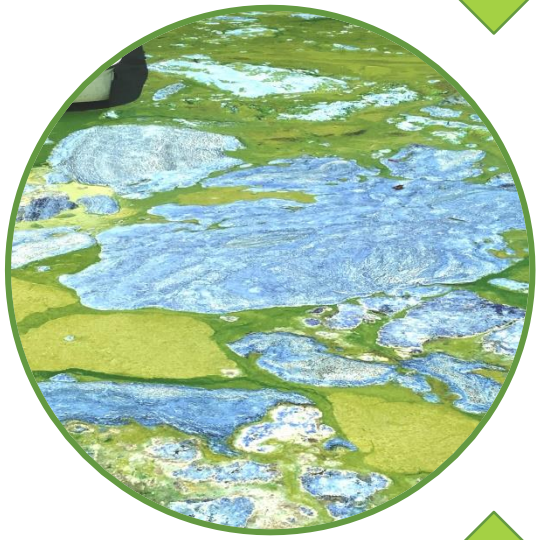


Harmful Algal Blooms & Our Water

Environmental Legislation and Policy

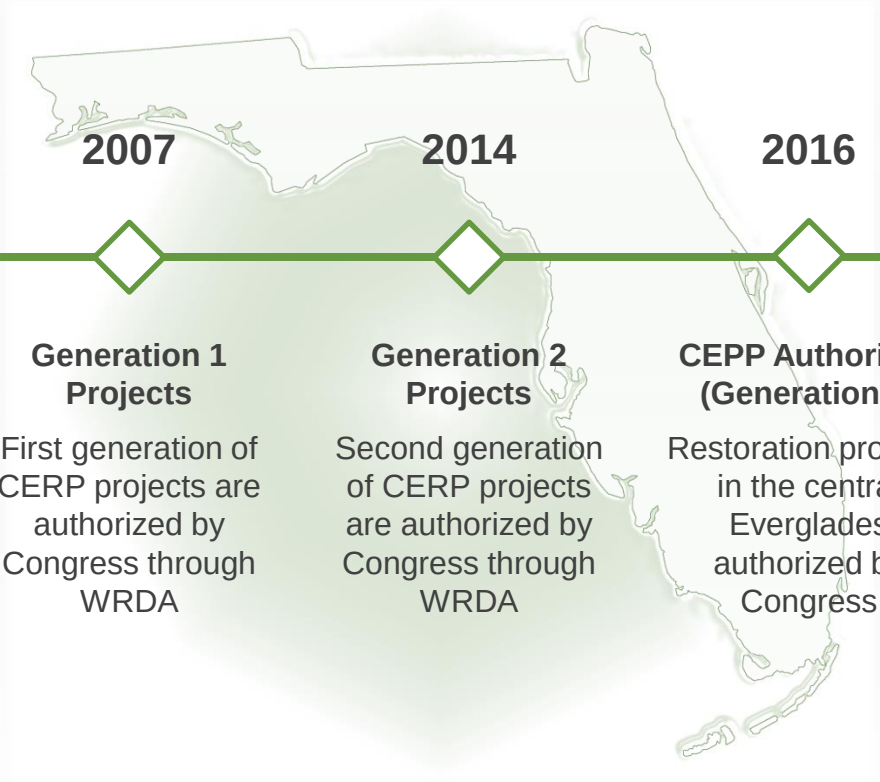
Overview of critical laws and congressional authorizations



1. **Clean Water Act** — 1972 – established basic regulatory standards for discharges of pollutants into WOTUS and for surface waters via (NPDES permits)
2. **HAB Law** — 1998 - Harmful Algal Bloom and Hypoxia Research and Control Act first authorized by Congress and included appropriations
3. **WRDA** — 2000 – Water Resources Development Act authorized CERP and Army Corps projects including Everglades and Lake Okeechobee
4. **Water Transfer** — 2008 - The “Water Transfer Rule” codified a longstanding EPA policy that all WOTUS are unitary and are exempt from CWA permits
5. **Do No Harm Act** — 2018 – The “Federal Do No Harm Act” is authorized and WRDA is reauthorized with appropriations and new provisions

CERP Timeline

Comprehensive Everglades Restoration Plan congressional authorization history



2000

CERP Authorized

CERP is authorized and is the largest environmental restoration program in history

2007

Generation 1 Projects

First generation of CERP projects are authorized by Congress through WRDA

2014

Generation 2 Projects

Second generation of CERP projects are authorized by Congress through WRDA

2016

CEPP Authorized (Generation 3)

Restoration projects in the central Everglades authorized by Congress

2018

EAA Reservoir Authorized

Everglades Ag. Area storage reservoir authorized via America's Water Infrastructure Act

