



Lake Okeechobee Operations and Blue-Green Algae Update

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South Florida Water Management District

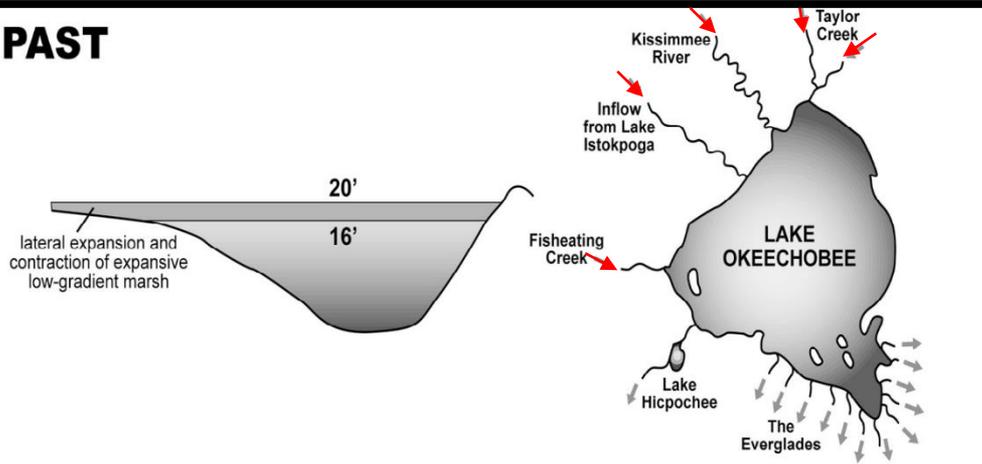
Palm Beach County WRTF Meeting

October 20, 2016

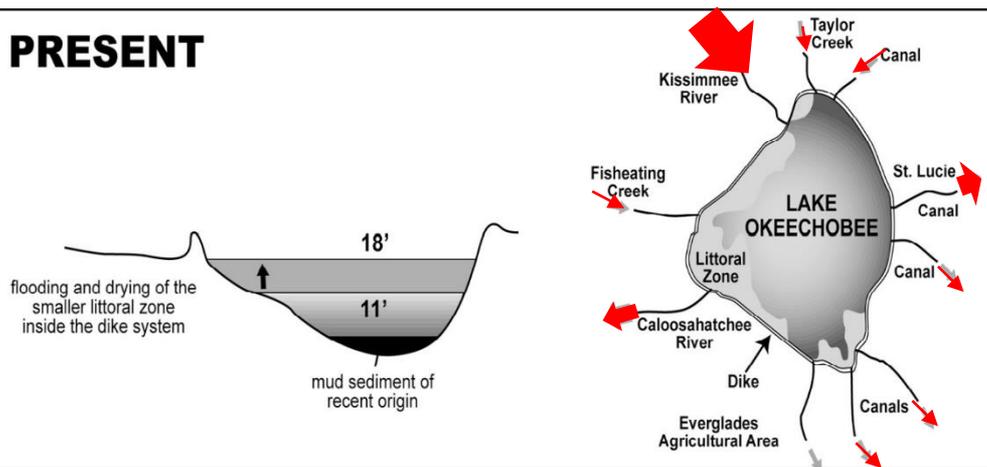


Lake Okeechobee Hydrology

PAST

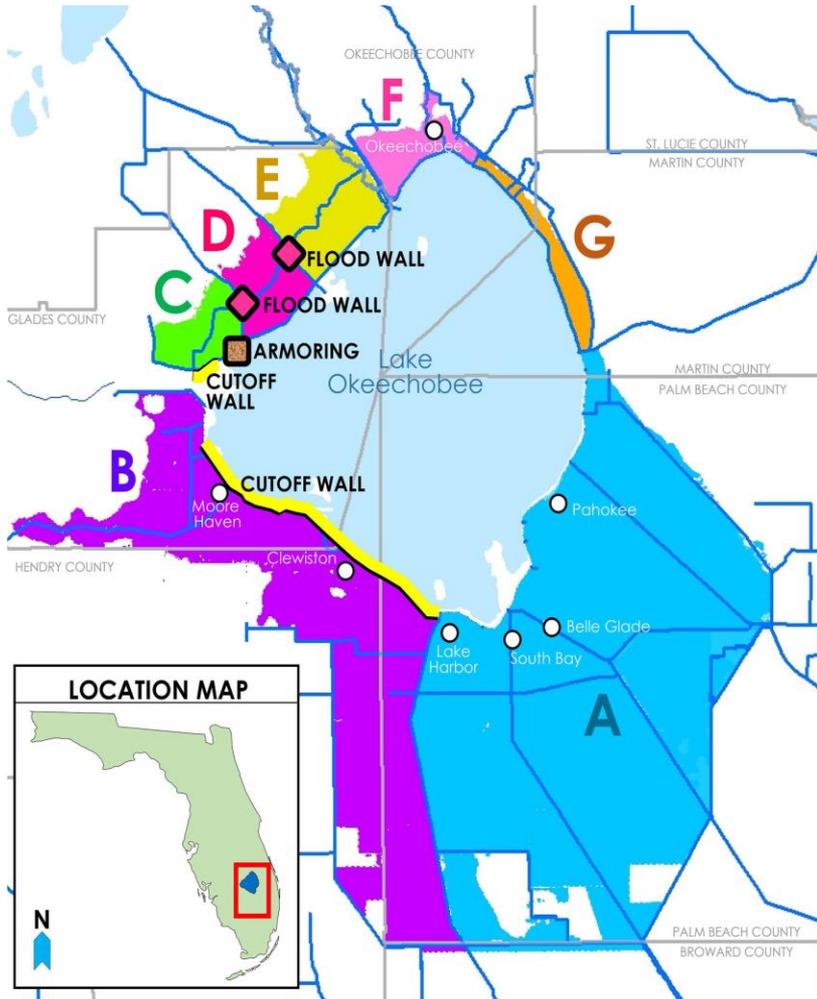


PRESENT

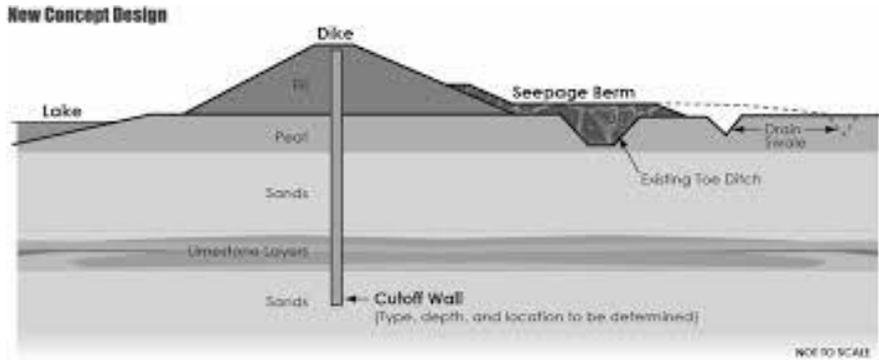


- All inflows and outflows gated except Fisheating Creek
- Operated mostly by USACE
- Lake can fill up much faster than it can be emptied
- Surrounded by Herbert Hoover dike

