

FISH, WILDLIFE, AND HABITAT MANAGEMENT PLAN



KISSIMMEE CHAIN OF LAKES

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KISSIMMEE CHAIN OF LAKES AT A GLANCE

	Tohopekaliga	Cypress	Hatchineha	Kissimmee
Watershed	Kissimmee River			
Watershed Area	21.2 Square Miles			
Primary Land Uses in Watershed	Developed and Natural	Natural	Natural	Natural
Average Diameter	10 miles long; 3 miles wide	3 miles long; 3 miles wide	6 miles long; 2 miles wide	12 miles long; 6 miles wide
Surface Area	18,810 acres	4,097 acres	6,665 acres	34,948 acres
Max Depth	13 feet	7 feet	8 feet	12 feet
Operational Water Level	52-55 ft. NGVD29	49-52.5 ft. NGVD29	49-52.5 ft. NGVD29	49-52.5 ft. NGVD29
Public Boat Ramps	6 boat ramps; 2 hand launch only ramps	1	1	3
Boat Ramp Lanes	10	1	1	5
Trailer Parking	84	Limited	26	41
Adjacent Conservation Lands	Paradise Island; Makinson Island Conservation Area; Oak Street Extension Preserve; Candella Island; Cherokee Point Conservation Area; Twin Oaks Conservation Area; Southport Regional Park	Kissimmee Chain of Lakes Area; Southport Ranch Mitigation Bank	Kissimmee Chain of Lakes Area; Lake Hatchineha Conservation Easement; Disney Wilderness Preserve	Brahma Island Conservation Easement; Kissimmee Chain of Lakes Area; Lake Kissimmee State Park; Three Lakes Wildlife Management Area
Florida Birding and Wildlife Trail	Kissimmee Lakefront Park; Makinson Island Conservation Area	X	X	Joe Overstreet Landing
Fish Management Areas	✓	✓	✓	✓
Fish Stocking	X	X	X	X
Target Fisheries	Largemouth Bass	Largemouth Bass, Black Crappie, Bream	Largemouth Bass, Black Crappie, Bream	Largemouth Bass, Black Crappie, Bream
Target Waterfowl	Ring-necked duck, Blue-winged teal, Wood duck, Mottled duck	Ring-necked duck, Blue-winged teal, Wood duck, Mottled duck	Ring-necked duck, Blue-winged teal, Wood duck, Mottled duck	Ring-necked duck, Blue-winged teal, Wood duck, Mottled duck
Imperiled Species	✓	✓	✓	✓

KISSIMMEE CHAIN OF LAKES AT A GLANCE

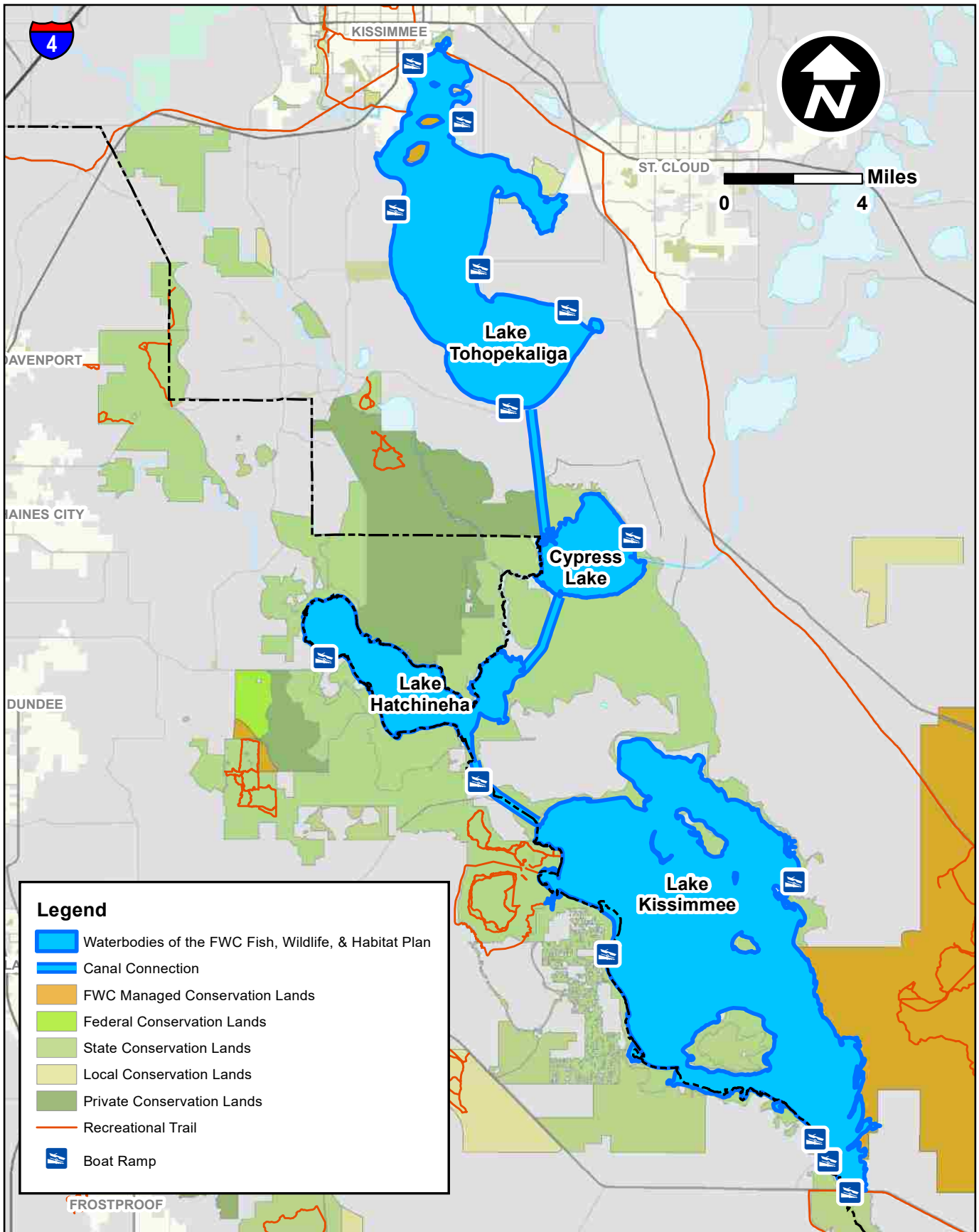


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ACRONYMS AND ABBREVIATIONS

AHRE	Aquatic Habitat Restoration and Enhancement Subsection
AMU	Alligator Management Unit
C&SF	Central and Southern Florida Flood Control Project
EDRR	Early Detection and Rapid Response
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FMA	Fish Management Area
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
GFBWT	Great Florida Birding and Wildlife Trail
IPM	Invasive Plant Management
ISMP	Imperiled Species Management Plan
KCOL	Kissimmee Chain of Lakes
KRRP	Kissimmee River Restoration Project
MBTA	Migratory Bird Treaty Act
NGO	Non-governmental Organization
NGVD29	National Geodetic Vertical Data of 1929
Plan	Fish, Wildlife, and Habitat Management Plan
RSD	Relative Stock Density
SAV	Submersed Aquatic Vegetation
SFWMD	South Florida Water Management District
SNAP	Statewide Nuisance Alligator Program
TAG	Technical Advisory Group
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WED	Waterfowl Energy Day

GLOSSARY

- Alligator Management Unit (AMU):** FWC established area with recreational harvest quotas based on defined alligator population targets.
- Bream:** A term to collectively refer to a variety of sunfish species. Some people use it to mean only Bluegill, while others use it to mean all Bluegill, Redear Sunfish (shellcraker), Warmouth, and other sunfish species.
- Catch Rate:** The number of fish caught per unit effort (e.g., hour or day). This term is often used as a measure of relative abundance for a particular fishery.
- Central and Southern Florida (C&SF) Project:** A multi-purpose project authorized by Congress for flood control, water supply, recreation, fish and wildlife resources, and other needs in South Florida.
- Creel Survey:** A survey used to gather information about angler effort, catch, and harvest for a fishery; typically conducted by the FWC from October through June.
- Drawdown:** The intentional lowering of a body of water to a level substantially lower than its typical water level.
- Early Detection and Response (EDRR):** A coordinated set of actions to find and eradicate potential invasive species in a specific location before they spread and cause harm.
- Electrofishing:** A non-lethal method of sampling fish populations where an electrical current is passed through the water to immobilize fish, allowing biologist to study the fish before releasing them alive back to the wild.
- Endangered Species:** Any species that is in danger of extinction throughout all or a significant portion of its range.
- Established:** A species having a self-sustaining and reproducing population in a specified geographic area without human intervention (can be native or nonnative).
- Eutrophication:** The process where a waterbody becomes more nutrient rich (usually with phosphorus) over time. The process generally results in excessive plant or algae growth, with increased sedimentation rates. Cultural eutrophication is where people cause a waterbody to become more nutrient-rich.
- Fisheries:** A specific aquatic resource, mostly a variety of fish species of cultural and economic importance that people catch and/or harvest.
- Harvest:** The total number or pounds of fish caught and kept from an area over a period of time.
- Impaired:** A waterbody that does not meet one or more applicable water quality standards as defined by the state and federal Clean Water Act.
- Imperiled Species:** A species found on the state's consolidated list of the official state and federal lists of endangered species, threatened species, and other species designated in some way by the respective jurisdictional agencies as meriting special protection or consideration.
- Invasive:** A species that (a) is nonnative to a specified geographic area, (b) was introduced by humans (intentionally or unintentionally), and (c) does or can cause environmental or economic harm or harm to humans.
- Littoral Zone:** A portion of the lake or other waterbody where sunlight can penetrate to the sediment and allow aquatic plants to grow. The littoral zone usually extends from the high water mark, which may be rarely inundated, to shoreline areas that are permanently inundated.

GLOSSARY

Monoculture: When one species dominates a geographical area in numbers and biomass. KCOL - most if not all monocultures are created through current hydrologic conditions.

Native: A species that occurs naturally in a specified geographic area.

NGVD29: National Geodetic Vertical Datum of 1929, the vertical reference or starting point used to measure water elevation.

Nuisance: An individual or group of a species that causes management issues or property damage, presents a threat to public safety, or is an annoyance. This applies to both native and nonnative species.

Relative Stock Density (RSD): A length categorization tool used to quantify the size structure of a fish stock. $RSD = (\text{number of fish} \geq \text{specified length} / \text{number of fish} \geq \text{stock length}) \times 100$.

RSD – 16: The relative stock density of fish which are 16 inches or greater in total length (TL). $RSD-16 = (\text{number of Largemouth Bass} \geq 16 \text{ inches in TL} / \text{number of Largemouth Bass} \geq \text{to the minimum stock length}) \times 100$.

Submersed Aquatic Vegetation (SAV): Rooted aquatic plant that grows completely under water.

Stakeholder: A person or group with an interest in the resource(s), including their management and potential outcomes.

Species of Special Concern (SSC): Any species of fish or wildlife that does not meet the criteria of endangered or threatened but is particularly vulnerable, and could easily become endangered or threatened due to distribution, low or declining numbers, specialized habitat needs or limits, or other factors.

Threatened Species: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Total Length (TL): The length of a fish as measured from the tip of the snout to the tip of the tail fin.

Total Maximum Daily Load (TMDL): The maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards.

TrophyCatch: An incentive-based conservation program designed for anglers who catch-and-release Largemouth Bass eight pounds or heavier, in Florida.

Tussock: A clump of floating vegetation and mud or raised organic sediments that is bound together by roots and is separated from the lake bottom.

Waterfowl Energy Day (WED): The number of waterfowl that can obtain their minimum daily energy needs in a given area for a certain amount of time.

Watershed: The land area that drains to one stream, lake, or river, affecting the water quality in that water body.

Water Quality: The condition of the water, based on physical, chemical, and biological characteristics. For this Plan, water quality is based on nutrient concentrations, which influence plant and algae growth (see, eutrophication).

ACKNOWLEDGMENTS

This fish, wildlife, and habitat management plan (Plan) for the Kissimmee Chain of Lakes (KCOL) would not have been possible without the participation from many stakeholders over the past two years. More than 967 stakeholders attended in-person and virtual meetings to learn and provide input on the goals, objectives, and actions in this Plan. The Florida Fish and Wildlife Conservation Commission (FWC) appreciates the thoughtful input from stakeholders. We will continue seeking out stakeholder involvement in years to come. This input will help determine future management actions on KCOL for the next five years and beyond, benefiting the state's fish and wildlife resources.

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EXECUTIVE SUMMARY



The Kissimmee Chain of Lakes (KCOL) is located in Osceola County and borders a large portion of Polk County in Central Florida. More than two dozen lakes make up the chain with four major lakes: Lake Tohopekaliga, Cypress Lake, Lake Hatchineha, and Lake Kissimmee. These lakes total approximately 65,000 surface acres. The KCOL is fed primarily by Shingle Creek, Boggy Creek, and Reedy Creek, with additional input from the Econlockhatchee Swamp. The chain outfalls into the Kissimmee River and contributes to the headwaters of Lake Okeechobee and the Everglades.

The Kissimmee River Basin has experienced a great deal of man-made change, mainly due to flood control efforts. Prior to 1900, most movement along the Kissimmee River and the KCOL was via boat as there were few improved roads. Following severe damage from a hurricane in 1947, which included extensive flooding, the State of Florida requested assistance from the federal government to design and implement a flood control plan for the basin. Work began the following year. Congress specifically authorized the Kissimmee River portions of the project in 1954, with the design completed in 1960.

From 1962 to 1971, the C-38 canal was constructed, which straightened 103 miles of the meandering Kissimmee River into a 56-mile, 30-foot-deep canal. While providing flood protection, this canal has resulted in changes to hydrology, water quality, and wetland features throughout the Kissimmee River

Basin. Before the construction of the C-38 canal, KCOL had limited outfall capacity due to the meandering nature of the Kissimmee River. The river, and its associated wetlands and floodplains, allowed for water storage during the wet season, followed by an almost continuous release throughout the year.

The Kissimmee River Restoration Project (KRRP) was authorized by Congress in 1992 under the Water Resources Development Act. The KRRP is a joint partnership between the South Florida Water Management District (SFWMD) and the US Army Corps of Engineers (USACE) to improve the health and sustainability of the Kissimmee River Basin and the KCOL. The goals of the KRRP are to return flow to the Kissimmee River's historic channel and restore the river and floodplain ecosystems within the basin by restoring over 40 square miles of river and floodplain, including 43 miles of the meandering river channel and approximately 27,000 acres of wetlands (SFWMD 2014).

Today, the KCOL is one of Florida's most important and diverse aquatic resources. The chain currently serves as essential habitat for many fish and wildlife species, a source of agricultural water supply, and an important recreational area. The lakes in the KCOL provide opportunities for angling, hunting, birding, boating, and camping.

Florida Fish and Wildlife Conservation Commission (FWC) is responsible for managing fish and wildlife

resources across the state, including those on KCOL. Over the years, stakeholders have expressed concerns about FWC's aquatic plant management on the KCOL. In response, FWC incorporated a stakeholder engagement process to gather input for this fish, wildlife, and habitat management plan (Plan), focusing on Lake Tohopekaliga, Cypress Lake, Lake Hatchineha, and Lake Kissimmee. The Plan provides goals, objectives, and actions that inform future FWC work plans and management activities on the KCOL, based on input from various stakeholders.

The stakeholder engagement process consisted of a public meeting to provide information on the project schedule and gather feedback. In addition, FWC conducted an online survey and held one-on-one and working group interviews with business leaders, highly vested stakeholders, and staff from other agencies. Later, FWC contracted with Inwood Consulting Engineers, Inc. (Inwood) to facilitate public meetings and stakeholder focus groups and help prepare the Plan. Based on the initial stakeholder engagement, FWC and Inwood combined feedback into four focal areas:

- Fish and Wildlife Management
- Habitat Management
- Public Use and Recreation
- Communication and Interagency Coordination

FWC and Inwood drafted management goals and objectives for each focal area based on input from the online survey, interviews, and working group meetings. The draft goals and objectives were presented to stakeholders during virtual and in-person focus groups held around the KCOL. One of the most discussed topics was habitat management, including the importance of native SAV and balancing exotic plant cover, which can provide fish and wildlife habitat but also reduce access and navigation on the KCOL. Based on input received from stakeholders during those focus groups, FWC and Inwood revised the goals and objectives and prepared management actions.

The goals, objectives, and actions presented in this Plan are limited to the FWC's authority to manage, protect, and conserve fish and wildlife and their habitats. Many stakeholders expressed concerns to the FWC about environmental factors such as water level control and water quality that can impact fish and wildlife resources on KCOL. These factors are outside of the mission and authority of the FWC but highlight the need for more and better interagency coordination to promote fish and wildlife resources to other agencies and partners. This concern has been noted and made part of the goals, objectives, and actions in this Plan. FWC also heard from stakeholders about the need for more and better communication with the public and, as a result, set a goal for more effective communication with the public.



Sunrise on Lake Hatchineha.

CHAPTER 1

INTRODUCTION



INTRODUCTION

KCOL forms the headwaters of the Everglades. They begin at Shingle Creek south of Orlando, discharging at the southern end of Lake Kissimmee into the Kissimmee River. There, the water flows into Lake Okeechobee and ultimately into the Everglades and Florida Bay. The shallow lakes and their associated marshes and wet prairies provide foraging, breeding, nesting, and nursery habitat for numerous fish and wildlife species, including prized game fish, waterfowl, and several imperiled species.

KCOL is internationally known for its recreational and commercial value for angling, hunting, wildlife viewing, boating, and more. The diverse habitat and abundant wildlife provide a variety of nature-based recreational opportunities for the many user groups drawn to the KCOL. Lakes Kissimmee and Tohopekaliga are two of the largest lakes in Florida, attracting anglers worldwide to participate in bass tournaments commonly hosted on the chain. Anglers seek trophy Largemouth Bass, common to the chain. KCOL is favored among hunters, with lake habitats attracting several species of dabbling and diving ducks. Several areas on the KCOL are part of the Great Florida Birding and Wildlife Trail (GFBWT). They have become premier birding destinations.