State Initiative

New Executive Order from Governor DeSantis

Executive Order 19-12

- $2.5 billion over 4 years for Everglades restoration & protection ($1 billion increase)
- Blue-Green Algae Task Force to focus on algae bloom reduction
- SFWMD start next phase of EAA
- Office of Environmental Accountability and Transparency
- Appointment of a Chief Science Officer

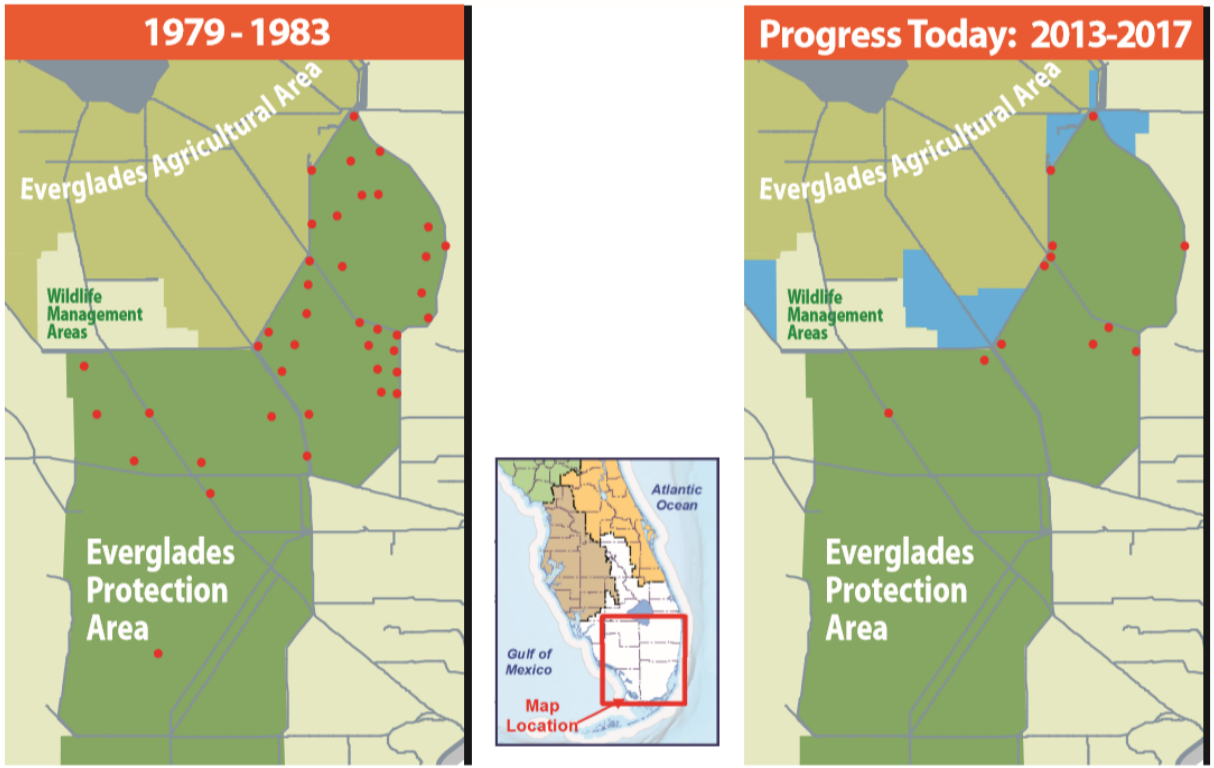


Future Project Outlook

- ✓ **SFWMD** – investigating deep well injection solution via exploratory well
- ✓ **Army Corps of Engineers** – evaluate / modify LORS Schedule
- ✓ **Florida Legislature** – fund septic-to-sewer conversions along the IRL
- ✓ **Congress** – Fund EAA Reservoir / Prioritize CREP and CEPP projects
- ✓ **NOAA / CDC** – Research and conduct tests involving human health
- ➢ **Stuart**?

Phosphorus control programs over the last 20 years have significantly improved Everglades water quality.

Florida has invested more than $1.8 billion in water quality improvements aimed at lowering phosphorus levels. Today, as a result of Florida's efforts, concentrations within the Everglades have positively responded and are now at 10 ppb.



Red dots show areas with levels of phosphorus measuring over 10 parts per billion prior to restoration efforts and today with most areas restored to ecologically healthy water quality.

The monitoring stations above the 10 ppb continue to make significant progress in achieving that standard. Water in Everglades National Park now meets the standard.

FROM 24 PARTS PER BILLION TO 9 PARTS PER BILLION: The reduction in average phosphorus concentrations in water within the Everglades over the past two decades.

