



NATIONAL
ESTUARINE
RESEARCH
RESERVE
SYSTEM



NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

10 Years of System-Wide Monitoring Program (SWMP) in the Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR)

Water Quality & Weather Components

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Overview

- What is SWMP? Goal?
- GTMNERR SWMP Sites
- GTMNERR SWMP Data



What is System-Wide Monitoring Program (SWMP)?

- Long-term standardized monitoring program
- Established by NOAA conducted by each NERR
- Three monitoring components:
 - Abiotic indicators of water quality and weather
 - Biological monitoring
 - Watershed, habitat, and land use mapping



SWMP Goal

- Establish a system-wide monitoring program that measures short-term variability and long-term change in estuaries
- Provide researchers, resource managers, educators, and other coastal decision makers with information on Reserve conditions
- Gain a better understanding of how human activities and natural events can change coastal ecosystems



SWMP Abiotic – Water

- YSI 6600 EDS Datasondes
- Parameters Monitored
 - Temperature
 - Salinity
 - Dissolved Oxygen
 - pH
 - Depth
 - Turbidity
- Nutrients
 - Collected monthly
 - Nitrogen
 - Phosphorus
 - Chlorophyll a
 - Various other analytes



GTMNERR SWMP Water Quality

- 4 permanent water quality monitoring stations
 - 15 minute intervals
 - 365 days a year



GTMNERR SWMP Water Quality

Site: Pine Island

- Tolomato River
- Low Impact
- Northern most site within the Reserve



GTMNERR SWMP Water Quality

Site: San Sebastian

- Confluence of San Sebastian River and Matanzas River
- High Impact
- Located near St. Augustine Inlet
- Channel Marker 1



GTMNERR SWMP Water Quality

Site: Fort Matanzas

- Matanzas River
- Medium Impact
- Channel Marker 75
- Located near Matanzas Inlet



GTMNERR SWMP Water Quality

Site: Pellicer Creek

- Pellicer Creek
- Low Impact
- Faver-Dykes State Park
- Real-time data (Satellite Telemetry)

