



Lake Okeechobee Key Findings Based on Monitoring and Analysis During Water Years 2013-2017

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Senior Scientist
South Florida Water Management District

Greater Everglades Ecosystem Restoration
Coral Springs, FL
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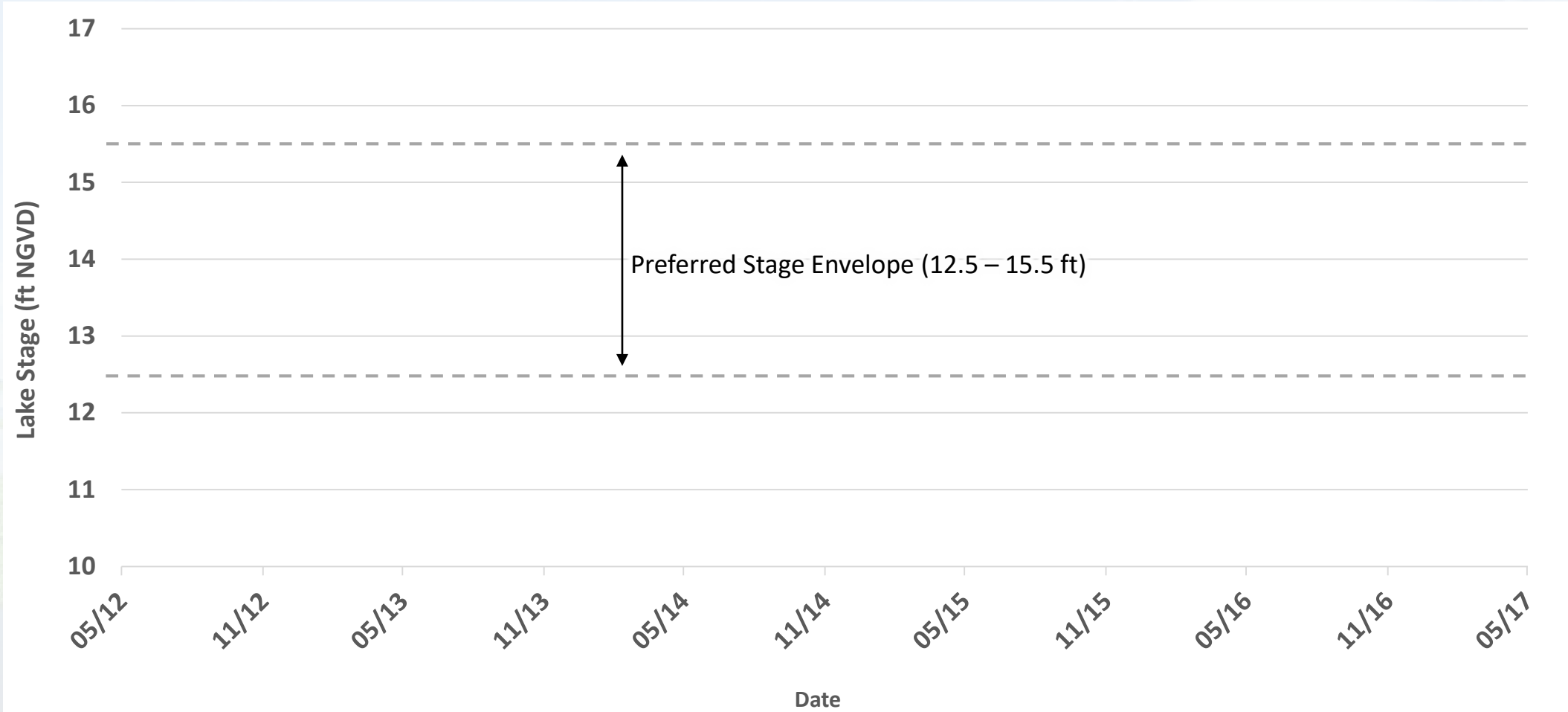
Outline

- **System Status Report Chapter 4 - Lake Okeechobee**
- **Summarizing key findings from May 2012 to April 2017**
(a.k.a. Water Years 2013–2017)
 - Lake Stage
 - Water Quality
 - Nutrients, Clarity, Phytoplankton and Vegetation
 - Fish
 - Wading Birds
- **Assessed using Performance Measures**

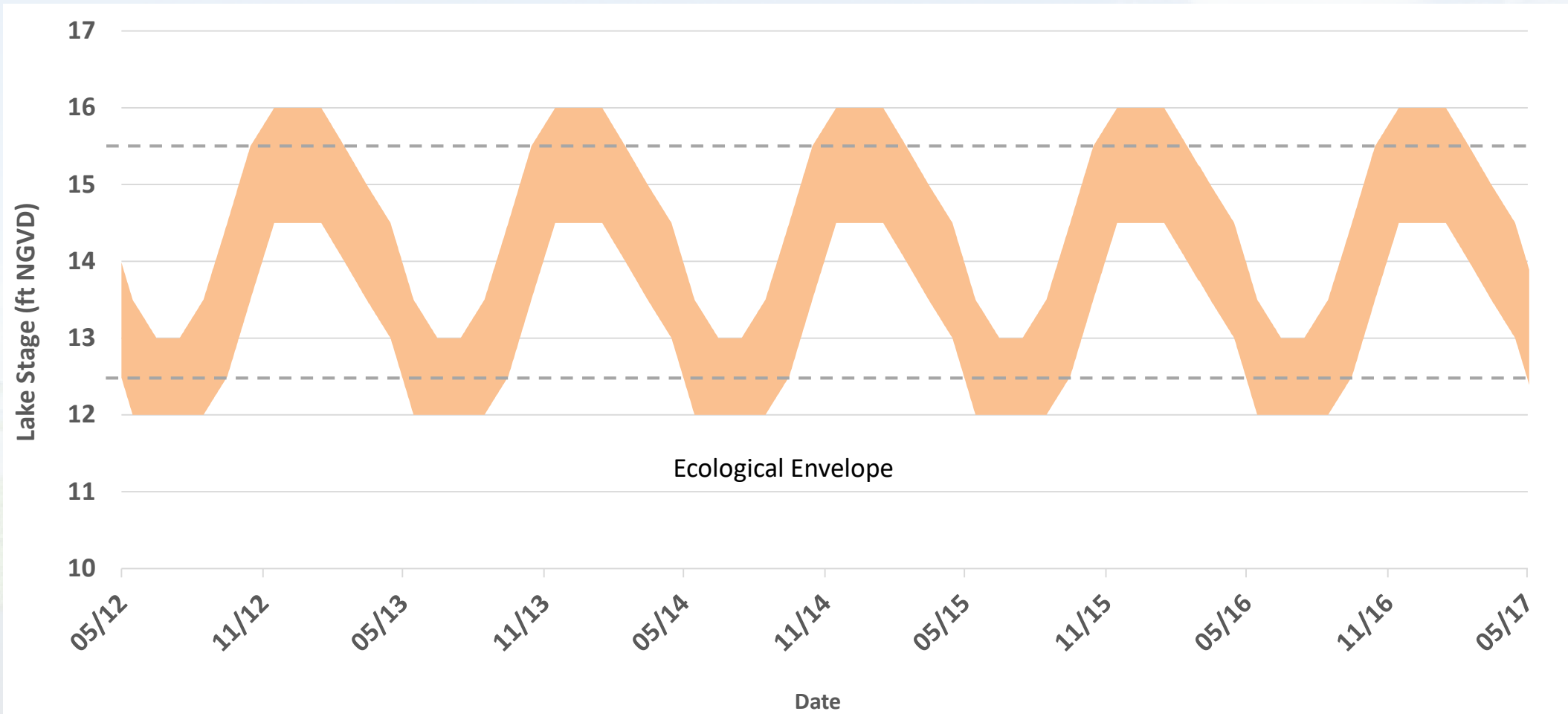
Lake Stage

- **Lake Okeechobee water levels are managed for...**
- Flood Control
 - Water Supply
 - Ecological health of Lake, Estuaries and Greater Everglades