Aquifer Confinement & Injection Wells

Data provided by the USGS

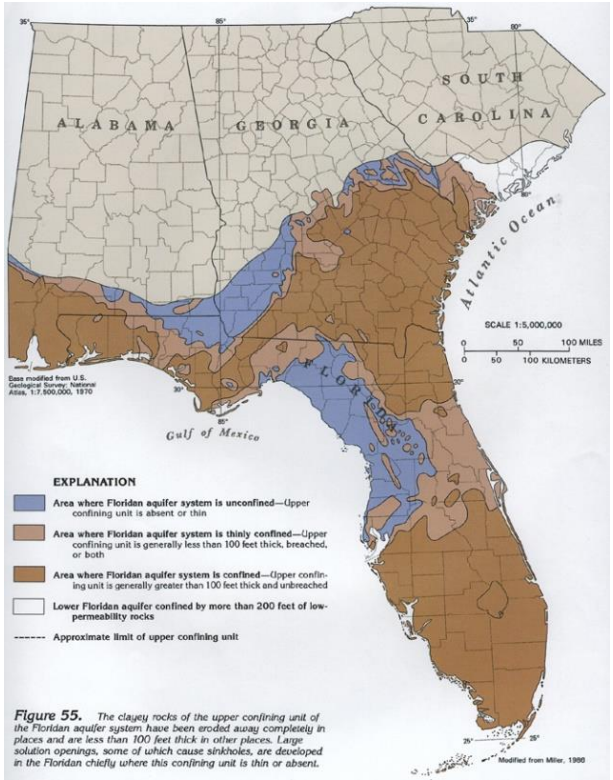


Figure 55. *The clayey rocks of the upper confining unit of the Floridan aquifer system have been eroded away completely in places and are less than 100 feet thick in other places. Large solution openings, some of which cause sinkholes, are developed in the Floridan chiefly where this confining unit is thin or absent.*

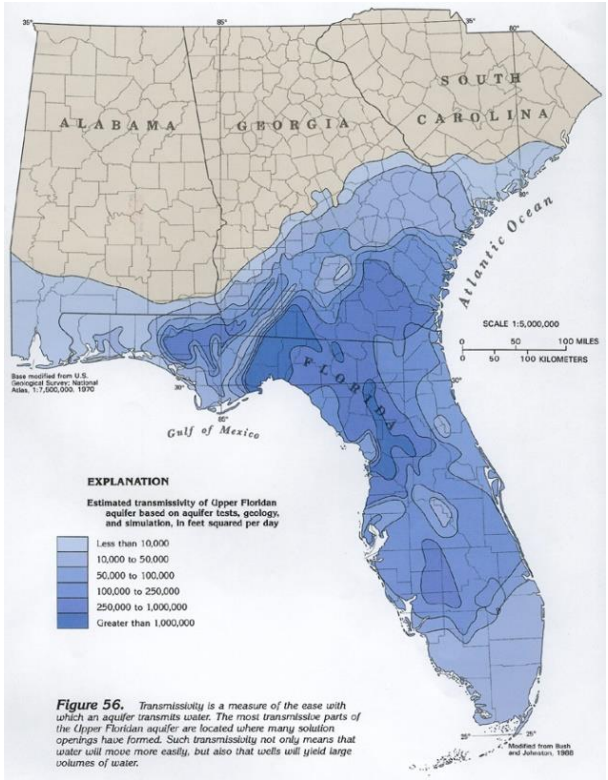


Figure 56. *Transmissivity is a measure of the ease with which an aquifer transmits water. The most transmissive parts of the Upper Floridan aquifer are located where many solution openings have formed. Such transmissivity not only means that water will move more easily, but also that wells will yield large volumes of water.*

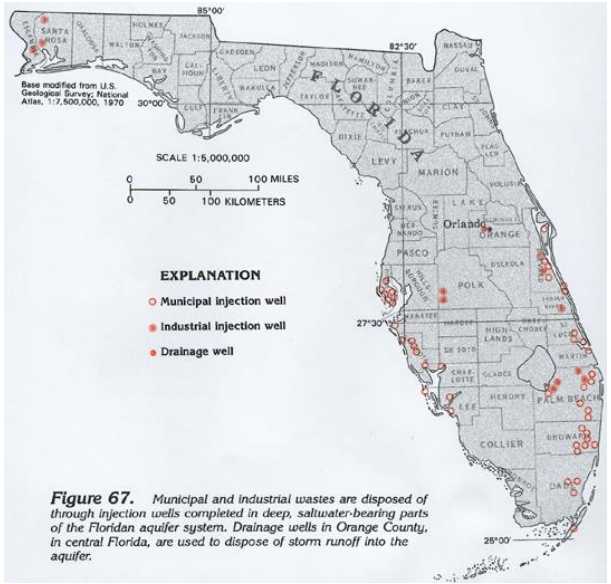


Figure 67. *Municipal and industrial wastes are disposed of through injection wells completed in deep, saltwater-bearing parts of the Floridan aquifer system. Drainage wells in Orange County, in central Florida, are used to dispose of storm runoff into the aquifer.*