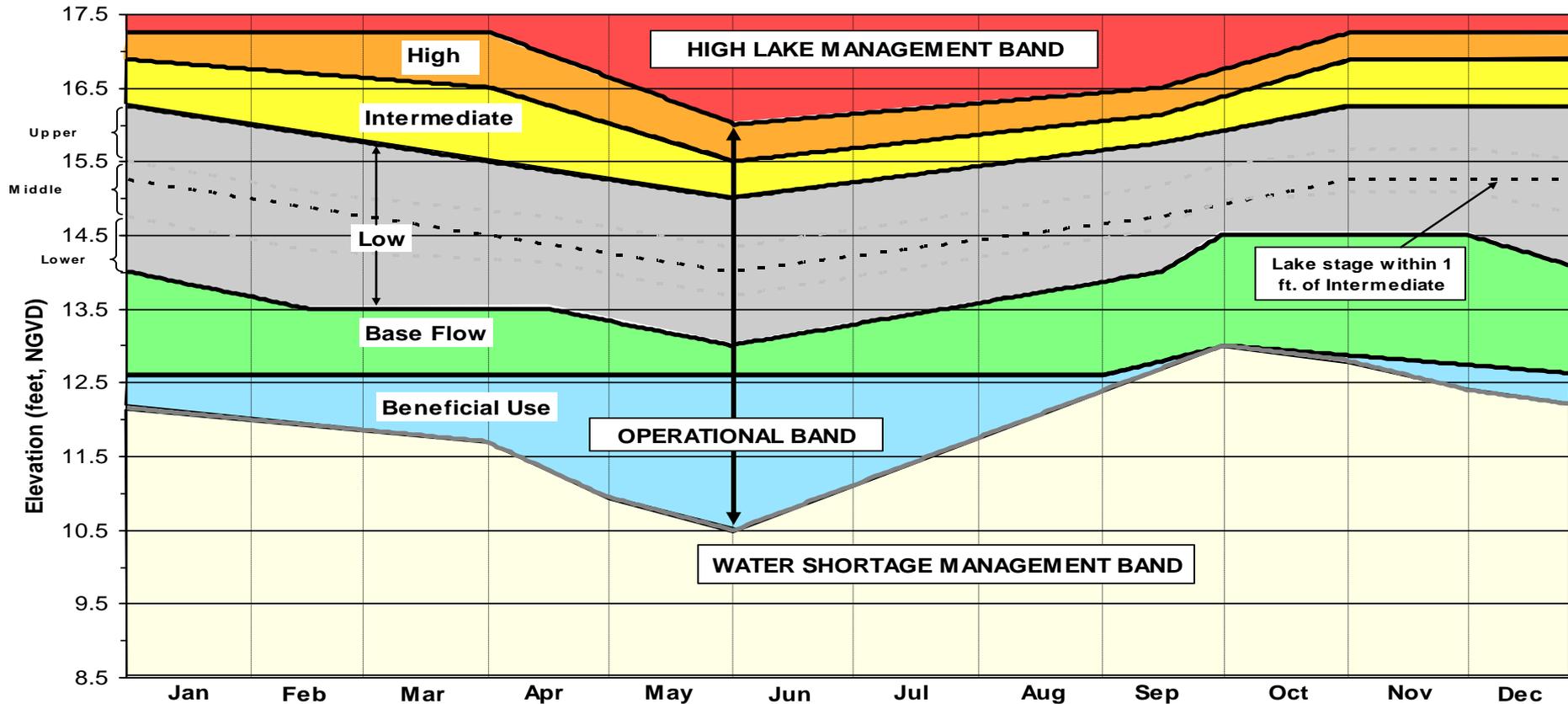
Herbert Hoover Dike Rehabilitation



HERBERT HOOVER DIKE (HHD) TENTATIVELY SELECTED PLAN FEATURES BY COMMON INUNDATION ZONES



Features of the 2008 Lake Okeechobee Interim Regulation Schedule (LORS-2008)



NOTES:

- High Lake Management Band:** Outlet canals may be maintained above their optimum water management elevations.
- Operational Band:** Outlet canals should be maintained within their optimum water management elevations.
- Water Shortage Management Band:** Outlet canals may be maintained below optimum water management elevations.

CENTRAL AND SOUTHERN FLORIDA PROJECT

2008 LAKE OKEECHOBEE
INTERIM REGULATION SCHEDULE
PART B

DATED: March 2008
DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT
CORPS OF ENGINEERS, JACKSONVILLE, FLORIDA

2008 LORS

Part D: Establish Allowable Lake Okeechobee Releases to Tide (Estuaries)

Note: This operational guidance provides essential supplementary information to be used in conjunction with other supporting documentation including text within the Water Control Plan.

When conducting Base Flow releases, flows can be distributed East and West up to 650 cfs as needed to minimize impacts or provide benefits through S-80 and S-79

Apply Meteorological Forecasts on a Weekly Basis; apply Seasonal and Multi-Seasonal Climate/Hydrologic Outlooks on a Monthly Basis