Lake Okeechobee Stage Data WY 2012 to 2017

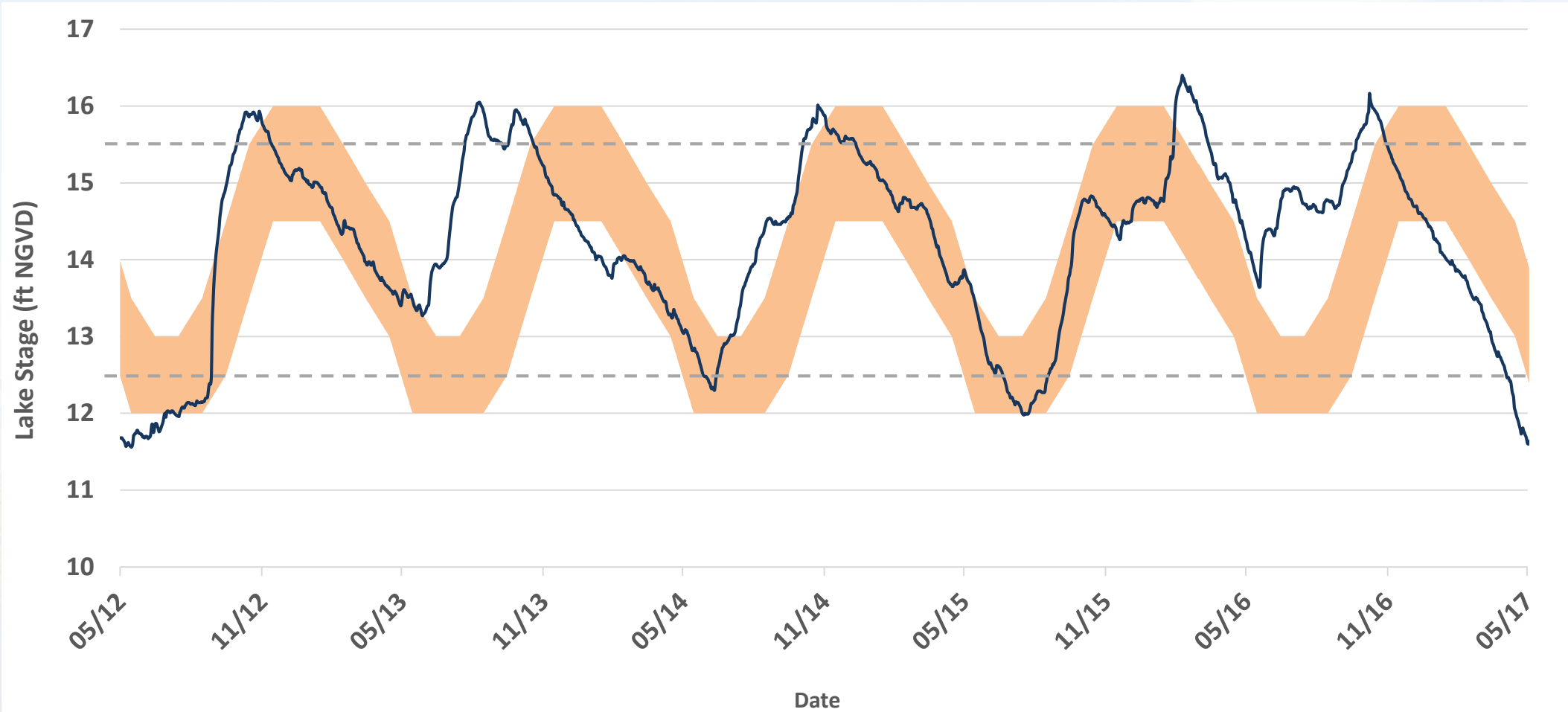


Lake Okeechobee Stage Data WY 2012 to 2017

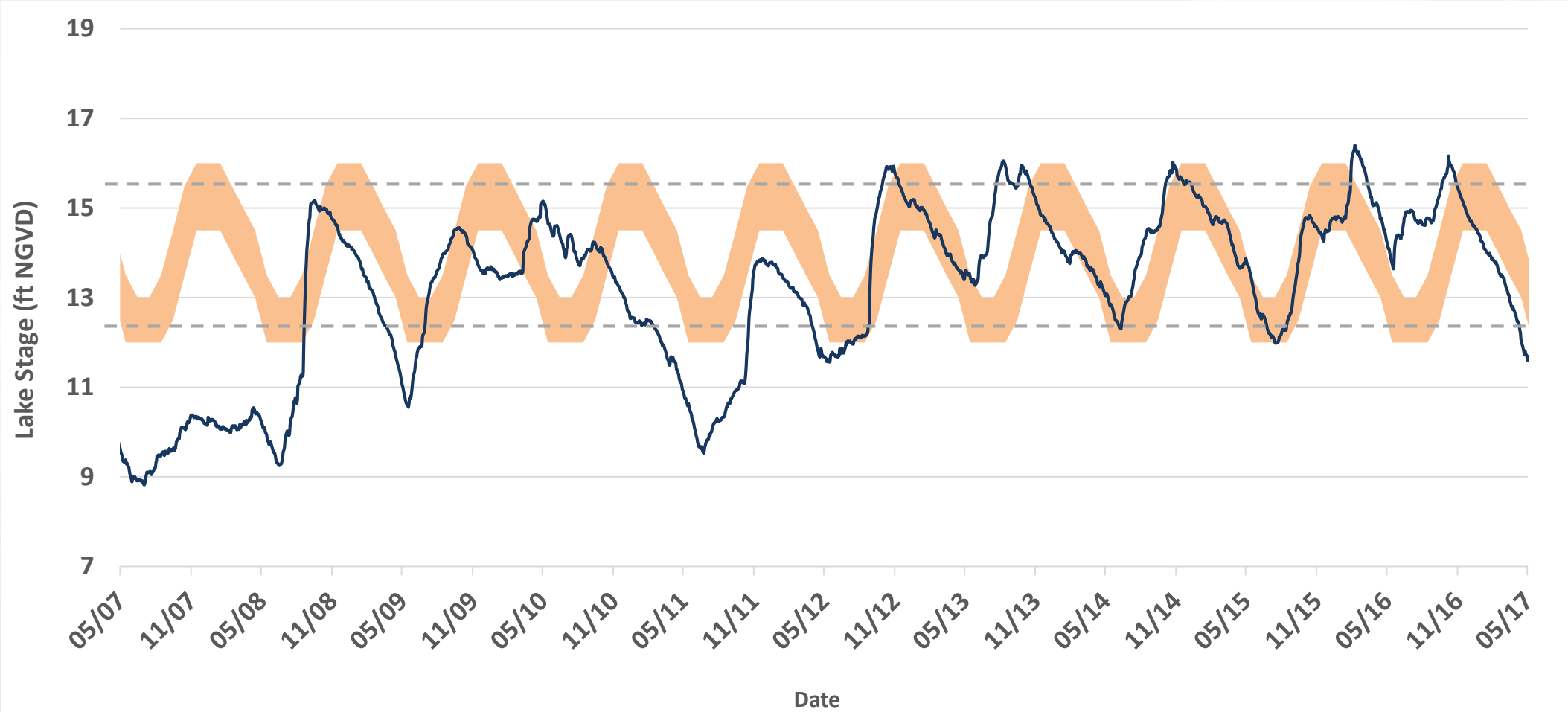


Lake Okeechobee Stage Data

WY 2012 to 2017

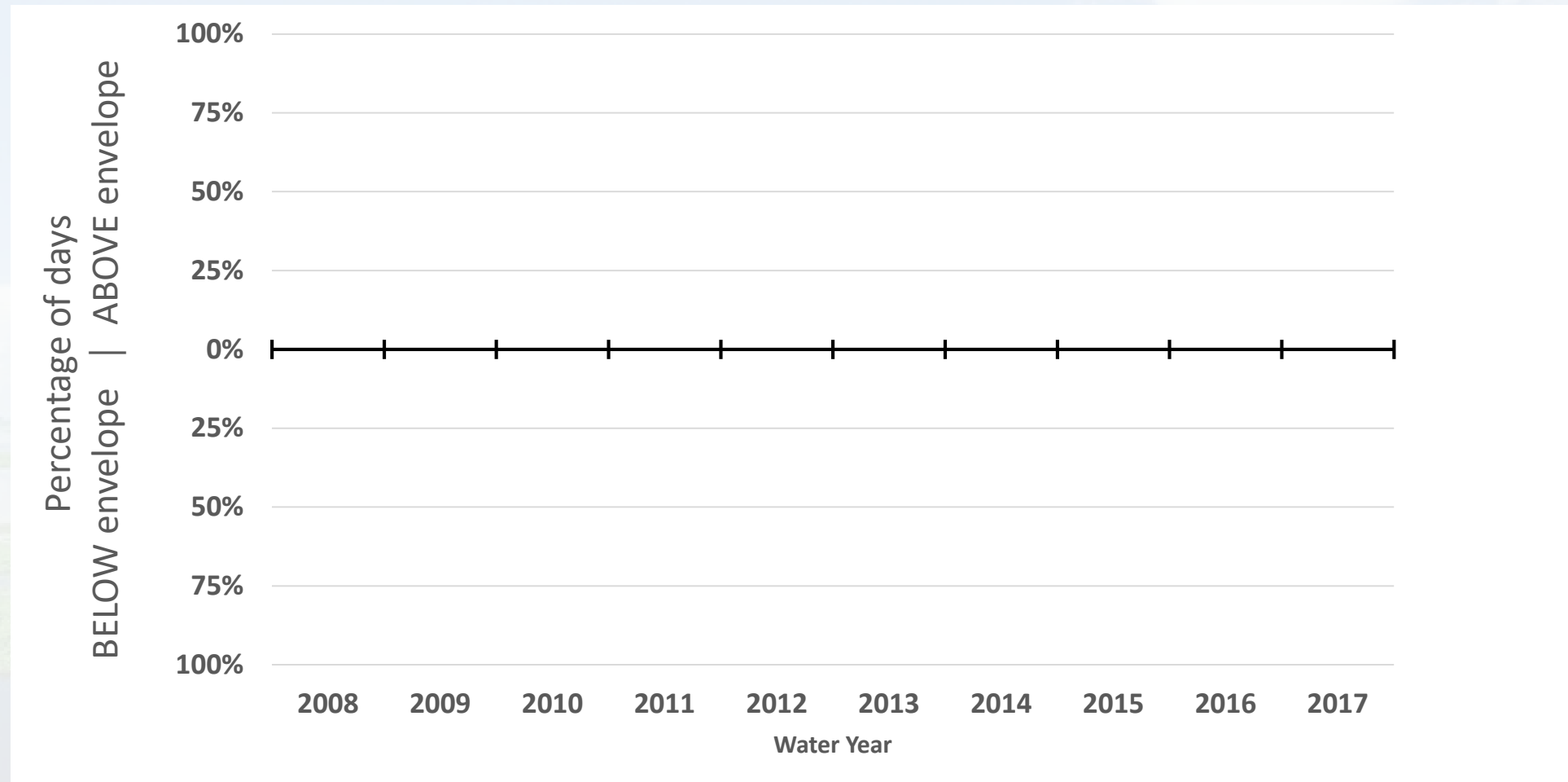


Lake Okeechobee Stage Data WY 2008 to 2017



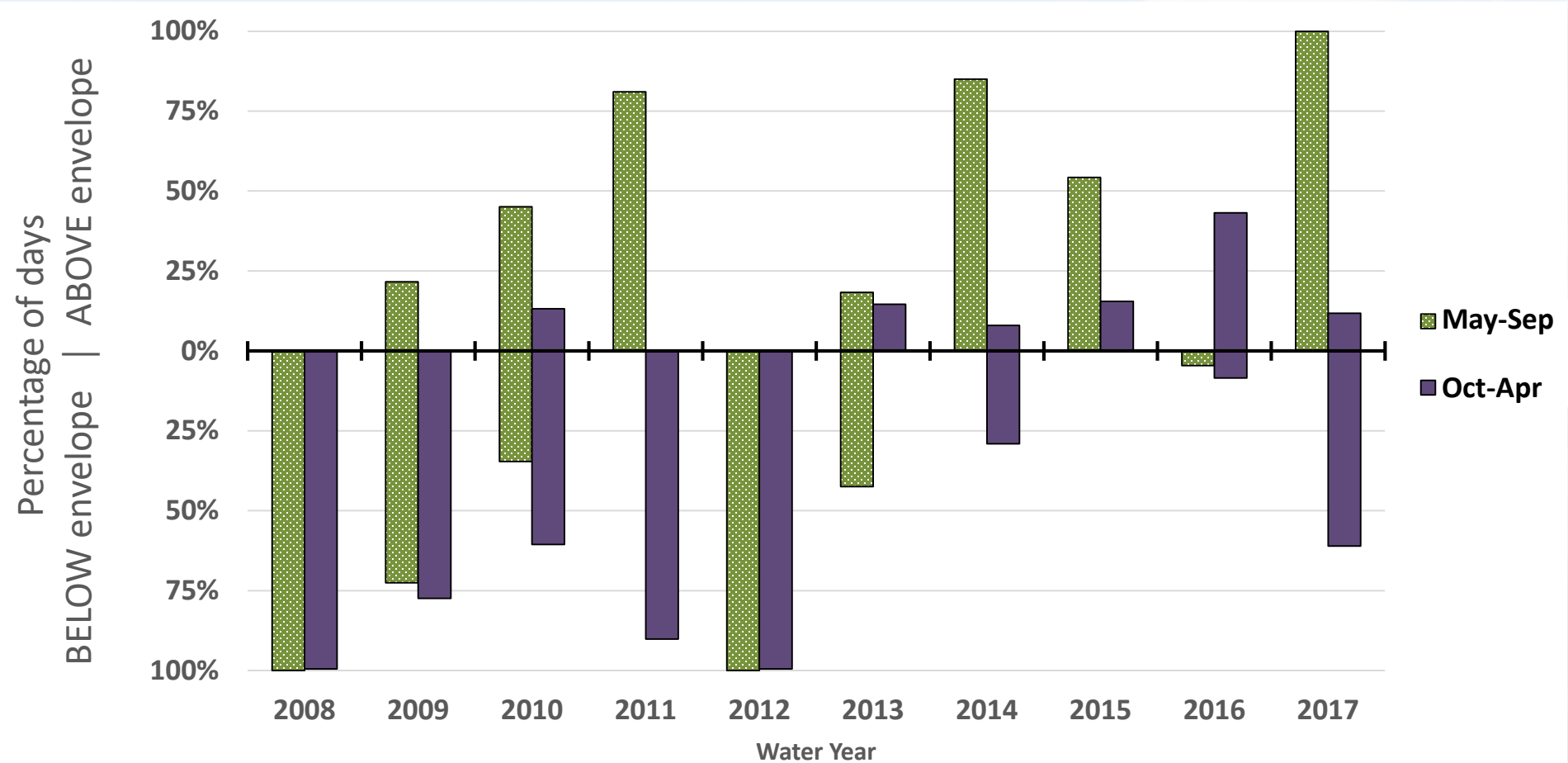
Percentage of time lake stages outside of Ecological Envelope

