Division: Habitat and Species Conservation
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All Photos are MyFWC unless otherwise noted.
Photo: Lake Okeechobee marsh showing native habitat
Florida fresh water aquatic resources such as lakes and rivers serve many purposes, including recreation such as boating, swimming, fishing and hunting. They are important for flood control and provide sources of water for drinking and agricultural irrigation. Florida’s fresh water systems are some of our most scenic locations; people pay a premium to live on or near fresh water lakes and rivers.
The desired goal for lake management is healthy freshwater systems that support fish and wildlife resources and provide recreational opportunities for people. However, managing lakes in Florida presents challenges. Florida lakes are shallow and under natural conditions they fluctuate greatly, flooding during storm events and drying out during drought periods. This is a natural cycle and very important for the health of our lakes. Currently, water control structures keep lakes from flooding over their banks and also prevent them from drying out, breaking the cycle of natural fluctuations between high and low water. This unnatural condition has significant impacts on fish, wildlife and plants that grow in lakes. In addition, water flowing into our lakes is typically high in nutrients from a variety of sources such as urban and agricultural run off, water treatment plants and septic systems. These problems have become worse over time due to Florida’s increased human population growth and associated changes on the landscape.
While FWC’s focus is fish and wildlife populations and invasive plant management, there are other important factors that are essential to the overall health of lakes and their suitability for public use. No one agency has authority over all the factors that lead to a healthy lake. Cooperation and coordination among agencies is necessary to protect, restore and manage our lakes. FWC works with State and Federal agencies and also cooperates with many county and local governments.
FWC’s Role in Lake Management

Managing for healthy fish and wildlife populations, diverse habitats, and recreational opportunity
- Controlling invasive non-native plants
- Managing noxious native plants
- Planting native plant species
- Monitoring and augmenting fish populations
- Managing and monitoring wildlife

Within FWC, the Division of Habitat and Species Conservation, the Division of Hunting & Game Management and the Division of Freshwater Fisheries work collectively to achieve optimal habitat by managing invasive plants and restoring habitat. Within HSC, this includes multiple sections: Invasive Plant Management, Aquatic Habitat Conservation and Restoration, and Wildlife Habitat Management.
Detection and Monitoring

FWC monitors freshwater habitats to ensure management programs are addressing issues and maintaining a diverse native community. For example, we conduct flights to monitor percent coverage of floating plants on Lake Okeechobee and we also conduct on-water transects on many lakes to monitor submerged vegetation and bottom hardness. Recent technological changes have enabled management programs to combine collected data to get an instant snapshot of the plant community and where potential problem areas may exist.

Photos: Lake Jackson in Tallahassee, Florida survey transects (left) and habitat map (right)
Detection and Monitoring

FWC monitors a variety of species including fish to ensure we are meeting our management goals. Florida is known as the Fishing Capital of the World. Photos show some nice large mouth bass that FWC electro-shocked only a few weeks ago in Lake Istokpoga, bird banding activities, and alligator monitoring. The graphs and tables provide data to the public from our Long Term Fish Monitoring program.
While there are many challenges with our highly altered fresh water systems, there is no doubt that these areas are vitally important to Floridians and visitors. Because there are so many uses, there are diverse opinions on what lakes should look like, and it can be difficult to please all stakeholders, making management more difficult. Staff reach out to a diversity of stakeholders to ensure that management plans take into account the needs of various groups and organizations. FWC works hard to balance competing desires of stakeholders while also striving to maintain and enhance habitat for fish and wildlife species.
Invasive plants are defined as those not native to Florida and are known to cause environmental and economic harm. Because they grow much faster than our native plants, they require some type of management action to prevent these negative impacts.
Conserving navigation on public waterways was the driving force behind Congress authorizing the US Army Corps of Engineers to control water hyacinth in Florida beginning in 1899 through the Rivers and Harbors Act.