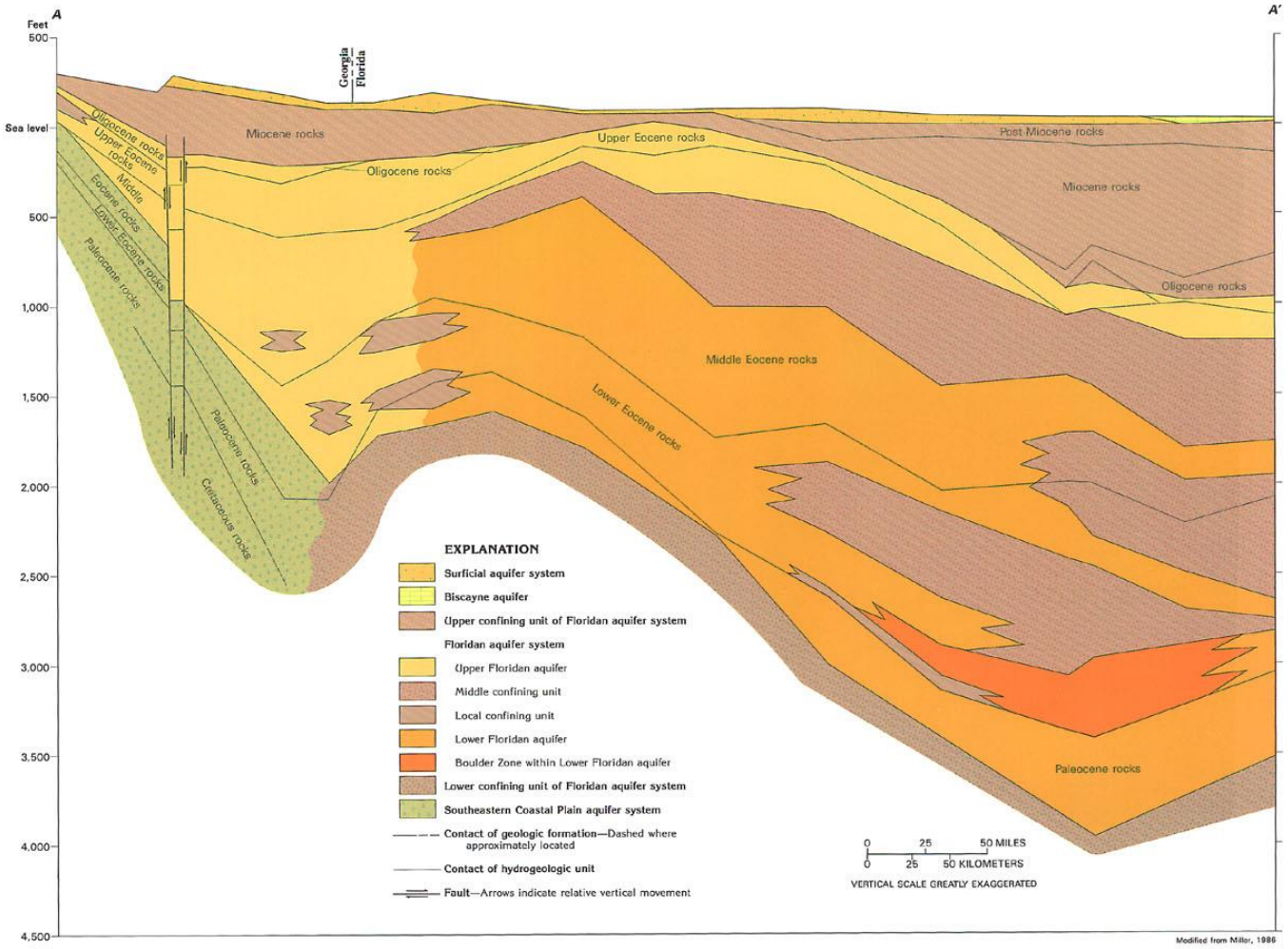
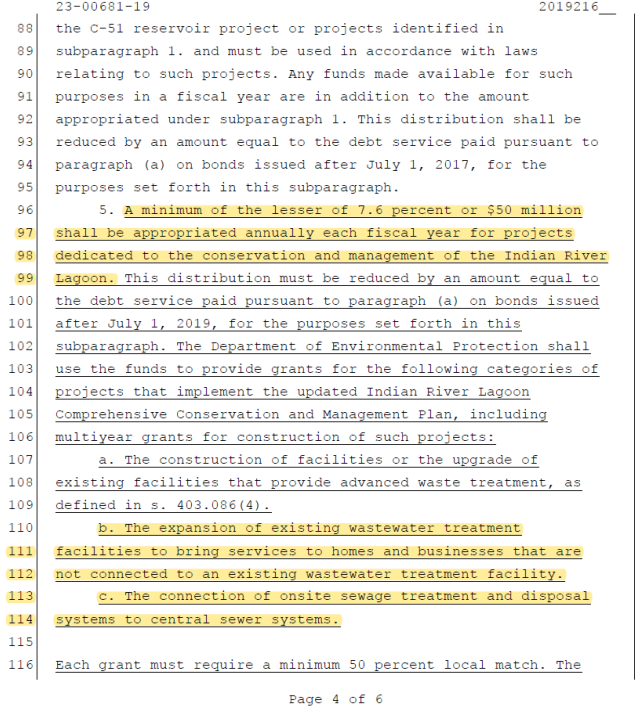