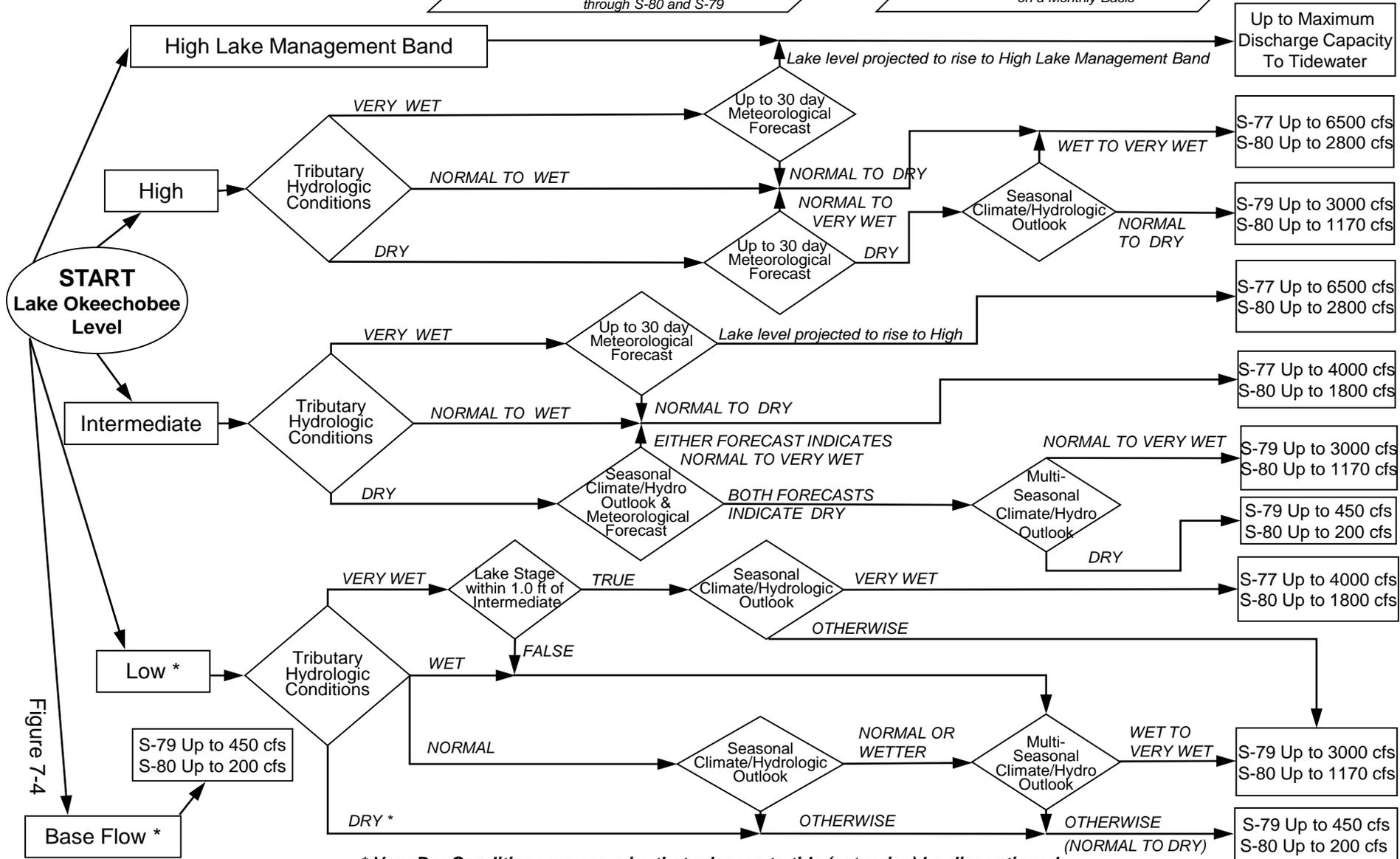


Figure 7-4

2008 LORS

Part C: Establish Allowable Lake Okeechobee Releases to the Water Conservation Areas

*Apply Multi-Seasonal
Climate/Hydrologic Outlooks
on a Monthly Basis*

*Apply Tributary
Condition
Criteria Daily*

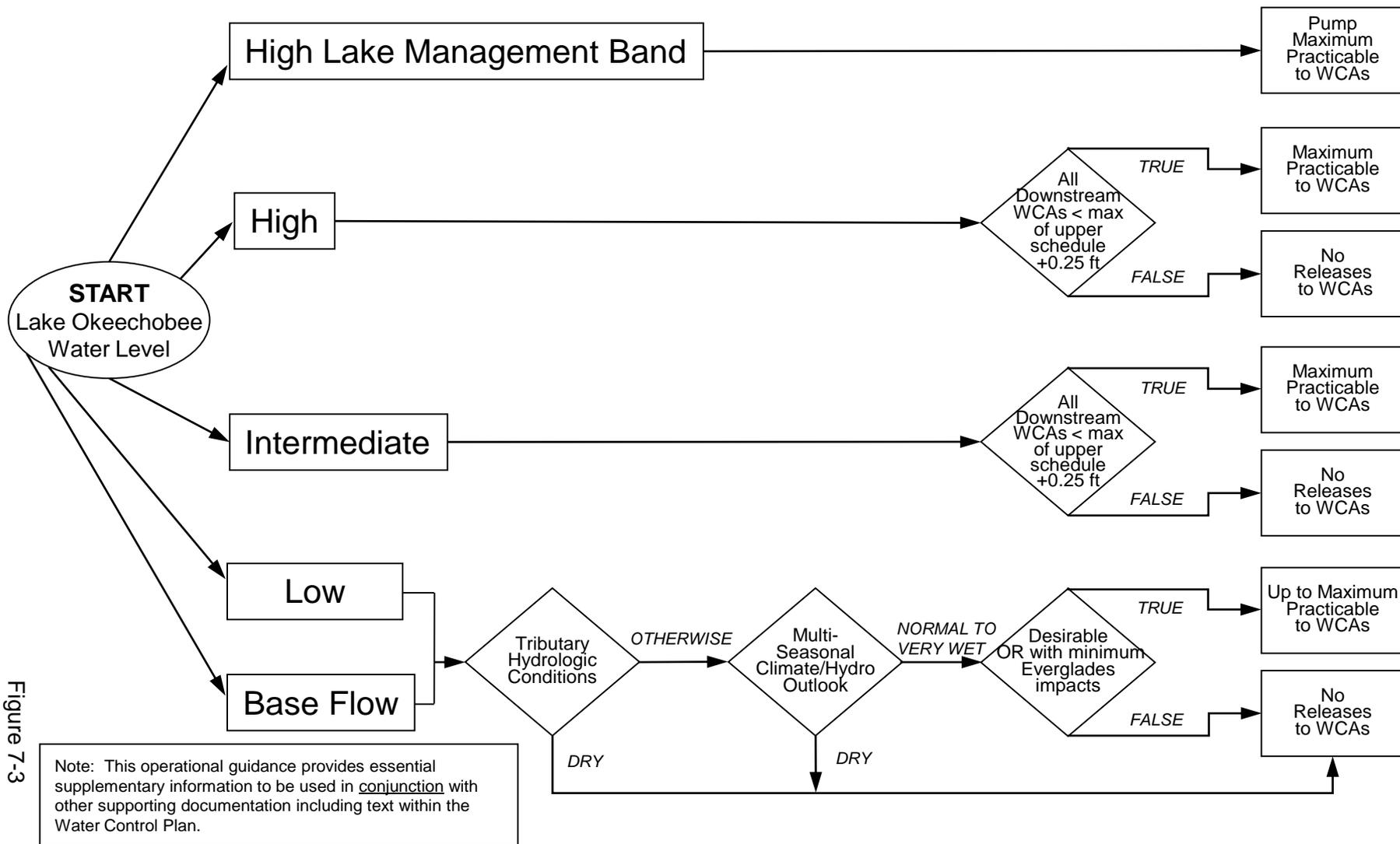
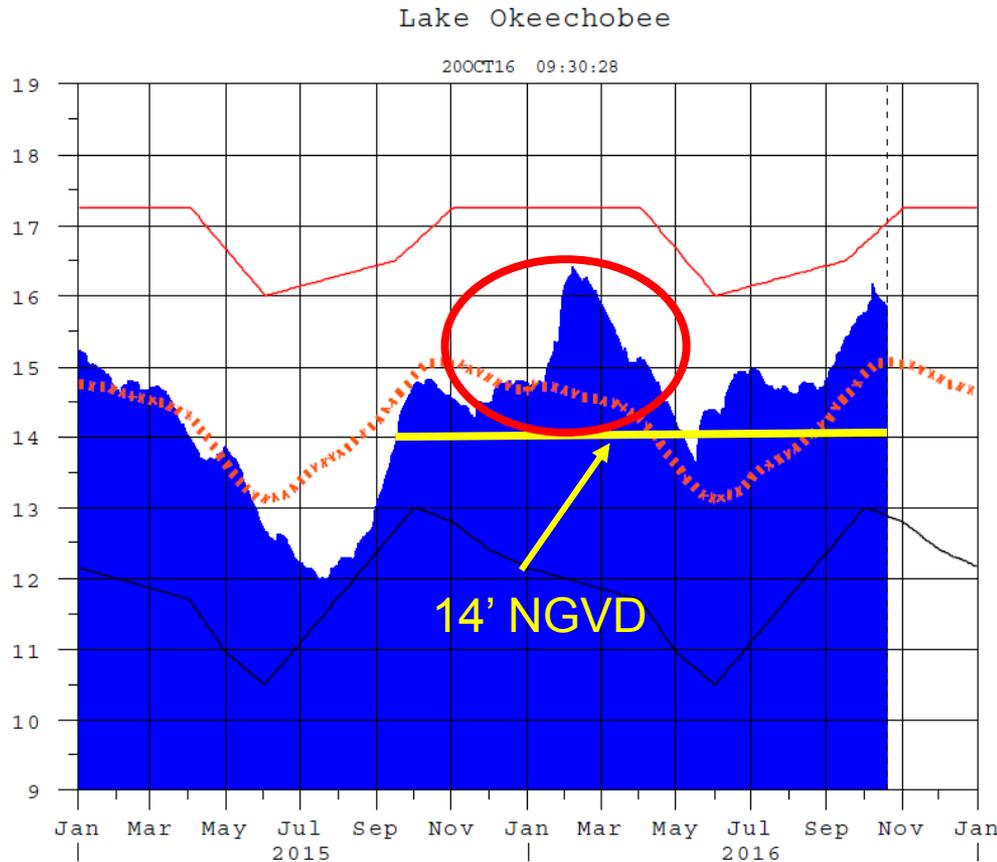


