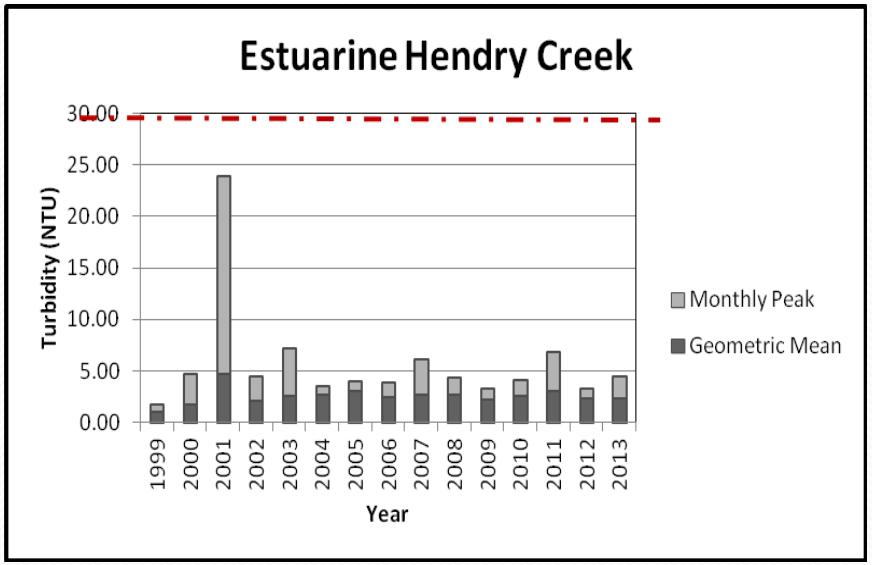
Between 2009 and 2013, average turbidity increased in the 3 most northern segments and decreased in the 3 most southern segments. The average reduction was 10%.

The peak monthly turbidity dropped in all estuarine segments but two, for an average of 8% reduction.

The most common peak months were February (17%) and June (17%), however, all month except December were represented.



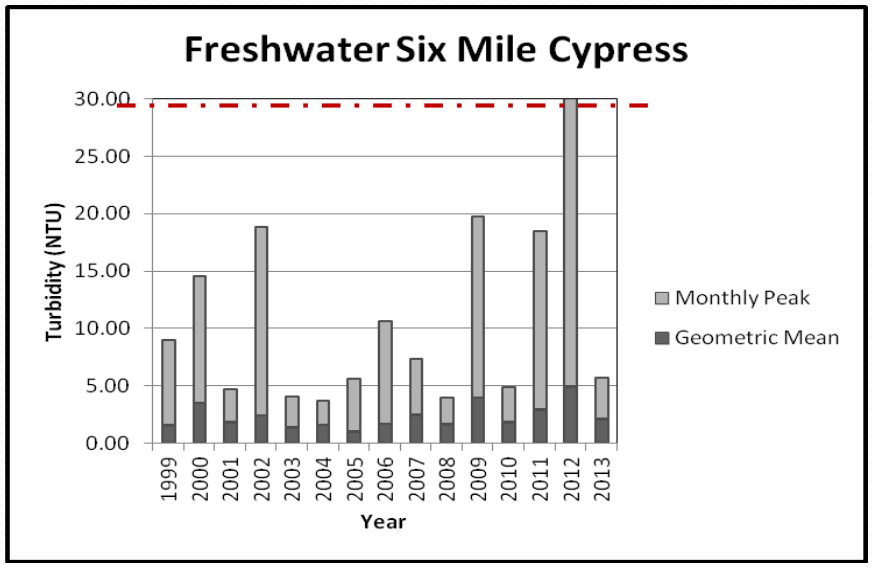
2009-2013 change	
average	-37%
peak	-57%