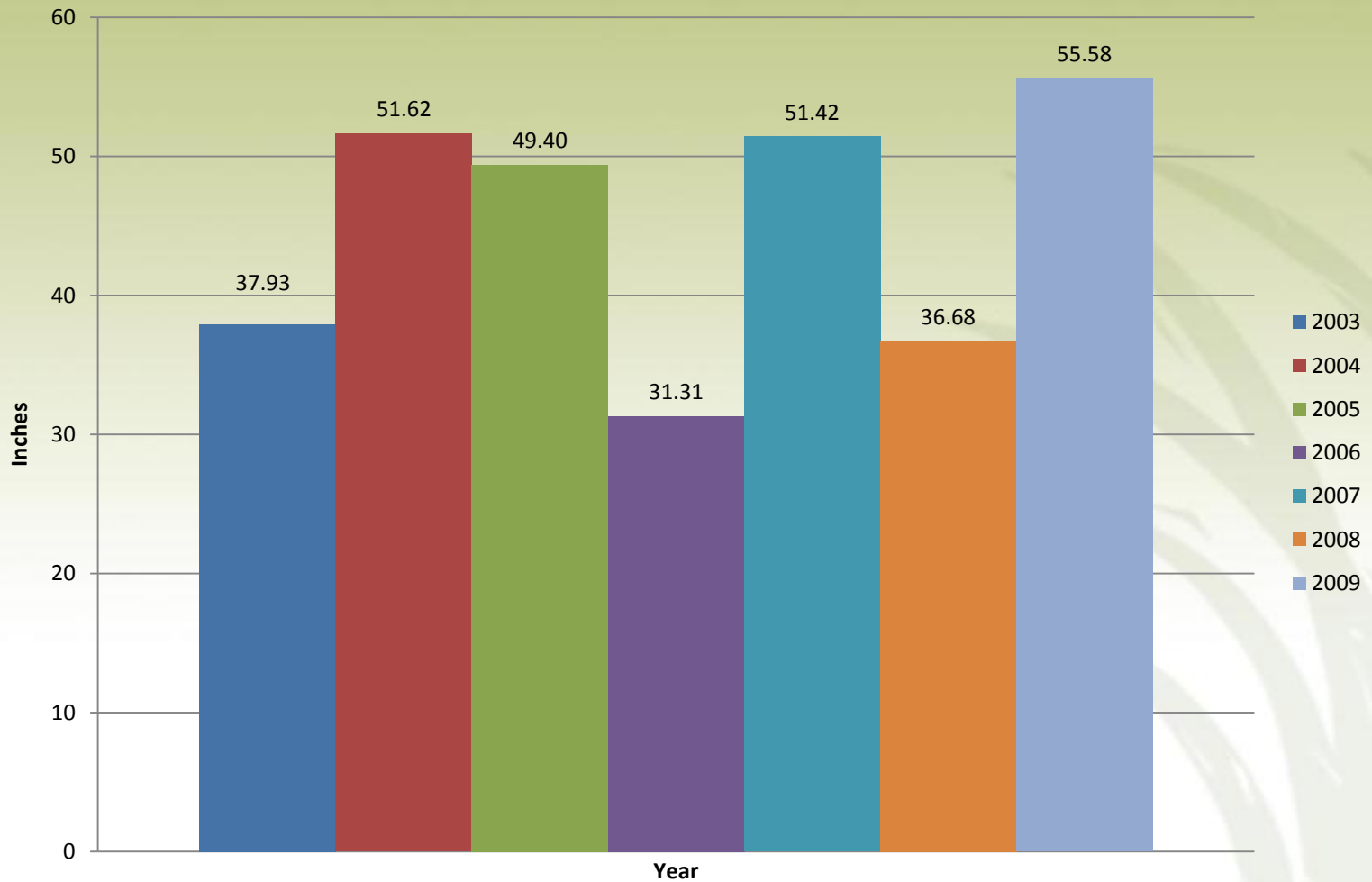


SWMP Abiotic– Weather Station

- 1 permanent weather station
 - 15 minute intervals
 - 365 days a year
- Weather Parameters
 - Temperature
 - Wind Speed & Direction
 - Relative Humidity
 - Barometric Pressure
 - Rainfall
 - Photosynthetic Active Radiation (PAR)
 - Photosynthetic wavelengths used by plants
- Real-time data (Satellite Telemetry)
- Princess Place Preserve (Pellicer Creek)



GTMNERR Weather Station: Annual Rainfall Total



[Almost] 10 years of SWMP Data

- Water Quality
 - Physical Monitoring
 - Pine Island & Fort Matanzas – 2001
 - San Sebastian & Pellicer Creek – 2002
 - Nutrient Monitoring – Mid 2002
- Weather Station – Late 2002



[Almost] 10 years of SWMP Data

- Data collected provides a strong baseline
 - A great point of reference for additional monitoring and/or research projects within the Reserve
- Data is like an accordion
 - It can be very broad or extremely detailed depending on what you are looking for
 - Short-term variability and long-term change



Short-term Variability

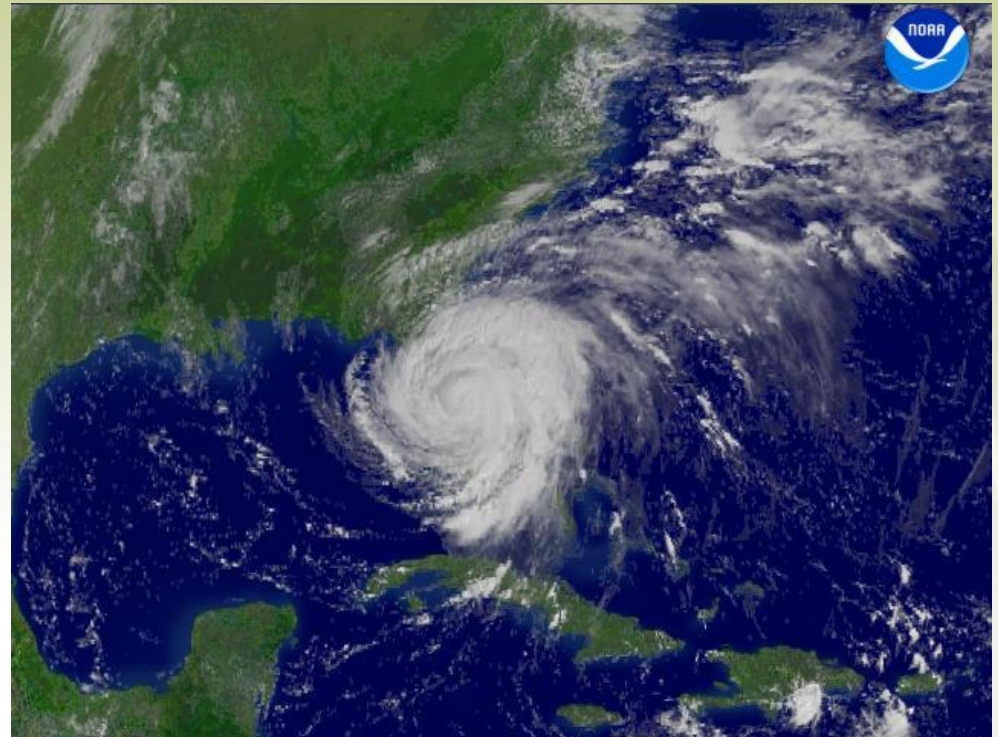
- 2004 Hurricanes: Frances, Jeanne, Charley
- 2008 Tropical Storm Fay
- 2009 No Name Low Pressure System