Figure 7-3

Lake Okeechobee Water Levels

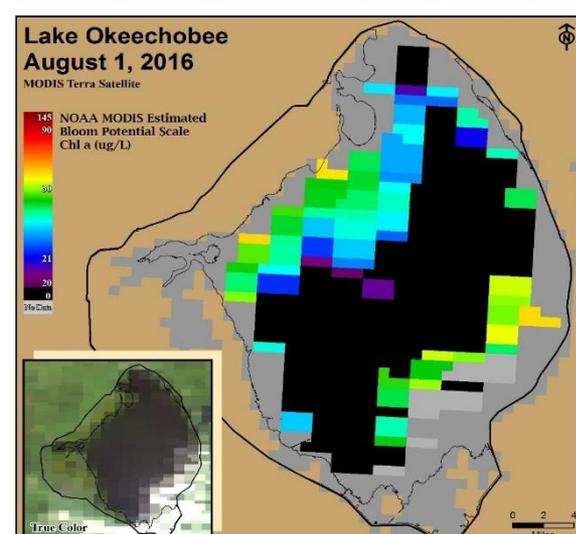
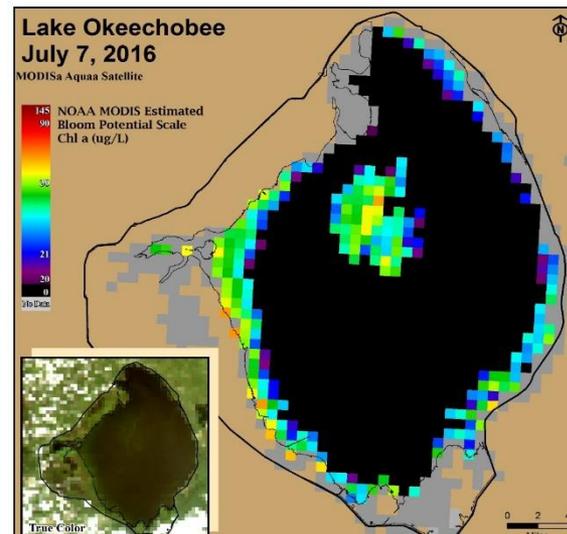
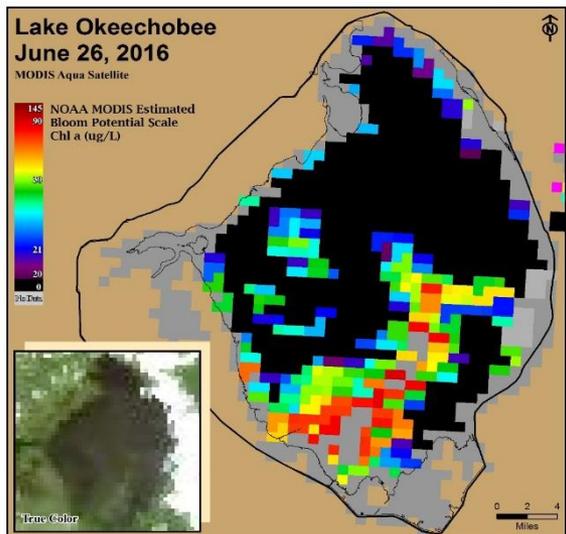
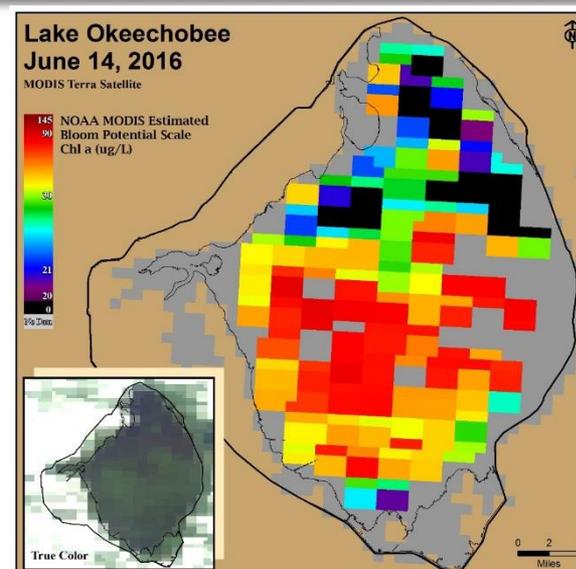
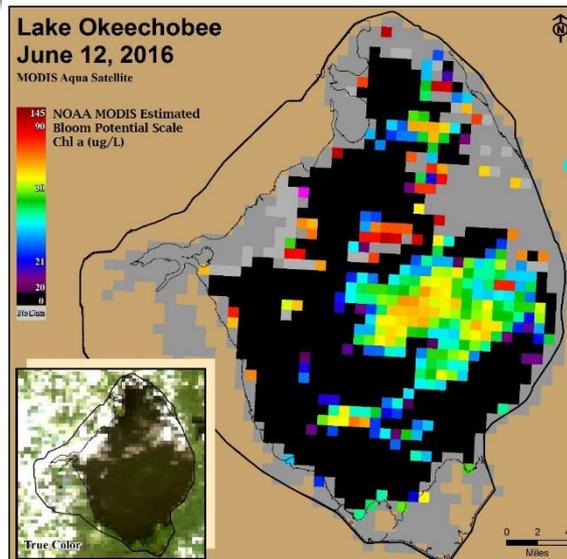
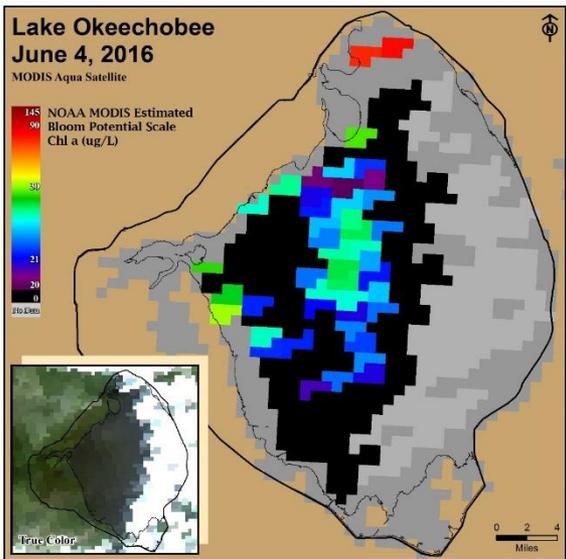


Lake Okeechobee had been above 14' NGVD almost continuously for 10 months (since September 2015)