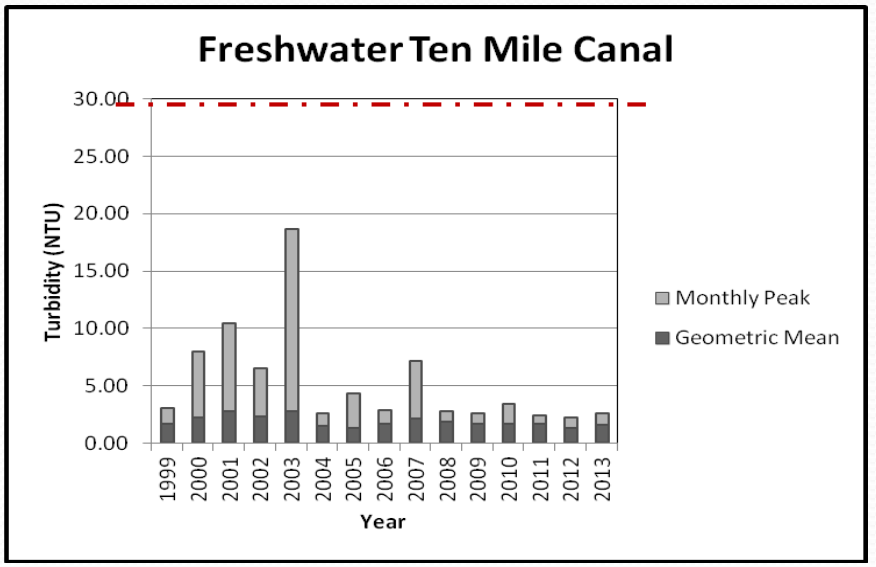
2009-2013 change	
average	10%
peak	-10%

Turbidity in Fresh Systems

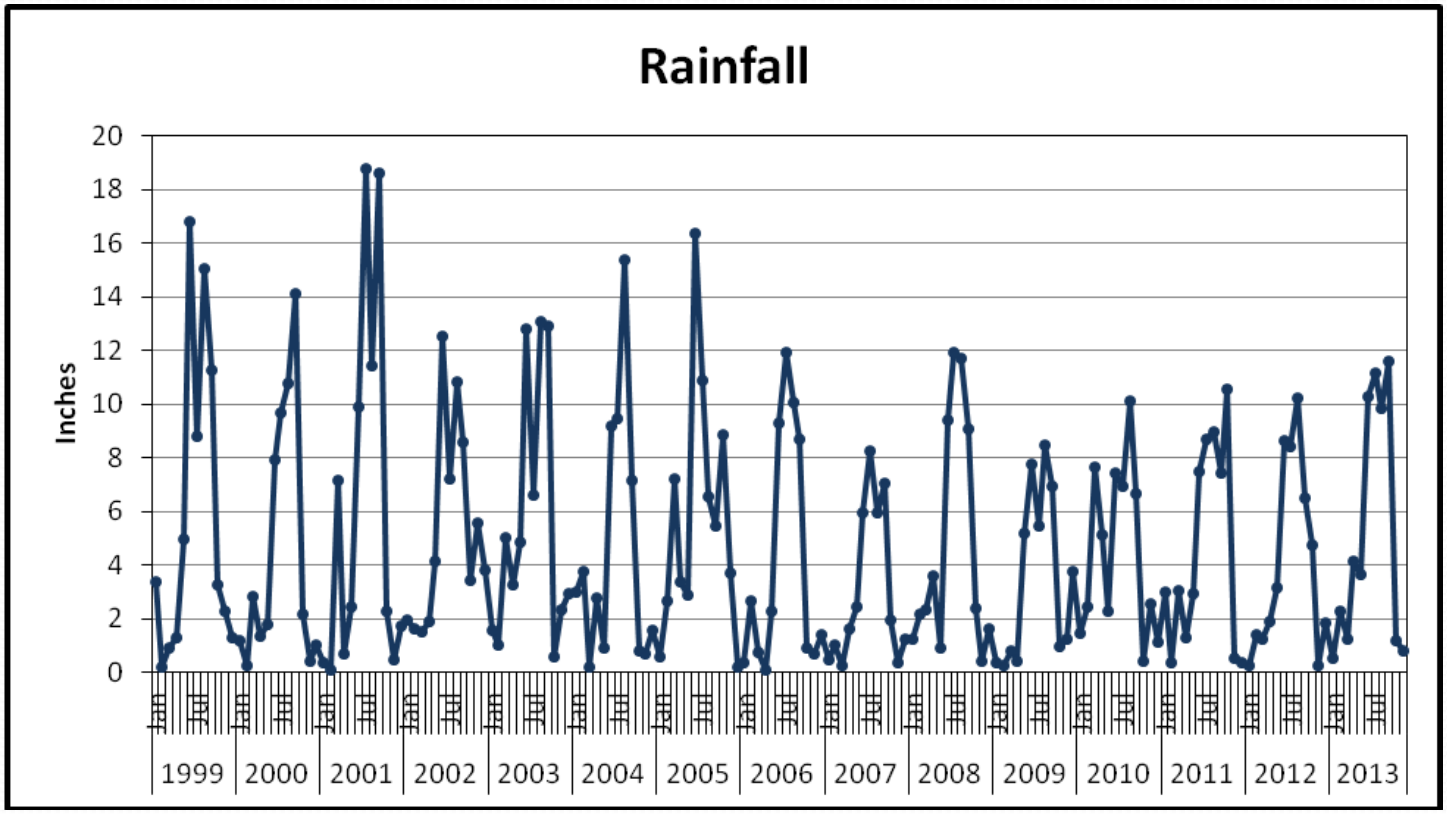
Between 2009 and 2013, average turbidity dropped in all freshwater segments.
The average reduction was 29%.
The peak monthly turbidity dropped in all estuarine segments but two, for an average of 30% reduction.
The most common peak month was June (23%), followed by July (17%) and January (17%).
All months except August, September and December were represented.