Figure 52. *The Floridan aquifer system changes significantly from south-central Georgia to southern Florida. Aquifers and confining units in the system thicken and thin from well to well, and generally resemble complexly interfingering, lens-shaped bodies of rock. The line of the hydrogeologic section is shown in figure 51.*

Septic “Crackdown”

A Legislative Priority for the Interim

- 2.6 million homes in State
- 600,000 homes around IRL
- 10,000 homes identified in MC
- 1,000 homes identified in Stuart
- Avg. per-home conversion cost between $15,000 to $20,000



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the C-51 reservoir project or projects identified in subparagraph 1. and must be used in accordance with laws relating to such projects. Any funds made available for such purposes in a fiscal year are in addition to the amount appropriated under subparagraph 1. This distribution shall be reduced by an amount equal to the debt service paid pursuant to paragraph (a) on bonds issued after July 1, 2017, for the purposes set forth in this subparagraph.

5. A minimum of the lesser of 7.6 percent or $50 million shall be appropriated annually each fiscal year for projects dedicated to the conservation and management of the Indian River Lagoon. This distribution must be reduced by an amount equal to the debt service paid pursuant to paragraph (a) on bonds issued after July 1, 2019, for the purposes set forth in this subparagraph. The Department of Environmental Protection shall use the funds to provide grants for the following categories of projects that implement the updated Indian River Lagoon Comprehensive Conservation and Management Plan, including multiyear grants for construction of such projects:

a. The construction of facilities or the upgrade of existing facilities that provide advanced waste treatment, as defined in s. 403.086(4).

b. The expansion of existing wastewater treatment facilities to bring services to homes and businesses that are not connected to an existing wastewater treatment facility.

c. The connection of onsite sewage treatment and disposal systems to central sewer systems.

Each grant must require a minimum 50 percent local match. The

Page 4 of 6

Dr. Gilmore – Endangered Species

Research and Scope of Work

- ✓ **Phase I** – Listing Procedures
- ✓ **Phase II** – Data Collection
- ✓ **Phase III** – Data Analysis
- ✓ **Phase IV** – Produce Detailed Species Account
- ✓ **Phase V** – Presentation of Accounts and Arguments
- ✓ **Phase VI** – Travel to Washington D.C. for Review Panels

Total cost - $121,520

Species Listing

1. Mountain Mullet, *Dajao* (*Agonostomus) monticola*,
2. Opossum Pipefish, *Microphis brachyurus lineatus*,
3. Swordspine Snook, *Centropomus ensiferus*,
4. Burrow Grunt, *Pomadasys crocro*,
5. Bigmouth Sleeper, *Gobiomorus dormitor*,
6. River Goby, *Awaous banana*,
7. Slashcheek Goby, *Ctenogobius pseudofasciatus*,
8. Violet Goby,*Gobioides broussonetii*.











Watershed Restoration & Protection / Pilot Projects:

- Poppleton Creek
- Haney Creek
- Algae diversion at Shepard Park
- Future projects?



Gauging Engagement

Communicating with the public and external agencies

How involved should we be and what do we prioritize?