BACKGROUND

The FWC heard from many stakeholders about the condition of KCOL and the management of fish, wildlife, and habitat therein. To address stakeholders' concerns and advance the FWC's mission, the FWC committed to preparing a fish, wildlife, and habitat management plan (Plan). The Plan process would incorporate stakeholder input to establish goals and optimize the agency's management of the waterbody for the next five years and beyond.

The planning process began in 2019 with developing a plan proposal and a later in-person kick-off meeting. The meeting was held in February 2020. FWC presented the current conditions and management practices on the KCOL and described the process to develop this Plan. Stakeholders were invited to provide input on the planning process through various options, including online surveys, one-on-one interviews, focus groups, and virtual and in-person public meetings. More than 967 stakeholders participated in the planning process to shape the FWC's management on the KCOL.

PURPOSE

The Plan aims to establish goals and objectives to optimize fish, wildlife, and habitat management on the KCOL. FWC developed goals and objectives with stakeholder and expert input over two years. The goals provide general statements on desired future conditions on KCOL. The objectives identify measurable targets the FWC hopes to accomplish over the next five years. The targets will guide future management decision-making and inform annual work plans. Additionally, the Plan aims to effectively communicate the types of management activities the FWC conducts within its authority.

FWC'S PROMISE TO THE STAKEHOLDERS

A promise to stakeholders communicates how stakeholder input will be considered and integrated into the Plan. The FWC presented a stakeholder promise at the first public kick-off meeting. This promise has remained a core value for the FWC throughout the two-year planning process. The promise has helped stakeholders know their involvement matters to the FWC and clarified Inwood's role as a neutral facilitator in the stakeholder engagement and planning process.

FWC promises to provide opportunities for stakeholders to provide input into developing the FWC's Plan. We promise to consider all stakeholder input and recommendations for lake management goals, objectives, and actions. We promise to address and balance, where feasible, the needs of all stakeholder groups and FWC management guidelines for the lakes. FWC is committed to a plan that consists of stakeholder-supported management actions, and FWC will make the final decisions on content of the Plan.



AUTHORITY

FWC is provided authority, under Article 4 of Florida's Constitution, to manage, protect, and conserve fish and wildlife and their habitats. This authority gives the FWC the ability to develop and enforce rules and regulations for fishing and hunting, including the "take" of species. In addition, FWC has the authority to prepare and implement management plans for species and their habitats. FWC also maintains law enforcement for resource protection, access to public waterbodies, and public safety on and off those waterbodies. FWC develops education and outreach programs that engage stakeholders on many topics, including the importance of fish and wildlife resources; fishing, hunting, and boater safety; and volunteer initiatives.

The FWC is comprised of different divisions with an agency mission of managing fish and wildlife resources for their long-term well-being and the benefit of people.

The divisions associated with this plan are:

Freshwater Fisheries Management - manages, enhances, and conserves Florida's freshwater aquatic life for the benefit of people.

Habitat and Species Conservation - manages to ensure healthy populations of all native wildlife and their habitats. Habitat sections include Invasive Plant Management and Aquatic Habitat Conservation and Restoration.

Fish and Wildlife Research Institute - provides timely research information to help guide management of Florida's fish and wildlife resources.

Hunting and Game Management - manages and conserves game wildlife for the future, while fostering safe and responsible hunting.

Law Enforcement - protects Florida's fish, wildlife, and habitats to ensure their long-term well-being and continued viability for educational, recreational, and commercial activities.

More information on FWC programs can be found: <https://myfwc.com/about/overview/programs/>

FWC's authority does not extend to water quality or management (e.g., water level regulation). During the two-year planning process, many stakeholders expressed their water quality and management concerns to the FWC. The experience and stakeholder input resulted in an entire focal area within the Plan: Communication and Interagency Coordination. FWC acknowledged the need to promote fish and wildlife resources with agencies directly responsible for resources (e.g., water quality and levels) that affect fish and wildlife. In addition, FWC recognized the need for better communication with stakeholders regarding management actions and outcomes.



October 2021 FWC Commission Meeting, St. Augustine.

CHAPTER 2

GOALS AND OBJECTIVES



The goals and objectives created for this Plan identify management priorities and provide a mechanism for resolving issues by guiding specific projects to achieve FWC's mission and vision for the KCOL. The focal areas encompass broad categories that promote FWC's mission. The goals describe desired future conditions that convey a purpose. The objectives are derived from the goals and contain concise metrics for determining actions and evaluating the success of those actions.

The FWC and Inwood prepared the draft goals and objectives based on input from stakeholders and subject matter experts within the FWC. FWC stakeholders were given multiple opportunities throughout 2020 and early 2021 to provide input on FWC management programs. The lake management planning process and stakeholder engagement are summarized in Chapter 5. Stakeholder information led to the identification of four focal areas, which correspond with the core functions of the FWC's management of freshwater aquatic systems.

The four focal areas identified for the KCOL Plan:

- Fish and Wildlife Management
- Habitat Management
- Public Use and Recreation
- Communication and Interagency Coordination

Once the focal areas were established, the FWC developed goals and "SMART" objectives: specific, measurable, achievable, results-oriented, and timely management of the system. The FWC gathered feedback on the draft goals and objectives through

virtual and in-person focus groups with stakeholders throughout June and July 2021. Based on this feedback, the management goals and objectives were developed. From there, FWC created actions to define the mechanisms for achieving the specific objectives for each goal. FWC will review the Plan within five years to determine its effectiveness and update as necessary to achieve the goals. This review will begin in the 2027-2028 fiscal year.

WHAT IS A **SMART** OBJECTIVE?



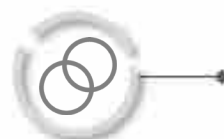
Specific
outline in a clear statement
precisely what is required



Measurable
identify a measurable element
to determine success or failure



Achievable
ensure necessary resources are
available and staff is able to
achieve



Results-Oriented
specify an end result that is
appropriate to FWC and aligns
with FWC's mission



Timely
specify a deadline when the
results can be achieved

FOCAL AREA 1: FISH AND WILDLIFE MANAGEMENT

Many stakeholders expressed concern about current fish and wildlife populations in the KCOL. The KCOL provides habitats for many fish and wildlife species, including species unique to the region, like the endangered Everglade snail kite. Wildlife can be especially vulnerable to abrupt changes in habitat due to anthropomorphic effects and natural climate events, such as hurricanes. Fish spawning can also increase or decrease depending on a variety of factors occurring on the lakes from year to year. These fish and wildlife management goals and objectives are intended to support healthy fish and wildlife populations on the KCOL.

FOCAL AREA 2: HABITAT MANAGEMENT

Timing seems to be an issue. Spawning seasons should be a time to allow bass movement without disruption to habitat. Also, time leading up to that to allow feeding is essential.

- KCOL Stakeholder Comment, Online Survey, December, 2020.

FWC and Inwood heard concerns from many stakeholders about the current habitat management on the KCOL. The most discussed topics include herbicide use, the loss of native plant communities, mainly Kissimmee grass, and the prevalence of hydrilla blocking access and navigation. Managing competing interests on the chain is a balancing act that FWC is striving to improve. Stakeholder desires (e.g., fewer herbicide treatments and more mechanical harvesting), listed species regulations, fish and wildlife needs, budgetary constraints, and technical limitations (i.e., shallow water, upland disposal sites, etc.) are difficult to balance. Further complicating habitat management on the chain is the stabilized water level, which FWC does not control. Ultimately, FWC aims to improve and expand native plant communities through various methods, when feasible, which will provide greater habitat for fish and wildlife resources on the KCOL.

A balance of both submerged and emergent vegetation is needed. The lack of control on airboat spraying is ridiculous.

- KCOL Stakeholder Comment, Online Survey, December, 2020.

I understand that the FWC is in a difficult position to manage aquatic vegetation on the KCOL system. Nutrient loading is our enemy and the inability to manipulate water levels make the task extremely difficult.

- KCOL Stakeholder Comment, Online Survey, January, 2021.

FOCAL AREA 3: PUBLIC USE AND RECREATION

The KCOL provides abundant recreational opportunities for a multitude of user groups. The online surveys indicated that most respondents were anglers, followed by boaters, wildlife viewers, residents, and hunters. With an abundance of different users frequenting the KCOL throughout the year, managing the recreational opportunities on the chain is imperative. FWC is committed to providing diverse recreational opportunities that meet the long-term needs of the stakeholders on the KCOL.

It's tough to continually balance the ever-changing needs of people and wildlife. Keep up the great work!

- KCOL Stakeholder Comment, Online Survey, December, 2020.

FOCAL AREA 4: COMMUNICATION AND INTERAGENCY COORDINATION

There are a variety of stakeholder interests on the KCOL, including angling, hunting, boating, and wildlife viewing. The importance of the chain and the development of this Plan are reflected in the numerous stakeholders that participated in the planning process. Stakeholders expressed the need for more effective communication and stakeholder engagement regarding management actions. This is an important tool that FWC can provide to facilitate transparency regarding the management on the KCOL.

Management of the KCOL requires a multi-agency effort. FWC has partnered with other state and local agencies in the past to conduct habitat management activities in the lake, including restoration projects that improve fish and wildlife resources. This type of interagency coordination is important for achieving the FWC's fish and wildlife habitat goals on the KCOL. This Plan includes goals and objectives aimed at enhancing coordination with partner agencies for the purpose of improving fish and wildlife resources.

“

I would like to see a comprehensive explanation of the methodology and reasoning behind the vegetation and water level management on the chain. I think that it would be beneficial if the users of the lakes would understand why the various management practices are utilized.

- KCOL Stakeholder Comment,
Online Survey, January, 2021.

I appreciate the survey, I believe the people should have more of an input in the aforementioned concerns and treatment, as we spend a lot of time on this chain and see the devastation and consequences.

- KCOL Stakeholder Comment,
Online Survey, December, 2020.

”

Table 1: Goals And Objectives For Fish And Wildlife Management.**FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT****Goal A: Manage the Kissimmee Chain of Lakes fisheries to ensure long-term sustainability and public enjoyment.**

Objective A-1	Manage the Lake Tohopekaliga Largemouth Bass population, which results in angler effort greater than or equal to 40,000 angler hours/peak season with an angler catch rate of 0.7 fish/hour.
Action A-1.1	Conduct an annual peak season (January through May) creel survey on Lake Tohopekaliga.
Action A-1.2	Ensure habitat goals for Lake Tohopekaliga are met to promote a healthy bass population (per C-1 and C-2).
Action A-1.3	Identify and execute habitat restoration projects that benefit the bass population and angler catch rates on Lake Tohopekaliga.
Action A-1.4	Increase outreach to help promote the Largemouth Bass fishery using recent research and management information. Use outreach material to help anglers better target bass on Lake Tohopekaliga.
Objective A-2	Manage the Lake Kissimmee Largemouth Bass population, which results in angler effort greater than or equal to 75,000 angler hours/peak season with an angler catch rate of 0.5 fish/hour.
Action A-2.1	Conduct an annual peak season (January through May) creel survey on Lake Kissimmee.
Action A-2.2	Ensure habitat goals for Lake Kissimmee are met to promote a healthy bass population (per C-1 and C-2).
Action A-2.3	Identify and execute habitat restoration projects that benefit Lake Kissimmee's bass population and angler catch rates.
Action A-2.4	Increase outreach to help promote the Largemouth Bass fishery using recent research and management information. Use outreach material to help anglers better target bass on Lake Kissimmee.
Objective A-3	Manage the KCOL Largemouth Bass population, which results in electrofishing catch rates greater than or equal to 0.6 fish/minute.
Action A-3.1	Routinely sample the bass population in KCOL using electrofishing during the spring.
Action A-3.2	Ensure KCOL habitat objectives are met to promote healthy bass populations (per C-1 and C-2).
Action A-3.3	Identify and execute habitat restoration projects that benefit the KCOL bass populations.
Action A-3.4	Work with the SFWMD and USACE to investigate the feasibility of water level fluctuation for the potential benefit of fish populations, including Largemouth Bass.

FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT (CONT.)

Objective A-4	Manage the KCOL Largemouth Bass population, which results in a strong year class for age-1 fish (i.e., a modal peak) at least once every three years.
Action A-4.1	Routinely sample the KCOL bass population using electrofishing during the spring.
Action A-4.2	Ensure submersed aquatic vegetation objectives are met to promote strong year-class production (per C-1, C-2 D-1, and D-2).
Action A-4.3	Investigate the optimal timing of hydrilla treatments to enhance year-class production by ensuring available nursery habitat for young of the year bass (per D-3).
Action A-4.4	Work with the SFWMD and USACE to investigate the feasibility of water level fluctuation to create optimal conditions for year-class production.
Objective A-5	Manage the KCOL Largemouth Bass Relative Stock Density (RSD) of RSD-16 greater than or equal to 18%.
Action A-5.1	Routinely sample the KCOL bass population using electrofishing during the spring.
Action A-5.2	Routinely produce a length frequency histogram and calculate an RSD-16 on KCOL.
Action A-5.3	Conduct annual peak season (January through May) creel surveys on lakes Tohopekaliga and Kissimmee to monitor angler catch of fish greater than or equal to 16 inches TL.
Objective A-6	Manage the Lake Kissimmee Black Crappie population, which results in angler effort greater than or equal to 50,000 angler hours/non-peak season with an angler catch rate of 1.70 fish/hour.
Action A-6.1	Conduct an annual non-peak season (January through May) creel survey on Lake Kissimmee.
Action A-6.2	Ensure habitat goals for Lake Kissimmee are met to promote a healthy Black Crappie population (per C-1 and C-2).
Action A-6.3	Identify and execute habitat restoration projects that benefit the Black Crappie population and angler catch rates.
Action A-6.4	Increase outreach to help promote the Black Crappie fishery using recent research and management information. Use outreach material to help anglers better target Black Crappie on Lake Kissimmee.
Action A-6.5	Ensure that hydrilla does not exceed 25% coverage on the lake so that Black Crappie are readily available to anglers.
Action A-6.6	Work with the SFWMD and USACE to investigate the feasibility of water level fluctuation to create optimal conditions for Black Crappie year-class production.

FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT (CONT.)

Objective A-7	Manage the Lake Kissimmee bream population, which results in angler effort greater than or equal to 20,000 angler hours/ non-peak season with an angler catch rate of 2.30 fish/hour.
Action A-7.1	Conduct an annual non-peak season (January through May) creel survey on Lake Kissimmee.
Action A-7.2	Ensure habitat goals for Lake Kissimmee are met to promote a healthy bream population (per C-1 and C-2).
Action A-7.3	Identify and execute habitat restoration projects that benefit the bream population and angler catch rates.
Action A-7.4	Increase outreach to help promote the bream fishery using recent research and management information. Use outreach material to help anglers better target bream on Lake Kissimmee.
Action A-7.5	Ensure that hydrilla does not exceed 25% coverage on the lake so that bream are readily available to anglers.
Action A-7.6	Work with the SFWMD and USACE to investigate the feasibility of water level fluctuation to create optimal conditions for bream year class production.
Objective A-8	Achieve at least 100 TrophyCatch approvals per year for the KCOL.
Action A-8.1	Ensure habitat objectives are met throughout the KCOL to promote a trophy bass population (per C-1 and C-2).
Action A-8.2	Monitor catches of trophy bass to ensure sustainability and/or improvement continues.
Action A-8.3	Promote the TrophyCatch program to KCOL anglers by utilizing the communication tools outlined in this Plan, including outreach events (e.g., fishing tournaments, clubs meetings) and informational material (e.g., flyers, signage, kiosks).

FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT (CONT.)**Goal B: Manage the Kissimmee Chain of Lakes wildlife resources to ensure long-term sustainability and public enjoyment.**

Objective B-1	Manage the alligator population within the KCOL to a desired/minimum count of juveniles (1-4 feet total length) and adults (greater or equal to 6 feet total length) seen below: Lake Tohopekaliga: Juveniles = 1,732/866 Adults = 738/369 Lake Hatchineha: Juveniles = 628/314 Adults = 408/204 Cypress Lake: Juveniles = 244/122 Adults = 434/217 Lake Kissimmee: Juveniles = 1,626/813 Adults = 2,356/1,178
Action B-1.1	Conduct annual alligator nightlight surveys to monitor population numbers, size structures, and trends.
Action B-1.2	Analyze nightlight survey data annually and use results to adjust quotas for harvesting alligators and their eggs if necessary and in accordance with FWC's Alligator Management Program's protocols.
Action B-1.3	Engage with SFWMD to ensure that water level management schedules do not threaten the survival and recruitment of hatchlings on a large-scale and long-term basis.
Objective B-2	Promote the installation of at least 12 wood duck boxes within the next five years on the KCOL.
Action B-2.1	Collaborate with local organizations to find funding for box construction. (i.e., Deer Tag Grants).
Action B-2.2	Assist with logistics and technical assistance for mounting and placing boxes.
Action B-2.3	Assist in coordinating nest box and predator guard cleaning and maintenance.
Action B-2.4	Assist with record keeping for technical assistance regarding the expansion of the box program.
Objective B-3	Coordinate monitoring and research with agency partners to guide management actions for the Everglade snail kites and their nests.
Action B-3.1	Ensure that snail kite nest monitoring in the KCOL is continually funded to aid in kite conservation and research.
Action B-3.2	Coordinate management activities that have the potential to impact active kite nesting with the USFWS to ensure compliance with the Endangered Species Act.

FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT (CONT.)

Action B-3.3	Provide USFWS the opportunity to contribute to management plans that may impact kite foraging or nesting habitat.
Action B-3.4	Control large, dense emergent vegetation monocultures in favor of diverse, heterogenous vegetative communities.
Action B-3.5	Promote lake drawdowns and low water projects, when necessary, to promote healthy snail kite foraging and nesting conditions for the long term. Coordinate project details with USFWS to prevent the take of snail kite nests.
Objective B-4	Create a Waterfowl Energy Day (WED) model to estimate available waterfowl food on the KCOL within two years.
Action B-4.1	Identify existing FWC vegetation survey data that can be incorporated into the model.
Action B-4.2	Identify and incorporate non-FWC data that can be used to strengthen the model inputs.
Action B-4.3	Annually quantify the available food present during the winter waterfowl migration.
Action B-4.4	Use the results to identify habitat communities requiring management to increase waterfowl food availability.
Objective B-5	Support the early detection and rapid response (EDRR) of invasive and/or non-native wildlife.
Action B-5.1	Seek out and compile data on high-priority non-native fish and wildlife detected within and near the lake management area to identify future threats.
Action B-5.2	Develop materials for staff and partners to help identify and target current and future threats to the lake management area.
Action B-5.3	Coordinate with partner agencies to respond to high-priority non-native fish and wildlife detected within or near the lake management area.