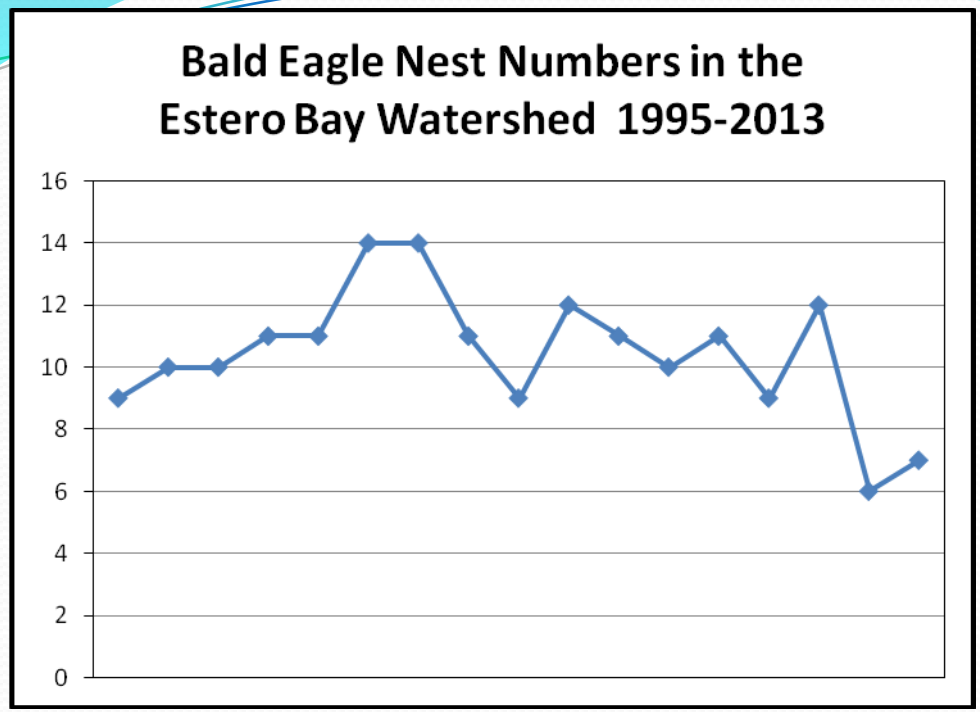


2009-2013 change	
average	-47%
peak	-71%



2009-2013 change	
average	-3%
peak	1%


Rainfall
Inches
20
18
16
14
12
10
8
6
4
2
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013



Year	Number of Nests	Success Rate
1995	9	5 (55%)
1996	10	6 (60%)
1997	10	4 (40%)
1998	11	7 (64 %)
1999	11	6 (55 %)
2000	14	?
2001	14	10(71%)
2002	11	2(18%)
2003	9	2(22%)
2004	12	6(50%)
2005	11	?
2006	10	7(70%)
2007	11	4(37%)
2008	9	6(67%)
2009	12	5(42%)
2012	6	?
2013	7	?

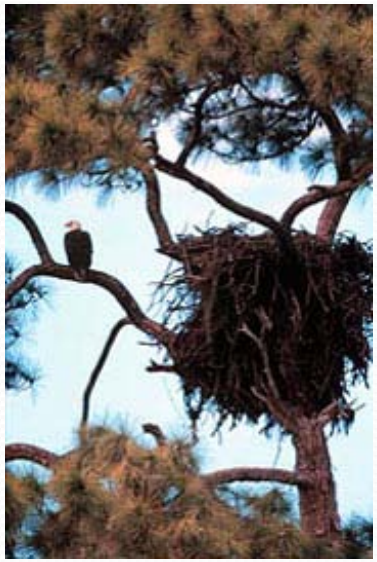
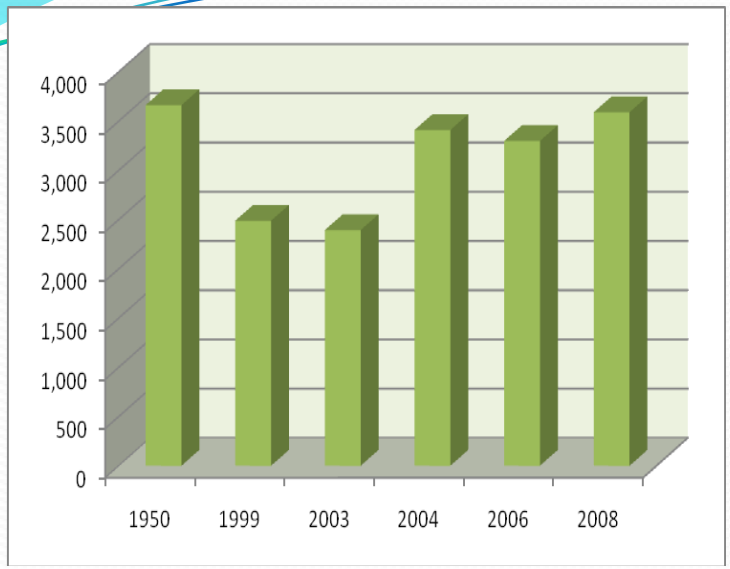


Table 1: Peak nest counts, by species, for surveys conducted in Estero Bay from 2009 to 2013.

Year	Months	DCCO	ANHI	BRPE	GBHE	GREG	SNEG	LBHE	TRHE	REEG	CAEG	BCNH	YCNH	GRHE	Total
2009	Feb - Aug	94	1	108	76	84	16	10	14	5	0	12	17	2	439
2010	Feb - Aug	58	0	77	115	63	26	10	22	7	0	26	19	5	428
2011	Jan - Aug	72	0	92	79	34	14	11	15	4	2	12	14	3	352
2012	Jan - Dec	66	0	88	55	69	33	15	26	11	2	7	17	5	394
2013	Jan - Dec	51	0	110	56	51	32	17	49	9	0	15	23	3	416