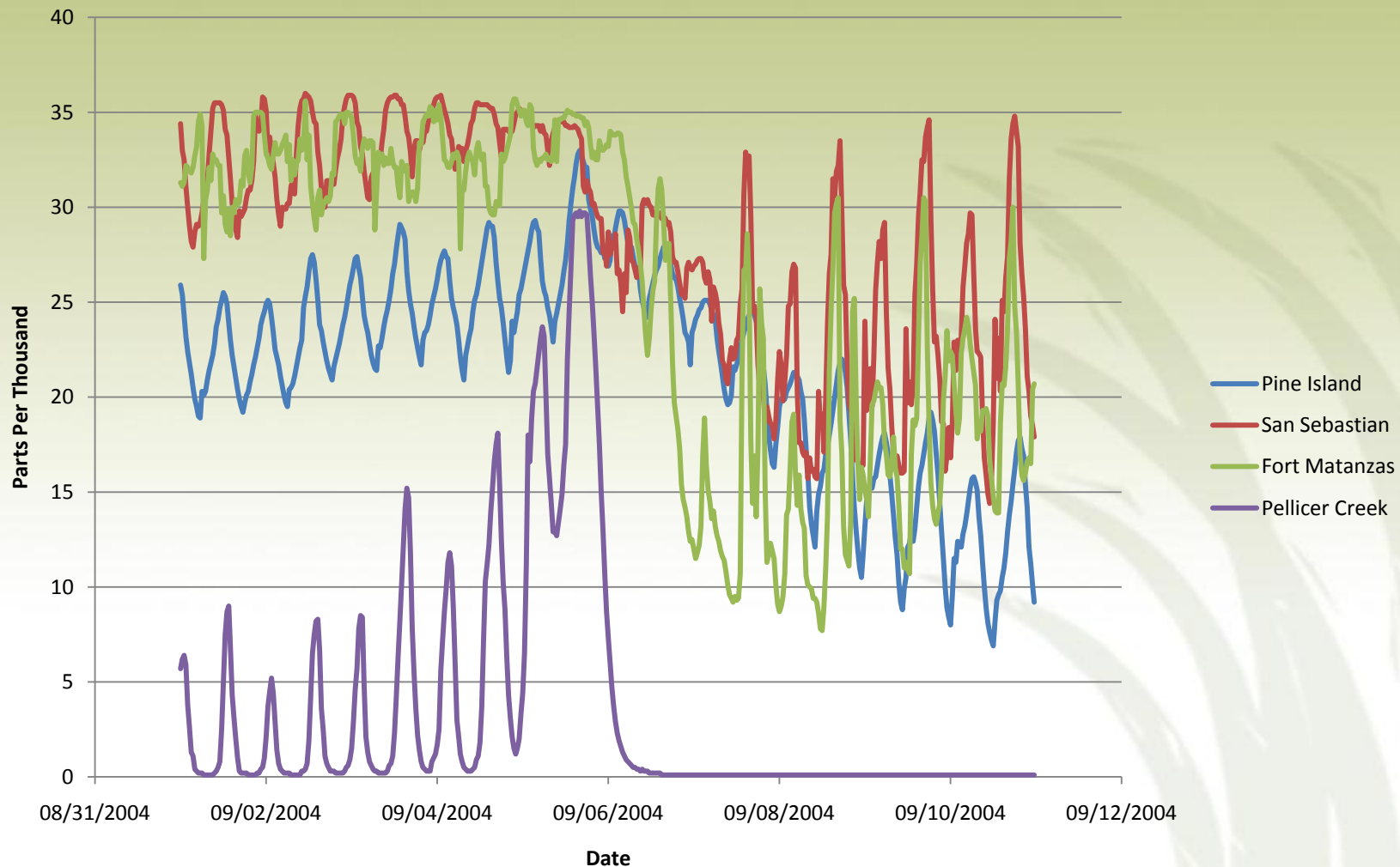
Short-term Variability

- Hurricane Frances
 - Aug. 25 – Sept. 10, 2004

| Date | Rainfall (mm) |
|----------|--------------------|
| 9/4/2004 | 5.080 |
| 9/5/2004 | 1.270 |
| 9/6/2004 | 173.230 |
| 9/7/2004 | 23.368 |
| 9/8/2004 | 3.556 |
| Total | 206.504 mm |
| | 8.13 inches |