Table 2: *Goals And Objectives For Habitat Management.***FOCAL AREA 2 - HABITAT MANAGEMENT****Goal C: Manage the Kissimmee Chain of Lakes to provide optimal habitat for fish and wildlife and the benefit of the public.**

Objective C-1	Manage greater than half of the littoral zone at moderately high (40-70%) vegetation coverage of desirable native plants for foraging habitat.
Action C-1.1	Conduct annual monitoring of emergent and submersed vegetation on the KCOL utilizing Long Term Management and Invasive Plant Management protocols.
Action C-1.2	Manage habitat to achieve this objective by utilizing best management practices such as revegetation, aquatic plant harvesting, herbicide treatments, prescribed fire, and lake drawdowns.
Objective C-2	Maintain greater than 10% of the littoral zone at moderately high vegetation coverage in depths of 0-3' to benefit wading birds and dabbling ducks.
Action C-2.1	Prioritize Big Grassy Island, North and South Steer Beach on Lake Tohopekaliga for this habitat.
Action C-2.2	Prioritize Jack's Slough and North Cove on Kissimmee for this habitat.
Action C-2.3	Prioritize species to manage to include hydrilla and water lilies. Ideal distribution is 70% SAV and water lilies with 30% emergent plants (cattail/pickerelweed) interspersed throughout.
Action C-2.4	Utilize drawdowns and organic material removal to restore diversity and productivity to the shallow water marsh.
Action C-2.5	Investigate using disturbance methods such as discing and fire in the non-persistent zone of the littoral zone to stimulate annual seed-producing plants.
Objective C-3	Maintain up to 10% of the littoral zone at high (100%) vegetation coverage in blocks of at least ½ acre to 2 acres to provide snail kite and wading bird nesting habitat. These areas are to be inundated all of the time and dominated by cattail, bulrush, and/or willow.
Action C-3.1	Promote heterogeneous mixtures of SAV, low stature emergent vegetation, and small patches of dense cattail and bulrush throughout the KCOL. Focus areas include Big Grassy, Lanier Point, and South Steer Beach on Lake Tohopekaliga, the southeast cove of Lake Hatchineha, and the southeastern shoreline of Lake Kissimmee. Best feasible management practices should be used, including herbicides, prescribed fire, drawdowns, and harvesting.
Action C-3.2	Plant woody substrate in constantly inundated areas near foraging habitats to provide nesting substrate, particularly on Lake Kissimmee. This should be done during low water events to increase planting success.

FOCAL AREA 2 - HABITAT MANAGEMENT (CONT.)

Objective C-4	Maintain greater than 10% of the littoral zone at high (100%) vegetation coverage within consolidated peat/muck areas at least three feet deep to provide nesting habitat for alligators. Aquatic plants are to include mixed marsh vegetation dominated by cattail.
Action C-4.1	For Lake Tohopekaliga, preserve and maintain the western shoreline between (1) Shingle Creek and Lanier Point, (2) the perimeters of Makinson and Paradise Islands, (3) and the southern extent of Goblets Cove as mature marsh habitats in vegetation management and lake restoration activities.
Action C-4.2	For Lake Kissimmee, preserve and maintain mature marsh habitats around (1) Lemon and Strum Islands, (2) Brahma Island, (3) lake shoreline south of Brahma Island, and (4) the eastern shoreline south of Overstreet Landing.
Action C-4.3	For Lakes Hatchineha and Cypress, identify and designate mature marsh habitats around the lake perimeter to preserve and maintain through vegetation management and lake restoration activities.
Goal D: Manage hydrilla within the Kissimmee Chain of Lakes at levels that allow for optimum fish and wildlife habitat while ensuring cost-effectiveness and stakeholder support.	
Objective D-1	Manage SAV/hydrilla on Lakes Tohopekaliga and Cypress to be 30% - 40% total coverage. Allow up to 30% of the littoral zone to be SAV/hydrilla, with the remainder of the total coverage occurring offshore.
Action D-1.1	Conduct annual monitoring of SAV on the KCOL in late summer (July-August) utilizing LTM standardized protocol.
Action D-1.2	Annual hydrilla management will be designed to maintain the target total coverage of SAV but may be further limited by annual FWC budgets.
Action D-1.3	Hydrilla management will be prioritized in areas where it is limiting public access or where it is encroaching upon native SAV.
Objective D-2	Manage SAV/hydrilla on Lakes Kissimmee and Hatchineha to be 15% - 25% total coverage both to occur inshore and offshore.

FOCAL AREA 2 - HABITAT MANAGEMENT (CONT.)

Action D-2.1	Conduct Annual monitoring of SAV on the KCOL in late summer (July-August) utilizing LTM standardized protocol.
Action D-2.2	Annual hydrilla management will be designed to maintain the target total coverage of SAV but may be further limited by annual FWC budgets.
Action D-2.3	Hydrilla management will be prioritized in areas where it is limiting public access or where it is encroaching upon native SAV.
Objective D-3	<p>The timing and location of hydrilla treatment will be based on the following considerations:</p> <ul style="list-style-type: none"> • Annual management will be finalized after considering environmental variables, public stakeholder input, consultation with the USFWS, and KCOL team discussions. • Hydrilla management, both inshore and offshore, can occur between September and May, with larger, more widespread treatment occurring in October and February and smaller, less widespread treatments occurring in September, December, January, March, April, and May. • Hydrilla management will also consider high-profile bass fishing tournaments, bass spawning activity, waterfowl implications, and snail kite nesting activity which all vary on an annual basis.
Action D-3.1	Hydrilla management will be prioritized in areas where it is limiting public access or where it is encroaching upon native SAV.
Action D-3.2	Any hydrilla management occurring outside of these recommended dates will be reviewed and confirmed by FWC biologists prior to implementation
Goal E: Manage invasive plant species within the Kissimmee Chain of Lakes at levels which that allow for optimum fish and wildlife habitat while ensuring cost-effectiveness and stakeholder support.	
Objective E-1	Manage major invasive plants, including water hyacinth, water lettuce, Cuban bulrush, and water primrose at the lowest feasible levels through a maintenance control program.
Action E-1.1	FWC biologists will monitor invasive plant populations and directly contract maintenance activities as needed.
Action E-1.2	Contractors and cooperators will survey the KCOL on a regular basis.

FOCAL AREA 2 - HABITAT MANAGEMENT (CONT.)

Action E-1.3	Small areas of invasive plants will be managed on a regular basis to prevent expansion and reduce the overall amount of herbicide applied within the KCOL.
Action E-1.4	Invasive plant management activities may be temporarily suspended following discussions with FWC subject matter experts.
Objective E-2	Continually explore innovative methods of managing aquatic habitats in order to improve the balance between vegetation, water quality, and stakeholder use.
Action E-2.1	Include new herbicide technologies that improve performance on target species, increase selectivity, and reduce impacts on non-target plants.
Action E-2.2	Utilize mechanical harvesting when feasible to meet plant and habitat management objectives.
Action E-2.3	Investigate the feasibility of alternative tools to manage invasive plants in order to reduce the use of herbicide in the KCOL.
Action E-2.4	FWC will continue to partner with universities and other agencies for testing and utilization of new herbicide technologies in accordance with US EPA and Florida DACS protocols.
Objective E-3	Consider the timing, season, environmental conditions, and location of treatments to the greatest extent possible around priority areas when scheduling management activities.
Action E-3.1	FWC biologists will develop a comprehensive list of critical timing considerations for fish and wildlife critical life history events (e.g., nesting, fledging, spawning, molting) and public use opportunities (e.g., fishing, hunting) and schedule management actions to minimize conflicts to the greatest extent feasible.
Action E-3.2	Prepare maps and draft hydrilla management plans for public stakeholder comments at annual meetings in early September. After this meeting, management actions will be finalized, and stakeholders will be notified of finalized management plans through press releases and GovDelivery notifications.
Action E-3.3	Open water hydrilla management is preferred between September and the end of October, with any remaining open water management to occur between February and May.
Action E-3.4	Hydrilla management is preferred between September and May, depending on waterfowl hunting, snail kite nesting surveys, bass spawning activity, and fishing tournaments. Preference will be for treatments to occur in October and February to avoid waterfowl hunting seasons and snail kite nesting season.

FOCAL AREA 2 - HABITAT MANAGEMENT (CONT.)

Action E-3.5	Any hydrilla management occurring outside of these recommended dates will be reviewed and confirmed by FWC biologists prior to implementation.
Action E-3.6	Stakeholders will be notified of all large-scale hydrilla management activities through press releases and GovDelivery notifications.
Objective E-4	Support early detection and rapid response (EDRR) programs to eradicate small populations of newly discovered invasive species before they expand and displace native plant communities.
Action E-4.1	FWC biologists will survey the KCOL on a monthly basis to detect newly discovered invasive species. FWC biologists use the Florida Exotic Pest Plant Council's list of invasive plant species.
Action E-4.2	New populations of invasive species will be controlled immediately and completely to prevent additional loss of native habitat.
Objective E-5	Ensure effective contractor oversight and continually evaluate the efficacy of plant management operations.
Action E-5.1	Require contractors to submit GPS tracks for all plant management actions.
Action E-5.2	FWC biologists will conduct periodic site inspections to evaluate the correct implementation of plant control projects.
Action E-5.3	FWC biologists will provide direct oversight of all aerial and large-scale herbicide applications.

Table 3: *Goals And Objectives For Public Use and Recreation.***FOCAL AREA 3 - PUBLIC USE AND RECREATION****Goal F: Provide diverse recreational opportunities that meet the long-term needs of stakeholders on the Kissimmee Chain of Lakes.**

Objective F-1	Within five years, utilizing partnerships at the local level, identify and execute six projects to create or enhance boating access, angling, and wildlife viewing opportunities on the KCOL.
Action F-1.1	Work with local municipalities and Osceola County to build one new boat ramp on Lake Tohopekaliga that includes state-of-the-art bass fishing tournament amenities.
Action F-1.2	Work with local municipalities and Osceola County to construct at least one new fishing pier.
Action F-1.3	Work with local municipalities and Osceola County to identify at least three new bank fishing opportunities, including a special opportunity fishing site(s).
Action F-1.4	Work with local municipalities and Osceola County to construct at least one new wildlife viewing pier, separate but adjacent to the new fishing pier specified under F-1.2.
Objective F-2	Conduct aquatic plant control as needed to maintain access to fish and wildlife resources, including boat ramps, federal navigational trails, fishing piers, and flood control structures.
Action F-2.1	FWC biologists will survey all public access locations and give priority to the maintenance of these locations unless prevented by restrictions such as snail kite nesting or budget limitations.
Action F-2.2	Plant management activities at these locations may include the management of native vegetation and non-native vegetation.
Action F-2.3	Plant management activities at these access locations will be conducted to minimize the long-term impact on desirable vegetation.
Objective F-3	Within five years, identify and execute at least one new project to create or enhance hunting opportunities on the KCOL.
Action F-3.1	Investigate and pursue stormwater treatment and retention areas in the Kissimmee Basin as viable hunting opportunities.
Action F-3.2	Annually support and perform at least one AHRES project to restore diverse floating leaved marsh habitat through herbicide or mechanical removal of tussock and invasive cattail and water primrose.
Action F-3.3	Continue pursuing avenues to fund and complete projects on Rolling Meadows in cooperation with SFWMD.

Table 4: *Goals And Objectives For Communication and Interagency Coordination***FOCAL AREA 4 - COMMUNICATION AND INTERAGENCY COORDINATION**

Goal G: Increase the efficiency and effectiveness of external communication related to fish, wildlife, and habitat management on the Kissimmee Chain of Lakes.

Objective G-1	Maintain an active stakeholder contact list for the KCOL and enhance FWC's online resources to provide information regarding FWC's ongoing monitoring, current management activities, and upcoming stakeholder involvement opportunities.
Action G-1.1	Utilize stakeholder email list to inform stakeholders about engagement opportunities (e.g., public meetings, focus groups, etc.).
Action G-1.2	Utilize stakeholder email list to provide information and receive input regarding management on the KCOL.
Action G-1.3	Utilize the "What's Happening on my Lake" webapp to present up-to-date monitoring and management data on the KCOL.
Action G-1.4	Create bi-annual newsletters to highlight the monitoring and management of fish, wildlife, and habitat on the KCOL.
Action G-1.5	Update KCOL sites and forecast page quarterly to ensure accurate fisheries monitoring and management information are available.
Action G-1.6	Investigate innovative ways to improve and streamline information to and from stakeholders regarding FWC's Management and Research.
Objective G-2	Collaborate with partners to build positive advocacy for the KCOL that supports scientifically sound fish and wildlife management and promotes resources at local, regional, and national levels.
Action G-2.1	Partner with local governments to install information kiosks at local KCOL boat ramps to increase outreach and promotion of the KCOL fishery and FWC's management.
Action G-2.2	Identify non-FWC communication outlets (e.g., social media) to help promote FWC's management and research efforts on the KCOL.
Action G-2.3	Investigate innovative ways to improve and streamline information to stakeholders at a local, regional, and national level to promote FWC's management and research on the KCOL.
Objective G-3	Utilize organized in-person or virtual public engagements a minimum of twice annually to share and receive information regarding FWC's management and monitoring efforts on the KCOL.
Action G-3.1	Optimize stakeholder involvement and representation from all stakeholder groups by considering the date, time, and location when scheduling public engagement.

FOCAL AREA 4 - COMMUNICATION AND INTERAGENCY COORDINATION (CONT.)

Action G-3.2	Ensure FWC public engagement announcements go out at least two weeks in advance.
Action G-3.3	When possible, incorporate hybrid (in-person and virtual) options for attending public meetings to accommodate stakeholders' needs and optimize stakeholder participation.
Action G-3.4	Over the next five years, hold at least one open house event where FWC and other management agencies can present KCOL related information and be available for questions/input from stakeholders.
Objective G-4	Promote open dialogue between the public and FWC staff for the public to ask questions and provide input and feedback regarding management on the KCOL.
Action G-4.1	Ensure FWC biologists' contact information are readily available to stakeholders via online resources.
Action G-4.2	Respond to all stakeholder questions and comments in a reasonable time.
Action G-4.3	Attend outreach events (e.g., local club/NGO meetings, HOAs, fishing tournaments) representing different user groups to be available for stakeholder questions and feedback on KCOL management.
Goal H: Enhance coordination with other managing partner agencies to provide an integrated management approach on the Kissimmee Chain of Lakes to improve fish and wildlife resources.	
Objective H-1	Ensure that partner agencies adequately consider fish and wildlife resources in their planning activities.
Action H-1.1	Participate in interagency teams, technical advisory groups, and public forums related to the KCOL.
Action H-1.2	Provide written comments to the appropriate regulatory agency on permit applications that may affect fish and wildlife resources.
Objective H-2	Provide stakeholders and government partners with forums to exchange up-to-date information on FWC programs, management, and conditions on the KCOL.
Action H-2.1	Invite other governmental agencies to stakeholder meetings to provide input and keep them informed of stakeholder concerns that may be outside of FWC's jurisdiction.
Action H-2.2	Use FWC's "What's Happening on my Lake?" tool for partner agency management activities.
Objective H-3	Coordinate with regional partners that work on fish and wildlife issues related to the KCOL.
Action H-3.1	Create a technical advisory group (TAG) comprised of federal, state, university, and other partners to exchange fish and wildlife resources information.
Action H-3.2	Coordinate financial or physical resources with universities or others conducting research within the KCOL.
Action H-3.3	Propose to participate in one cost-share project annually to improve habitat, fish and wildlife resources, or water quality on the KCOL.

CHAPTER 2

GOALS AND OBJECTIVES



The goals and objectives created for this Plan identify management priorities and provide a mechanism for resolving issues by guiding specific projects to achieve FWC's mission and vision for the KCOL. The focal areas encompass broad categories that promote FWC's mission. The goals describe desired future conditions that convey a purpose. The objectives are derived from the goals and contain concise metrics for determining actions and evaluating the success of those actions.

The FWC and Inwood prepared the draft goals and objectives based on input from stakeholders and subject matter experts within the FWC. FWC stakeholders were given multiple opportunities throughout 2020 and early 2021 to provide input on FWC management programs. The lake management planning process and stakeholder engagement are summarized in Chapter 5. Stakeholder information led to the identification of four focal areas, which correspond with the core functions of the FWC's management of freshwater aquatic systems.

The four focal areas identified for the KCOL Plan:

- Fish and Wildlife Management
- Habitat Management
- Public Use and Recreation
- Communication and Interagency Coordination

Once the focal areas were established, the FWC developed goals and "SMART" objectives: specific, measurable, achievable, results-oriented, and timely management of the system. The FWC gathered feedback on the draft goals and objectives through

virtual and in-person focus groups with stakeholders throughout June and July 2021. Based on this feedback, the management goals and objectives were developed. From there, FWC created actions to define the mechanisms for achieving the specific objectives for each goal. FWC will review the Plan within five years to determine its effectiveness and update as necessary to achieve the goals. This review will begin in the 2027-2028 fiscal year.

WHAT IS A **SMART** OBJECTIVE?



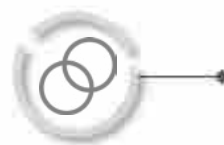
Specific
outline in a clear statement
precisely what is required



Measurable
identify a measurable element
to determine success or failure



Achievable
ensure necessary resources are
available and staff is able to
achieve



Results-Oriented
specify an end result that is
appropriate to FWC and aligns
with FWC's mission



Timely
specify a deadline when the
results can be achieved

FOCAL AREA 1: FISH AND WILDLIFE MANAGEMENT

Many stakeholders expressed concern about current fish and wildlife populations in the KCOL. The KCOL provides habitats for many fish and wildlife species, including species unique to the region, like the endangered Everglade snail kite. Wildlife can be especially vulnerable to abrupt changes in habitat due to anthropomorphic effects and natural climate events, such as hurricanes. Fish spawning can also increase or decrease depending on a variety of factors occurring on the lakes from year to year. These fish and wildlife management goals and objectives are intended to support healthy fish and wildlife populations on the KCOL.