May-Sep (green) and Oct-Apr (purple)



Percentage of time lake stages outside of Ecological Envelope

May-Sep (green) and Oct-Apr (purple)



Water Quality Performance Measures

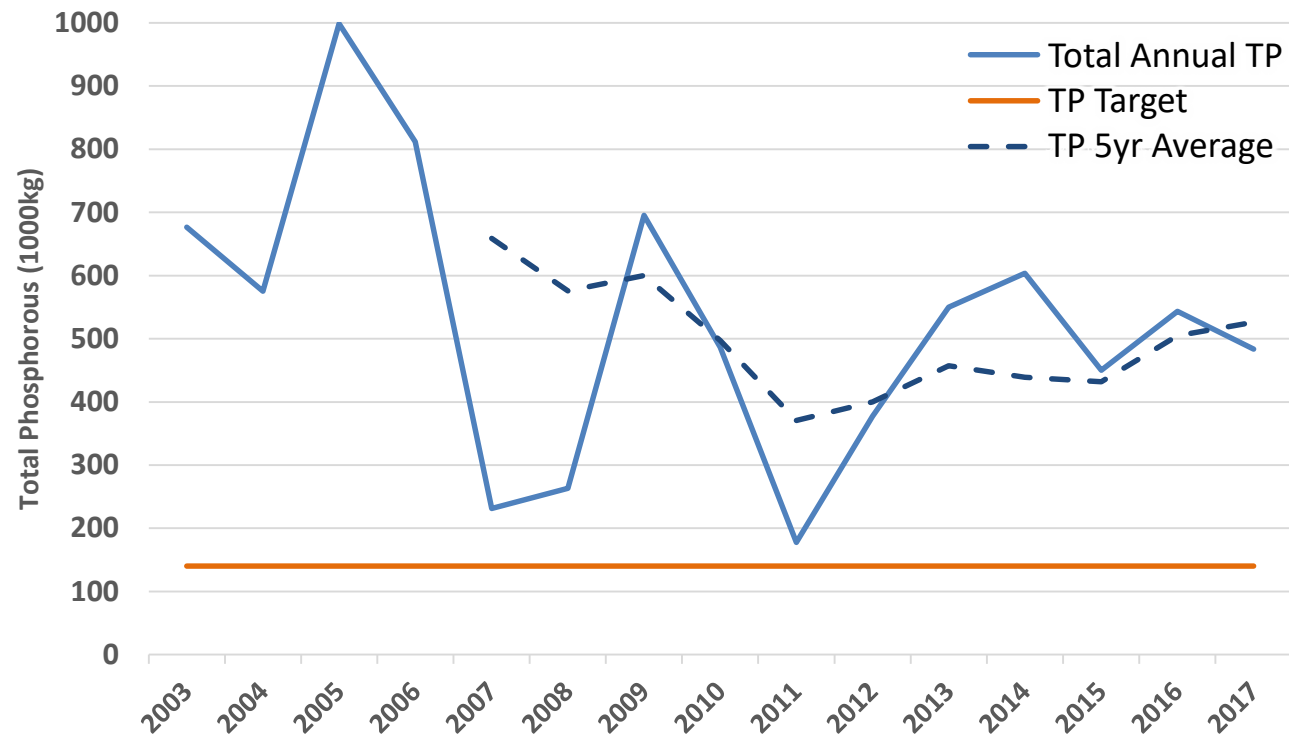
Variable	Performance Measure Target	Five-Year Average (WY2008-WY2012)	Five-Year Average (WY2013-WY2017)
Total Phosphorus (TP) Load	140 mt/yr	387 mt/yr	531 mt/yr
Total Nitrogen (TN) Load	No target	4,788 mt/yr	6,302 mt/yr
Pelagic TP	40 µg/L	134 µg/L	129 µg/L
Pelagic TN	No target	1.52 ppm	1.41 ppm
Pelagic SRP	No target	42 µg/L	43 µg/L
Pelagic DIN	No target	191 µg/L	199 µg/L
Pelagic TN to TP	> 22:1	11.3:1	10.6:1
Pelagic DIN to SRP	> 10:1	4.5:1	4.7:1
Nearshore TP	Below 40 µg/L	76 µg/L	89 µg/L
Algal bloom frequency	< 5% of pelagic Chl-a exceeding 40 µg/L	5.6%	9.1%
Diatom to Cyanobacteria Ratio	>1.5:1	3.3:1 (Pelagic) 3.6:1 (Nearshore)	2.1:1 (Pelagic) 1.4:1 (Nearshore)
Nearshore Water Clarity	Secchi disk visible on lake bottom at all nearshore SAV sampling locations from May to September (100%)	44%	32%
Nearshore SAV Coverage	Total SAV ≥50,000 ac (interim goal ≥35,000 ac) No current Vascular SAV target	38,137 ac 17,388 ac	28,905 ac 22,032 ac

Water Quality PM's - Nutrients

Variable	Performance Measure Target	Five-Year Average (WY2008-WY2012)	Five-Year Average (WY2013-WY2017)
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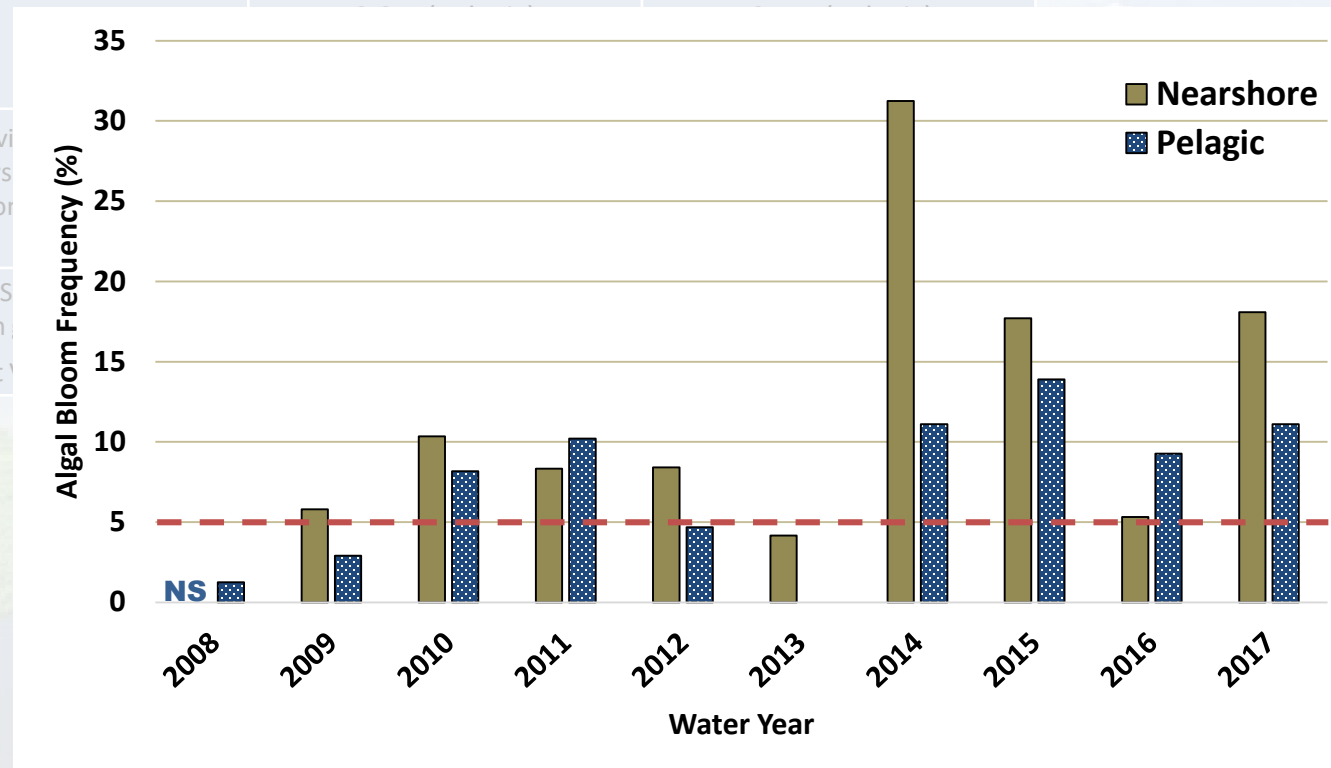
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Pelagic TN	No		
Pelagic SRP	No		
Pelagic DIN	No		
Pelagic TN to TP	>		
Pelagic DIN to SRP	>		
Nearshore TP	Below		