Photos: Florida Archives
Clockwise from bottom - three steam boats struggle through water hyacinth at the public dock on the St Johns River at Palatka ca. 1900. Water hyacinth and water lettuce impeding boat traffic on Lake Rousseau in the 1960s and on the St Johns River in the 1950s.
Early water hyacinth control efforts:
Our predecessor agency, the FL Game and Fresh Water Fish Commission began controlling aquatic plants in the early 1950s.

Photos: Florida Archives
From top left- FWC (then Game and Freshwater Fish Commission) crew applying herbicides to control water hyacinth in the 1960s. Removing water hyacinth from Lake Okeechobee in the late 1930s. Removing hyacinth using a conveyor in the Caloosahatchee River in 1939. Bar graph showing historical hyacinth populations. Historical hyacinths exceeded 125,000 acres statewide.
FWC Statutory Responsibilities

- 1970  Florida Legislature passes law related to aquatic plant management and control
  - Florida Statutes 369.20 & 369.22
- 2008 Program responsibilities transferred to FWC

FWC is responsible for 2 statewide programs controlling invasive plants:

- **Aquatic plants in public waterways**
  - 369.20, FS – FWC direct the control and regulation of noxious aquatic weeds and direct research and planning, so as to protect human health, safety, and recreation and, to prevent injury to plant and animal life and property.
  - 369.22, FS – When state funds are involved, or when waters of state responsibility are involved, FWC to guide, review, approve, and coordinate the activities of all public bodies, authorities, state agencies, units of local or county government, commissions, districts, and special districts engaged in operations to manage or eradicate aquatic plants.
- **Permitting** (includes chemical, mechanical, physical control and triploid grass carp)
  - 369.20, FS – No person or public agency shall control any aquatic weeds or plants in waters of the state unless a permit has been issued by FWC, unless the activity or waters are exempted by FWC rule.
- **Research**
  - 369.20, FS – FWC shall promote, develop, and support research activities directed toward the more effective and efficient control of aquatic plants.
  - 369.252, FS
When we speak of management of invasive and noxious aquatic plants in Florida there are several management tools that can be utilized.

- **Chemical control** is the use of herbicides to control target plants.
- **Mechanical control** encompasses many different pieces of equipment used to harvest or shred target vegetation.
- **Biological control** is the use of natural biological enemies of the target/host plant to help control it’s population.
- **Physical control** includes things like prescribed fire, lake drawdowns and small infestations where manual (hand) removal is applicable.
**Biological Control**

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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</thead>
<tbody>
<tr>
<td>• Can have great selectivity due to host-specific</td>
<td>• ~ 10 years for one agent</td>
</tr>
<tr>
<td>• Maintenance control strategy</td>
<td>• Expensive upfront</td>
</tr>
<tr>
<td>• Cost reduced</td>
<td>• Time – lag</td>
</tr>
<tr>
<td></td>
<td>• Do not have effective biocontrol for water hyacinth and water lettuce</td>
</tr>
<tr>
<td></td>
<td>• Grass carp may not be compatible (barriers, selectivity)</td>
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</tbody>
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**Biological control** – A method using organisms, such as insects, fishes, fungi or plant diseases to control or limit the spread of targeted invasive plants. New biological controls are tested many times by scientists to minimize the possibility of harmful impacts on native species or important agricultural crops.

Biological control requires extensive testing and funding and on average takes over 10 years before an agent can be released. An example of a well-known biological control is the alligatorweed flea beetle. Biological control insects have not been effective for water hyacinth, water lettuce and hydrilla.

Triploid grass carp have been successful in certain lakes. They have great selectivity as long as hydrilla is present. In general, biological controls are not a silver bullet; they need to be used in conjunction with other maintenance strategies. Once established, cost is reduced. However, there is significant lag-time before the effectiveness of biocontrol can be observed. Carp can be controversial because once hydrilla is gone, they will eat desirable (native) plants. Barriers are required to prevent escape.
### Physical Control: Prescribed Fire