Hurricane Frances Salinity September 2004



Short-term Variability

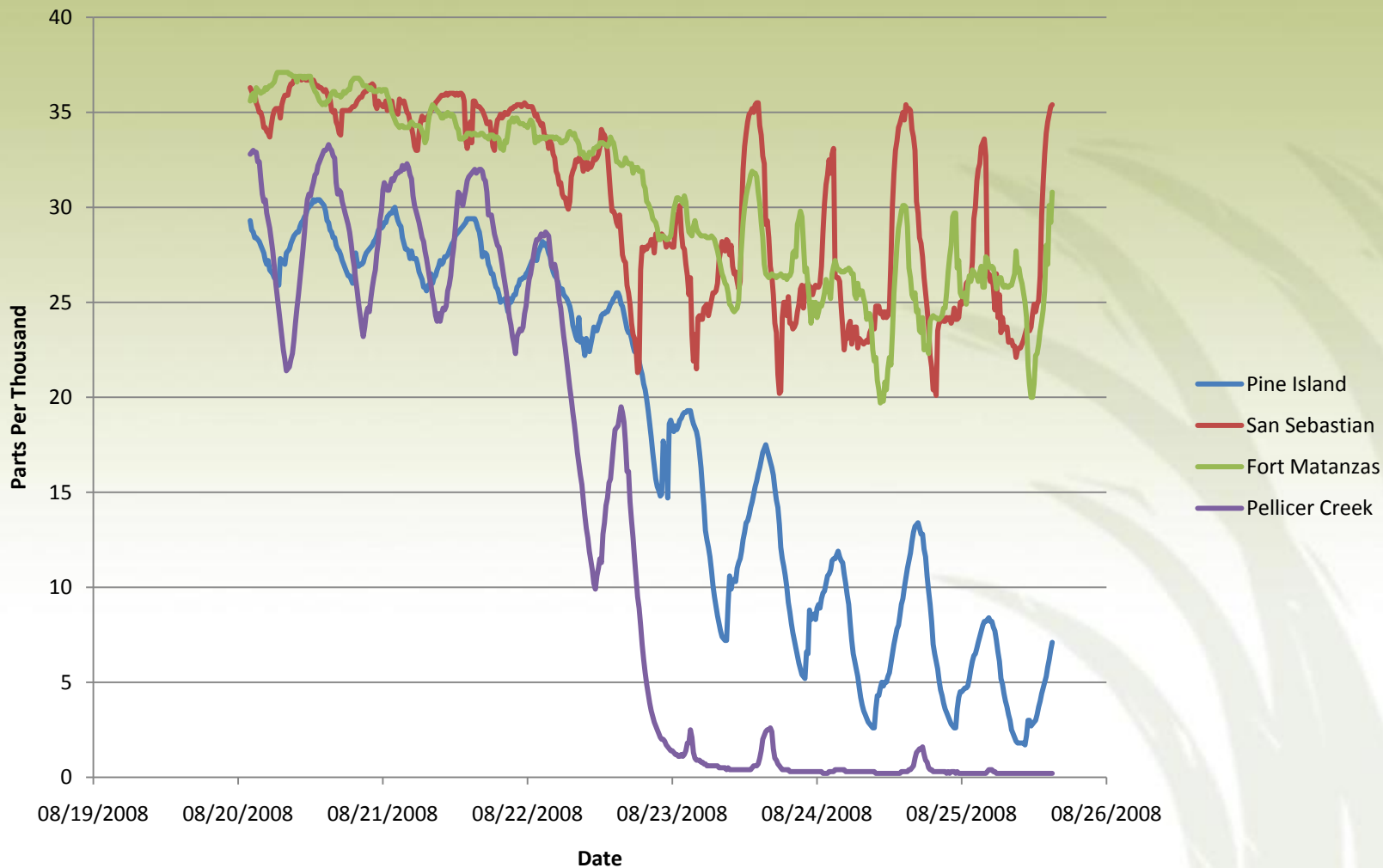
■ Tropical Storm Fay

- August 15 – 28, 2008

| Date | Rainfall (mm) |
|----------------|--------------------|
| 8/20/2008 | 44.450 |
| 8/21/2008 | 33.782 |
| 8/22/2008 | 99.314 |
| 8/23/2008 | 4.826 |
| 8/24/2008 | 10.414 |
| 8/25/2008 | 5.588 |
| Total Rainfall | 198.374 mm |
| | 7.81 inches |