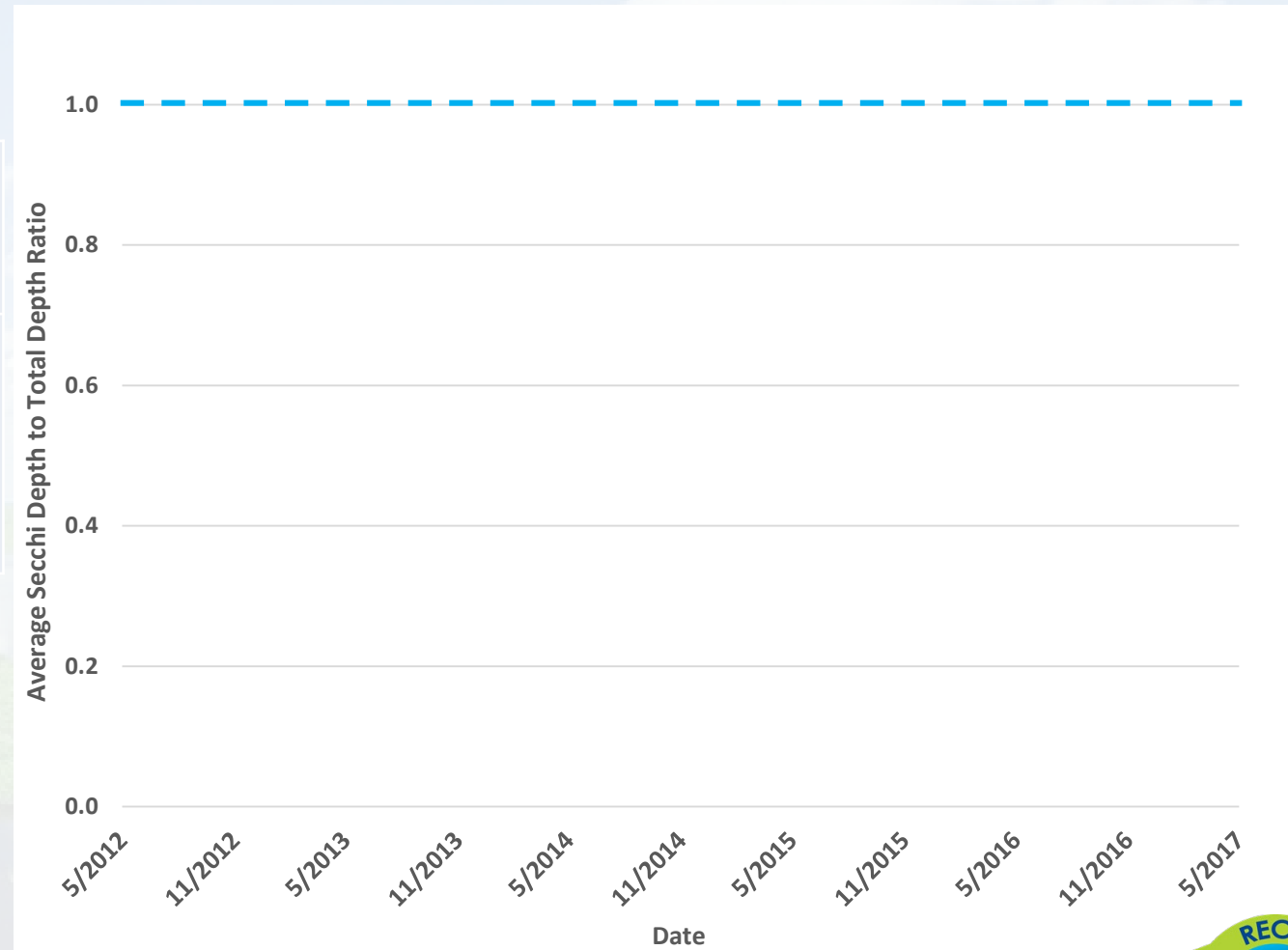
Water Quality PM's - Phytoplankton

Variable	Performance Measure Target	Five-Year Average (WY2008-WY2012)	Five-Year Average (WY2013-WY2017)
Algal bloom frequency	< 5% of pelagic Chl-a exceeding 40 µg/L	5.6%	9.1%
Diatom to Cyanobacteria Ratio			
Nearshore Water Clarity	Secchi disk visible at all nearshore locations from 10/1/2014 to 9/30/2017		
Nearshore SAV Coverage	Total SAV coverage (interim goal) No current SAV coverage		



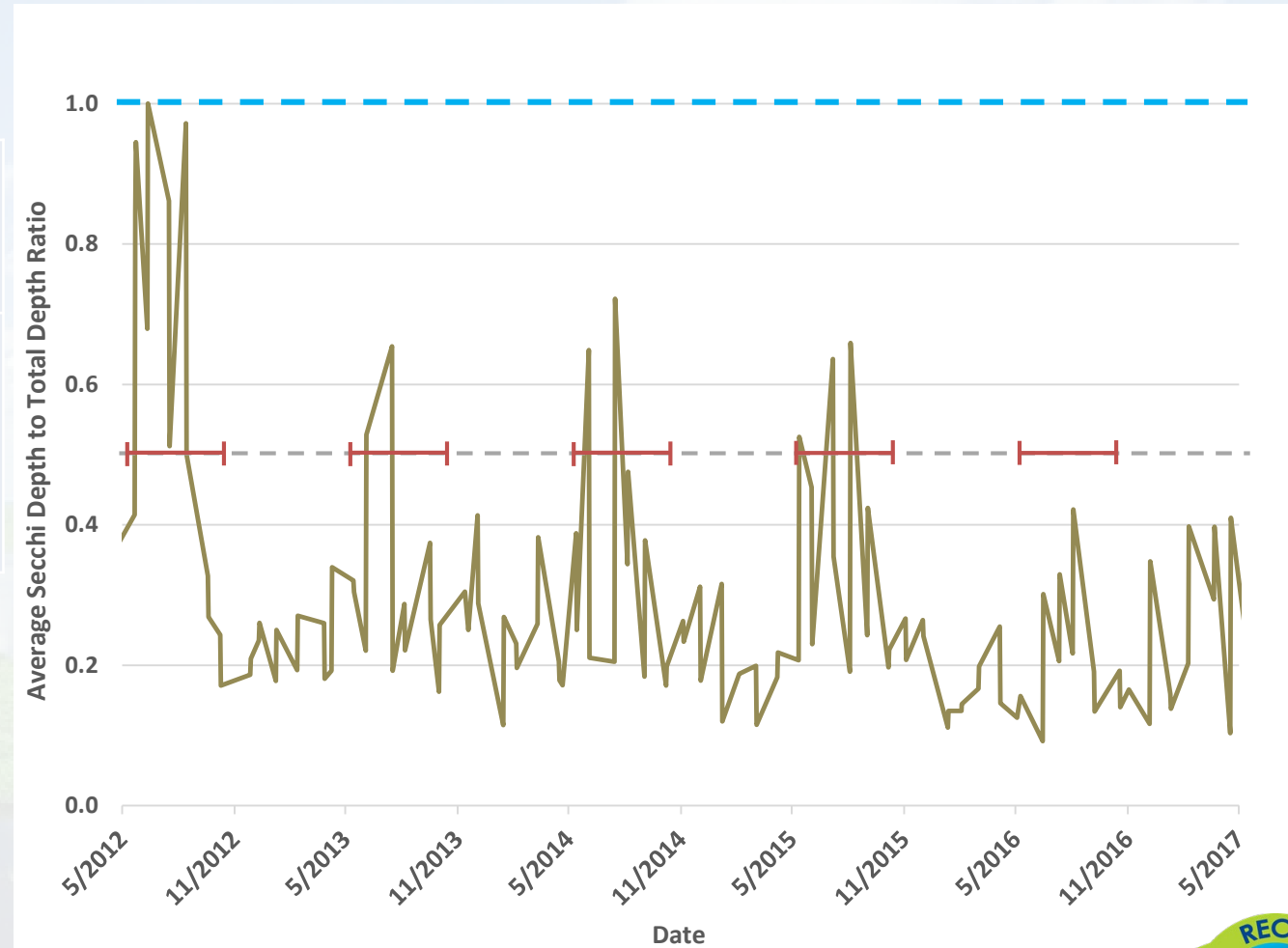
Water Quality PM's – Water Clarity

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Water Quality PM's – Water Clarity

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Water Quality PM's – Submerged Aquatic Vegetation

Variable	Performance Measure Target	Five-Year Average (WY2008-WY2012)	Five-Year Average (WY2013-WY2017)
Nearshore SAV Coverage	Total SAV $\geq$ 50,000 ac (interim goal $\geq$ 35,000 ac)	38,137 ac	28,905 ac
	No current Vascular SAV target	17,388 ac	22,032 ac

Non-vascular e.g. *Chara* spp.



Vascular e.g.