FOCAL AREA 2: HABITAT MANAGEMENT

Timing seems to be an issue. Spawning seasons should be a time to allow bass movement without disruption to habitat. Also, time leading up to that to allow feeding is essential.

- KCOL Stakeholder Comment, Online Survey, December, 2020.

FWC and Inwood heard concerns from many stakeholders about the current habitat management on the KCOL. The most discussed topics include herbicide use, the loss of native plant communities, mainly Kissimmee grass, and the prevalence of hydrilla blocking access and navigation. Managing competing interests on the chain is a balancing act that FWC is striving to improve. Stakeholder desires (e.g., fewer herbicide treatments and more mechanical harvesting), listed species regulations, fish and wildlife needs, budgetary constraints, and technical limitations (i.e., shallow water, upland disposal sites, etc.) are difficult to balance. Further complicating habitat management on the chain is the stabilized water level, which FWC does not control. Ultimately, FWC aims to improve and expand native plant communities through various methods, when feasible, which will provide greater habitat for fish and wildlife resources on the KCOL.

“

A balance of both submerged and emergent vegetation is needed. The lack of control on airboat spraying is ridiculous.

- KCOL Stakeholder Comment, Online Survey, December, 2020.

I understand that the FWC is in a difficult position to manage aquatic vegetation on the KCOL system. Nutrient loading is our enemy and the inability to manipulate water levels make the task extremely difficult.

- KCOL Stakeholder Comment, Online Survey, January, 2021.

”

FOCAL AREA 3: PUBLIC USE AND RECREATION

The KCOL provides abundant recreational opportunities for a multitude of user groups. The online surveys indicated that most respondents were anglers, followed by boaters, wildlife viewers, residents, and hunters. With an abundance of different users frequenting the KCOL throughout the year, managing the recreational opportunities on the chain is imperative. FWC is committed to providing diverse recreational opportunities that meet the long-term needs of the stakeholders on the KCOL.

“

It's tough to continually balance the ever-changing needs of people and wildlife. Keep up the great work!

- KCOL Stakeholder Comment, Online Survey, December, 2020.

”

FOCAL AREA 4: COMMUNICATION AND INTERAGENCY COORDINATION

There are a variety of stakeholder interests on the KCOL, including angling, hunting, boating, and wildlife viewing. The importance of the chain and the development of this Plan are reflected in the numerous stakeholders that participated in the planning process. Stakeholders expressed the need for more effective communication and stakeholder engagement regarding management actions. This is an important tool that FWC can provide to facilitate transparency regarding the management on the KCOL.

Management of the KCOL requires a multi-agency effort. FWC has partnered with other state and local agencies in the past to conduct habitat management activities in the lake, including restoration projects that improve fish and wildlife resources. This type of interagency coordination is important for achieving the FWC's fish and wildlife habitat goals on the KCOL. This Plan includes goals and objectives aimed at enhancing coordination with partner agencies for the purpose of improving fish and wildlife resources.

“

I would like to see a comprehensive explanation of the methodology and reasoning behind the vegetation and water level management on the chain. I think that it would be beneficial if the users of the lakes would understand why the various management practices are utilized.

- KCOL Stakeholder Comment,
Online Survey, January, 2021.

I appreciate the survey, I believe the people should have more of an input in the aforementioned concerns and treatment, as we spend a lot of time on this chain and see the devastation and consequences.

- KCOL Stakeholder Comment,
Online Survey, December, 2020.

”

Table 1: Goals And Objectives For Fish And Wildlife Management.**FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT****Goal A: Manage the Kissimmee Chain of Lakes fisheries to ensure long-term sustainability and public enjoyment.**

Objective A-1	Manage the Lake Tohopekaliga Largemouth Bass population, which results in angler effort greater than or equal to 40,000 angler hours/peak season with an angler catch rate of 0.7 fish/hour.
Action A-1.1	Conduct an annual peak season (January through May) creel survey on Lake Tohopekaliga.
Action A-1.2	Ensure habitat goals for Lake Tohopekaliga are met to promote a healthy bass population (per C-1 and C-2).
Action A-1.3	Identify and execute habitat restoration projects that benefit the bass population and angler catch rates on Lake Tohopekaliga.
Action A-1.4	Increase outreach to help promote the Largemouth Bass fishery using recent research and management information. Use outreach material to help anglers better target bass on Lake Tohopekaliga.
Objective A-2	Manage the Lake Kissimmee Largemouth Bass population, which results in angler effort greater than or equal to 75,000 angler hours/peak season with an angler catch rate of 0.5 fish/hour.
Action A-2.1	Conduct an annual peak season (January through May) creel survey on Lake Kissimmee.
Action A-2.2	Ensure habitat goals for Lake Kissimmee are met to promote a healthy bass population (per C-1 and C-2).
Action A-2.3	Identify and execute habitat restoration projects that benefit Lake Kissimmee's bass population and angler catch rates.
Action A-2.4	Increase outreach to help promote the Largemouth Bass fishery using recent research and management information. Use outreach material to help anglers better target bass on Lake Kissimmee.
Objective A-3	Manage the KCOL Largemouth Bass population, which results in electrofishing catch rates greater than or equal to 0.6 fish/minute.
Action A-3.1	Routinely sample the bass population in KCOL using electrofishing during the spring.
Action A-3.2	Ensure KCOL habitat objectives are met to promote healthy bass populations (per C-1 and C-2).
Action A-3.3	Identify and execute habitat restoration projects that benefit the KCOL bass populations.
Action A-3.4	Work with the SFWMD and USACE to investigate the feasibility of water level fluctuation for the potential benefit of fish populations, including Largemouth Bass.

FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT (CONT.)

Objective A-4	Manage the KCOL Largemouth Bass population, which results in a strong year class for age-1 fish (i.e., a modal peak) at least once every three years.
Action A-4.1	Routinely sample the KCOL bass population using electrofishing during the spring.
Action A-4.2	Ensure submersed aquatic vegetation objectives are met to promote strong year-class production (per C-1, C-2 D-1, and D-2).
Action A-4.3	Investigate the optimal timing of hydrilla treatments to enhance year-class production by ensuring available nursery habitat for young of the year bass (per D-3).
Action A-4.4	Work with the SFWMD and USACE to investigate the feasibility of water level fluctuation to create optimal conditions for year-class production.
Objective A-5	Manage the KCOL Largemouth Bass Relative Stock Density (RSD) of RSD-16 greater than or equal to 18%.
Action A-5.1	Routinely sample the KCOL bass population using electrofishing during the spring.
Action A-5.2	Routinely produce a length frequency histogram and calculate an RSD-16 on KCOL.
Action A-5.3	Conduct annual peak season (January through May) creel surveys on lakes Tohopekaliga and Kissimmee to monitor angler catch of fish greater than or equal to 16 inches TL.
Objective A-6	Manage the Lake Kissimmee Black Crappie population, which results in angler effort greater than or equal to 50,000 angler hours/non-peak season with an angler catch rate of 1.70 fish/hour.
Action A-6.1	Conduct an annual non-peak season (January through May) creel survey on Lake Kissimmee.
Action A-6.2	Ensure habitat goals for Lake Kissimmee are met to promote a healthy Black Crappie population (per C-1 and C-2).
Action A-6.3	Identify and execute habitat restoration projects that benefit the Black Crappie population and angler catch rates.
Action A-6.4	Increase outreach to help promote the Black Crappie fishery using recent research and management information. Use outreach material to help anglers better target Black Crappie on Lake Kissimmee.
Action A-6.5	Ensure that hydrilla does not exceed 25% coverage on the lake so that Black Crappie are readily available to anglers.
Action A-6.6	Work with the SFWMD and USACE to investigate the feasibility of water level fluctuation to create optimal conditions for Black Crappie year-class production.

FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT (CONT.)

Objective A-7	Manage the Lake Kissimmee bream population, which results in angler effort greater than or equal to 20,000 angler hours/ non-peak season with an angler catch rate of 2.30 fish/hour.
Action A-7.1	Conduct an annual non-peak season (January through May) creel survey on Lake Kissimmee.
Action A-7.2	Ensure habitat goals for Lake Kissimmee are met to promote a healthy bream population (per C-1 and C-2).
Action A-7.3	Identify and execute habitat restoration projects that benefit the bream population and angler catch rates.
Action A-7.4	Increase outreach to help promote the bream fishery using recent research and management information. Use outreach material to help anglers better target bream on Lake Kissimmee.
Action A-7.5	Ensure that hydrilla does not exceed 25% coverage on the lake so that bream are readily available to anglers.
Action A-7.6	Work with the SFWMD and USACE to investigate the feasibility of water level fluctuation to create optimal conditions for bream year class production.
Objective A-8	Achieve at least 100 TrophyCatch approvals per year for the KCOL.
Action A-8.1	Ensure habitat objectives are met throughout the KCOL to promote a trophy bass population (per C-1 and C-2).
Action A-8.2	Monitor catches of trophy bass to ensure sustainability and/or improvement continues.
Action A-8.3	Promote the TrophyCatch program to KCOL anglers by utilizing the communication tools outlined in this Plan, including outreach events (e.g., fishing tournaments, clubs meetings) and informational material (e.g., flyers, signage, kiosks).

FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT (CONT.)**Goal B: Manage the Kissimmee Chain of Lakes wildlife resources to ensure long-term sustainability and public enjoyment.**

Objective B-1	Manage the alligator population within the KCOL to a desired/minimum count of juveniles (1-4 feet total length) and adults (greater or equal to 6 feet total length) seen below: Lake Tohopekaliga: Juveniles = 1,732/866 Adults = 738/369 Lake Hatchineha: Juveniles = 628/314 Adults = 408/204 Cypress Lake: Juveniles = 244/122 Adults = 434/217 Lake Kissimmee: Juveniles = 1,626/813 Adults = 2,356/1,178
Action B-1.1	Conduct annual alligator nightlight surveys to monitor population numbers, size structures, and trends.
Action B-1.2	Analyze nightlight survey data annually and use results to adjust quotas for harvesting alligators and their eggs if necessary and in accordance with FWC's Alligator Management Program's protocols.
Action B-1.3	Engage with SFWMD to ensure that water level management schedules do not threaten the survival and recruitment of hatchlings on a large-scale and long-term basis.
Objective B-2	Promote the installation of at least 12 wood duck boxes within the next five years on the KCOL.
Action B-2.1	Collaborate with local organizations to find funding for box construction. (i.e., Deer Tag Grants).
Action B-2.2	Assist with logistics and technical assistance for mounting and placing boxes.
Action B-2.3	Assist in coordinating nest box and predator guard cleaning and maintenance.
Action B-2.4	Assist with record keeping for technical assistance regarding the expansion of the box program.
Objective B-3	Coordinate monitoring and research with agency partners to guide management actions for the Everglade snail kites and their nests.
Action B-3.1	Ensure that snail kite nest monitoring in the KCOL is continually funded to aid in kite conservation and research.
Action B-3.2	Coordinate management activities that have the potential to impact active kite nesting with the USFWS to ensure compliance with the Endangered Species Act.

FOCAL AREA 1 - FISH AND WILDLIFE MANAGEMENT (CONT.)

Action B-3.3	Provide USFWS the opportunity to contribute to management plans that may impact kite foraging or nesting habitat.
Action B-3.4	Control large, dense emergent vegetation monocultures in favor of diverse, heterogenous vegetative communities.
Action B-3.5	Promote lake drawdowns and low water projects, when necessary, to promote healthy snail kite foraging and nesting conditions for the long term. Coordinate project details with USFWS to prevent the take of snail kite nests.
Objective B-4	Create a Waterfowl Energy Day (WED) model to estimate available waterfowl food on the KCOL within two years.
Action B-4.1	Identify existing FWC vegetation survey data that can be incorporated into the model.
Action B-4.2	Identify and incorporate non-FWC data that can be used to strengthen the model inputs.
Action B-4.3	Annually quantify the available food present during the winter waterfowl migration.
Action B-4.4	Use the results to identify habitat communities requiring management to increase waterfowl food availability.
Objective B-5	Support the early detection and rapid response (EDRR) of invasive and/or non-native wildlife.
Action B-5.1	Seek out and compile data on high-priority non-native fish and wildlife detected within and near the lake management area to identify future threats.
Action B-5.2	Develop materials for staff and partners to help identify and target current and future threats to the lake management area.
Action B-5.3	Coordinate with partner agencies to respond to high-priority non-native fish and wildlife detected within or near the lake management area.

Table 2: *Goals And Objectives For Habitat Management.***FOCAL AREA 2 - HABITAT MANAGEMENT****Goal C: Manage the Kissimmee Chain of Lakes to provide optimal habitat for fish and wildlife and the benefit of the public.**

Objective C-1	Manage greater than half of the littoral zone at moderately high (40-70%) vegetation coverage of desirable native plants for foraging habitat.
Action C-1.1	Conduct annual monitoring of emergent and submersed vegetation on the KCOL utilizing Long Term Management and Invasive Plant Management protocols.
Action C-1.2	Manage habitat to achieve this objective by utilizing best management practices such as revegetation, aquatic plant harvesting, herbicide treatments, prescribed fire, and lake drawdowns.
Objective C-2	Maintain greater than 10% of the littoral zone at moderately high vegetation coverage in depths of 0-3' to benefit wading birds and dabbling ducks.
Action C-2.1	Prioritize Big Grassy Island, North and South Steer Beach on Lake Tohopekaliga for this habitat.
Action C-2.2	Prioritize Jack's Slough and North Cove on Kissimmee for this habitat.
Action C-2.3	Prioritize species to manage to include hydrilla and water lilies. Ideal distribution is 70% SAV and water lilies with 30% emergent plants (cattail/pickerelweed) interspersed throughout.
Action C-2.4	Utilize drawdowns and organic material removal to restore diversity and productivity to the shallow water marsh.
Action C-2.5	Investigate using disturbance methods such as discing and fire in the non-persistent zone of the littoral zone to stimulate annual seed-producing plants.
Objective C-3	Maintain up to 10% of the littoral zone at high (100%) vegetation coverage in blocks of at least ½ acre to 2 acres to provide snail kite and wading bird nesting habitat. These areas are to be inundated all of the time and dominated by cattail, bulrush, and/or willow.
Action C-3.1	Promote heterogeneous mixtures of SAV, low stature emergent vegetation, and small patches of dense cattail and bulrush throughout the KCOL. Focus areas include Big Grassy, Lanier Point, and South Steer Beach on Lake Tohopekaliga, the southeast cove of Lake Hatchineha, and the southeastern shoreline of Lake Kissimmee. Best feasible management practices should be used, including herbicides, prescribed fire, drawdowns, and harvesting.
Action C-3.2	Plant woody substrate in constantly inundated areas near foraging habitats to provide nesting substrate, particularly on Lake Kissimmee. This should be done during low water events to increase planting success.

FOCAL AREA 2 - HABITAT MANAGEMENT (CONT.)

Objective C-4	Maintain greater than 10% of the littoral zone at high (100%) vegetation coverage within consolidated peat/muck areas at least three feet deep to provide nesting habitat for alligators. Aquatic plants are to include mixed marsh vegetation dominated by cattail.
Action C-4.1	For Lake Tohopekaliga, preserve and maintain the western shoreline between (1) Shingle Creek and Lanier Point, (2) the perimeters of Makinson and Paradise Islands, (3) and the southern extent of Goblets Cove as mature marsh habitats in vegetation management and lake restoration activities.
Action C-4.2	For Lake Kissimmee, preserve and maintain mature marsh habitats around (1) Lemon and Strum Islands, (2) Brahma Island, (3) lake shoreline south of Brahma Island, and (4) the eastern shoreline south of Overstreet Landing.
Action C-4.3	For Lakes Hatchineha and Cypress, identify and designate mature marsh habitats around the lake perimeter to preserve and maintain through vegetation management and lake restoration activities.
Goal D: Manage hydrilla within the Kissimmee Chain of Lakes at levels that allow for optimum fish and wildlife habitat while ensuring cost-effectiveness and stakeholder support.	
Objective D-1	Manage SAV/hydrilla on Lakes Tohopekaliga and Cypress to be 30% - 40% total coverage. Allow up to 30% of the littoral zone to be SAV/hydrilla, with the remainder of the total coverage occurring offshore.
Action D-1.1	Conduct annual monitoring of SAV on the KCOL in late summer (July-August) utilizing LTM standardized protocol.
Action D-1.2	Annual hydrilla management will be designed to maintain the target total coverage of SAV but may be further limited by annual FWC budgets.
Action D-1.3	Hydrilla management will be prioritized in areas where it is limiting public access or where it is encroaching upon native SAV.
Objective D-2	Manage SAV/hydrilla on Lakes Kissimmee and Hatchineha to be 15% - 25% total coverage both to occur inshore and offshore.

FOCAL AREA 2 - HABITAT MANAGEMENT (CONT.)

Action D-2.1	Conduct Annual monitoring of SAV on the KCOL in late summer (July-August) utilizing LTM standardized protocol.
Action D-2.2	Annual hydrilla management will be designed to maintain the target total coverage of SAV but may be further limited by annual FWC budgets.
Action D-2.3	Hydrilla management will be prioritized in areas where it is limiting public access or where it is encroaching upon native SAV.
Objective D-3	<p>The timing and location of hydrilla treatment will be based on the following considerations:</p> <ul style="list-style-type: none"> • Annual management will be finalized after considering environmental variables, public stakeholder input, consultation with the USFWS, and KCOL team discussions. • Hydrilla management, both inshore and offshore, can occur between September and May, with larger, more widespread treatment occurring in October and February and smaller, less widespread treatments occurring in September, December, January, March, April, and May. • Hydrilla management will also consider high-profile bass fishing tournaments, bass spawning activity, waterfowl implications, and snail kite nesting activity which all vary on an annual basis.
Action D-3.1	Hydrilla management will be prioritized in areas where it is limiting public access or where it is encroaching upon native SAV.
Action D-3.2	Any hydrilla management occurring outside of these recommended dates will be reviewed and confirmed by FWC biologists prior to implementation
Goal E: Manage invasive plant species within the Kissimmee Chain of Lakes at levels which that allow for optimum fish and wildlife habitat while ensuring cost-effectiveness and stakeholder support.	
Objective E-1	Manage major invasive plants, including water hyacinth, water lettuce, Cuban bulrush, and water primrose at the lowest feasible levels through a maintenance control program.
Action E-1.1	FWC biologists will monitor invasive plant populations and directly contract maintenance activities as needed.
Action E-1.2	Contractors and cooperators will survey the KCOL on a regular basis.