<table>
<thead>
<tr>
<th>Advantages</th>
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<tbody>
<tr>
<td>▪ Maintain an open herbaceous plant community</td>
<td>▪ Limited to a few kinds of plants</td>
</tr>
<tr>
<td>▪ Limit invasion of woody vegetation</td>
<td>▪ Difficult to securing timely authorizations</td>
</tr>
<tr>
<td>▪ Stimulate increased diversity of plant communities</td>
<td>▪ Smoke management</td>
</tr>
<tr>
<td>▪ Reduce organic sediment accumulation</td>
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Fire is a natural component of freshwater marshes and wetlands in Florida, particularly during the late winter, spring and early summer seasons. In an environment where water level is controlled, the natural vegetative community progresses from grasses and herbaceous plants to perennial and late successional plants such as shrubs, dense monotypic stands of cattails, and woody stemmed vegetation. Because of lack of fluctuation of water levels and circumstance that limit the opportunity for prescribed fire, sometimes vegetation is treated first with herbicide to kill and dry it prior to burning.
### Physical Control: Lake Drawdowns

<table>
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<th>Advantages</th>
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</tr>
</thead>
<tbody>
<tr>
<td>- Oxidization of organic sediments</td>
<td>- Specialized machinery to remove years of organic sediment accumulation</td>
</tr>
<tr>
<td>- Replicates the natural hydrology of Florida lakes</td>
<td>- Expensive</td>
</tr>
<tr>
<td>- Stimulates submerged aquatic vegetation (SAV) growth</td>
<td>- Impact to user groups</td>
</tr>
<tr>
<td>- Encourages diversity of emergent grasses and herbaceous plants</td>
<td>- Loss of water use</td>
</tr>
<tr>
<td>- Provides conditions for essential fish spawning and nursery habitat</td>
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**Drawdowns** are the practice of intentionally lowering the level of the lake, including completely draining the lake in some cases. This process imitates the natural process that occurred for many lakes during drought events and is nature’s way of revitalizing lake health. Once drawn down, muck and detritus can dry out, thus reducing some of the accumulated nutrient load. Many native plants only germinate during exposed soil conditions, so that they are stimulated to grow and reestablish once the lake is refilled.

A drawdown requires extensive cooperation and coordination with permitting agencies (USACE, WMD’s, USFWS) and generally requires planning years in advance. Water supply concerns must be addressed, and drawdowns require favorable weather conditions for a protracted dry period. Once drawn down, machines can be used to remove unwanted muck and sediment and recontour the lake bottom. During the drawdown noxious and exotics plants can also expand and encroach in areas, so management plans must be in place to address this.
Mechanical Control

Tools:
- Harvesters
- Shredders
- Mechanical Dredges
- Backhoes

Uses:
- Blockages at boat ramps
- Woody tussocks
- Habitat restoration
- Navigation trails
- Lyngbya control

**Mechanical control** – A method of controlling invasive plants by cutting, mowing or harvesting plants to limit seed or foliage production. There are several types of machines that are used during mechanical control. Harvesters and backhoes remove vegetation and associated organic material out of the water. Shredders break up plants and associated organic material that then drops to the bottom. Mechanical dredges are specialized for removing organic material and sediments.
Mechanical control was the earliest type of control for hyacinths and hydrilla. Effective control and reduction of these invasive plants was never achieved with mechanical control. Currently, harvesting and shredding are used on a smaller scale to achieve specific management goals.
There are 17 classes of herbicides registered for use in Florida waters by the EPA and Florida Department of Agriculture Consumer Services (DACS). To achieve EPA registration, aquatic herbicides must be effective in controlling target weeds, and meet the rigid environmental and toxicology criteria required by the EPA. Once a herbicide is approved by EPA, it must be certified by Florida Department of Agriculture and Consumer Services before it can be used in Florida.
The goal of plant managers is to control invasive plants without harming the native plants that grow in the same area. Plant managers perform selective applications by using specially formulated herbicides that target specific plant types and not others, seasonal applications, selective methods and varying concentrations. Other methods alone (i.e. harvesting, biological control) are ineffective at large-scale management of fast-growing exotics like water-hyacinths and water lettuce. In most cases, it is far more cost effective to use herbicides than mechanical methods. One crew applying herbicide can cover approximately 10 acres a day, whereas a crew operating a harvester can typically clear only one-half acre a day. Photo shows water-hyacinths that were sprayed (brown plants) among healthy native pads-example of selectivity.
Historically, chemical treatment is considerably less costly than mechanical control. Costs vary considerably depending on the type of plants targeted. In addition, single treatment costs may not be valid because the length of time between control is also a factor. Availability of suitable offload sites and the cost of transporting the harvested material for disposal is an additional consideration.
Management Techniques: Maintenance Control