- El Nino rainfall resulted in high lake stages in Winter and Spring
- Army Corps of Engineers made discharges to Caloosahatchee and St. Lucie to gain lake storage for hurricane season
- WCAs were above regulation schedule
- Smaller discharges to L-8 Canal to C-51 Canal

Lake Okeechobee Algal Blooms

NOAA - Unvalidated and Experimental Data



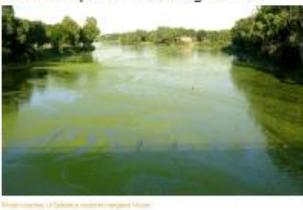
Blue-Green Algal Blooms

- Algal blooms are naturally occurring – common in summer and can appear in any body of water at any time when the right conditions occur
- Blue-green algae (cyanobacteria) can, but do not always, produce toxins that can be harmful to humans, pets and wildlife
- Elevated nutrient levels are principal cause of blue-green algal blooms
- Other factors include warm temperatures and stagnant conditions
- Microcystis is a freshwater algae, that can persist in the freshwater discharges, but dies at higher salinities

EPA United States Environmental Protection Agency
July, 2016

Freshwater HABs News

Blooms, Blooms and more Blooms!!! Press releases

<p>Florida - officials declared a state of emergency in four counties.</p> 	<p>Ohio – non-toxic algae bloom on Maumee River and parts of the Auglaize River</p> 
<p>California -algae bloom in Discovery Bay and Pyramid Lake</p> 	<p>New York - harmful algal bloom in Owasco Lake</p> 
<p>Utah - algal bloom in Utah Lake and the Jordan River</p> 	<p>North Dakota – microcystin in Bowman-Haley Reservoir and Paterson Lake</p> 

Blue-Green Algal Blooms



S-155 in Central Palm Beach County

- Blue-green algae blooms are buoyant. Wind and currents often form slicks that collect along the shoreline
- No effective treatment measures to manage blooms in the short term
- Visible blooms can appear one day and vanish the next
- Difficult to track

Blue-Green Algae Toxicity Testing

- Blue-green algae may or may not contain toxins – cannot tell simply by appearance, requires specialized testing
- No federal or state water quality standards for cyanobacteria toxins
- Levels under 10 micrograms per liter considered a low-level health risk from short term recreational exposure
- Sampling results reported on DEP's statewide tracking system
 - Samples taken by DEP or SFWMD
 - Samples analyzed by DEP
 - Algae identification
 - Microcystin



Summa Beach – Microcystin of 1.1 ug/L in one sample; 2nd sample not detected ; June, 2016

DEP News Florida's Environmental

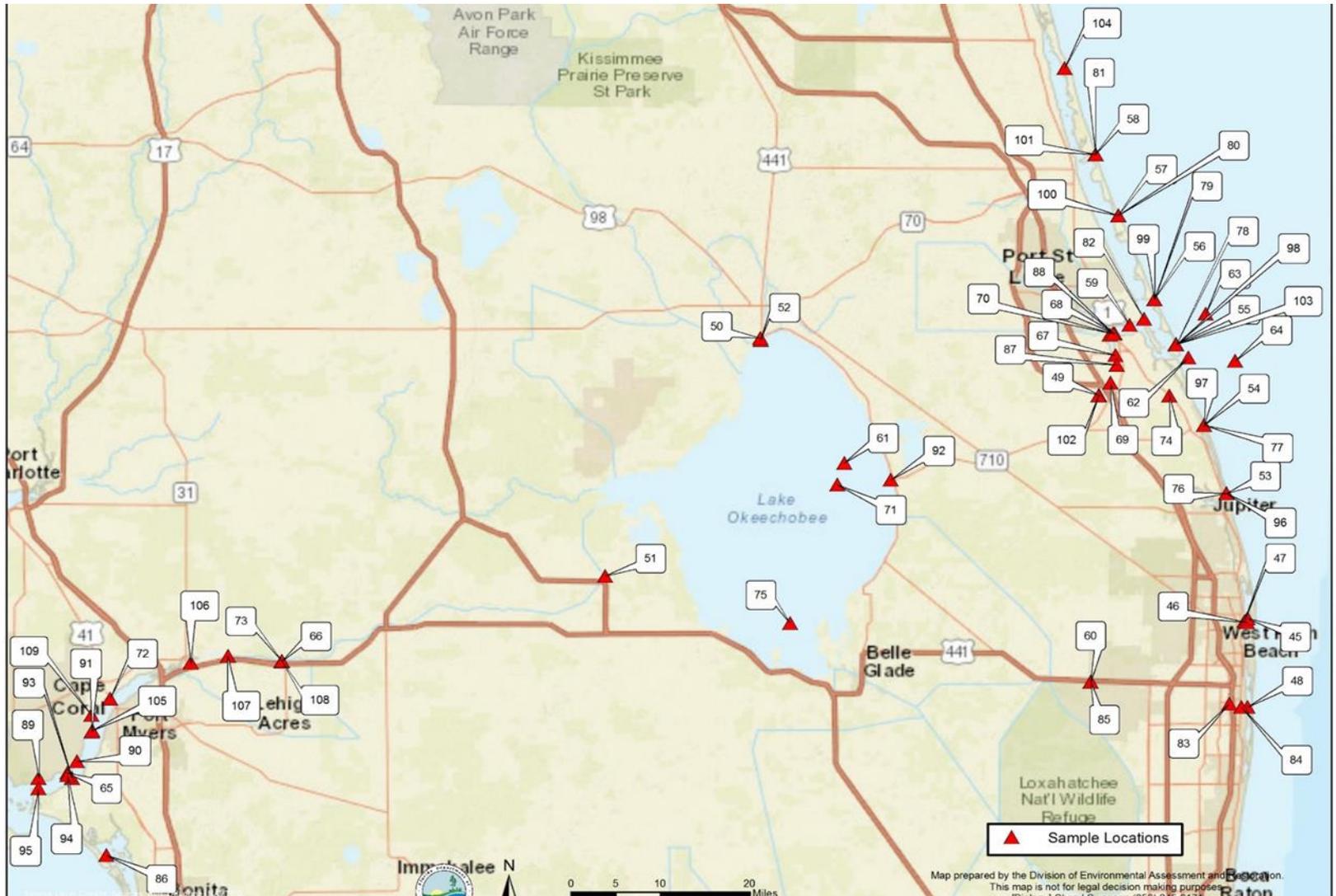
DEP 101 HOT TOPICS ARTICLES DEP RESOURCES CONTACTS DEP HOMEPAGE

South Florida Algal Bloom Monitoring and Response

REPORT ALGAL BLOOMS:
Call 855-305-3903
or [CLICK HERE](#)

ALGAL BLOOM INNOVATIVE TECHNOLOGY REVIEW PORTAL:
[CLICK HERE](#)

DEP Sampling Sites



Map prepared by the Division of Environmental Assessment and Restoration.
This map is not for legal decision making purposes.