Local Projects

Work to ensure that all local contributions to environmental pollution and degradation is mitigated

Public Awareness

Provide critical information to the public during emergencies and broaden awareness

Policy Advocacy

Communicate with all levels of government regarding immediate needs and long term solutions



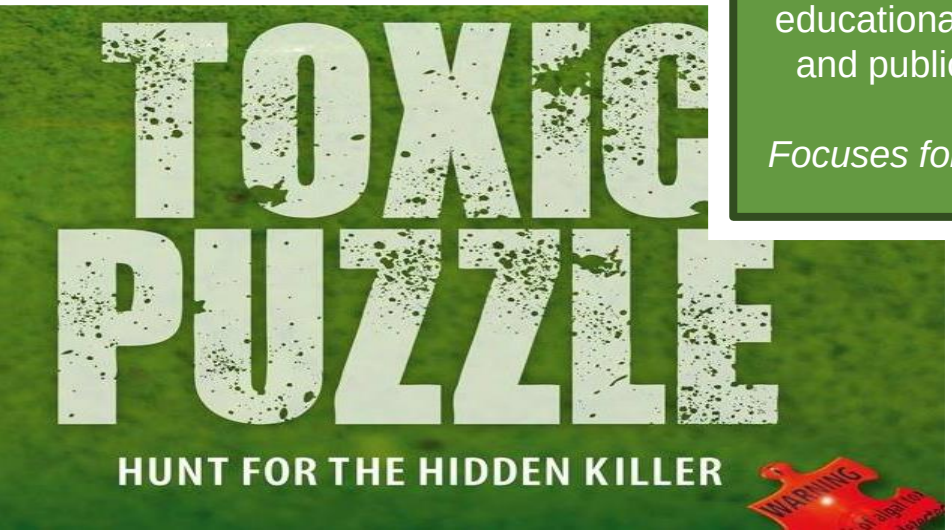




Public Information

Awareness campaigns, community events, educational materials, and public signage.

Focuses for the future?