FOCAL AREA 2 - HABITAT MANAGEMENT (CONT.)

Action E-1.3	Small areas of invasive plants will be managed on a regular basis to prevent expansion and reduce the overall amount of herbicide applied within the KCOL.
Action E-1.4	Invasive plant management activities may be temporarily suspended following discussions with FWC subject matter experts.
Objective E-2	Continually explore innovative methods of managing aquatic habitats in order to improve the balance between vegetation, water quality, and stakeholder use.
Action E-2.1	Include new herbicide technologies that improve performance on target species, increase selectivity, and reduce impacts on non-target plants.
Action E-2.2	Utilize mechanical harvesting when feasible to meet plant and habitat management objectives.
Action E-2.3	Investigate the feasibility of alternative tools to manage invasive plants in order to reduce the use of herbicide in the KCOL.
Action E-2.4	FWC will continue to partner with universities and other agencies for testing and utilization of new herbicide technologies in accordance with US EPA and Florida DACS protocols.
Objective E-3	Consider the timing, season, environmental conditions, and location of treatments to the greatest extent possible around priority areas when scheduling management activities.
Action E-3.1	FWC biologists will develop a comprehensive list of critical timing considerations for fish and wildlife critical life history events (e.g., nesting, fledging, spawning, molting) and public use opportunities (e.g., fishing, hunting) and schedule management actions to minimize conflicts to the greatest extent feasible.
Action E-3.2	Prepare maps and draft hydrilla management plans for public stakeholder comments at annual meetings in early September. After this meeting, management actions will be finalized, and stakeholders will be notified of finalized management plans through press releases and GovDelivery notifications.
Action E-3.3	Open water hydrilla management is preferred between September and the end of October, with any remaining open water management to occur between February and May.
Action E-3.4	Hydrilla management is preferred between September and May, depending on waterfowl hunting, snail kite nesting surveys, bass spawning activity, and fishing tournaments. Preference will be for treatments to occur in October and February to avoid waterfowl hunting seasons and snail kite nesting season.

FOCAL AREA 2 - HABITAT MANAGEMENT (CONT.)

Action E-3.5	Any hydrilla management occurring outside of these recommended dates will be reviewed and confirmed by FWC biologists prior to implementation.
Action E-3.6	Stakeholders will be notified of all large-scale hydrilla management activities through press releases and GovDelivery notifications.
Objective E-4	Support early detection and rapid response (EDRR) programs to eradicate small populations of newly discovered invasive species before they expand and displace native plant communities.
Action E-4.1	FWC biologists will survey the KCOL on a monthly basis to detect newly discovered invasive species. FWC biologists use the Florida Exotic Pest Plant Council's list of invasive plant species.
Action E-4.2	New populations of invasive species will be controlled immediately and completely to prevent additional loss of native habitat.
Objective E-5	Ensure effective contractor oversight and continually evaluate the efficacy of plant management operations.
Action E-5.1	Require contractors to submit GPS tracks for all plant management actions.
Action E-5.2	FWC biologists will conduct periodic site inspections to evaluate the correct implementation of plant control projects.
Action E-5.3	FWC biologists will provide direct oversight of all aerial and large-scale herbicide applications.

Table 3: *Goals And Objectives For Public Use and Recreation.***FOCAL AREA 3 - PUBLIC USE AND RECREATION****Goal F: Provide diverse recreational opportunities that meet the long-term needs of stakeholders on the Kissimmee Chain of Lakes.**

Objective F-1	Within five years, utilizing partnerships at the local level, identify and execute six projects to create or enhance boating access, angling, and wildlife viewing opportunities on the KCOL.
Action F-1.1	Work with local municipalities and Osceola County to build one new boat ramp on Lake Tohopekaliga that includes state-of-the-art bass fishing tournament amenities.
Action F-1.2	Work with local municipalities and Osceola County to construct at least one new fishing pier.
Action F-1.3	Work with local municipalities and Osceola County to identify at least three new bank fishing opportunities, including a special opportunity fishing site(s).
Action F-1.4	Work with local municipalities and Osceola County to construct at least one new wildlife viewing pier, separate but adjacent to the new fishing pier specified under F-1.2.
Objective F-2	Conduct aquatic plant control as needed to maintain access to fish and wildlife resources, including boat ramps, federal navigational trails, fishing piers, and flood control structures.
Action F-2.1	FWC biologists will survey all public access locations and give priority to the maintenance of these locations unless prevented by restrictions such as snail kite nesting or budget limitations.
Action F-2.2	Plant management activities at these locations may include the management of native vegetation and non-native vegetation.
Action F-2.3	Plant management activities at these access locations will be conducted to minimize the long-term impact on desirable vegetation.
Objective F-3	Within five years, identify and execute at least one new project to create or enhance hunting opportunities on the KCOL.
Action F-3.1	Investigate and pursue stormwater treatment and retention areas in the Kissimmee Basin as viable hunting opportunities.
Action F-3.2	Annually support and perform at least one AHRES project to restore diverse floating leaved marsh habitat through herbicide or mechanical removal of tussock and invasive cattail and water primrose.
Action F-3.3	Continue pursuing avenues to fund and complete projects on Rolling Meadows in cooperation with SFWMD.

Table 4: *Goals And Objectives For Communication and Interagency Coordination***FOCAL AREA 4 - COMMUNICATION AND INTERAGENCY COORDINATION**

Goal G: Increase the efficiency and effectiveness of external communication related to fish, wildlife, and habitat management on the Kissimmee Chain of Lakes.

Objective G-1	Maintain an active stakeholder contact list for the KCOL and enhance FWC's online resources to provide information regarding FWC's ongoing monitoring, current management activities, and upcoming stakeholder involvement opportunities.
Action G-1.1	Utilize stakeholder email list to inform stakeholders about engagement opportunities (e.g., public meetings, focus groups, etc.).
Action G-1.2	Utilize stakeholder email list to provide information and receive input regarding management on the KCOL.
Action G-1.3	Utilize the "What's Happening on my Lake" webapp to present up-to-date monitoring and management data on the KCOL.
Action G-1.4	Create bi-annual newsletters to highlight the monitoring and management of fish, wildlife, and habitat on the KCOL.
Action G-1.5	Update KCOL sites and forecast page quarterly to ensure accurate fisheries monitoring and management information are available.
Action G-1.6	Investigate innovative ways to improve and streamline information to and from stakeholders regarding FWC's Management and Research.
Objective G-2	Collaborate with partners to build positive advocacy for the KCOL that supports scientifically sound fish and wildlife management and promotes resources at local, regional, and national levels.
Action G-2.1	Partner with local governments to install information kiosks at local KCOL boat ramps to increase outreach and promotion of the KCOL fishery and FWC's management.
Action G-2.2	Identify non-FWC communication outlets (e.g., social media) to help promote FWC's management and research efforts on the KCOL.
Action G-2.3	Investigate innovative ways to improve and streamline information to stakeholders at a local, regional, and national level to promote FWC's management and research on the KCOL.
Objective G-3	Utilize organized in-person or virtual public engagements a minimum of twice annually to share and receive information regarding FWC's management and monitoring efforts on the KCOL.
Action G-3.1	Optimize stakeholder involvement and representation from all stakeholder groups by considering the date, time, and location when scheduling public engagement.

FOCAL AREA 4 - COMMUNICATION AND INTERAGENCY COORDINATION (CONT.)

Action G-3.2	Ensure FWC public engagement announcements go out at least two weeks in advance.
Action G-3.3	When possible, incorporate hybrid (in-person and virtual) options for attending public meetings to accommodate stakeholders' needs and optimize stakeholder participation.
Action G-3.4	Over the next five years, hold at least one open house event where FWC and other management agencies can present KCOL related information and be available for questions/input from stakeholders.
Objective G-4	Promote open dialogue between the public and FWC staff for the public to ask questions and provide input and feedback regarding management on the KCOL.
Action G-4.1	Ensure FWC biologists' contact information are readily available to stakeholders via online resources.
Action G-4.2	Respond to all stakeholder questions and comments in a reasonable time.
Action G-4.3	Attend outreach events (e.g., local club/NGO meetings, HOAs, fishing tournaments) representing different user groups to be available for stakeholder questions and feedback on KCOL management.
Goal H: Enhance coordination with other managing partner agencies to provide an integrated management approach on the Kissimmee Chain of Lakes to improve fish and wildlife resources.	
Objective H-1	Ensure that partner agencies adequately consider fish and wildlife resources in their planning activities.
Action H-1.1	Participate in interagency teams, technical advisory groups, and public forums related to the KCOL.
Action H-1.2	Provide written comments to the appropriate regulatory agency on permit applications that may affect fish and wildlife resources.
Objective H-2	Provide stakeholders and government partners with forums to exchange up-to-date information on FWC programs, management, and conditions on the KCOL.
Action H-2.1	Invite other governmental agencies to stakeholder meetings to provide input and keep them informed of stakeholder concerns that may be outside of FWC's jurisdiction.
Action H-2.2	Use FWC's "What's Happening on my Lake?" tool for partner agency management activities.
Objective H-3	Coordinate with regional partners that work on fish and wildlife issues related to the KCOL.
Action H-3.1	Create a technical advisory group (TAG) comprised of federal, state, university, and other partners to exchange fish and wildlife resources information.
Action H-3.2	Coordinate financial or physical resources with universities or others conducting research within the KCOL.
Action H-3.3	Propose to participate in one cost-share project annually to improve habitat, fish and wildlife resources, or water quality on the KCOL.

CHAPTER 3

STATE OF THE LAKES



HISTORY

Located in Central Florida in both Osceola and Polk counties, the KCOL forms the upper portion of the Kissimmee Basin that flows into the Lower Kissimmee Basin. Water from the KCOL outfalls into the Kissimmee River, which contributes to the headwaters of Lake Okeechobee and the Everglades. Together these bodies form the Kissimmee-Okeechobee-Everglades watershed system. The Upper Kissimmee Basin is a 1,620 square mile watershed. Historically, the lakes in the KCOL were connected by natural streams and sloughs.



Channelizing the Kissimmee River, 1960 - 1971.

The KCOL experienced dredging and channelization since the late 1800s when the United States government began the draining of Central and South Florida in the largest non-studied ecological project in the world. In 1882, dredging began to dig the South Port Canal to connect Lake Tohopekaliga with Cypress Lake. This action drained 40,000 acres of land and lowered Lake Tohopekaliga by five feet. Then the St. Cloud Canal was completed in 1884, connecting

East Lake Tohopekaliga to Lake Tohopekaliga. These changes, along with the natural connections within the KCOL, made the KCOL and Kissimmee River Basin a hub for the transportation of cattle, sugar, and lumber via riverboat.

In the mid-1900s, the focus shifted toward flood control within the KCOL. Congress authorized the construction of the Central & Southern Florida Project (C&SF Project) for Flood Control and Protection in 1948. This project channelized the Kissimmee River and controlled water flow from the KCOL. By 1963, two major water control structures were completed within existing canals: the St. Cloud Canal gated spillway (S-59) and the South Port Canal gated spillway (S-61). The C-38 canal was constructed from 1961 to 1971. Additional water control structures were placed to regulate water flow within and between the lakes. This included the S-65 Structure, which regulated lakes in the Middle Basin. The construction of the C-38 canal eliminated approximately 35 miles of the river channel and drained 6,200 acres of floodplain wetlands.

The ultimate purpose of these activities was to control water levels for agricultural and urban development. While the KCOL and Kissimmee River Basin changes improved navigation and flood protection, eliminating high and low water levels within the lakes had ecological consequences. The natural rise and fall of water levels were instrumental in preserving floodplain wetlands, in-lake habitats, and fish and wildlife production. Over time, valuable habitat and

water quality degraded because of the channelization and water level stabilization. The stabilization of lake levels has also spurred development in the floodplains of the KCOL and contributed to eutrophication and the proliferation of invasive aquatic plant species.

To restore the KCOL and Kissimmee River Basin, Congress authorized the KRRP in 1992 as part of the Water Resources Development Act. This project is a partnership between the SFWMD and the USACE to restore 40 square miles of river and floodplain ecosystem, including 43 miles of the meandering river channel and 27,000 acres of wetland habitat. Other goals of the project included returning original flow velocities through the KCOL.

HYDROLOGIC CHARACTERISTICS

The lakes and waterways within the KCOL are a valuable resource providing water supply, recreational opportunities, aesthetic and scenic qualities, and habitat for fish and wildlife. Natural and man-made factors influence the health of this system. Contributing factors consist of physical, chemical, and biological characteristics. They include climate (e.g., precipitation, wind, and temperature), lake morphology, groundwater input, atmospheric inputs, and surrounding land use, to name a few. Rapid environmental changes can diminish water quality, recreational and aesthetic value, and habitat suitability. Many times, human activity accelerates these changes. It is essential for this Plan to identify and recognize the controllable and uncontrollable factors that contribute to the health of the KCOL ecosystem while balancing management activities.

Multiple agencies manage the lakes within the KCOL. Management activities associated with the KCOL include but are not limited to flood control, water quality, habitat restoration and protection, fish and wildlife, aquatic plant species, and public use. Due to the authorization of the C&SF Project and subsequent construction of water control structures, most management activities are constrained by these flood control measures.

WATER QUALITY

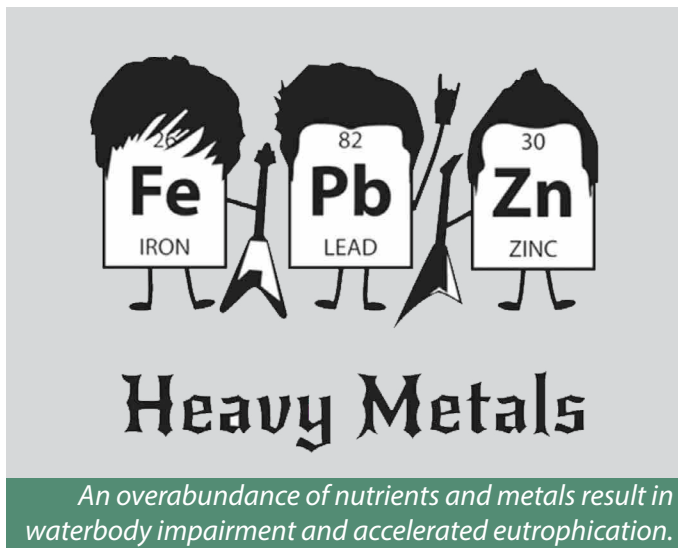
Water quality is often associated with water clarity. While water clarity is an important measure, many parameters and methods for measuring water quality are used. Within the KCOL, the two most substantial contributors to water quality are stormwater runoff and disruption of the natural system for flood control. Stormwater management and water level control must be included in the strategy to improve and maintain water quality within the KCOL. Improving water quality will help conserve the multiple uses and functions provided by the lakes and waterways of the KCOL.



Eelgrass in Lake Kissimmee.

One way to measure water quality is by determining the stage of eutrophication. Eutrophication is characterized by excessive plant and algal growth due to the increased availability of one or more limiting growth factors needed for photosynthesis, such as sunlight, nutrient fertilizers, and carbon dioxide (Schindler, 2006). Generally, increases in nitrogen and phosphorus contribute to increased algal growth, which degrades the water quality. Human activities have accelerated the rate and extent of eutrophication through point-source and non-point-source discharges of nutrients such as nitrogen and phosphorus (Carpenter et al., 1998). Since the Kissimmee Basin drains to Lake Okeechobee and is a significant contributor of phosphorus discharges, control of the eutrophication of the KCOL is very important for the health of Lake Okeechobee (SFWMD, 2011).

Lake Tohopekaliga, Cypress Lake, Lake Hatchineha, and Lake Kissimmee are all Class III freshwater lakes with a designated use for recreational purposes and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The FDEP evaluates whether these lakes meet their designated uses and determines impairment status. These four lakes within the KCOL are considered impaired waterbodies. These impairments include nutrients, lead, mercury, and/or biological parameters. The lakes are classified as eutrophic.



WATER LEVEL

The KCOL experienced major hydrological changes from dredging and channelizing projects in the 1880s. Lake stages fell significantly, and tens of thousands of acres of surrounding wetlands were drained. Water control structures were built at the outlet of each waterbody. SFWMD maintains and operates the structures according to the current regulation schedule overseen by the USACE. These operations narrowed the range of water level fluctuation from their natural state.

The lakes within the KCOL, including the four major lakes identified in this Plan, are considered shallow. The average depth of the four major lakes is 5.7 feet. Maximum depths range from 10.5-18.5 feet.

Lake Tohopekaliga fluctuates between 18,810 acres at low pool to 22,019 acres at high pool. Lake levels fluctuate between 52 and 55 feet National Geodetic Vertical Datum of 1929 (NGVD29) and are controlled by the S-61 structure. The average depth is 6.1 feet, with a maximum depth of 13 feet. The contributing watershed area is approximately 153,040 acres (SFWMD, 2011).



The S-65 control structure on Lake Kissimmee controls lake levels on Lakes Cypress, Hatchineha, and Kissimmee.

The S-65 Structure on Lake Kissimmee controls lake levels on Cypress Lake, Lake Hatchineha, and Lake Kissimmee. Levels range from 49 ft NGVD29 at low pool to 52.5 feet NGVD29 at high pool. The contributing watershed area for this system is approximately 901,529 acres (SFWMD, 2013). Cypress Lake is about 4,100 acres with an average depth ranging from 3.5 to 7.1 feet (FDEP, 2013). Lake Hatchineha is roughly 6,665 acres with an average depth of 4.5 feet and a maximum depth of 11.5 feet. Lake Kissimmee is the largest lake in the KCOL system, covering approximately 34,948 acres with average depths between 7.4 and 18.5 feet (SFWMD, 2011).