Tropical Storm Fay Salinity



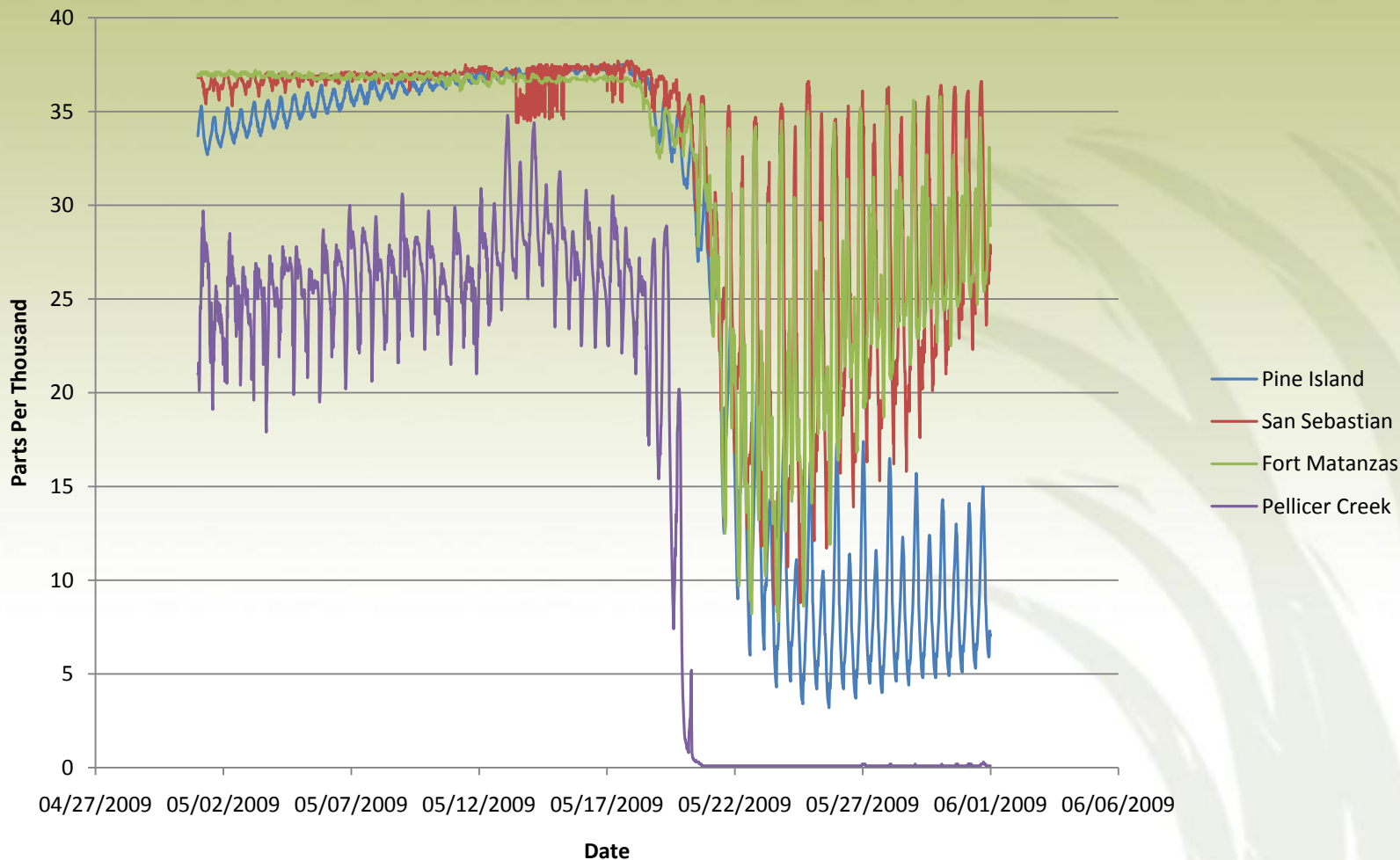
Short-term Variability

- No Name Low Pressure System
 - May 2009
 - Slow moving
 - A lot of Rain

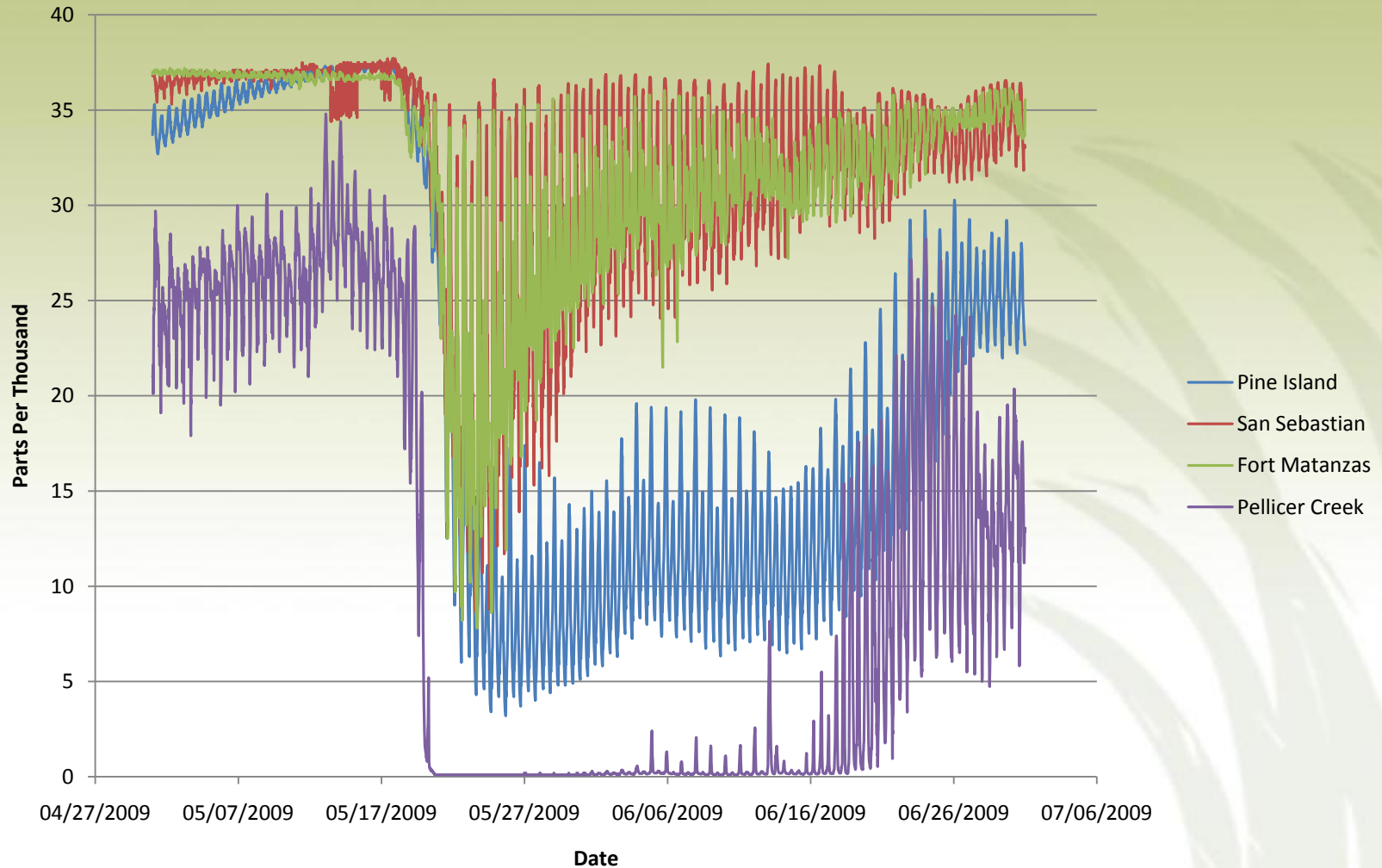
| Date | Rainfall (mm) |
|----------------|---------------------|
| 5/17/2009 | 24.384 |
| 5/18/2009 | 110.744 |
| 5/19/2009 | 60.198 |
| 5/20/2009 | 120.650 |
| 5/21/2009 | 63.754 |
| 5/22/2009 | 19.558 |
| 5/23/2009 | 13.716 |
| Total Rainfall | 434.594 mm |
| | 17.11 inches |