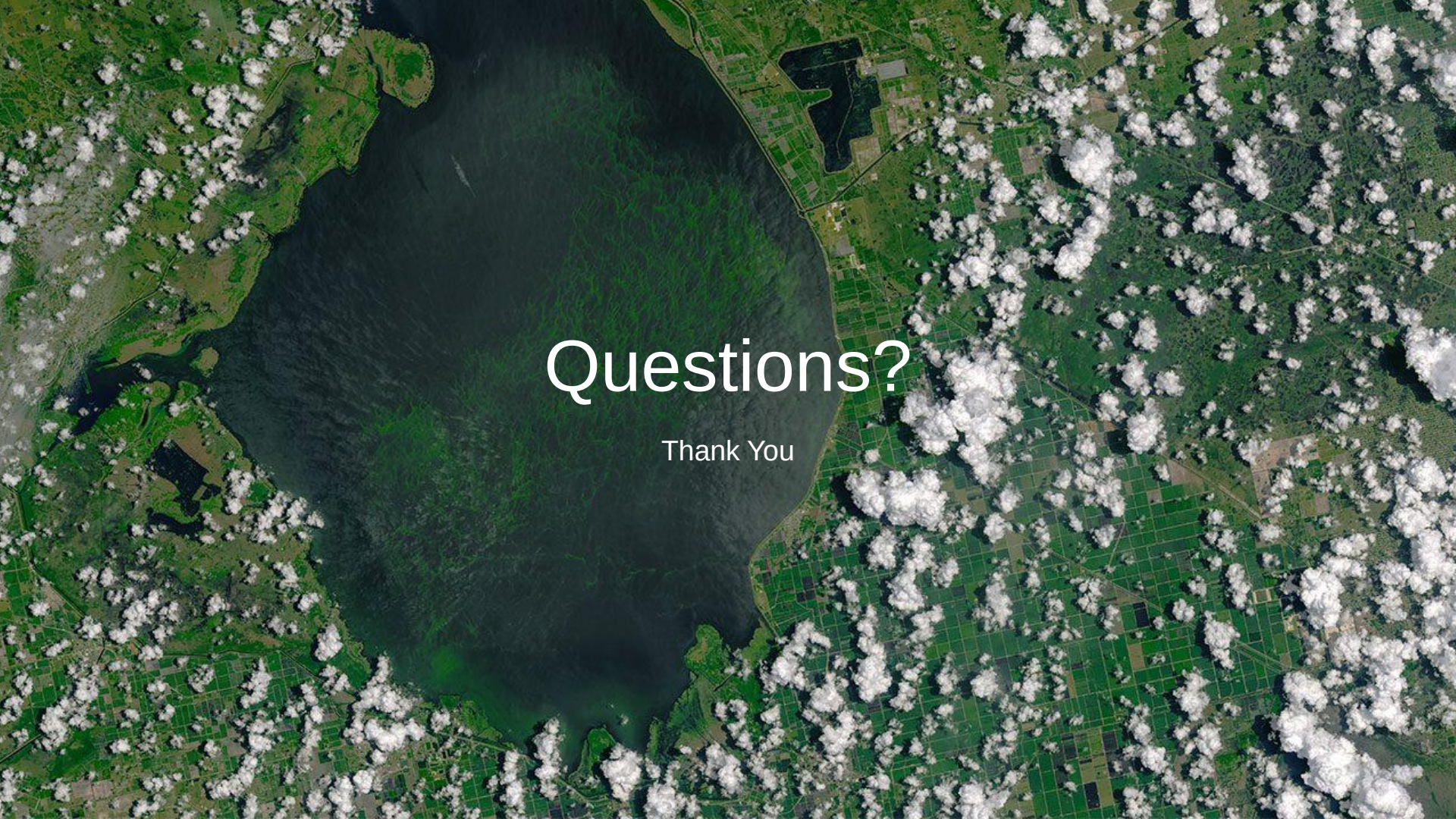


Priorities for the Future

Grants, Programs, and Projects

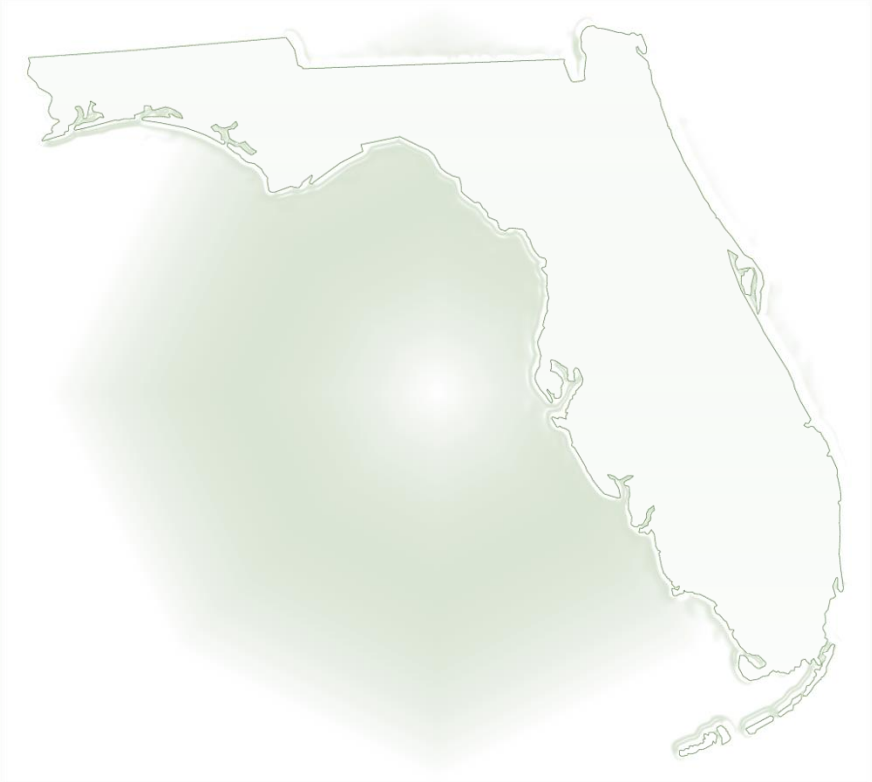
- DEP / State grants
- IRLC Grants
- Emergency Management
- Legislative Advocacy
- Endangered Species
- Local Projects and Water quality monitoring




Questions?
Thank You

Reference Section

Following slides are for educational purposes



Marine Algae

(Seaweed, kelp, and other non-plant cellular organisms)



Green Algae – "*Chlorophyta*" consist of more than 4,000 species (new classification), typically found in shallow bodies of water.



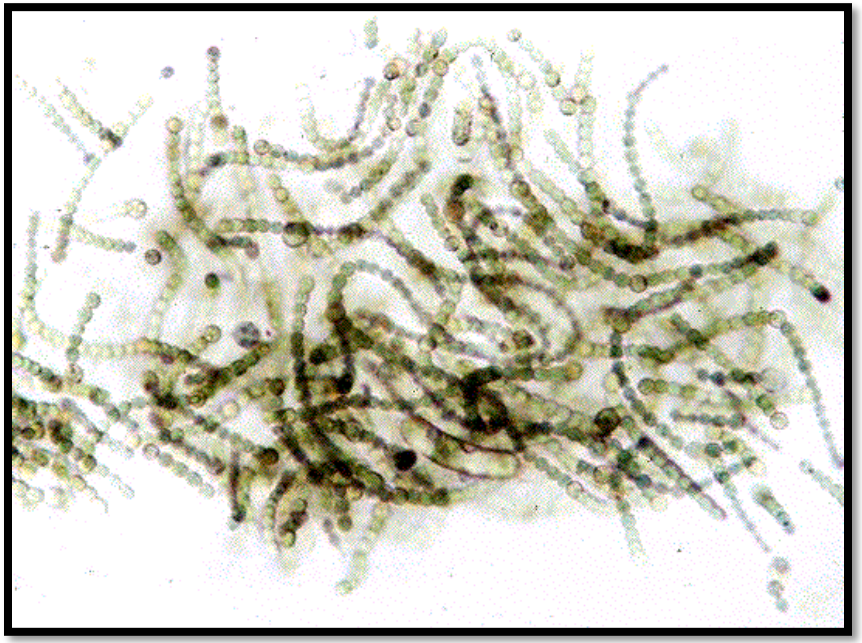
Red Algae – "*Rhodophyta*" consist of more than 6,500 species of which 200 are freshwater based. (Red Tide specifically linked to *Karenia brevis* – an algae that produces brevetoxin*).*



Brown Algae – "*Phaeophyta*" consist of more than 1,500 species and the most complex of algae variations.