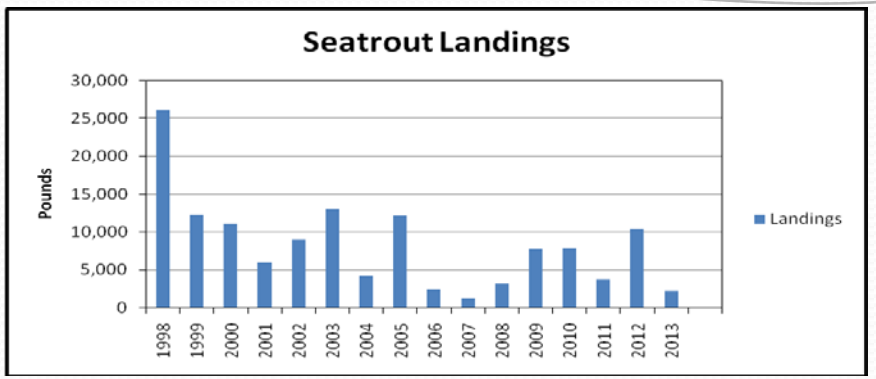
Seagrasses



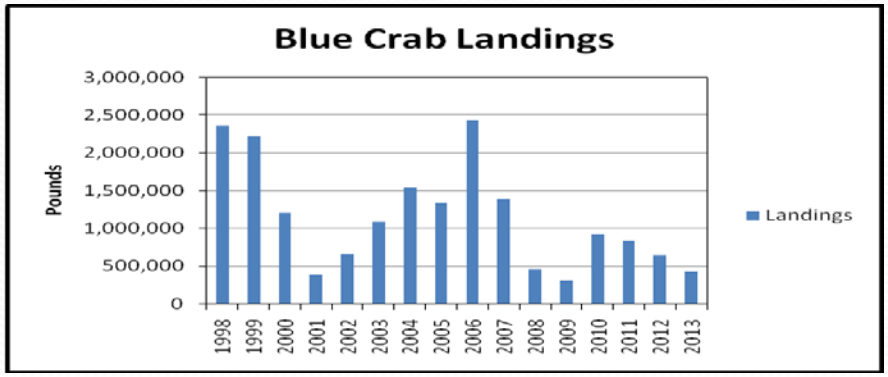
Seagrass Acreages in the Estero Bay Segments of the CHNEP						
Harbor Segment	**1950s**	**1999**	**2003**	**2004**	**2006**	**2008**
San Carlos Bay	3,118	3,709	4,338	5,192	5,376	6,469
Estero Bay	3,662	2,488	2,393	3,409	3,298	3,590
TOTAL	6,780	8,196	8,734	10,605	10,680	12,067

It is estimated that, in 1950, Estero Bay contained 3,769 acres of seagrasses.
While seagrass acreage declined between 1950 and 1999, significant gains have been made since then.
Persistence of seagrass has also been tracked. Persistence appears to be linked to water depth, with the most persistent areas being shallower and near-shore.
It is estimated that Estero Bay contains 107 acres of seagrasses that have been lost and are not restorable.
As of 2008, there were 3,590 acres of seagrasses of all species in Estero Bay and 6,469 acres in San Carlos Bay, which includes Matanzas Pass and the areas south of Bunche Beach, for a total of 12,067 acres.

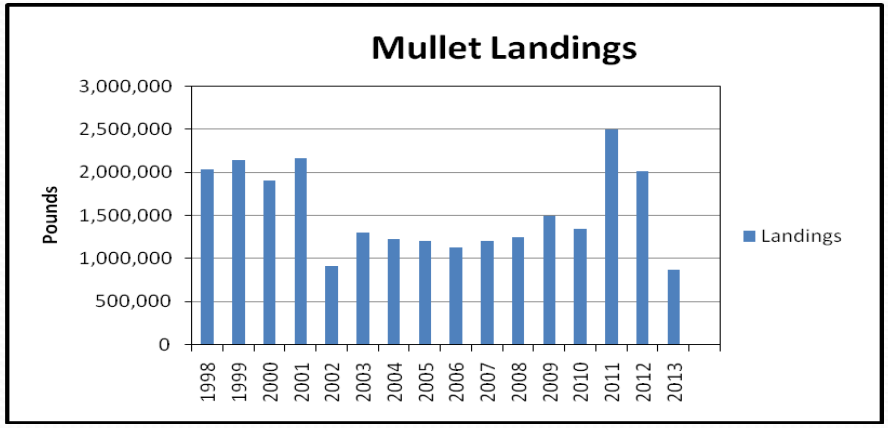
Commercial Fisheries Landings (Lee)