Low Pressure System Salinity May 2009



May-June 2009 Salinity

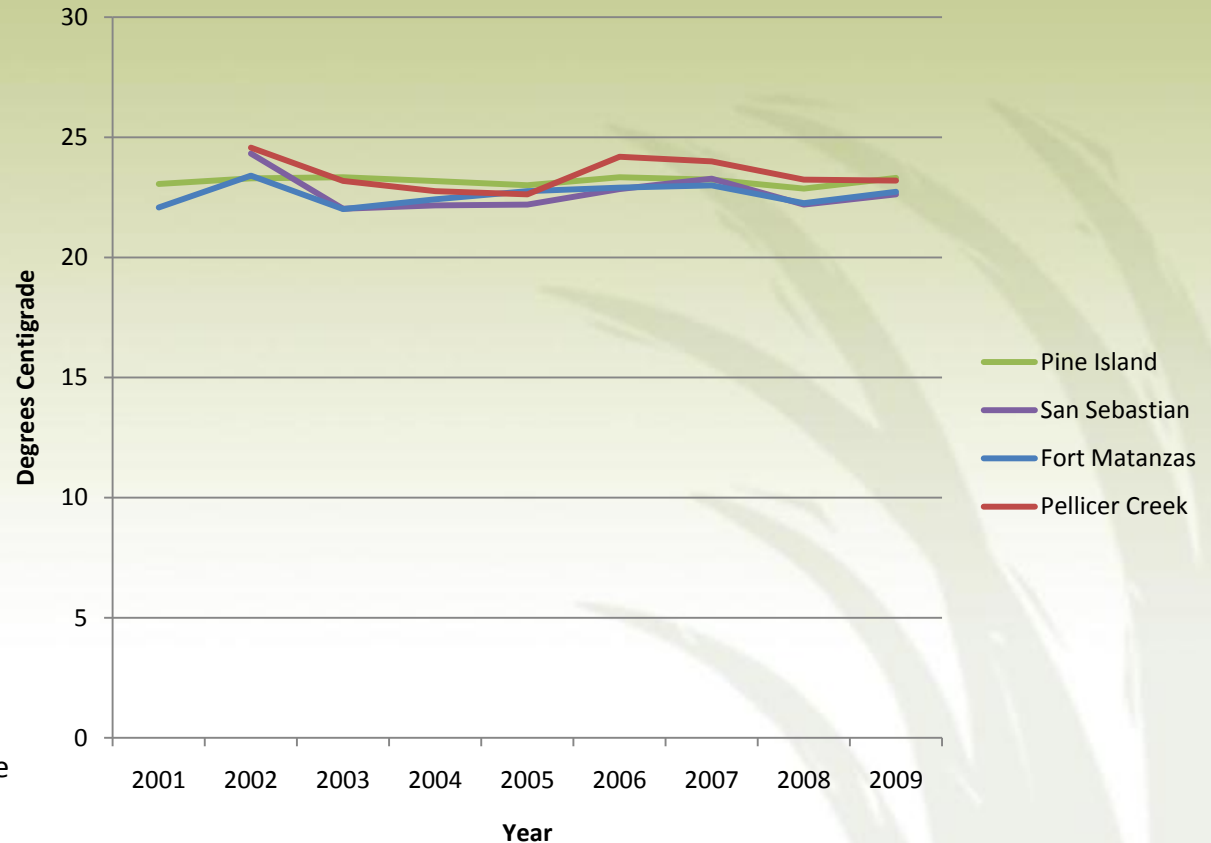


Lifetime* Average Temperature

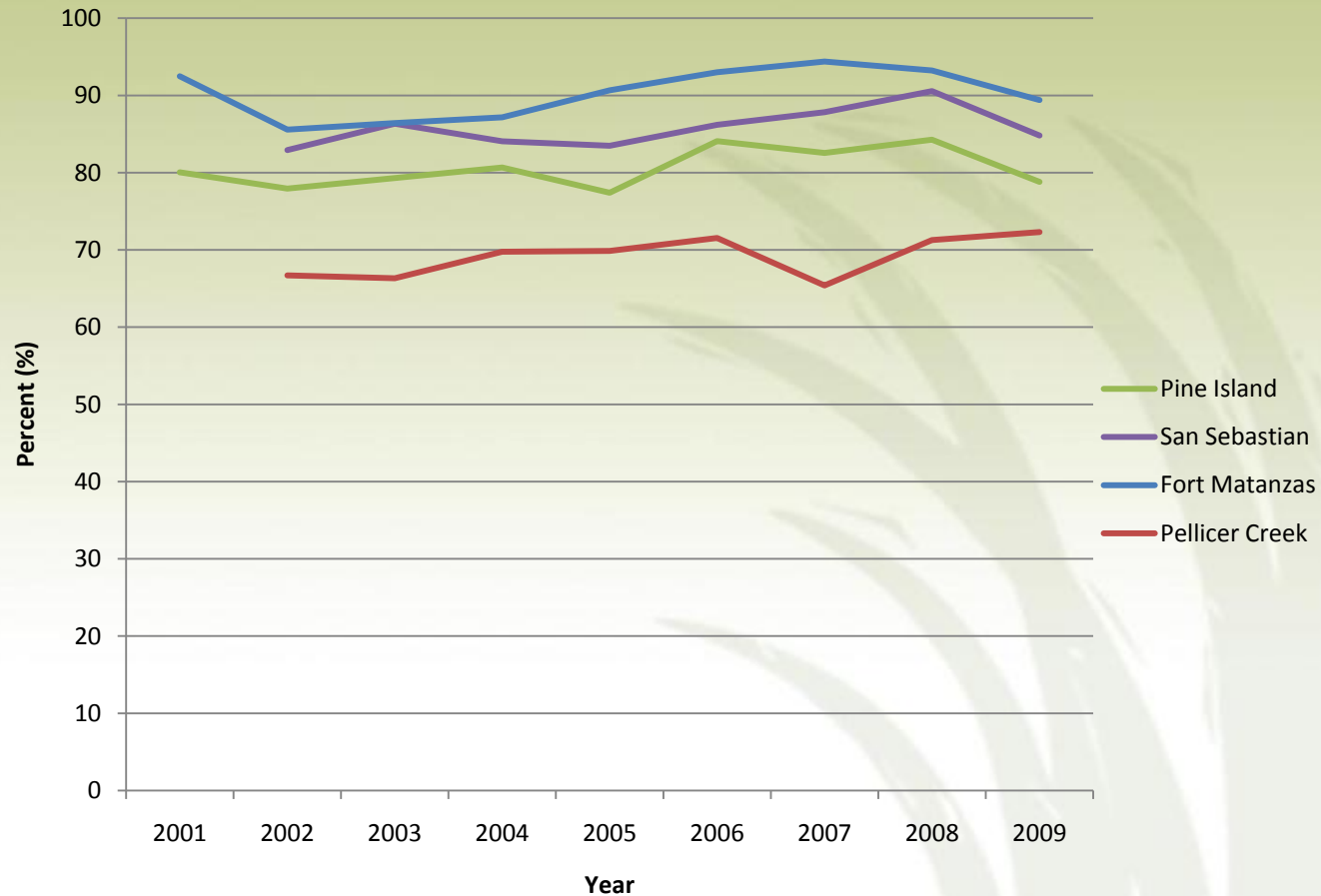
| Site | °C | °F |
|----------------|-------|-------|
| Pine Island | 23.17 | 73.71 |
| San Sebastian | 22.68 | 72.82 |
| Fort Matanzas | 22.65 | 72.77 |
| Pellicer Creek | 23.49 | 74.28 |