Fish and wildlife within the KCOL waterbodies have been linked to seasonal and annual patterns of water level fluctuation, which support wetland plant communities (USFWS, 1958; Williams et al., 1985; Johnson et al., 2007). Fish species depend on the hydroperiods of fluctuating water levels to maintain the vegetation needed to provide spawning locations, shelter, and refuge for prey. These fluctuations also allow for periods of seasonally low water levels to concentrate forage fish and other prey for adult Largemouth Bass and other predatory species that wait at the fringes of littoral vegetation to ambush prey (SFWMD, 2020).



Sandhill crane feeds her chick a spider.

FISH AND WILDLIFE

Fish and wildlife resources within the KCOL are some of Florida's most economically and aesthetically valuable resources, providing recreational and commercial value for angling, hunting, birding, and more. Due to the proximity of the lakes within the system and the connectivity formed by the canals, many of the same fish and wildlife species inhabit all of the lakes. The KCOL boasts an internationally recognized sport fishery

and recreational alligator harvesting. In addition, it provides habitats used by wood stork nesting colonies, Everglade snail kite nesting, and one of the largest concentrations of nesting bald eagles in the United States. The abundance and diversity of species draw large numbers of anglers, bird watchers, and waterfowl hunters to the KCOL each year.

FISHERIES

The KCOL supports a world-renowned fishery with iconic freshwater species, including the Largemouth Bass, Florida's most popular freshwater sport fish. At least 42 species have been documented in these lakes (Moyer et al., 1987), including other popular game fish such as Black Crappie, Bluegill, and Redear Sunfish. Table 5 details the community sample results from Lake Tohopekaliga and Lake Kissimmee.



A pair of spawning largemouth bass. Nests can typically be seen from the surface as cleared patches.

CHAPTER 3: STATE OF THE LAKES

Table 5: Historical Fish Community Sampled from the KCOL.

K = Lake Kissimmee T = Lake Tohopekaliga

Common Name	Scientific Name	Origin	Lake
Atlantic Needlefish	<i>Strongylura marina</i>	Native	K, T
Blue Tilapia	<i>Oreochromis aurea</i>	Non-Native	K, T
Black Acara	<i>Cichlasoma bimaculatum</i>	Non-Native	T
Black Crappie	<i>Pomoxis nigromaculatus</i>	Native	K, T
Bluefin Killifish	<i>Lucania goodei</i>	Native	K, T
Bluegill	<i>Lepomis macrochirus</i>	Native	K, T
Bowfin	<i>Amia calva</i>	Native	K, T
Brown Bullhead	<i>Ameiurus nebulosus</i>	Native	K, T
Brown Hoplo	<i>Hoplosternum littorale</i>	Non-Native	K, T
Brook Silverside	<i>Labidesthes sicculus</i>	Native	K, T
Bluespotted Sunfish	<i>Enneacanthus gloriosus</i>	Native	K, T
Channel Catfish	<i>Ictalurus punctatus</i>	Native	K, T
Chain Pickerel	<i>Esox niger</i>	Native	K, T
Dollar Sunfish	<i>Lepomis marginatus</i>	Native	K, T
Everglades Pygmy Sunfish	<i>Elassoma evergladei</i>	Native	K, T
Florida Gar	<i>Lepisosteus platyrhincus</i>	Native	K, T
Flagfish	<i>Jordanella floridae</i>	Native	K, T
Gizzard Shad	<i>Dorosoma cepedianum</i>	Native	K, T
Golden Shiner	<i>Notemigonus crysoleucas</i>	Native	K, T
Golden Topminnow	<i>Fundulus chrysotus</i>	Native	K, T
Inland Silverside	<i>Menidia beryllina</i>	Native	K, T
Lake Chubsucker	<i>Erimyzon sucetta</i>	Native	K, T
Least Killifish	<i>Heterandria formosa</i>	Native	K, T
Longnose Gar	<i>Lepisosteus osseus</i>	Native	K, T
Lined Topminnow	<i>Fundulus lineolatus</i>	Native	K, T
Largemouth Bass	<i>Micropterus salmoides</i>	Native	K, T
Mayan Cichlid	<i>Cichlasoma urophthalmus</i>	Non-Native	K, T
Eastern Mosquitofish	<i>Gambusia holbrooki</i>	Native	K, T
Okefenokee Pygmy Sunfish	<i>Elassoma okefenokee</i>	Native	T
Mozambique Tilapia	<i>Oreochromis mossambicus</i>	Non-Native	K
Pirate Perch	<i>Aphredoderus sayanus</i>	Native	K, T
Pugnose Minnow	<i>Opsopoeodus emiliae</i>	Native	K, T
Redbreast Sunfish	<i>Lepomis auitus</i>	Native	K, T
Redear Sunfish	<i>Lepomis microlophus</i>	Native	K, T
Redfin Pickerel	<i>Esox americanus</i>	Native	K, T
Sailfin Molly	<i>Poecilia latipinna</i>	Native	K, T
Seminole Killifish	<i>Fundulus seminolis</i>	Native	K, T
Spotted Sunfish	<i>Lepomis punctatus</i>	Native	K, T
Swamp Darter	<i>Etheostoma fusiforme</i>	Native	K, T
Tadpole Madtom	<i>Noturus gyrinus</i>	Native	K, T
Taillight Shiner	<i>Notropis maculatus</i>	Native	K, T
Threadfin Shad	<i>Dorosoma petenense</i>	Native	K, T
Vermiculated Sailfin Catfish	<i>Pterygoplichthys disjunctivus</i>	Non-Native	K, T
Walking Catfish	<i>Clarias batrachus</i>	Non-Native	T
Warmouth	<i>Lepomis gulosus</i>	Native	K, T
White Catfish	<i>Ameiurus catus</i>	Native	K, T
Yellow Bullhead	<i>Ameiurus natalis</i>	Native	K, T

LARGEMOUTH BASS (BLACK BASS)

Florida is known as the “Bass Fishing Capital of the World.” The Largemouth Bass is the most popular game fish in the KCOL. Overall, the Largemouth Bass population on all the lakes is good compared to most lakes in Florida, with some notable exceptions. Electrofishing surveys indicate that the size structure of fish in Lake Tohopekaliga and Cypress Lake are skewed to smaller fish. In contrast, the size structure for bass on Lake Kissimmee and Lake Hatchineha is skewed towards larger fish.



This 12 pound 15 ounce largemouth bass was recently caught during annual spring electrofishing.

Optimal nursery habitat consists of native SAV but can also include non-native aquatic vegetation such as hydrilla. Nursery habitat often produces a lot of young-of-the-year and/or age-1 fish in the population. Based on fisheries monitoring, there is a decline in juvenile bass in Lake Kissimmee. The lack of smaller fish in Lake Kissimmee is concerning and probably due to the relatively low coverage of SAV in the lake. Nursery habitat has been declining for many years now, and this trend needs to be reversed. A drawdown could be executed in the short term to stimulate seed germination. As mortality increases for harvestable size fish or larger, there will be a lack of recruitment to the fishery in the future. It is imperative that a strong year class is produced in the next couple of years to sustain the population and fishery on Lake Kissimmee. On Lake Hatchineha, the lack of smaller fish was evident and can probably be attributed to similar conditions as in Lake Kissimmee.

The amount of submersed vegetation can explain the lack of larger size classes in samples. The abundance of smaller size classes of fish is expected in Lake Tohopekaliga and Cypress Lake since the lakes are dominated by submersed aquatic vegetation, primarily hydrilla. Additionally, creel survey results for Lake Tohopekaliga indicate that larger size classes are prevalent in Lake Tohopekaliga, which

supports this hypothesis of reduced electrofishing sampling efficiency.

The amount of larger size classes in a Largemouth Bass population is critical to any fishery. In Florida, including the KCOL, a statewide regulation was enacted that allows anglers to harvest only one fish greater than or equal to 16 inches in Total Length (TL) in an attempt to prevent overharvest of these larger size classes. Therefore, quantifying the proportion of larger size classes of the Largemouth Bass population in the KCOL will be accomplished by calculating a Relative Stock Density (RSD) of fish 16 inches or greater in TL. It will be calculated using the following equation:

$$RSD-16 = (\# \text{ of largemouth bass greater or equal to 16 inches in TL} / \# \text{ of largemouth bass greater or equal to the minimum stock length}) \times 100$$

where minimum stock length is defined as eight inches or greater in TL. The target percentage for the RSD-16 on the KCOL is 18%. This threshold was selected based on electrofishing length-frequency data. It represents a size distribution in a population that translates to a historically good-to-excellent fishery.

Trophy Largemouth Bass is prized by most anglers. As a result, it is an important economic driver in freshwater fisheries throughout the United States. This is especially true for Florida, world-renowned for its trophy bass. In an attempt to assess trophy Largemouth Bass and the trophy fishery found in Florida, FWC launched a citizen-science-based program called TrophyCatch in 2012. Anglers submit Largemouth Bass catch data utilizing photo documentation. From this data, FWC is able to track the number of trophy-sized Largemouth Bass (eight pounds and heavier) being caught on an annual basis and assess various trends on lakes within the state. Specifically, the KCOL is known as an excellent trophy bass fishery. In fact, documentation of TrophyCatch-approved submittals on Lakes Tohopekaliga and Kissimmee places them as two of the top four public lakes in the state.

After reviewing the annual submissions over the course of the program, it was decided that a threshold of at least 100 trophy bass per year submitted by anglers on the KCOL would demonstrate successful maintenance and/or improvement of the trophy bass fishery that is currently found here.

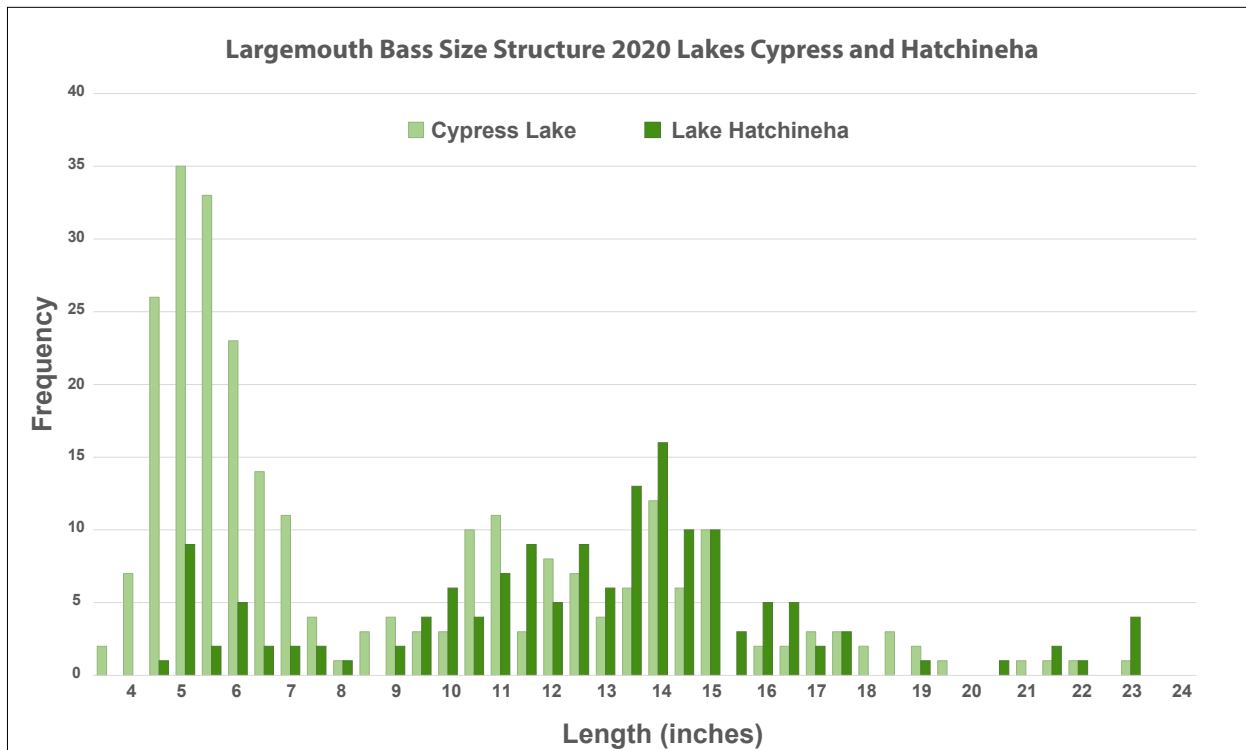


Figure 1: Length frequency histogram (i.e. size structure in inches) for largemouth bass on Lakes Cypress and Hatchineha from electrofishing samples collected in 2020.

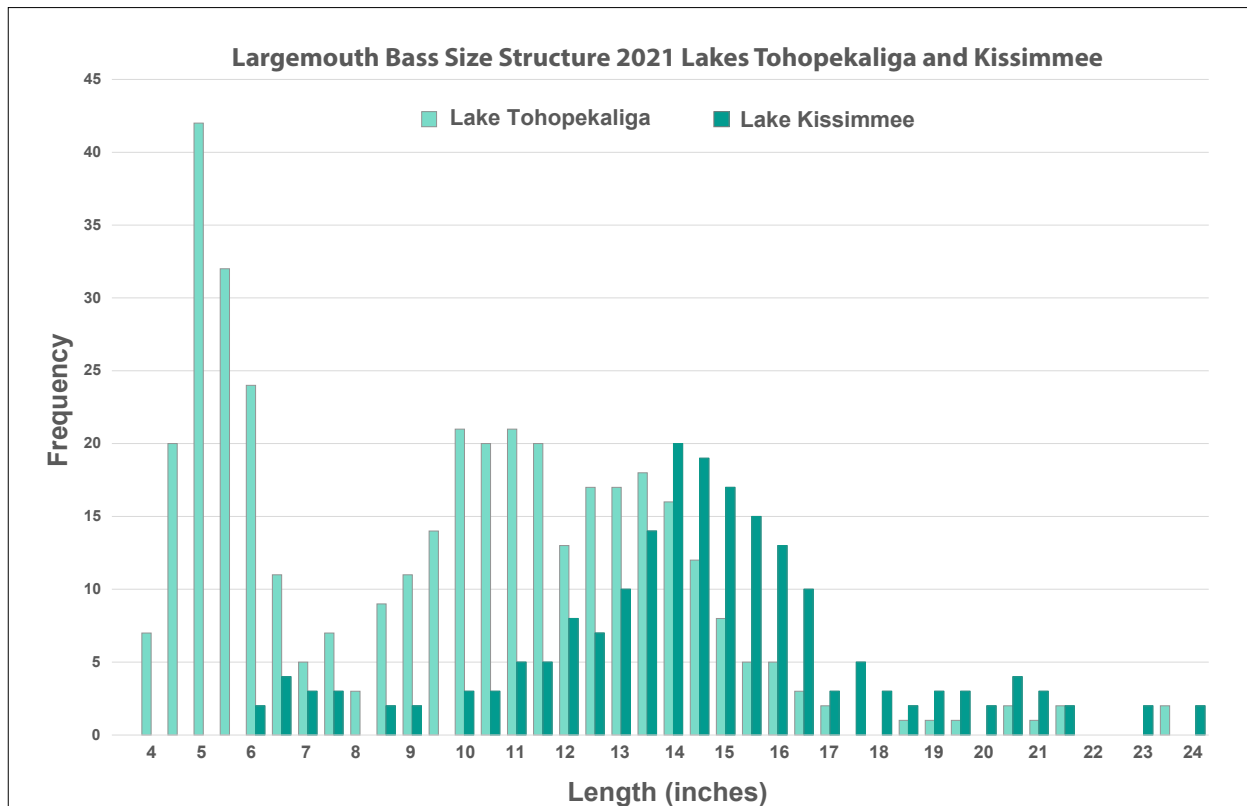


Figure 2: Length frequency histogram (i.e. size structure in inches) for largemouth bass on Lakes Tohopekaliga and Kissimmee from electrofishing samples collected in 2021.

BLACK CRAPPIE AND BREAM SPECIES

The Black Crappie is a highly valued game fish. Florida's Black Crappie fisheries are seasonal and occur during winter and spring. While Black Crappie can be found anywhere in a waterbody, many individuals spend much of their time in open water and typically move closer to shore to spawn.

Black Crappie are not directly targeted in fisheries sampling in the KCOL. They are seen in electrofishing surveys, but this is not the most effective way to sample Black Crappie. Instead, FWC relies primarily on creel surveys to infer the status of the species. Black Crappie and bream populations on Lake Kissimmee are in excellent condition. However, angler effort for these species is essentially non-existent on Lake Tohopekaliga, thus making it challenging to identify the status of this species. Hydrilla currently covers approximately 60% of Lake Tohopekaliga. Crappie anglers tend to prefer open water habitats. The lack of angler effort could be attributed to the coverage of hydrilla.

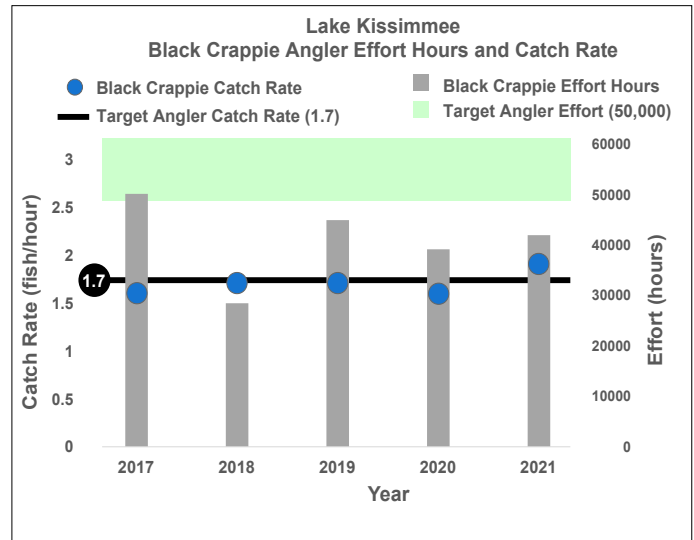
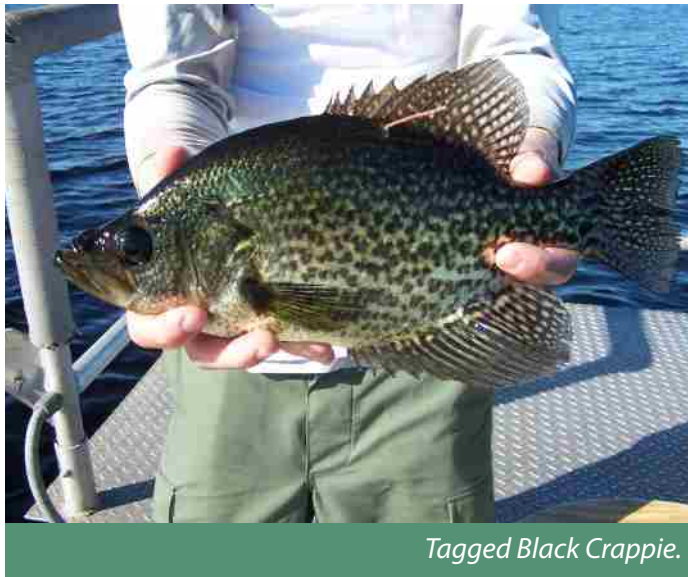


Figure 3: Effort (angler hours) and catch success (fish-per-hour) for Black Crappie on Lake Kissimmee from creel surveys conducted during 2017-2021.