Control when populations are small

Avoid crisis management

Maintenance control means that once the hyacinth infestation has been removed, we try to keep them at the lowest possible level using herbicides. Research by the University of Florida compared maintenance control, periodical control and no control of hyacinths. They found that maintenance control of hyacinths:

• Uses less chemicals than periodic control
• Adds less organic material and nutrients to the water compared to periodic control or no control at all.

When we can keep invasive plants at very low levels and spot treat as needed, we have less of an environmental impact and use less herbicides.
Recent Stakeholder Engagements

Feb. 6 - Kissimmee (111 stakeholder in attendance)
Feb. 7 - Okeechobee (181 stakeholders in attendance)
Feb. 13 - Sebring (204 stakeholders in attendance)
Feb. 19 - Gainesville
Feb. 25 - Astor
Feb. 26 - Eustis

492 responses sent to InvasivePlants@MyFWC.com

On January 28th, FWC began a temporary pause in its use of herbicides and announced a listening tour to better hear and understand the public’s concerns. We have held meetings in Kissimmee, Okeechobee, Sebring, and Gainesville, thus far. Upcoming meetings are scheduled for Astor and Eustis. We have also collected hundreds of written comments. As of February 15th, FWC received 492 emails to the stakeholder input inbox.
## Stakeholder Concerns

- Dissatisfaction with the condition of lakes
  - poor water quality
  - unhappy with plant management
  - declining fishing, hunting, and bird watching
- Contractor oversight, accountability, management
- Preference for mechanical harvesting vs. chemical
- Human and ecological safety of herbicides
- Coordination lacking with other agencies
Staff Ideas

Contractor Oversight and Accountability

- Explore new spray monitoring technologies
- Explore camera technologies
- Enhance random monitoring by FDACS and FWC
- Independent audit of contracts

Pilot project scheduled in March 2019 using a herbicide application mapping and reporting system that captures all spray activity with location and time. FWC is also committed to investigating other technologies like the use of cameras to record applicator activities to incorporate into current monitoring methods. We are looking into adding additional random monitoring protocols into current monitoring process.

Looking at better ways and avenues to provide overall lake data and condition information. Currently we have developed a What is Happening on My Lake webpage that has information with respect to management activities, plant levels, fishery levels and condition, boat ramp finder, schedules of operations and even bathymetric maps. The current page can be found at https://ipm-myfwc.shinyapps.io/whoml/
Additional Staff Ideas

**Use of herbicides**
- Request additional guidance from EPA and FDACS
- Develop new protocols for timing of application
- Develop new target goals for plant coverage

**Mechanical Harvesting**
- Additional coordination with harvesting companies
- Develop pilot projects to increase use
- Encourage/fund research on new technologies for biomass use

- FWC will request additional guidance from EPA and FDACS on glyphosate use in Florida’s waters. The agency will also request guidance for surfactants that are used in the aquatics program.
- FWC is working to develop pilot projects on lakes or areas of lakes where harvesters will be evaluated on ability to provide the primary means of plant management.
- A survey has been provided to mechanical harvesting companies to better gauge their current capabilities.
- Staff are working to schedule a harvesting summit with harvesting contractors and researchers to be held prior to the end of FY18-19.
Moving Forward

- Finish listening tour
  - February 25th – Astor
  - February 26th – Eustis

- Begin to implement improvements

Additional public meetings will occur next week. After the completion of these meetings, staff will meet with the Executive Director to begin to implement ideas and improvements outlined in this presentation and direction received from the Commission.