*Every year GTMNERR collected data for that site

Average Annual Temperature



Average Annual Dissolved Oxygen



Lifetime* Average Dissolved Oxygen

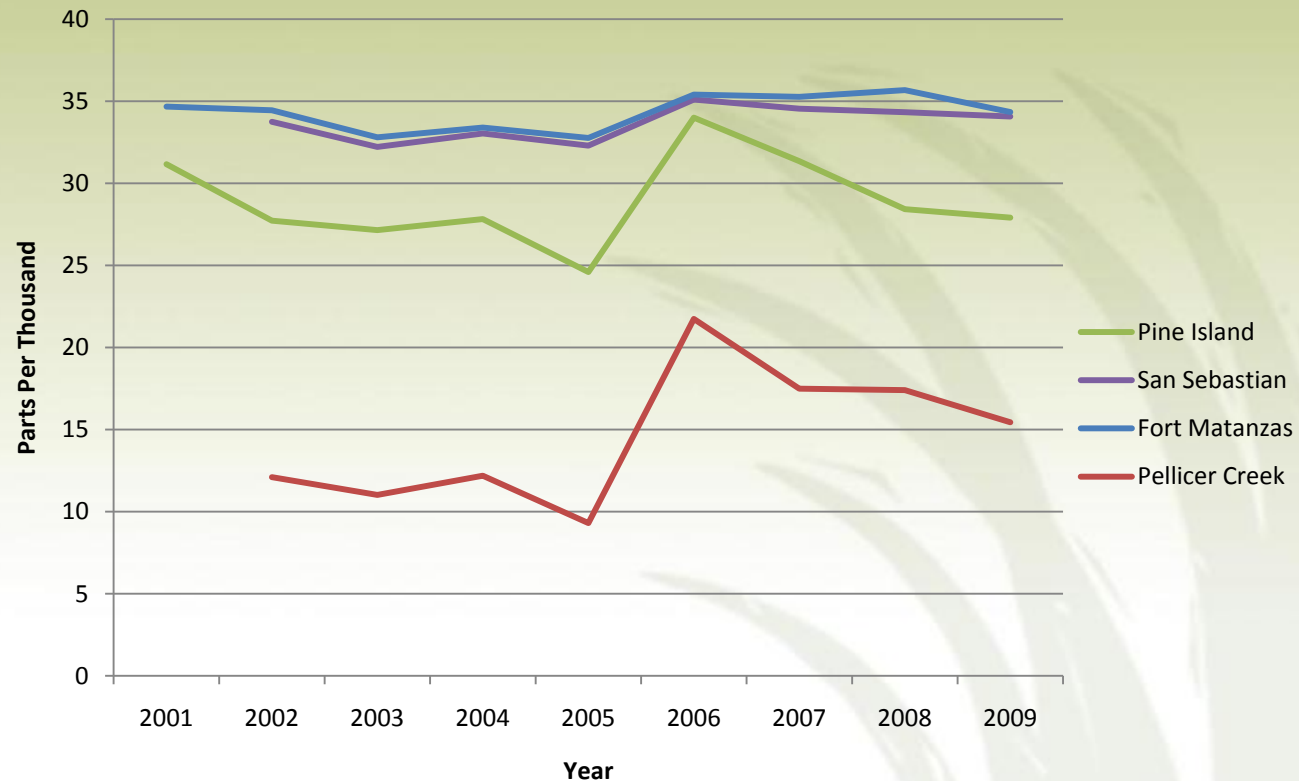
| Site | % |
|----------------|-------|
| Pine Island | 80.57 |
| San Sebastian | 85.78 |
| Fort Matanzas | 90.26 |
| Pellicer Creek | 69.15 |

*Every year GTMNERR collected data for that site



Average Annual Salinity

| Lifetime* Average Salinity | |
|----------------------------|-------|
| Site | ppt |
| Pine Island | 28.97 |
| San Sebastian | 33.83 |
| Fort Matanzas | 34.48 |
| Pellicer Creek | 15.48 |



*Every year GTMNERR collected data for that site



What does the data tell us?

- When changes occur in the estuary
 - Short-term
 - Long-term



How is the data managed?

- GTMNERR reviews data biweekly, quarterly, and annually based on NERRS Standard Operating Procedures
- Datasets are also reviewed by the NERRS Centralized Data Management Office



Where can I get the data?

- GTMNERR data download
 - www.nerrsdata.org



What does all of this mean?

- We have established a comprehensive baseline of data
- 9-10 years of data seems like a long time but it really isn't when establishing long-term trends
- Data great for investigating short-term variability (storms, drought, etc.)
- GTMNERR data coupled with partnering agencies historic data can track health of estuary over time



Is our water quality good?

- Physical data alone can not answer that question
- Physical data are useful screening indicators of potential problems
- The physical and chemical data coupled with biological monitoring (ex. oysters or fish) can all be used to determine the health of the estuary



What next?

- Continue water quality and weather monitoring
 - Continue analyzing data
- Enhance our Biological monitoring efforts
 - Long-term oyster monitoring and/or fisheries monitoring
- Facilitate or conduct research within the Reserve that answers questions pertaining to the health of the estuary



Contact Information

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Data Download (multiple sites)

www.nerrsdata.org

www.estuaries.gov



Questions?

*Now that's a
long-term change!*



Century Plant