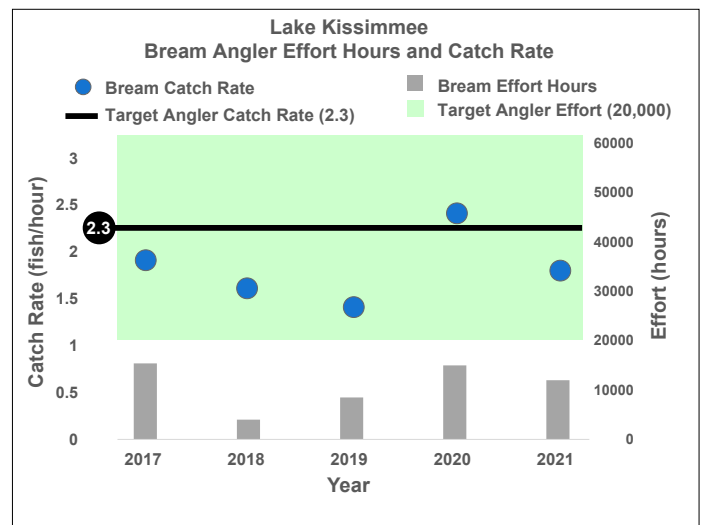


Figure 4: Effort (angler hours) and catch success (fish-per-hour) bream on Lake Kissimmee from creel surveys conducted during 2017-2021.

MANAGEMENT

Fisheries management generally involves actions that affect recruitment rates, growth, natural mortality, and fishing mortality. FWC incorporates population management, habitat management, and people management tools to sustain the fisheries within the KCOL.

Ongoing monitoring efforts on the KCOL include electrofishing and creel surveys by FWC staff to monitor all fish species populations with additional, specific efforts to monitor Largemouth Bass. Electrofishing is a widely used sampling method that stuns fish for a short period of time. This technique allows researchers to handle specimens for data collection and return them safely to the water. As part of FWC's long-term monitoring program, biologists use electrofishing to sample 25 different locations within a lake each fall. Every fish is identified, counted, and measured. The types and numbers of fish they collect can answer a lot of questions about the fish community, for example:

- Is there enough prey for big game fish to eat?
- Are there too many small fish and not enough big fish for anglers to catch?
- Is the fish community evenly balanced, or is it made up of only a few species?
- Are there any invasive species present and are they influencing the fish community?

Standardized electrofishing sampling incorporated into our Long-term Monitoring Database on the KCOL began in 2006. It continues annually with a statewide average of 25 species per waterbody. Biologists at FWC use long-term monitoring data to learn more about these interactions and predict how future changes may impact these fish communities.

Electrofishing surveys (2016-2021) indicate that Largemouth Bass catch-per-unit-effort (CPUE) is relatively stable for Lakes Kissimmee and Hatchineha. CPUE is increasing over time for Lake Tohopekaliga and possibly for Cypress Lake (2014-2021). The abundance of smaller size classes may be why CPUEs have been increasing since hydrilla has generally been rising in these lakes over time.

During the fall, Lakes Tohopekaliga and Kissimmee are sampled for all species (i.e., fish community) by electrofishing surveys. It is not surprising to see that Bluegill and Largemouth Bass dominate the percent composition in Lake Tohopekaliga since there is so much submersed vegetation. In contrast, we see an open-water species, Threadfin Shad, dominate the percent composition in Lake Kissimmee (Tables 6 & 7).

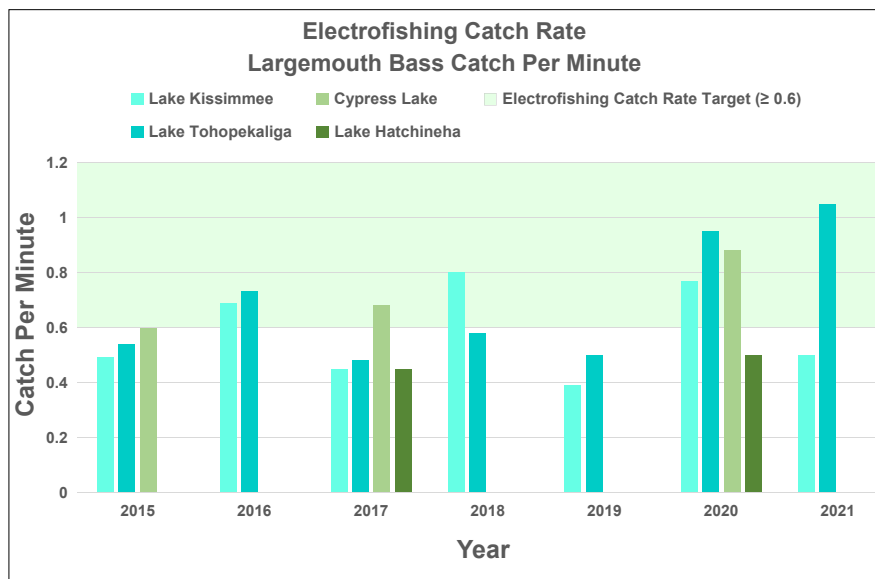


Figure 5: Catch-per-unit-effort (CPUE) for largemouth bass on lakes Tohopekaliga, Cypress, Hatchineha and Kissimmee from electrofishing samples collected during 2015-2021.

Angler creel surveys are performed on Lakes Tohopekaliga and Kissimmee to assess angler effort, catch, and harvest rates. Based on the results from the 2021 survey, effort and catch rates on Lake Tohopekaliga are outstanding. Angler catch rates for bass on Lake Tohopekaliga were excellent at 0.86 fish/hr. The Angler catch rate for bass on Lake Kissimmee was good at 0.51 fish/hr. Essentially, this success rate on Lake Kissimmee is where it has been for over 30 years.

However, decreasing bass effort has emerged on Lake Kissimmee, accounting for an approximate 40% loss in bass fishing effort over the last three years. The bass fishing effort is being redistributed elsewhere. Much of it may be attributed to Lake Tohopekaliga, as bass fishing effort has increased approximately 30% over the last two years. Bass fishing is by far the primary fishery on Lake Tohopekaliga. It is hypothesized that a negative perception has manifested due to a steady loss of vegetation on Lake Kissimmee. Effort for Black Crappie (non-peak season) on Lake Kissimmee surpassed bass by approximately 8,000 angler hours. The most recent data show that Lake Kissimmee was primarily a Black Crappie fishing lake in 2021. The bass fishery will undoubtedly rebound if vegetation, including submersed species, reestablishes itself in the lake. A potential management solution would be an

artificial drawdown, accelerating natural revegetation and reversing the negative bass fishing effort trend.

FISH MANAGEMENT AREAS

FWC has designated Cypress Lake, Lake Tohopekaliga, Lake Hatchineha, and Lake Kissimmee as Fish Management Areas (FMA) due to their impact on the local economy. An FMA is a pond, lake, or other body of water established for the management of freshwater fish as a cooperative effort with the local county. Target species, or those having the largest economic impact in the area, include Largemouth Bass, Black Crappie, Bluegill, and Redear Sunfish. FWC recognizes the importance of the black bass fisheries and the ecological and economic benefits they provide. In 2011, FWC approved the Black Bass Management Plan (BBMP) to ensure effective management of this resource. In 2019, FWC approved the Black Crappie Management Plan to direct management and research strategies that maintain or enhance the Black Crappie fisheries in Florida. Both of these plans can be found at <https://myfwc.com/fishing/freshwater/>.

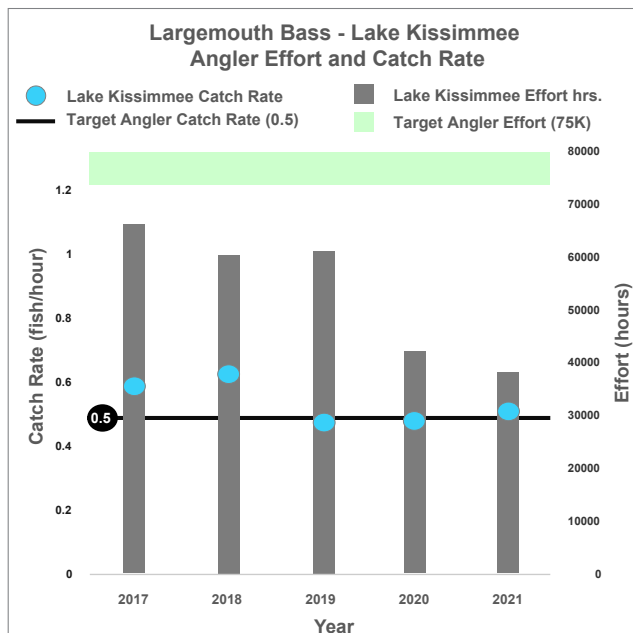


Figure 6: Effort (angler hours) and catch success (fish-per-hour) for largemouth bass on Lake Kissimmee from creel surveys conducted during 2017-2021.

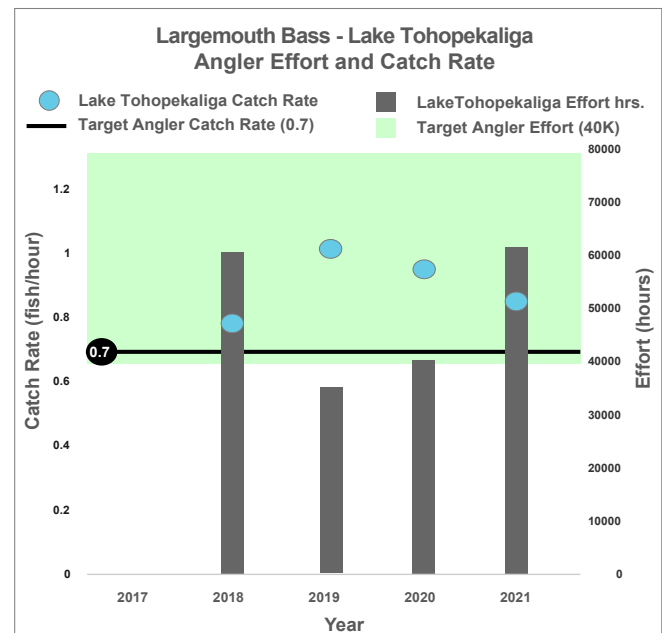


Figure 7: Effort (angler hours) and catch success (fish-per-hour) for largemouth bass on Lake Tohopekaliga from creel surveys conducted during 2017-2021.

Table 6: Lake Tohopekaliga Community Summary.

Species (Common Name)	Fish/min	SE	% Composition
Atlantic Needlefish	0.02	0.01	0.25 %
Black Crappie	0.02	0.01	0.25 %
Bluefin Killifish	0.12	0.04	1.76%
Bluegill	2.98	0.50	43.11%
Bowfin	0.01	0.01	0.19%
Brook Silverside	0.40	0.18	5.79%
Brown Bullhead	0.01	0.01	0.19%
Chain Pickerel	0.10	0.03	1.45%
Florida Gar	0.23	0.04	3.34%
Gizzard Shad	0.05	0.02	0.76%
Golden Shiner	0.42	0.12	6.10%
Golden Topminnow	0.03	0.01	0.44%
Inland Silverside	0.36	0.18	5.16%
Lake Chubsucker	0.18	0.05	2.64%
Least Killifish	0.09	0.05	1.26%
Longnose Gar	0.01	0.01	0.13%
Largemouth Bass	0.86	0.14	12.46%
Pugnose Minnow	0.14	0.07	2.01%
Redear Sunfish	0.09	0.02	1.26%
Sailfin Molly	0.04	0.03	0.57%
Seminole Killifish	0.01	0.01	0.13%
Threadfin Shad	0.73	0.42	10.64%
Warmouth	0.01	0.01	0.13%
Total	6.91	0.83	100.00%

Table 7: Lake Kissimmee Community Summary.

Species (Common Name)	Fish/min	SE	% Composition
Atlantic Needlefish	0.01	0.01	0.05 %
Blue Tilapia	0.00	0.00	0.03 %
Bluefin Killifish	0.34	0.22	2.30%
Bluegill	0.70	0.11	4.65%
Bowfin	0.04	0.01	0.24%
Brown Bullhead	0.01	0.01	0.05%
Brook Silverside	0.02	0.01	0.11%
Bluespotted Sunfish	0.00	0.00	0.03%
Channel Catfish	0.01	0.01	0.05%
Chain Pickerel	0.00	0.00	0.03%
Florida Gar	0.85	0.22	5.69%
Flagfish	0.00	0.00	0.03%
Gizzard Shad	0.04	0.02	0.29%
Golden Shiner	0.35	0.14	2.35%
Golden Topminnow	0.00	0.00	0.03%
Inland Silverside	0.31	0.21	2.08%
Lake Chubsucker	0.12	0.05	0.80%
Least Killifish	0.40	0.19	2.67%
Longnose Gar	0.00	0.00	0.03%
Largemouth Bass	0.15	0.03	1.02%
Mayan Cichlid	0.00	0.00	0.03%
Pugnose Minnow	0.03	0.01	0.19%
Redear Sunfish	0.04	0.02	0.29%
Sailfin Molly	0.32	0.16	2.11%
Seminole Killifish	0.01	0.01	0.08%
Threadfin Shad	11.18	2.52	74.72%
Vermiculated Sailfin Catfish	0.00	0.00	0.03%
Warmouth	0.00	0.00	0.03%
Total	6.91	0.83	100.00%



Electrofishing boats use a generator and sophisticated electronics to create a current that stuns fish, allowing biologists to net them.

WILDLIFE

The habitats within the KCOL support a variety of wildlife species. A list of species that are common within KCOL is located in Appendix A. Active wildlife management practices ensure long-term sustainability for these resources. This Plan highlights the species that are actively managed within the KCOL.



Mottled duck in flight against background of emergent vegetation.

AMERICAN ALLIGATOR



American alligator basking on a log.

FWC monitors and manages the American alligator population on the KCOL. Alligator management programs implemented by FWC emphasize the conservation of alligator populations for their ecological, aesthetic, and economic values while providing for public use and safety. The presence of alligators provides a variety of benefits to the lakes and the local communities. Ecologically, alligators are considered the apex predator of Florida's lakes and rivers. As apex predators, they contribute to the control of populations of other fish and wildlife species. They also can serve as an indicator of the health of waterbodies since their health is indicative of the health of the aquatic system in which they live.

Alligators are also considered ecosystem engineers who, through manipulating their surroundings, create habitat that is beneficial to other wildlife. In addition to the ecological benefits alligators provide, they also provide recreational and economic benefits. Alligators and their eggs are harvested throughout Florida for commercial and recreational purposes. The KCOL supports commercial alligator egg harvests, whereby alligator farmers collect eggs from the lakes to support their businesses. Recreationally, alligators are harvested from the KCOL each year as a part of the Statewide Alligator Harvest. This program provides recreational opportunities and supports the local

communities when participants spend money on things such as gas, food, lodging, and local guides. Even non-hunters are drawn to these lakes in the hopes of seeing alligators, which is a significant factor supporting businesses such as airboat tours.

HABITAT REQUIREMENTS

Alligators prefer freshwater lakes, ponds, slow-moving rivers, and associated wetlands. They will also inhabit brackish waters. Optimal habitat includes a mixture of habitats such as open water, wetlands, swamps, and areas of high ground for nesting. Alligators build their nests by mounding mud, peat, sticks, and other vegetation. Alligators create holes by excavating vegetation and muck in inundated areas. These "gator holes" retain water during periods of drought and are vital to other wildlife species, including insects, fish, snakes, turtles, and birds. Alligators excavate the holes to stay cool during hot weather, attract prey, and provide the water necessary for mating. These ecosystem engineers are considered a keystone species. Their nests provide nesting habitat for other reptile species, and the gator holes provide water and refuge for many wildlife species.

Table 8: KCOL Alligator Population Estimates.

Alligator Population Estimates						
UNIT	POPULATION SEGMENT	FIRST YEAR OF SURVEY	POPULATION ESTIMATE AT FIRST YEAR	LATEST SURVEY YEAR	LATEST POPULATION ESTIMATE	CHANGE IN POPULATION (%)
Tohopekaliga	Total Population	1994	2,180	2017	7,826	263
	Adults (6-ft and larger)	1994	731	2019	1,603	117.5
Cypress	Total Population	2000	1,167	2019	648	-33.5
	Adults (6-ft and larger)	2000	510	2019	348	-19.8
Hatchineha	Total Population	1988	1,240	2019	3,937	225.9
	Adults (6-ft and larger)	1988	424	2019	1,141	180.3
Kissimmee	Total Population	1991	4,830	2019	14,454	213.7
	Adults (6-ft and larger)	1991	2,452	2019	3,515	49.3

LISTING STATUS

The American alligator is federally listed under the Endangered Species Act as a threatened species due to its similarity of appearance to the American crocodile (*Crocodylus acutus*), and as a state-designated threatened species by [Florida's Endangered and Threatened Species Rule](#). Alligators can be legally taken only by individuals with proper licenses and permits.

POPULATION

Night spotlight surveys are conducted in spring and summer on the lakes. Table 8 provides the latest population estimates on the KCOL.