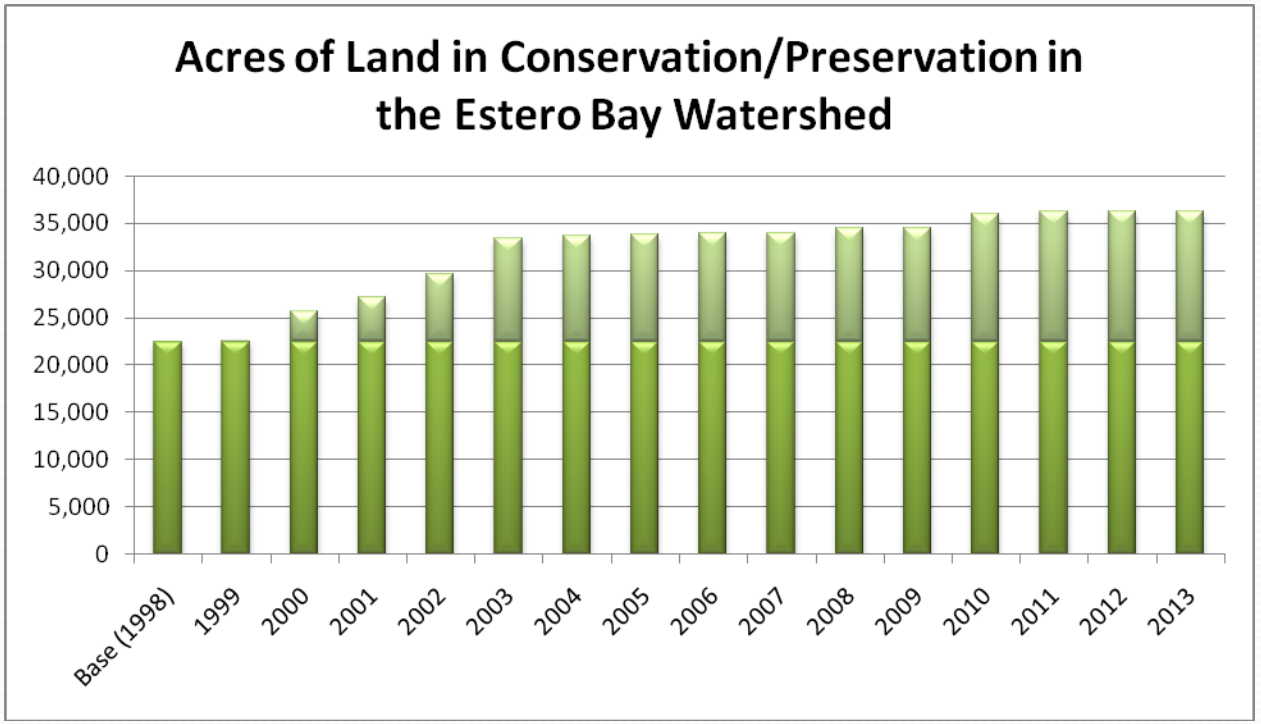
-91.31%



-81.86%

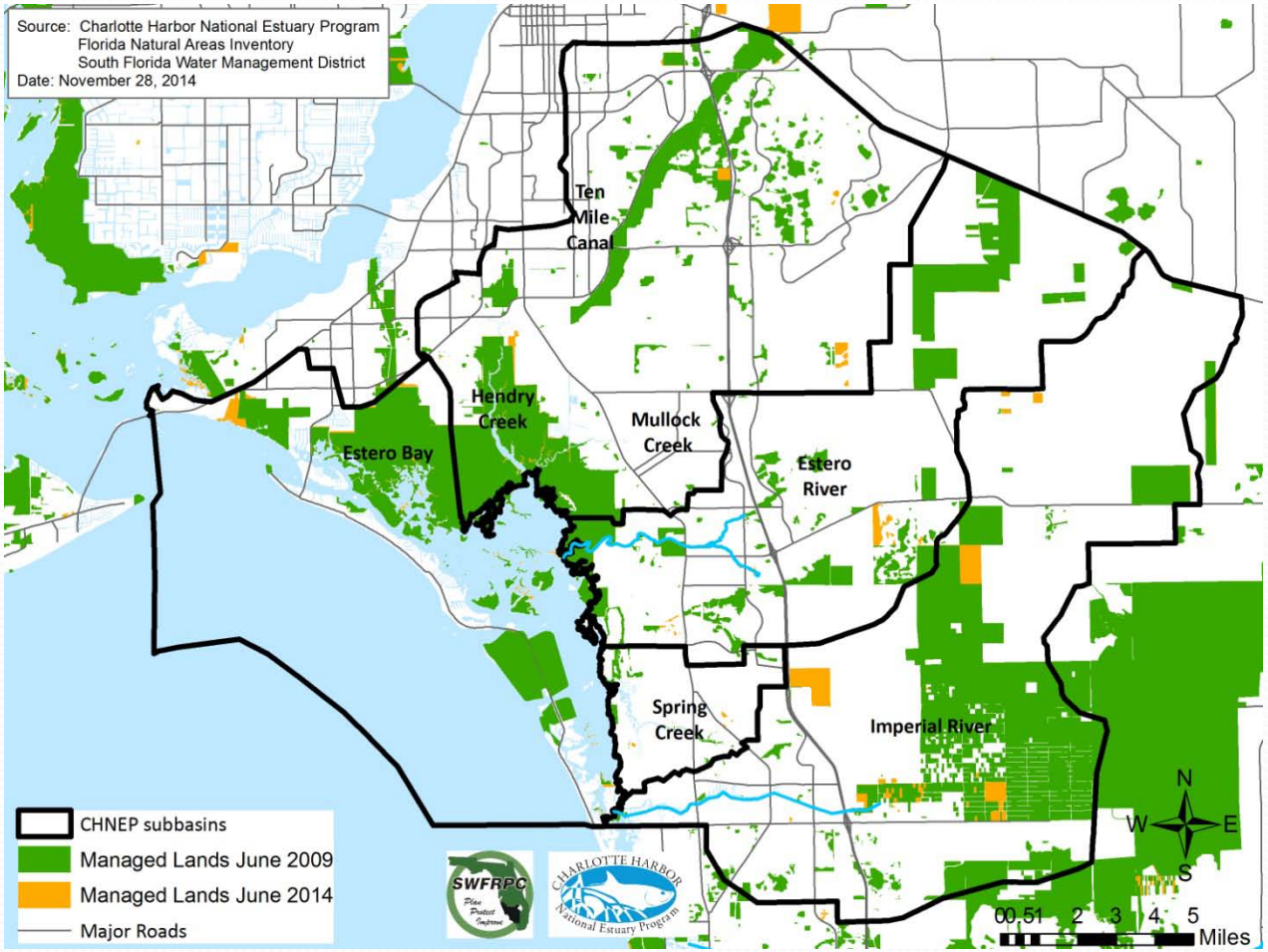


-57%



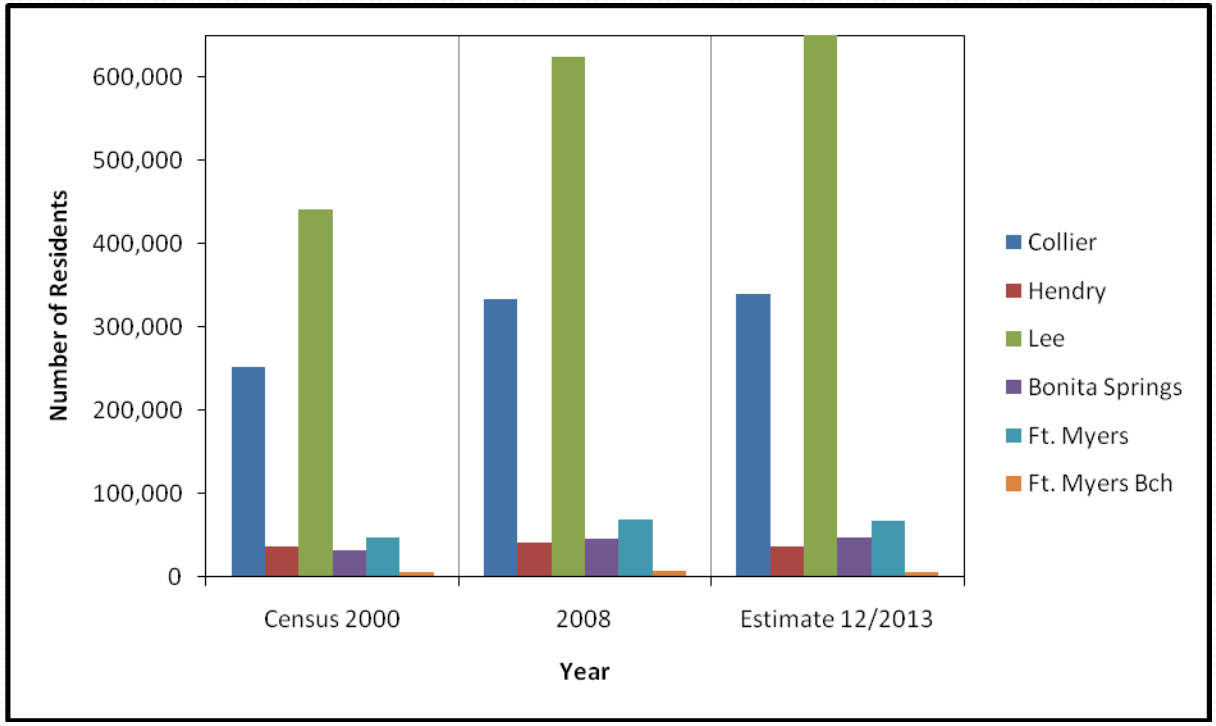
Year	Base (1998)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Acres	22,502	122	3,032	1,491	2,429	3,887	167	238	109	1,042	511