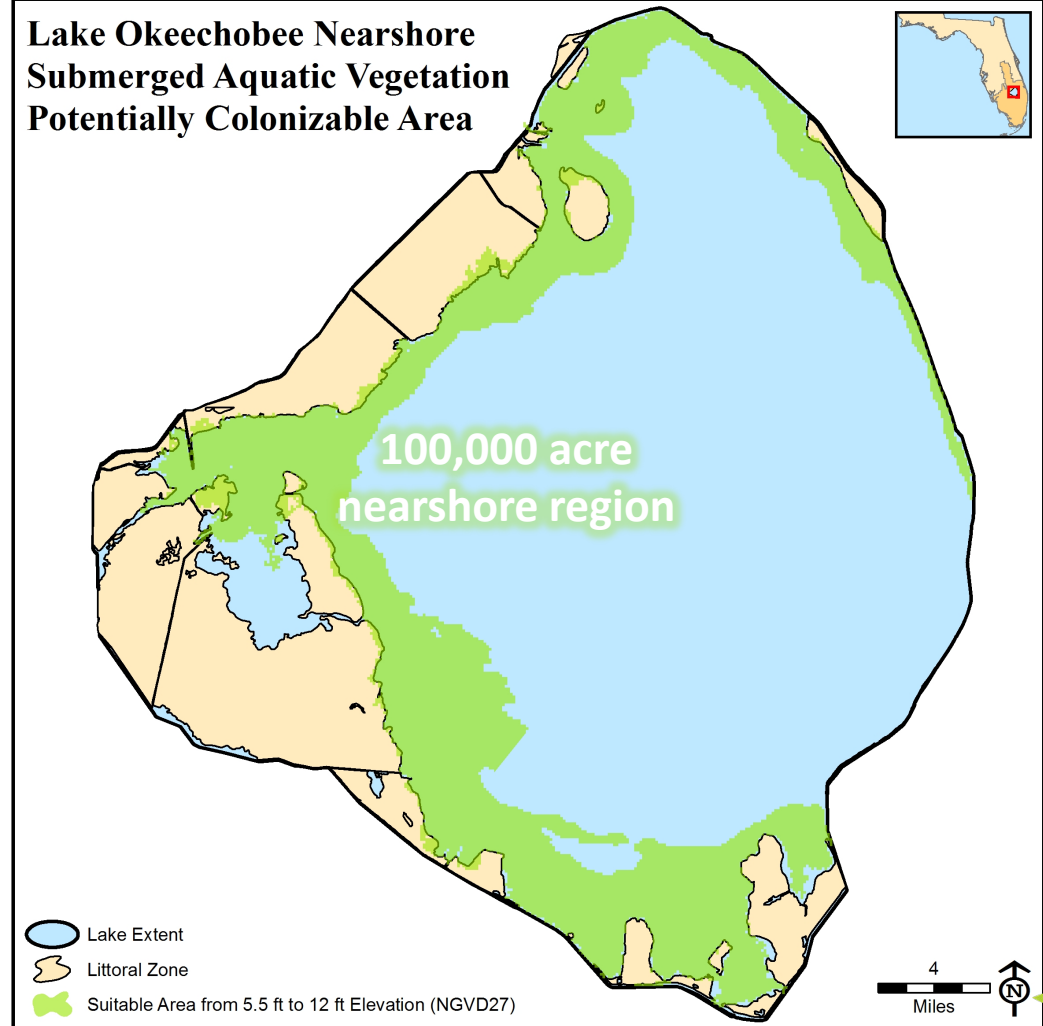
Coontail

Vallisneria



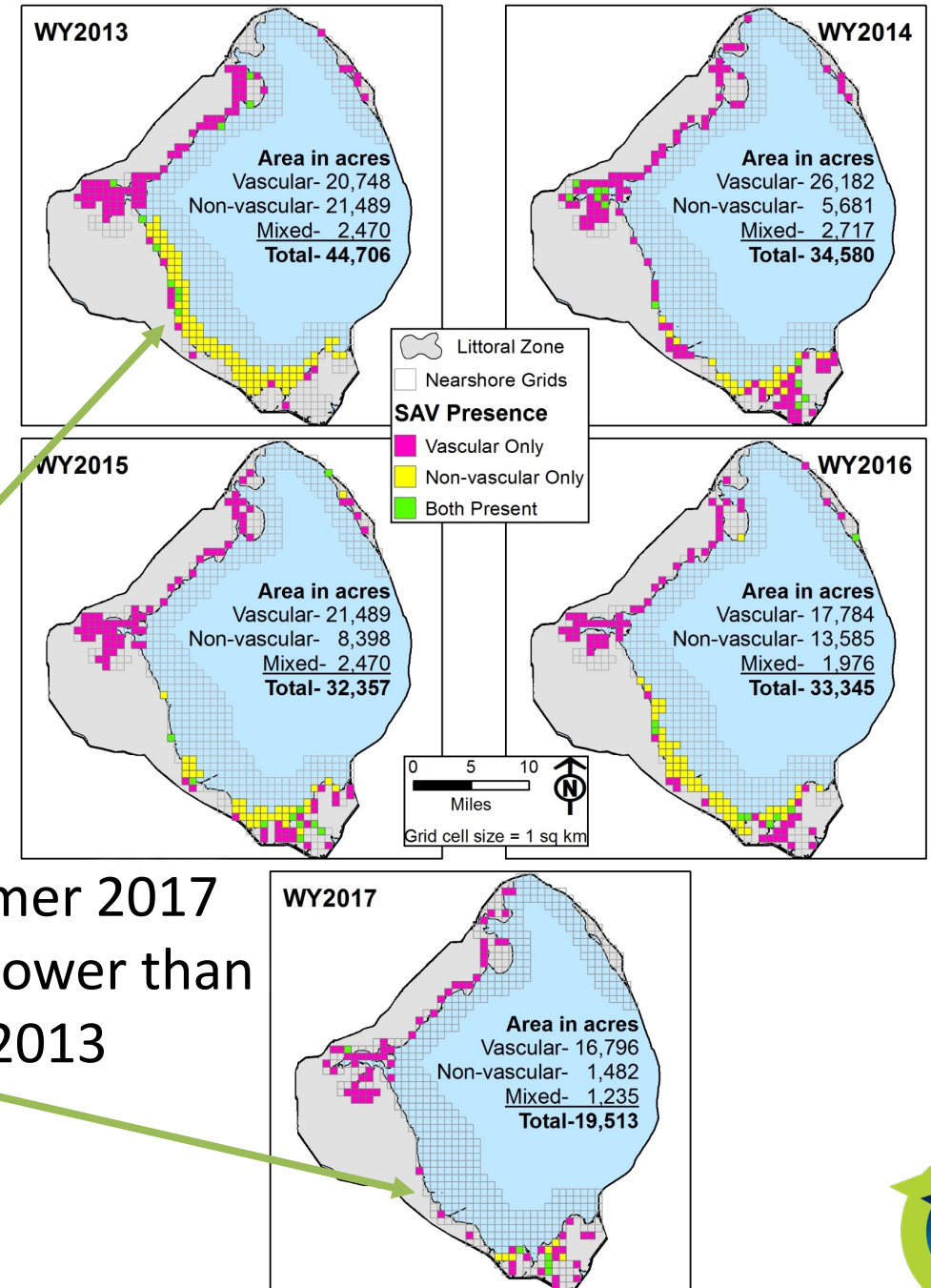
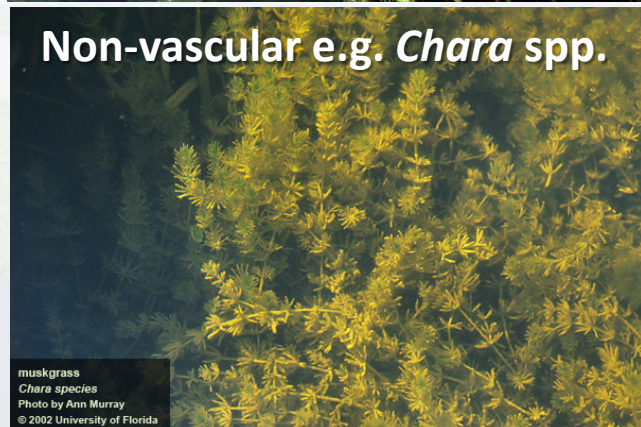
Eel grass

Lake Okeechobee Nearshore
Submerged Aquatic Vegetation
Potentially Colonizable Area