Blue Green Algae (BGA)

"Cyanobacteria" aka *Cyanophyta*



- Simplest form of algae (many unicellular) with tens of thousands of known species
- Not all BGA produce toxins
- Toxins released when cell wall is ruptured or cellular decay occurs
- Microcystin (hepatotoxin) primary known toxin can be absorbed through skin contact, ingestion, and/or inhalation

Known Algae Toxins

Toxin Types	Examples	Effects
Neurotoxins	Anatoxin-a, Anatoxin-a(s), Saxitoxin, Neosaxitoxin	Affects central nervous system, causes seizures, paralysis, respiratory failure, and death
Hepatotoxins	Microcystins, Nodularins, Cylindrospermopsin	Affects liver, causes hemorrhaging, tissue damage, tumors, liver cancer, and death
Dermatotoxins and Gastrointestinal toxins	Aplysiatoxins, Lyngbyatoxin-a, lipopolysaccharide endotoxins	Affects skin and mucous membranes, causes rashes, respiratory illness, headache, and stomach upset
Cytotoxins	Cylindrospermopsin	Affects liver and other organs, causes chromosome loss, DNA strand breakage, and organ damage

*BMAA (beta-Methylamino-L-alanine) - a cyanobacterial metabolite believed to be the causative or a contributory factor in the development of non-familial neurodegenerative diseases (like ALS, Parkinson's, and Alzheimer's)

Exposure and Diet

Is consumption of local fish / shellfish dangerous?

- Current science extremely limited.
- Bivalves (oysters, mussels, clams, scallops, etc.) – particularly dangerous to consume during or after an algal bloom.
- “Red Tide” can take months to flush out of bivalves after exposure.
- Link between BMAA at high levels in brains of dead dolphins – shows the toxin can cause plaques and tangles in brain.
- Benthic-oriented (bottom feeding) fish / organisms of special concern.

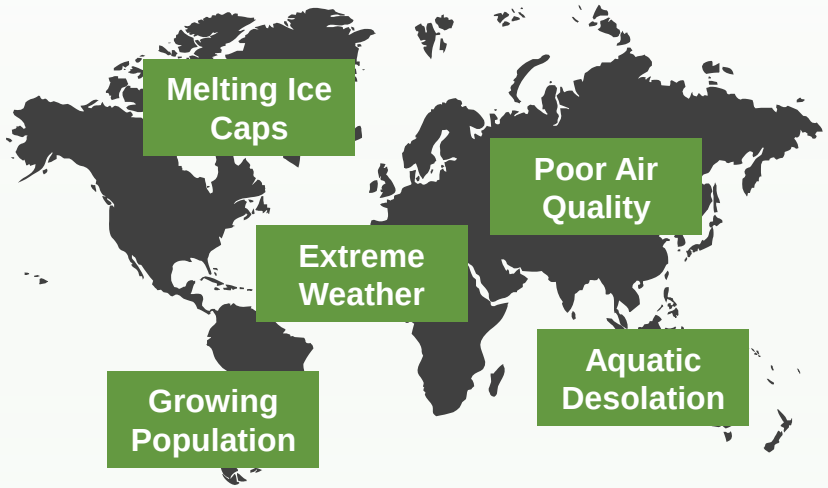
“The consumption of algal cells was the main factor to influence the accumulation of MCs by fish. Smaller fish accumulated more MCs in their kidneys and hearts. The ADI (acceptable daily intake) values based on the consumption of these four fish all exceeded the provisional tolerable daily intake (TDI) proposed by the WHO” (World Health Organization).
(*Junmei Jia, Wei Luo, Yonglong Lu, John P. Giesy, 2014*)

Global Climate Change

Increasing duration, frequency, and distribution of environmental events

Water Management

The future of water quality will not simply be reserved to pollution standards, but also where and how water is transferred, retained, and ultimately treated.



“Widespread scientific consensus exists that the world’s climate is changing. Some of these changes will likely include more variable weather, heat waves, heavy precipitation events, flooding, droughts, more intense storms, sea level rise, and air pollution. Each of these impacts could negatively affect public health.” – The U.S. Centers for Disease Control and Prevention