Year	2009	2010	2011	2012	2013
Acres	19	1,523	210	63	0

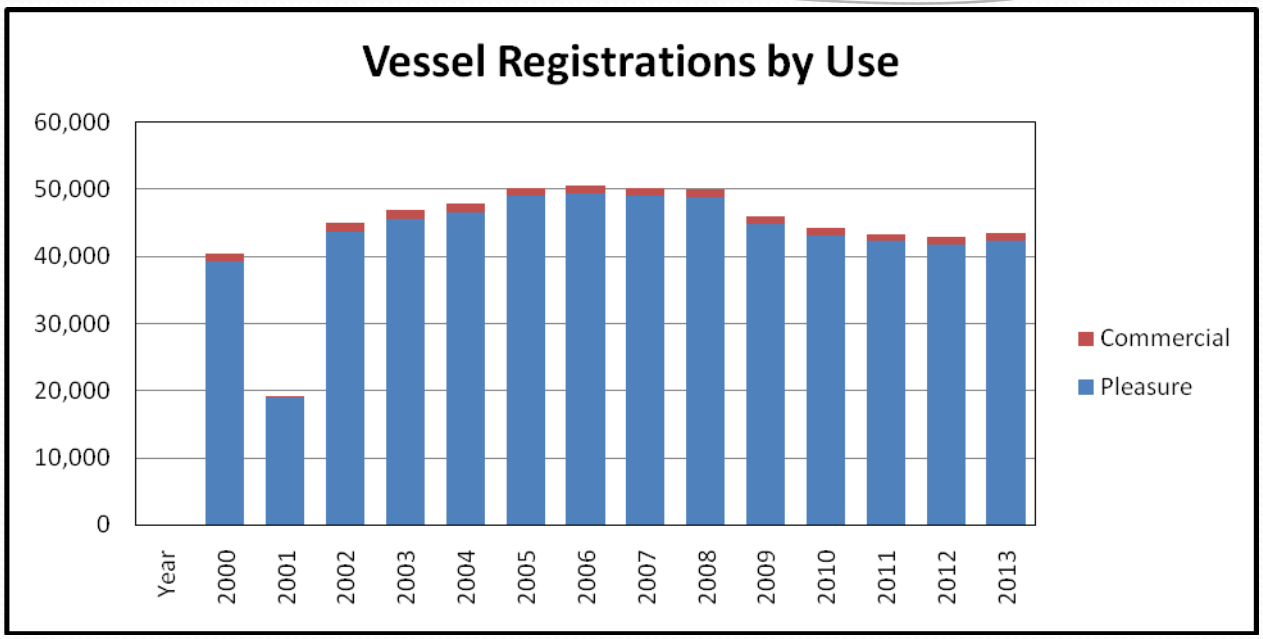


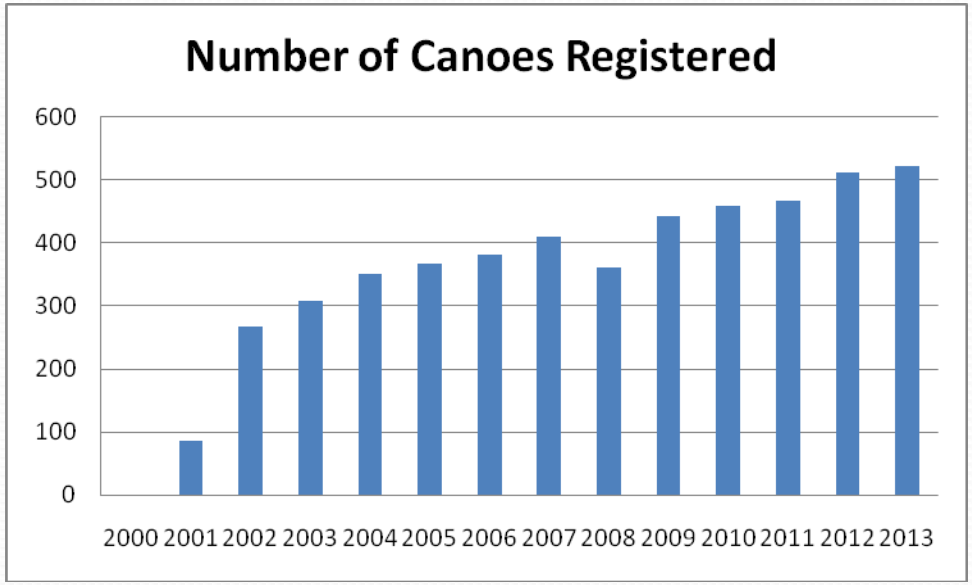
2014 Conservation Lands of the Estero Bay Watershed with Conservation Easements

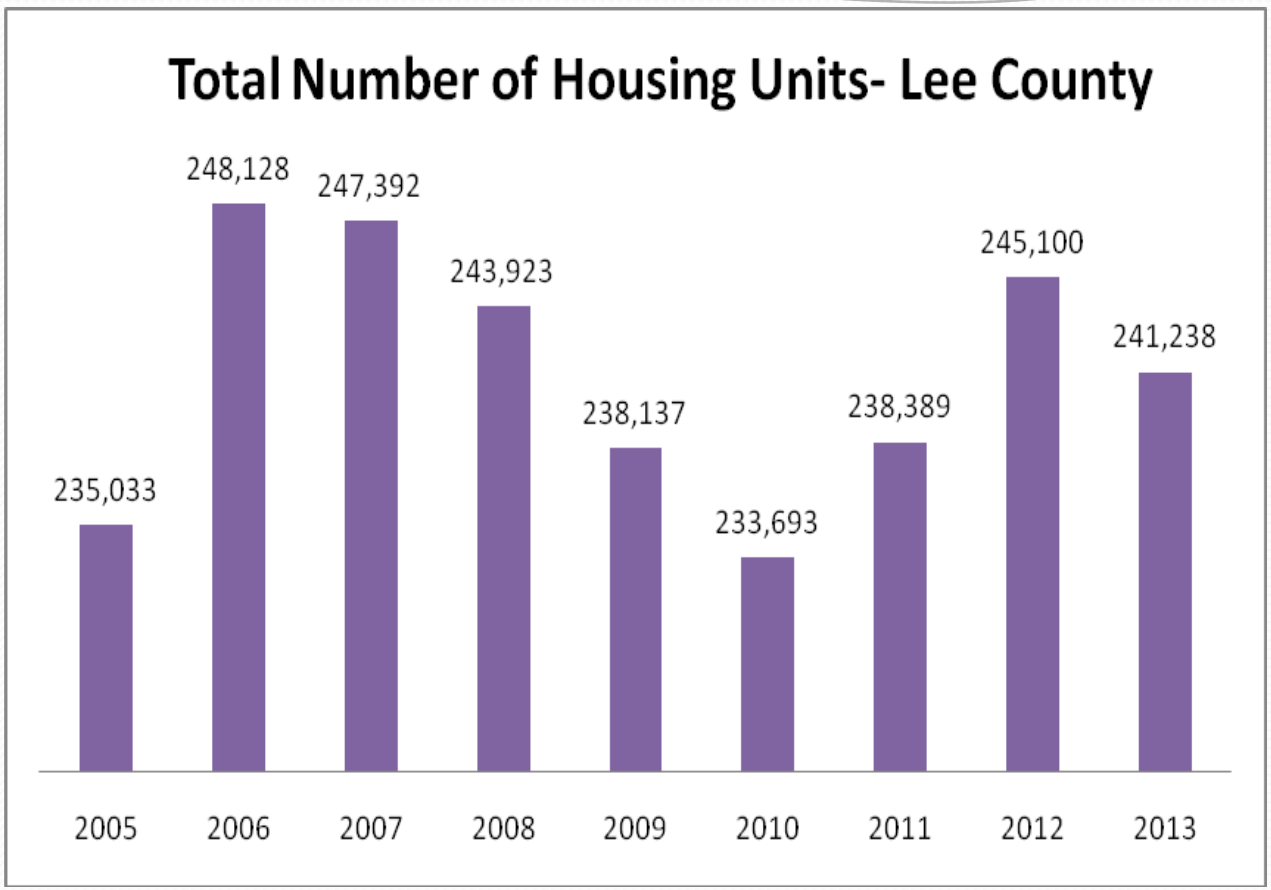
At the time of the 2000 Census, the Estero Bay Basin had nearly 145,000 people living within its boundaries. By 2010, the Estero Bay basin population had grown by a third to over 195,000.