Palm Beach County Blooms



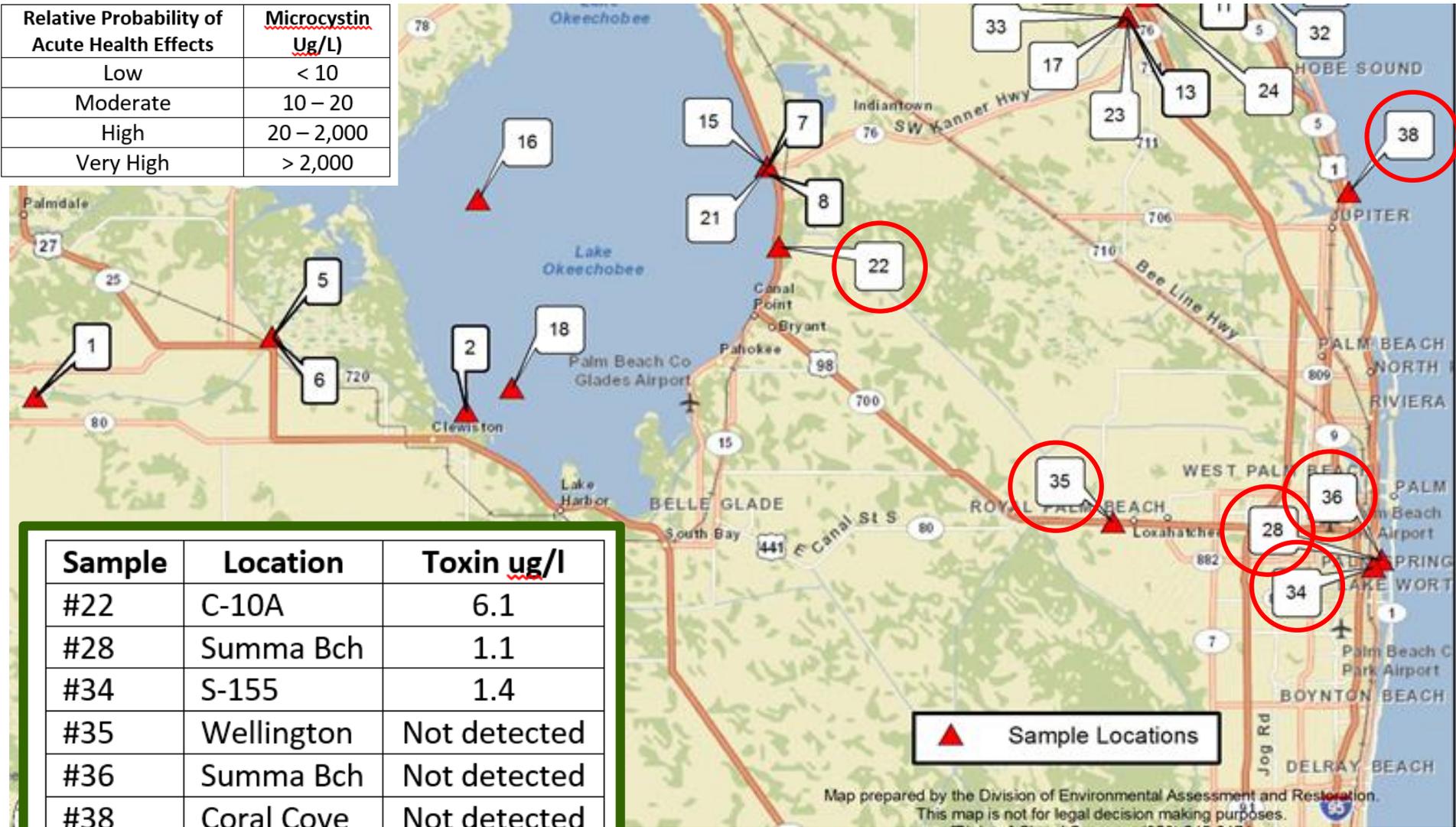
C-51 Canal near STA 1-East



Summa Beach in West Palm Beach

Palm Beach County June Sampling Results

Relative Probability of Acute Health Effects	Microcystin Ug/L)
Low	< 10
Moderate	10 – 20
High	20 – 2,000
Very High	> 2,000



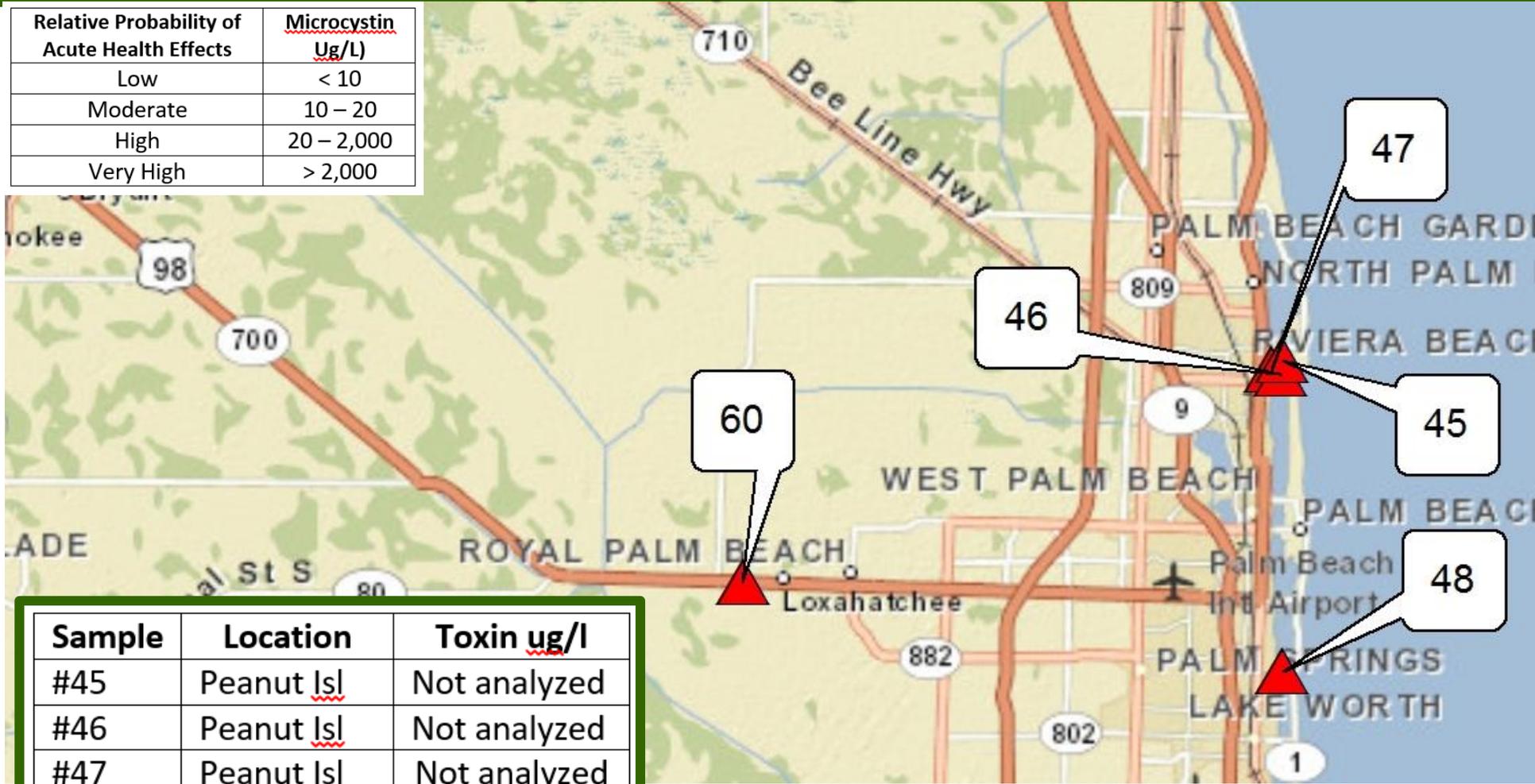
Sample	Location	Toxin ug/l
#22	C-10A	6.1
#28	Summa Bch	1.1
#34	S-155	1.4
#35	Wellington	Not detected
#36	Summa Bch	Not detected
#38	Coral Cove	Not detected

▲ Sample Locations

Map prepared by the Division of Environmental Assessment and Restoration. This map is not for legal decision making purposes.