Submerged Aquatic Vegetation

improves WQ and provides habitat



Summer 2017
~55% lower than
2013

Fish abundance used as a metric for ecosystem health

➤ **Catch Per Unit Effort (CPUE) i.e. fish per minute**

➤ **Black Crappie**

- Surveyed in January of each year
 - Age 1
 - ≥ 10 inches

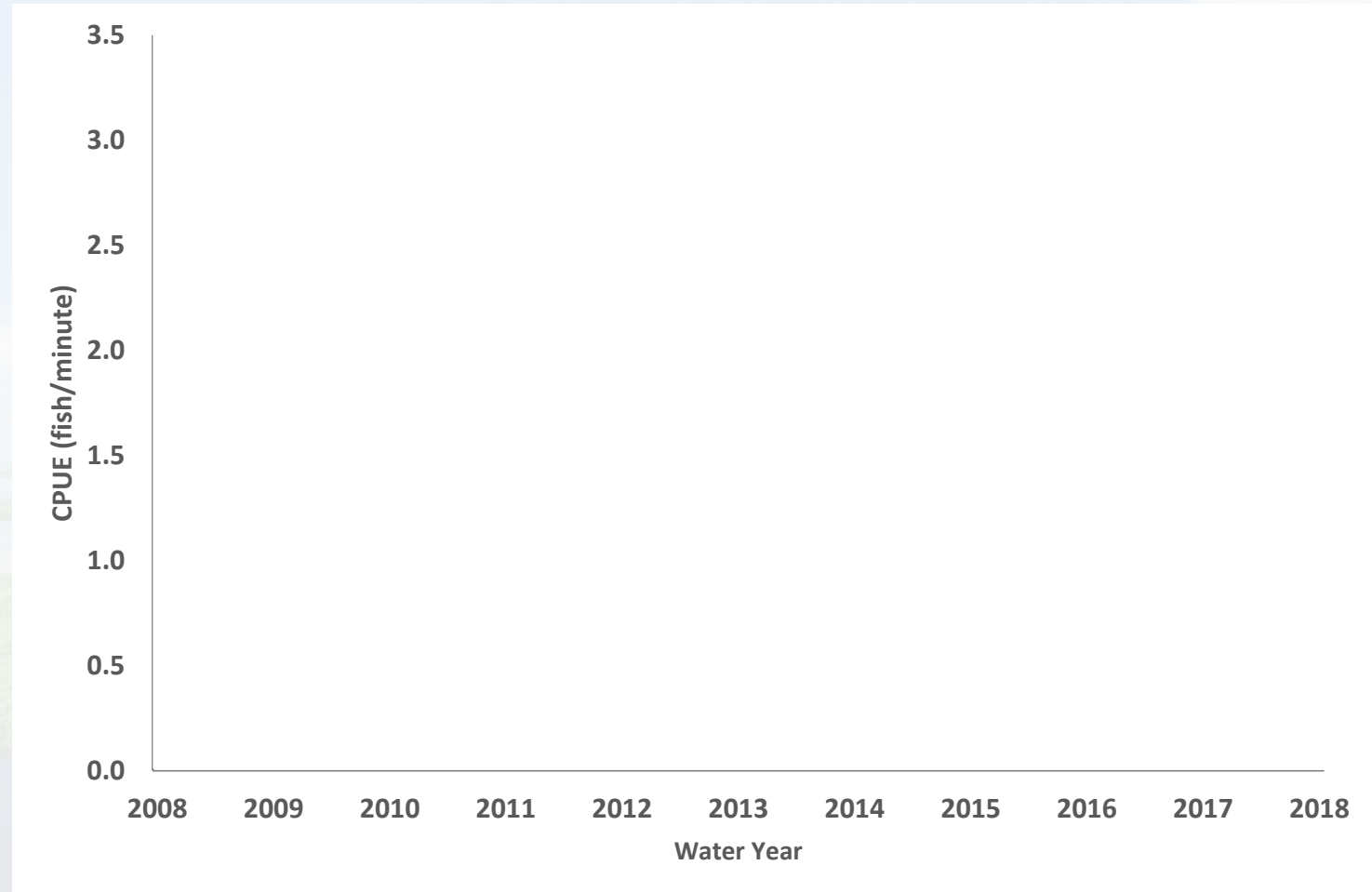


➤ **Largemouth Bass**

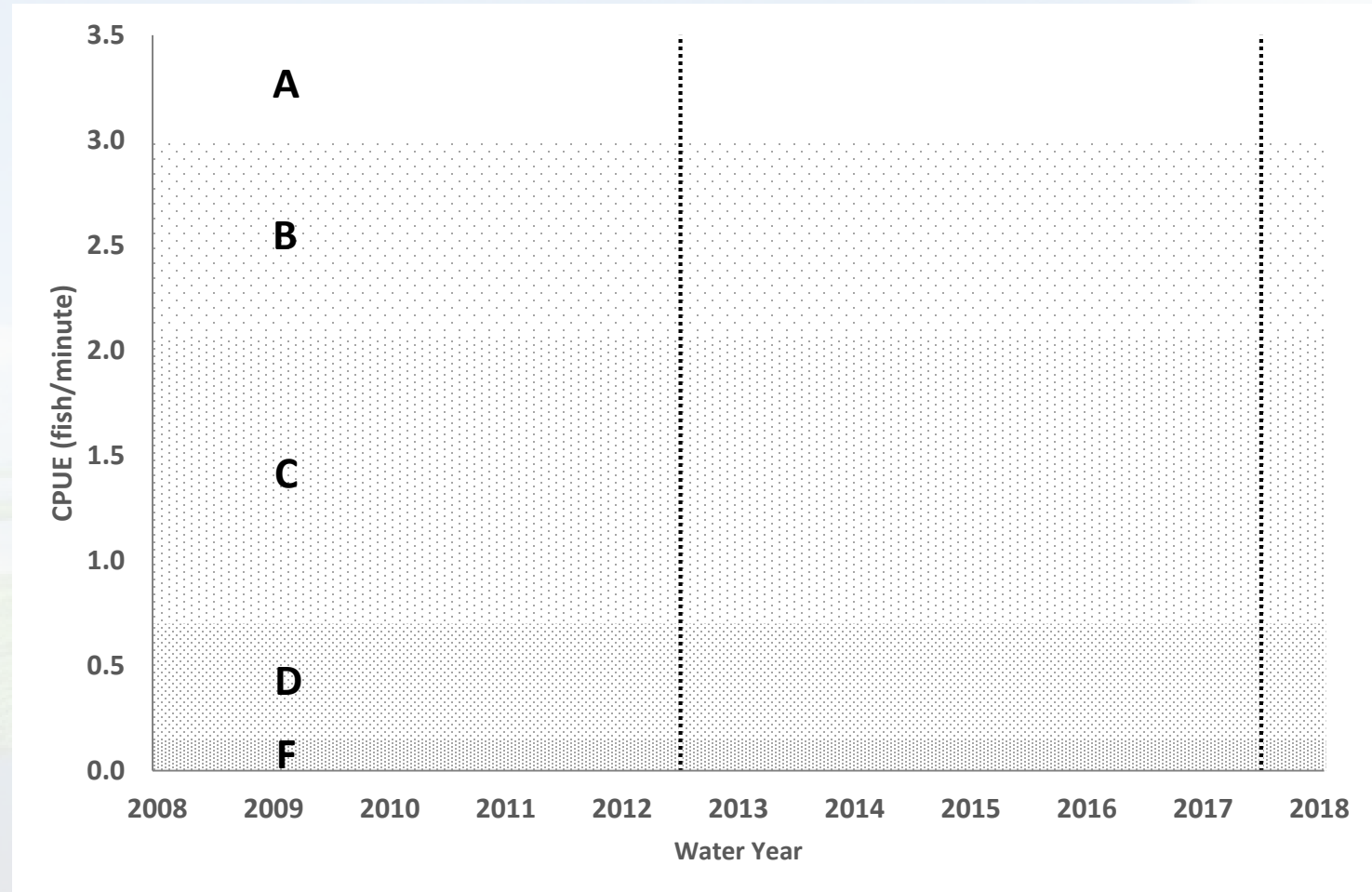
- Surveyed in October of each year
 - Age 1
 - ≥ 12 inches



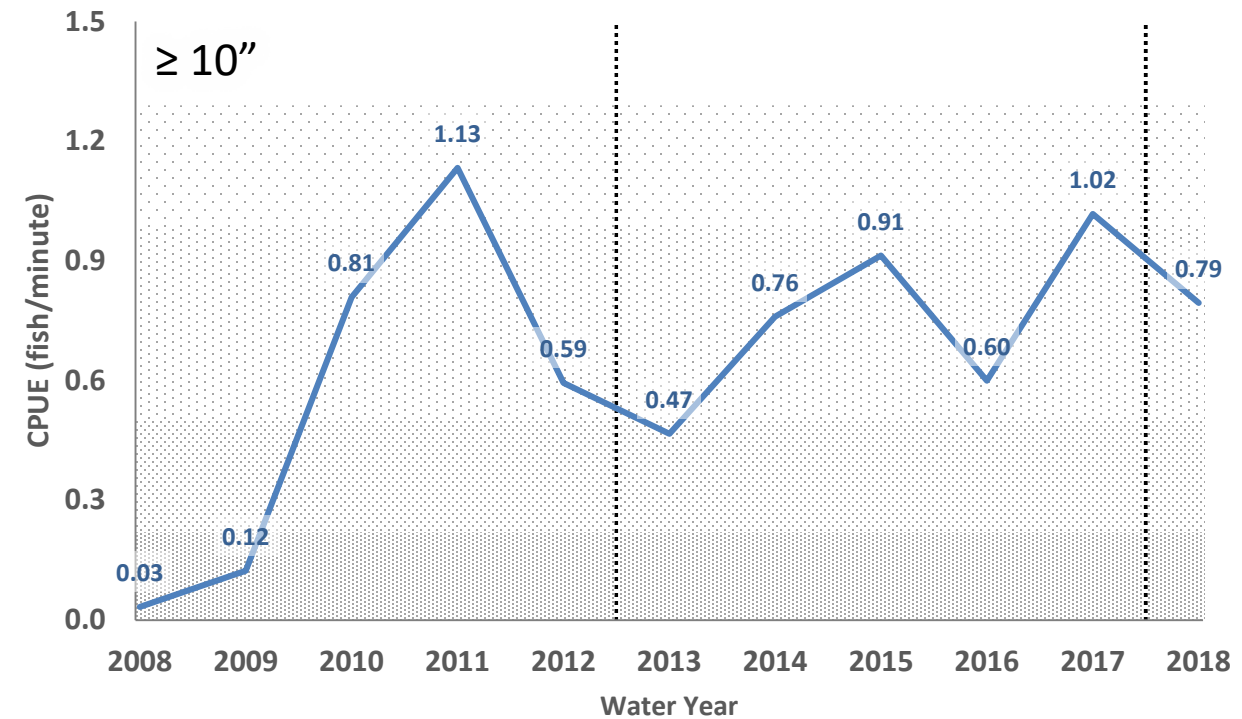
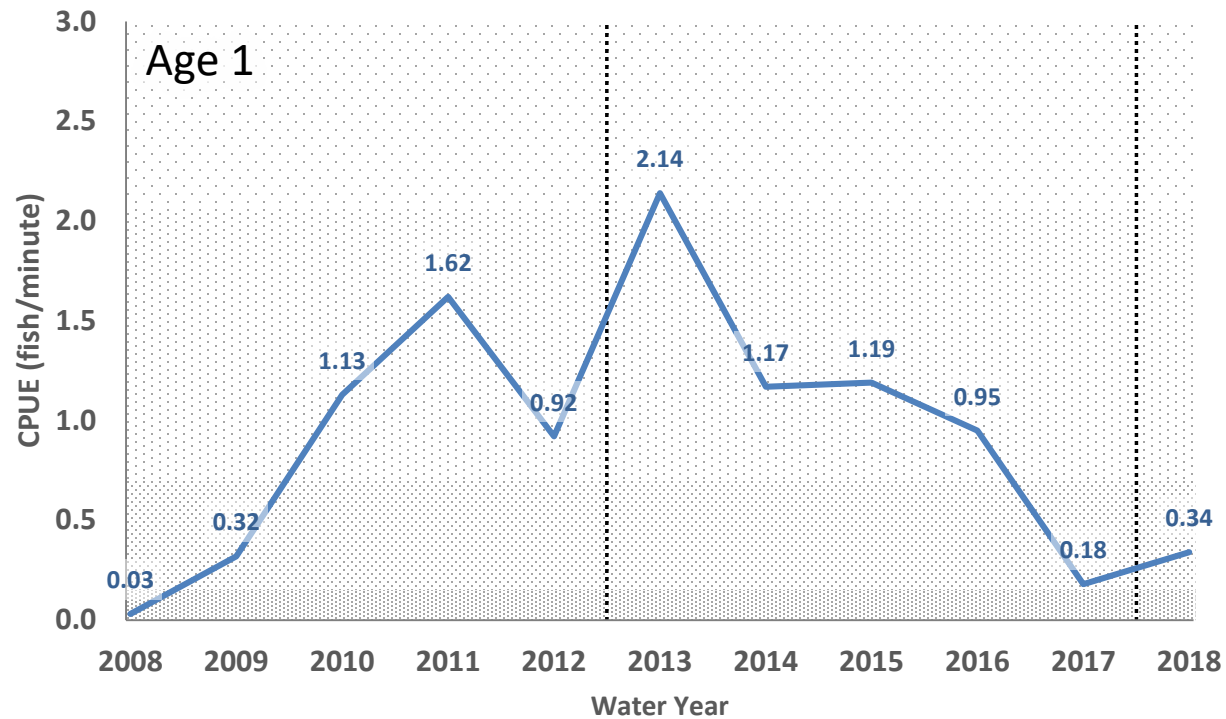
Fish abundance used as a metric for ecosystem health