Since the year 2000 the growth rates for each jurisdiction are:
Collier 35.11%, Hendry 3.38%, Lee County 49.95%, Bonita Springs 45.28%, Fort Myers 41.45%, and Fort Myers Beach 1.75%.

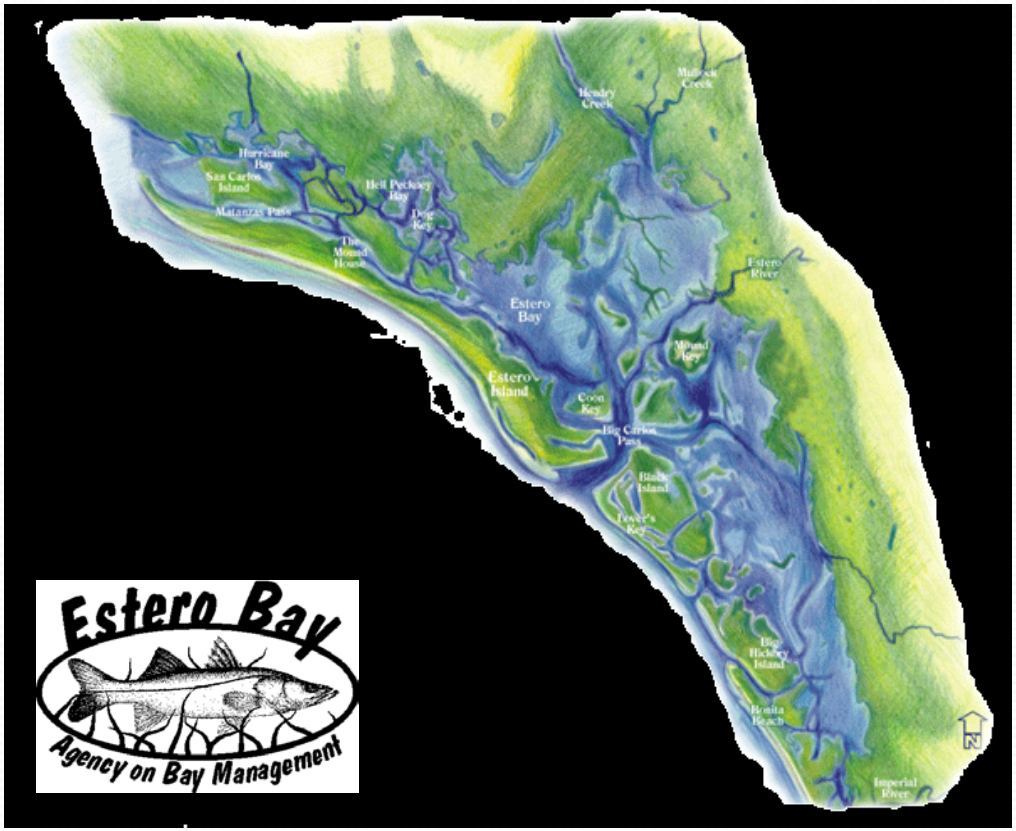

Vessel Registrations by Use
60,000
50,000
40,000
30,000
20,000
10,000
0
Year
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Commercial
Pleasure


Number of Canoes Registered
600
500
400
300
200
100
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013



Although the recent economic downturn has slowed the rate of growth in the watershed, it is important to note that, during the period of this study, 108,340 residential (single and multi units) building permits were issued, indicating a very high rate of growth and development across Lee County.

State of the Bay 2014



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Prepared by the Southwest Florida Regional Planning Council and the Charlotte Harbor National Estuary Program.

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Small Town Charm. Big Bright Future.

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Big Issues * Real Solutions

Charlotte Harbor National Estuary Program