Palm Beach County July Sampling Results

Relative Probability of Acute Health Effects	Microcystin Ug/L)
Low	< 10
Moderate	10 – 20
High	20 – 2,000
Very High	> 2,000



Sample	Location	Toxin ug/l
#45	Peanut Isl	Not analyzed
#46	Peanut Isl	Not analyzed
#47	Peanut Isl	Not analyzed
#48	C-51 / LWL	Not detected
#60	C-51 / Well.	6.3

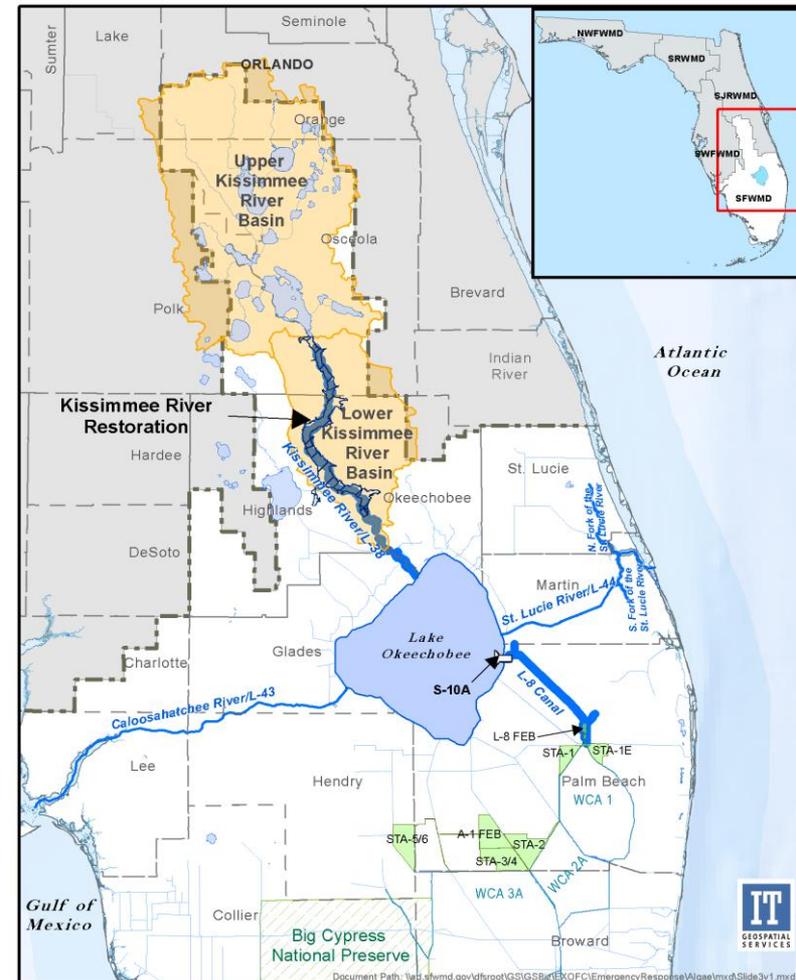
District Response to Emergency Order: Three-Part Approach

- Temporary operational measures
 - Kissimmee Chain of Lakes operations
 - Moved water south via L-8 and C-51
 - Exercised operational flexibility
- Expedited projects on public lands
 - DuPuis Wildlife Management Area
 - Section C Water Farm located in the C-23/C-24 Basin
- Temporary measures on private lands
 - Florida Power and Light's cooling pond
 - Emergency pumping at Bluefield Grove, Sunrise Grove and Caulkins Citrus



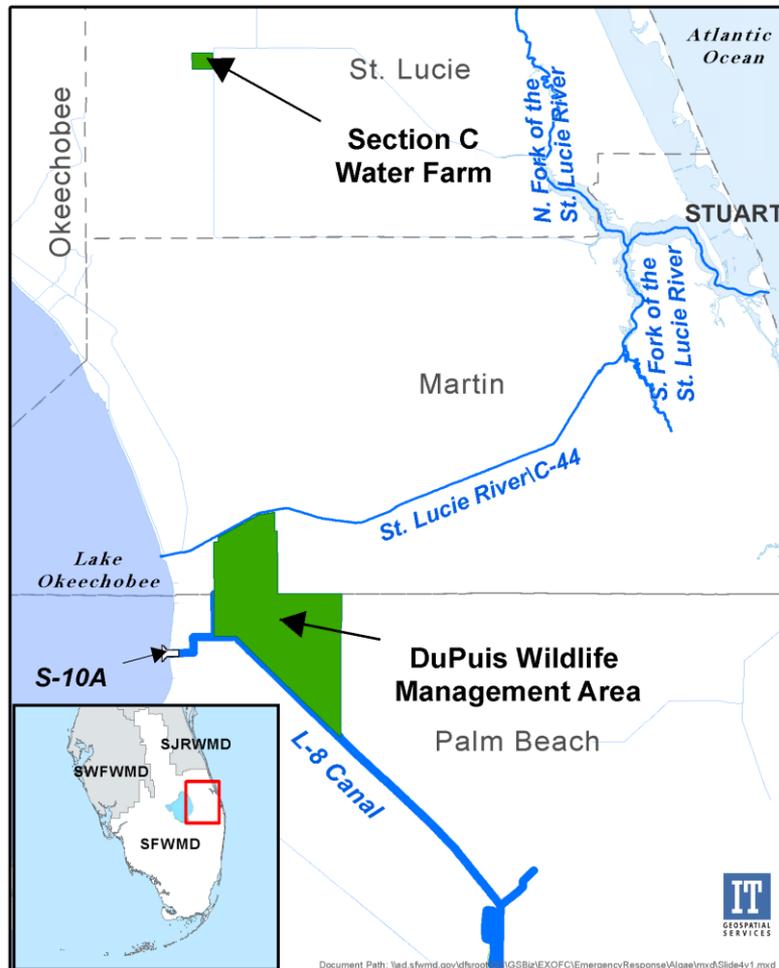
Temporary Operational Measures

- Held additional water in the Kissimmee Chain of Lakes
 - Slows flow of water into Lake Okeechobee
 - Reduction in volumes east/west
- Increased Lake Okeechobee discharges to the south
 - Optimized water flow south through the L-8 and C-51 canals
 - Discharges to STAs/FEB/WCAs