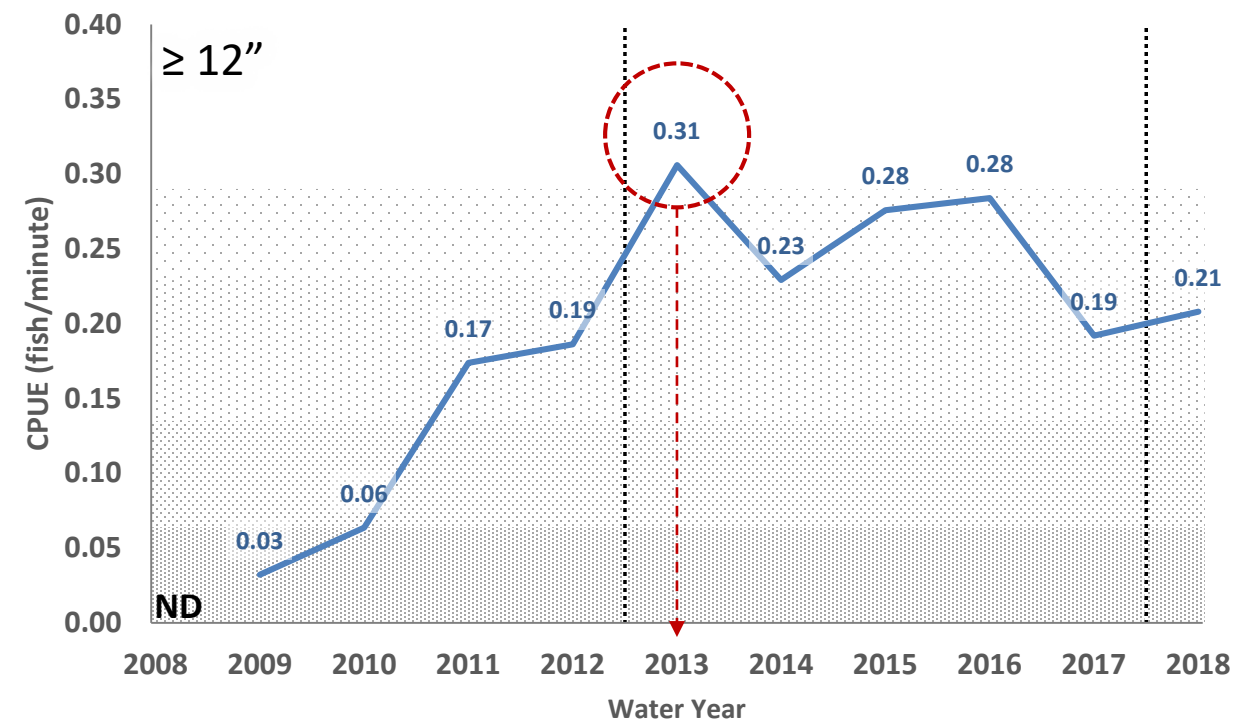
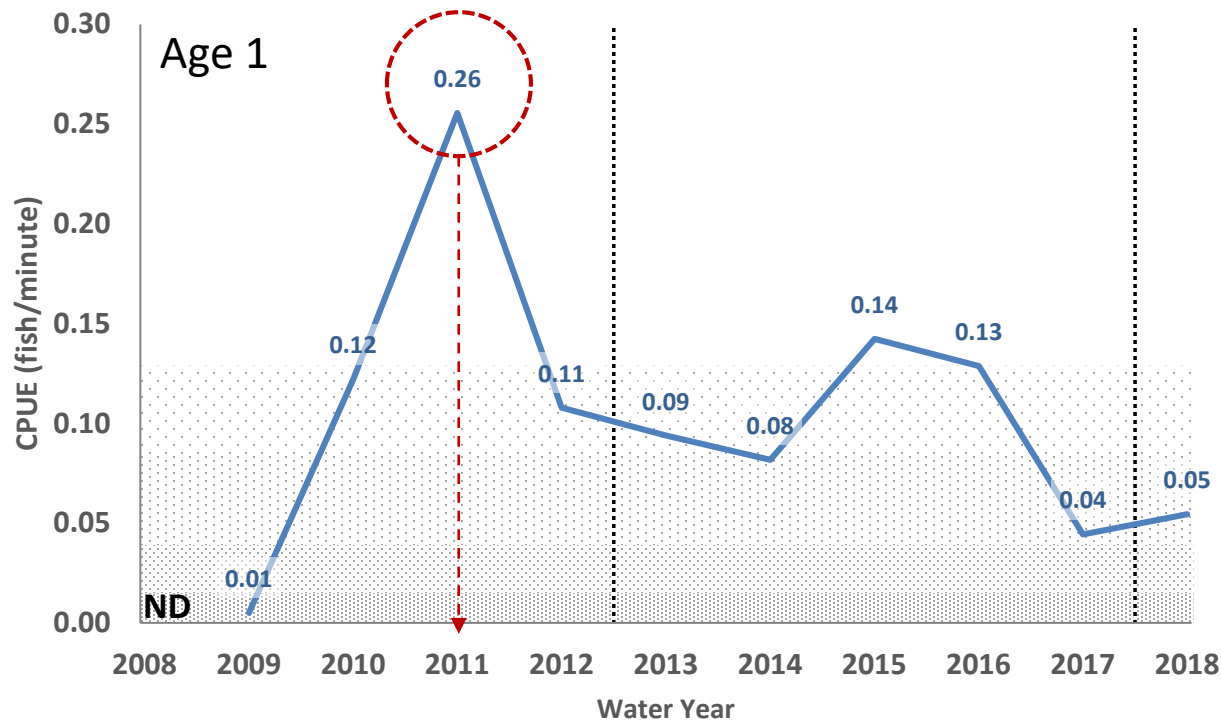
Fish abundance used as a metric for ecosystem health



Black Crappie



Largemouth Bass

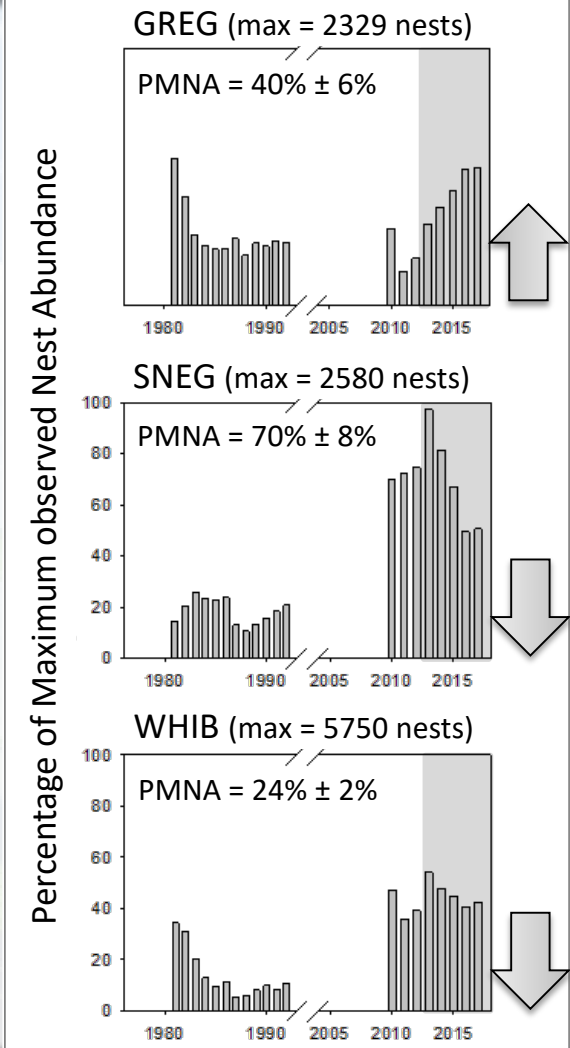
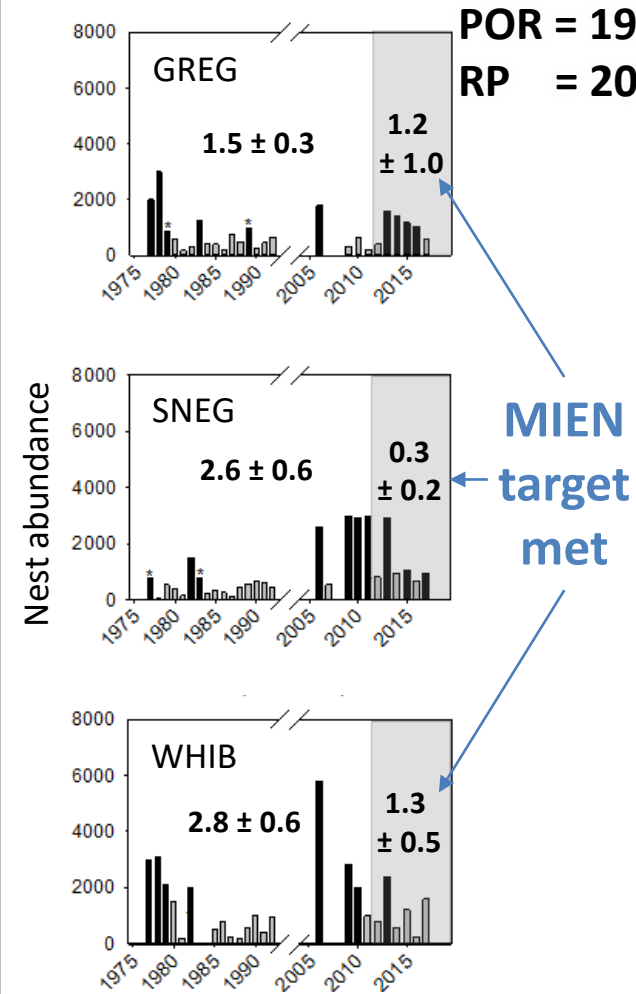