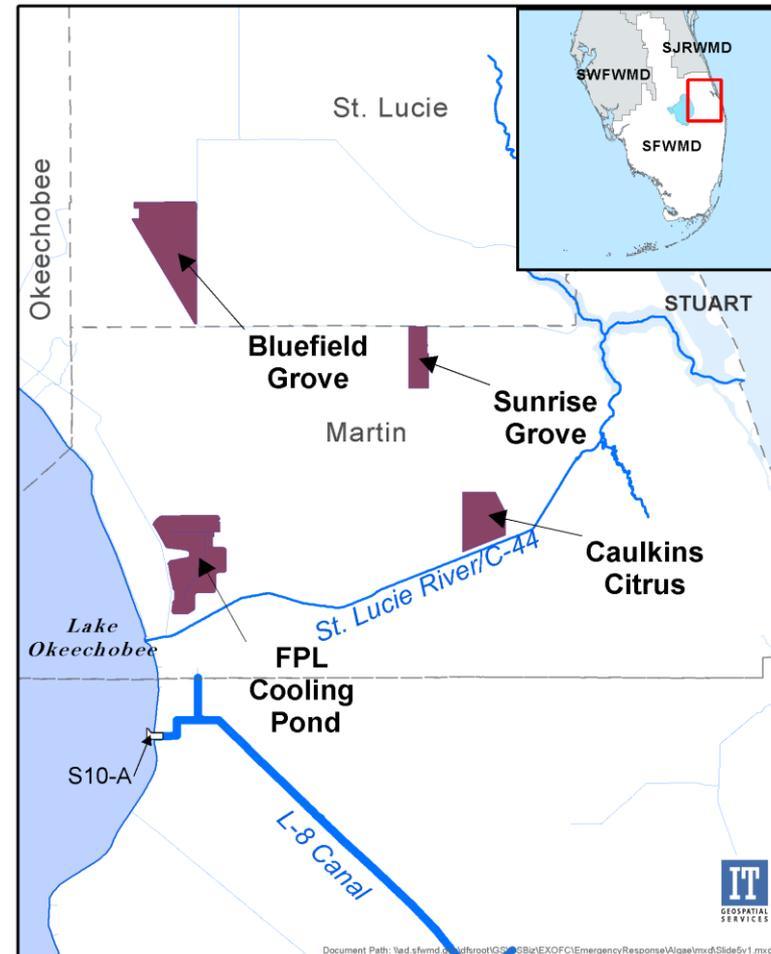
Expedited Dispersed Storage and Retention Projects on Public Lands

- DuPuis Wildlife Management Area - Dispersed Water Mgmt
 - Expedited implementation of water management measures necessary to better manage stormwater runoff
- Water Farm on Section C in the C-23/C-24 Basin
 - Expedited construction of a 320-acre impoundment next to C-23 Canal
 - Board approved \$2.6 million in emergency funding
 - DEP and ACOE permits issued



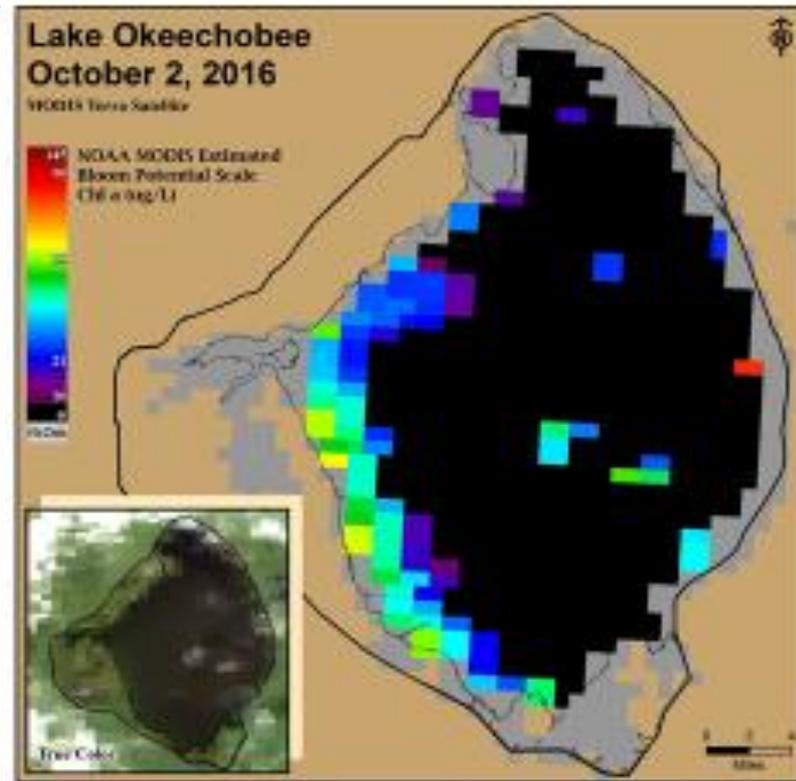
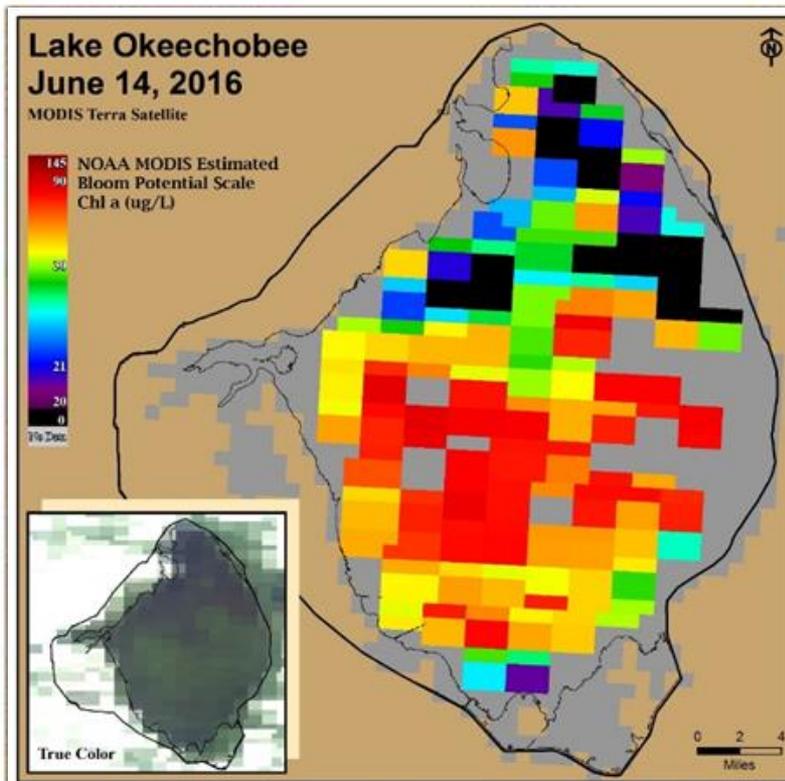
Temporary Emergency Actions on Private Lands

- Florida Power and Light's Martin County Cooling Reservoir
 - Temporarily stored Lake Okeechobee water withdrawn from the C-44 Canal (~2.2 billion gallons per month)
 - Storage continued for approximately three months
- Emergency pumping at Bluefield Grove, Sunrise Grove and Caulkins Citrus
 - Stormwater retained onsite within existing water management facilities
 - Consistent with agricultural operations
 - Did not supersede the landowners' ability to provide flood protection



Current Conditions

Unvalidated and Experimental Data



Summary



- Blue-green algae blooms persisted in Lake Okeechobee over the summer
- Visible blue green algae is not always toxic
- No significant toxin levels reported in water samples collected in Palm Beach County
- No reported blooms in Broward County
- Discharges at C-51 were pulsed in coordination with tidal cycles to minimize potential for algae build up in the Lake Worth Lagoon

How to Report a Bloom



Lake Okeechobee near Ritta Island

- If you spot a bloom, call the Department of Environmental Protection's bloom reporting hotline at 855-305-3903 or visit
 - <https://depnewsroom.wordpress.com/algal-bloom-monitoring-and-response/>

Discussion



Lake Okechobee near Pahokee