Wading Bird foraging and nesting tied to lake health

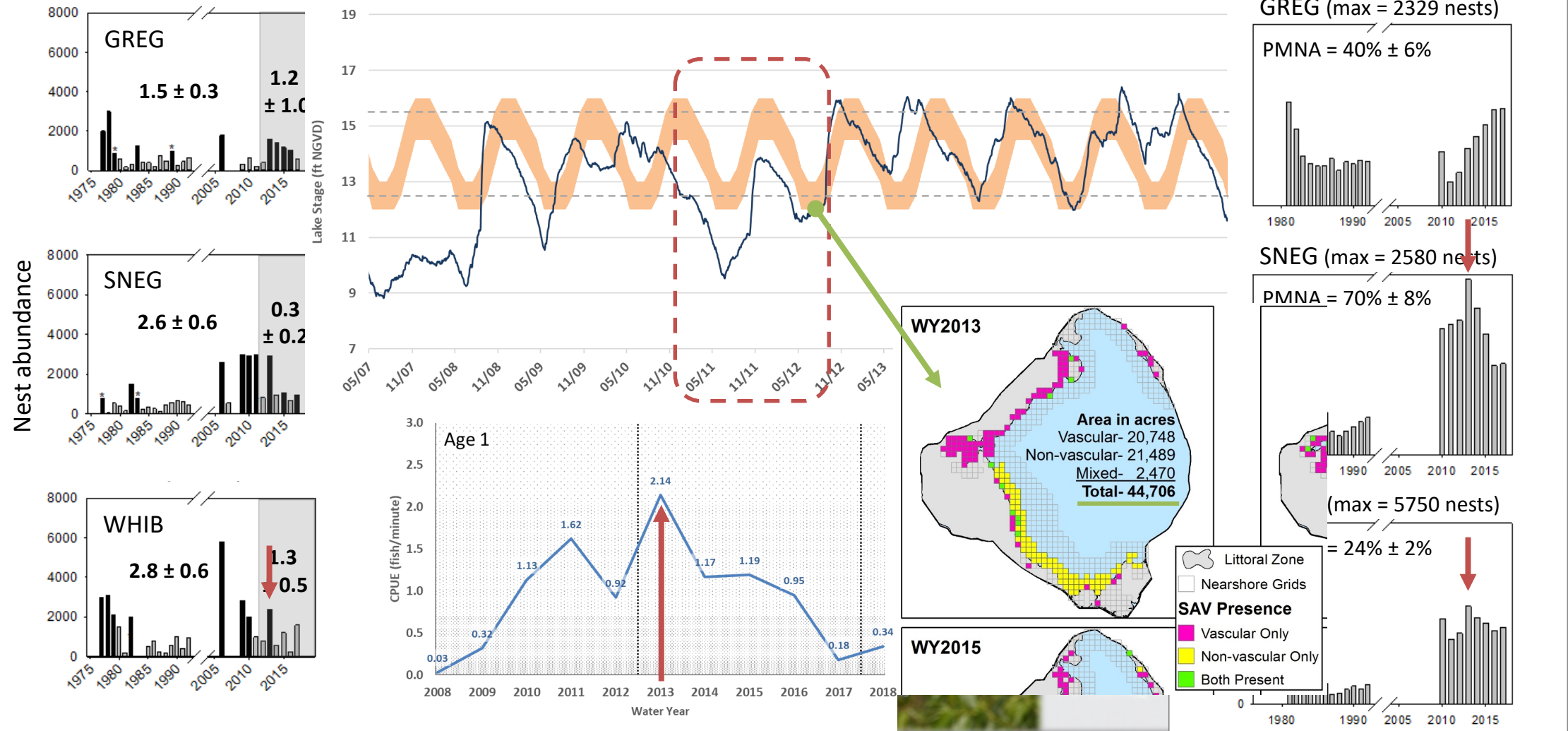
- **MIEN - Mean Interval between Exceptional Nesting years**
 - Exceptional = greater than 70th percentile of all abundance estimates in POR (1977-1992, 2002-2011)
 - Target = reporting period (2012-2017) MIEN more than one standard error below overall prior MIEN
- **PMNA – mean Percentage of Maximum Nest Abundance**
 - PMNA = mean 5-yr running average of nest abundance / average of 5 highest nest abundances in POR
 - Metric score is between 0% and 100%, and the target is 100%
- **Great Egret (GREG), Snowy Egret (SNEG), White Ibis (WHIB)**



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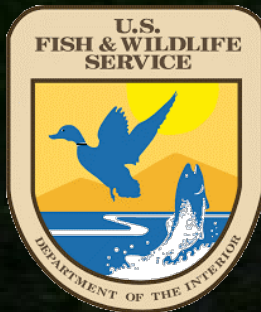
Acknowledgements

SFWMD – Andy Rodusky, Chuck Hanlon, Rich Botta, Therese East, Zach Welch

FWC – Alyssa Jordan, Andrea Dominguez

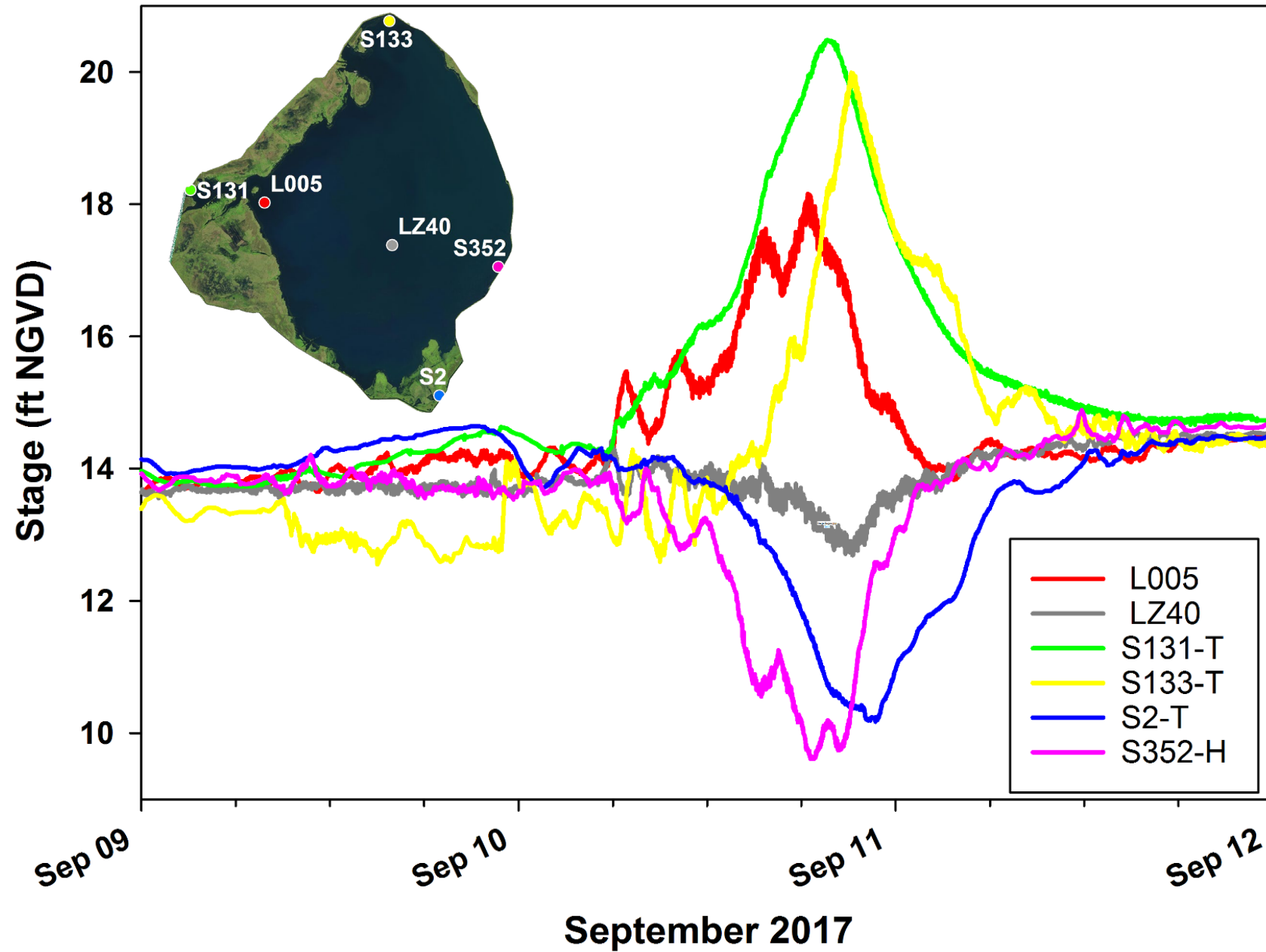
Florida Atlantic University - Dale Gawlik, David Essian

Audubon Florida – Paul Gray

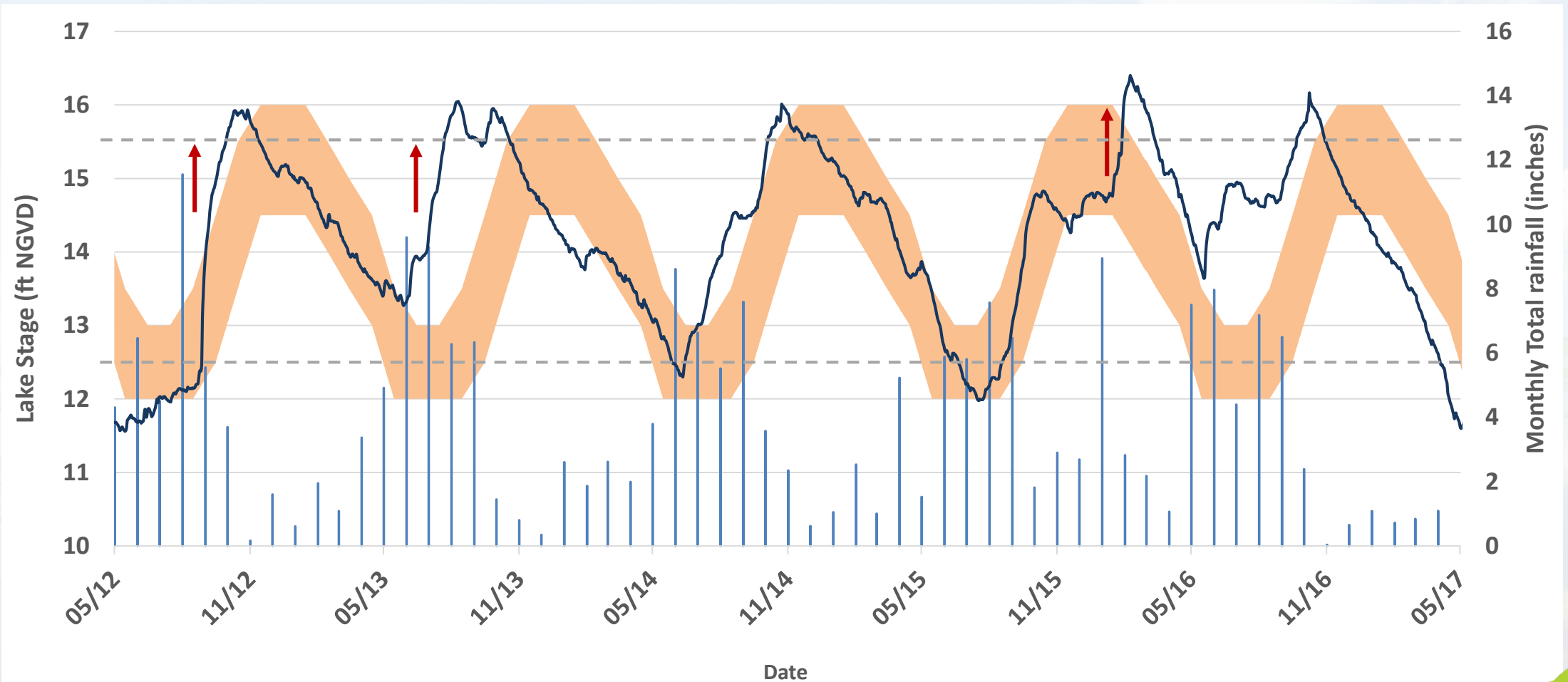




Lake Okeechobee Stage Time Series



Lake Okeechobee Stage Data WY 2012 to 2017



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