To help maintain the number of alligators and their eggs on the KCOL, FWC establishes harvest quotas and monitors the populations. FWC conducts nightlight surveys on each lake annually to monitor the population. The surveys consist of counting and sizing alligators at nighttime along established transects. The surveys are used to estimate alligator populations, size structures, and population trends

(i.e., increasing or decreasing trends). Harvest quotas are reduced when survey data indicate that the adult alligator (6-ft and longer) population has decreased by 25%-49% of the established population target. If survey data indicate that the adult population has decreased by $\geq 50\%$, then the harvest quota is suspended. Similarly, quotas for alligator egg collections can be adjusted based on population trends.

Alligator populations vary by waterbody, but they are most abundant on Lakes Kissimmee, Tohopekaliga, Hatchineha, and Cypress. Total and adult populations have increased from their pre-harvest estimates and remained above the target population for Lakes Tohopekaliga, Kissimmee, and Hatchineha. Total and adult population estimates on Cypress Lake have declined slightly but remain reasonably close to the target populations.

Egg collections that occur on Lakes Tohopekaliga, Kissimmee, and Hatchineha have generally increased on these lakes from their initial years of collections.

The number of nests for alligator farmers has varied from year to year. Still, such variation is normal and often results from variation in environmental conditions such as water levels.

Overall, alligator populations on the KCOL appear to be healthy. FWC will continue to monitor these populations and adjust harvest quotas or other management strategies as needed.

MANAGEMENT

Alligator conservation is a success story in Florida. The FWC's Statewide Alligator Management Program has been nationally and internationally recognized as a model for the sustainable use of a natural resource. This program provides for the recreational and commercial harvest of alligators by quota permit, harvest of nuisance alligators, and collection of alligator eggs by the alligator farming industry on designated waterbodies.

ALLIGATOR MANAGEMENT UNIT

Each year harvest quotas are established on alligator management units (AMUs). The quotas provide recreational opportunities and maintain alligator populations at targeted levels. Lakes Tohopekaliga, Cypress, Hatchineha, and Kissimmee are all individual AMUs monitored for harvest quota. Recreational hunting is just one part of the FWC's overall approach to managing the alligator population.

STATEWIDE NUISANCE ALLIGATOR PROGRAM

FWC administers the Statewide Nuisance Alligator Program (SNAP) to address people's concerns regarding potential alligator threats. SNAP uses contracted nuisance alligator trappers throughout the state to remove alligators from locations where they are perceived to be a threat to people, pets, or livestock. FWC created the Nuisance Alligator Hotline at 866-FWC-GATOR (866-392-4286) to address concerns regarding alligators. More information about the SNAP program is on the FWC website at <https://myfwc.com/wildlifehabitats/wildlife/alligator/snap/>.



Female alligator guarding her nest. Alligator nests are made by mounding mud, peat, sticks, and other vegetation.



Alligator farmer collecting eggs from the nest. A permit is required to harvest wild alligator eggs.

WATERFOWL



Ring-necked duck. Ring-necks are migratory and overwinter on the KCOL. These waterfowl are diving ducks and will dive for their food.



Blue-winged teal, shown dabbling on the lake, overwinter on the KCOL and provide hunting opportunities for waterfowl hunters.

The Kissimmee Chain of Lakes is a vital resource for migratory and resident waterfowl. It is listed as a focal waterfowl area by the Atlantic Coast Joint Venture. Mottled ducks, wood ducks, and black-bellied whistling ducks breed, molt, and forage year-round on the lakes. Migratory blue-winged teal and ring-necked ducks overwinter in the system and provide most hunting opportunities. Other species can include northern pintails, northern shovelers, gadwall, green-winged teal, and American wigeon. Groups of scaup and canvasbacks can occasionally be found in offshore open water areas.

HABITAT REQUIREMENTS

Water depths, plant species, and the arrangement and percent coverage of plants relative to open water are key determinants of suitable waterfowl habitat (Chamberlain, 1960; Weller, 1999; Baldassarre, 2013). Given alterations to the natural processes, which helped provide the desirable conditions, and water quality, management of vegetation for waterfowl can be necessary. There are two main habitat zones where different functional groups of waterfowl can be found on the KCOL. The functional groups vary in each lake according to bathymetry and hydrology (i.e., Lake Hatchineha is different than Lake Kissimmee).

The first type is shallow water emergent marsh in the littoral zone. Hydrologic conditions cause these areas to either go dry or remain relatively shallow annually, stimulating seed-producing plants preferred by waterfowl. With water depths ranging between 2 and 18 inches, these areas can provide dabbling duck habitat when there is a desirable density and interspersed of open water and emergent plants. These conditions provide brood-rearing and molting habitat for resident mottled ducks and important foraging habitat for migratory and wintering blue-winged teal and other dabblers. Hydrologic stabilization and invasive plants have degraded much of these areas.

The second habitat type used by waterfowl is the deeper floating-leaved marsh and SAV beds. These areas are dominated by waterlily and spatterdock interspersed with pickerelweed, bulrush, and other perennial emergent plants. Waterlilies and spatterdock are an important food for ring-necked ducks and blue-winged teal (Jeske, 1995; Botero and Rusch, 1994). Also occurring in these deeper water areas are a diversity of submersed aquatic plants. Hydrilla is the preferred habitat for waterfowl wintering on Florida lakes. Johnson and Montalbano (1984) found the highest abundance and diversity of waterfowl occurred on hydrilla. Maintaining expansive aquatic plant beds, especially hydrilla, will be vital to attracting wintering waterfowl.

The littoral zone is also important brood-rearing and molting habitat for resident wood ducks. Anecdotal evidence suggests that the local KCOL population of wood ducks has drastically declined due to habitat changes. Fortunately, studies show a robust nesting box program can improve regional wood duck populations and increase recreational opportunities (Bellrose and Holm, 1994). Proper nest box programs are labor-intensive. The boxes must be maintained with predator guards and annually cleaned before the nesting season. As a starting point, a minimum of 12 wood duck boxes should be placed and monitored on each lake in the KCOL. This may be increasingly important as migratory waterfowl populations fluctuate in Florida due to breeding population and migration changes.

LISTING STATUS

Florida waterfowl species are not listed under the federal or state endangered species. Still, they are afforded protection under the Migratory Bird Treaty Act (MBTA).

POPULATION

The USFWS conducts annual surveys on waterfowl breeding populations and their associated habitats. In conjunction with annual hunting season harvest estimates and waterfowl banding data, these surveys are used to set annual hunting frameworks and bag limits. For more information on continental waterfowl populations, see the US Fish and Wildlife Service reports on their website.

The species and numbers of waterfowl within a given area can be strongly influenced by external factors such as reproductive output on northern breeding grounds, weather, and the availability of quality habitat elsewhere (Baldassarre 2013). Hunting pressure and other disturbance has also been shown to alter local abundance of waterfowl (St. James et. al 2013). Thus, current local waterfowl populations are not necessarily indicative of the quality of local habitat. As such, this plan does not contain quantitative waterfowl population or harvest objectives. Rather, the measurable goals are provided in the habitat objectives.

MANAGEMENT

Waterfowl management on the KCOL has three main habitat objectives under current conditions. The first is the reduction of dense perennial emergent vegetation in nearshore areas to create a deep-water marsh with a desirable interspersed of plants and open water. Drawdowns, herbicide, and mechanical control provide the necessary habitat responses. Second, and most important, is the retention of significant acreages of hydrilla. Minimizing hydrilla control, especially before the winter migration of waterfowl to provide the most habitat, is paramount in attracting and maintaining an abundance and diversity of ducks. Lastly, an operational wood duck box program should be implemented to increase the nesting cavity availability to local wood ducks, potentiating a regional population increase.



Mama wood duck with eggs in box. Wood ducks are cavity-nesting and will use constructed boxes for their nests.



FWC staff installing and marking a wood duck box.

WADING BIRDS



Snowy Egret taking flight on Lake Kissimmee.

The term ‘wading birds’ refers to a diverse group of long-legged and long-billed bird species that forage in shallow-water habitats and typically nest in colonies. Wading birds rely on wetlands and small islands to fulfill their important life history requirements. The KCOL and its associated wetlands provide optimal foraging, roosting, and nesting habitat for wading bird species.

HABITAT REQUIREMENTS

Wading birds depend on healthy wetlands, islands, and other vegetated areas suitable for resting and breeding near foraging habitat. Wading birds build nests of sticks, twigs, and finer materials in trees or shrubs on islands or over standing water. Some species, such as the little blue heron and tricolored heron, typically nest in multi-species colonies. Other species prefer single-species groups or build solitary nests. The little blue heron, tricolored heron, and wood stork nest from March to August. Signs of an active nesting colony include adults regularly flying to and from suitable nesting habitats, adults carrying nesting material (e.g., sticks), adults perching on or near nests, or the presence of flightless young. Wading birds will re-use colonies for years if the conditions remain suitable.

The littoral zone and adjacent wetlands provide the foraging habitat needed by nearby nesting colonies. They tend to forage near their nesting sites to conserve energy. Reproductive success correlates to foraging success.

LISTING STATUS

Three state threatened species, the little blue heron, roseate spoonbill, tricolored heron, and the federally threatened wood stork, have been observed within the KCOL. Protected wading birds that may nest on the KCOL include the wood stork, tricolored heron, and little blue heron. In addition to this Plan, Florida’s Imperiled Species Management Plan (ISMP) (FWC, 2016), along with a [Species Action Plan for Six Imperiled Wading Birds](#) (FWC, 2013) and [Species Conservation Measures and Permitting Guidelines for Threatened Wading Birds](#) (FWC, 2018) address the conservation needs of wading birds while providing a framework for successful management of these species.

POPULATION

Known colony location information can be found at the links below. However, please note that the data are incomplete, and it is important to be mindful of where wading birds are gathering and nesting on the lakes during the breeding season:

- Active wood stork nesting colonies: <https://www.fws.gov/northflorida/WoodStorks/wood-storks.htm>
- Documented recent breeding sites for state-threatened wading birds (under Wading Bird Guidelines): <https://geodata.myfwc.com/pages/upland>
- Annual survey data for select colonies in the South Florida Wading Bird Reports: <https://www.sfwmd.gov/documents-by-tag/wadingbirdreport>

MANAGEMENT

A Species Action Plan for Six Imperiled Wading Birds (FWC, 2013) identifies major threats, including loss of wetland habitat, habitat degradation due to hydrology and water quality changes, disturbance at breeding sites, and elevated populations of native and non-native predators. In addition to the existing goals and objectives outlined in this Plan and the active management practices detailed in the ISMP, we have

developed guidelines for operators on KCOL to ensure the major threats to wading birds are mitigated. These guidelines include:

- Avoid activities within 300 feet around breeding colonies during the breeding season (March-August) to avoid disturbance (e.g., birds flushing from active nests).
- Prevent mammalian predators from accessing breeding sites by maintaining open water around breeding colonies by managing floating vegetation outside of the breeding season.
- During water management activities in freshwater wetlands, maintain quality wading bird foraging habitat within 8 mi (13 km) of breeding sites during the breeding season by ensuring availability of areas with water depths between 2-8 in (5-20 cm).
- Outside of the breeding season, maintain vegetation that supports nests at known colony locations. If vegetation is invasive (e.g., Brazilian pepper), remove and replace with native vegetation gradually so that birds may continue to use the site for nesting.
- Time planned drawdowns so water is not removed from around breeding sites while birds have nests with eggs or dependent young.



Tricolored heron fishing in Lake Kissimmee.

IMPERILED SPECIES



FWC biologist focuses on a pair of snail kites to retrieve band data. Leg bands provide useful information and helps biologists estimate the annual snail kite population.

Florida's imperiled species are fish and wildlife species that meet the criteria to be listed as federally endangered, federally threatened, state threatened, or Species of Special Concern. All Florida's federal and state listed species are currently listed in [Florida's Endangered and Threatened Species List](#). While the USFWS has primary responsibility for Florida's federally protected species, FWC works in partnership to conserve these species. FWC developed the [ISMP](#) to address the needs of state-listed species that did not already have a management plan or specific program in place. These species also have Commission-approved [Species Conservation Measures](#)

[and Permitting Guidelines](#) that have been developed to clarify what is needed for the conservation and permitting of these species. Some listed and non-listed species have well-developed programs which address their conservation, management, or recovery. In addition to the species previously mentioned in this Plan, the following are protected species that occur in the KCOL and receive additional consideration when implementing management activities within the lakes.

BALD EAGLE

The bald eagle, our national bird and symbol of the United States, is easily distinguished from other raptors by its size, silhouette, and plumage. The Florida bald eagle population and eagle nests have been protected through science-based land management, regulation, public education, and law enforcement. The habitats within the KCOL are optimal for bald eagles and provide ample nesting, roosting, and foraging opportunities.

HABITAT REQUIREMENTS

Bald eagles typically use forested habitats for nesting and roosting. Foraging habitat consists of expanses of shallow fresh or saltwater. However, they are opportunistic foragers and will feed and scavenge on various prey. In Florida, primary prey consists of fish and waterfowl species. Daytime roosts are in the highest trees and adjacent to shorelines. Nests are usually quite large and built in live, native pines less than two miles from water.

LISTING STATUS

Although the bald eagle was removed from the federal and state endangered species list in 2007 and 2008, respectively, it is still afforded protection under the federal Bald and Golden Eagle Protection Act (1940), the MBTA (1918), and the state bald eagle rule 68A-16-002, F.A.C. These protections prohibit the take of eagles, their nests, or trees containing their nests. The FWC completed the Species Action Plan for the Bald Eagle in 2017, replacing the 2008 Bald Eagle Management Plan.

POPULATION

Today, Florida has one of the densest concentrations of nesting bald eagles in the lower 48 states. The greatest number of nesting territories in Florida are found along the Gulf Coast and around the larger lakes, particularly the KCOL. Bald eagle nesting occurs throughout the KCOL, with the highest nest densities within 1.8 miles of open water. Most of Florida's breeding bald eagles remain in the state year-round. At the same time, sub-adult and non-breeding adults migrate out of Florida (Stevenson and Anderson, 1994; Curnutt, 1996; Mojica 2006).

Based on the latest survey data, the bald eagle population appears stable. Nesting areas documented by FWC during aerial surveys from 1998 through 2017 can be found in the Historical Bald Eagle Nesting Areas database on the FWC website.

MANAGEMENT

The bald eagle is a conservation success story. FWC has monitored the population of nesting bald eagles in Florida since 1972. As a result of the population having met or exceeded recovery goals, the bald eagle was removed from the USFWS endangered species list and the FWC imperiled species list. Eagle nesting is not monitored on the KCOL. However, FWC will follow the actions outlined in the Species Action Plan, which are necessary to maintain a stable or increasing bald eagle population in Florida.



Bald eagle perches in pine while surveying its territory.

EVERGLADE SNAIL KITE



Everglade snail kite soars over the marsh.

The Everglade snail kite is a mid-sized raptor that is highly specialized to forage almost exclusively on aquatic snails in the genus *Pomacea*. This, along with a range restriction, makes the snail kite's survival directly dependent on the hydrology and water quality of the watersheds it inhabits, including those within the KCOL.



Male Everglade snail kite eating an apple snail on a fence post.

HABITAT REQUIREMENTS

Snail kites inhabit freshwater marshes throughout South, Central, and sometimes into North Florida. The traditional snail kite nesting season lasts from March through June, but they can nest in any month of the year, depending on conditions. Predation is the leading cause of nest failure. For this reason, snail kites always build their nests over or surrounded by water. Nests are built in various vegetation, including cattail, bulrush, and willow. The ideal kite nesting

habitat consists of a combination of shallow, sparse to moderately vegetated foraging habitat, with some small patches of dense or woody vegetation for nesting.

Water levels that drop too rapidly can allow terrestrial predators to access nests. Water levels that rise too rapidly can flood nests. Vegetation that gets too thick crowds out more beneficial vegetation and doesn't allow kites to find and capture snails from the water. Dense vegetation patches connected to land can also allow predators to access nests. Invasive plants are particularly problematic due to their rapid rates of growth, dense growth patterns, and ability to crowd out native vegetation.

LISTING STATUS

The Everglade snail kite is listed as an endangered species under the federal Endangered Species Act and Florida's Endangered and Threatened Species Rule. They have been listed as endangered since 1967.

POPULATION DATA

The snail kite population crashed in the early 2000s. The population dropped from roughly 3,500 individuals at the end of the 1990s to approximately 600 by 2008. Since then, the population has steadily increased, reaching a post-crash high of roughly 3,100 birds in 2019. The 2020 population estimate is approximately 2,300 birds. The population is still less than half of what it was 20 years ago before the population crashed.

Snail kites are monitored throughout Florida by a team at the University of Florida. Funding for the monitoring is provided by the USACE, SFMWD, SJRWMD, and FWC. Monitoring consists of crews in airboats searching known and suspected wetlands for snail kites and their nests. When nests are found, they will be monitored regularly until the young birds leave the nest. Nestlings that reach 24 days old will be fitted with a leg band with a unique alphanumeric code so they can be identified later. This banding effort helps researchers understand snail kite movements, population size, and many other important factors in their ecology.

MANAGEMENT

FWC supports the recovery of snail kites in many ways. Management actions that may alter foraging habitat are avoided within 500 feet of an active nest when practicable. Monotypic and/or invasive stands of vegetation are managed to promote more diverse native vegetative communities. Prescribed fire is also used to maintain healthy native plant communities that support kite nesting and foraging. FWC also works closely with partner agencies to manage water levels that support healthy snail kite habitat and nesting conditions.



Biologist banding snail kite nestlings. During the banding process, biologists record a variety of morphometric measurements from the nestlings.



Nestling snail kites in nest waiting for adults to return with food.

FWC uses the monitoring data to identify critical habitat areas for snail kites, areas to avoid disturbing kites, and to understand the influence of habitat management activities on kite ecology. FWC also supports projects to understand juvenile snail kite survival and movements, nest failure causes, and management activities' influence on apple snails.

The lakes included in this Plan are all surveyed as part of this effort. In 2019, nesting increased in the KCOL. It made up 44% of statewide snail kite nesting, while nesting in other areas of the state declined, particularly nesting on Lake Okeechobee. Many of the nests documented on Lake Kissimmee occurred on floating islands covered in woody vegetation (Fletcher et al., 2020).

SANDHILL CRANES AND WHOOPING CRANES



Florida sandhill crane foraging with a whooping crane.

Sandhill cranes are omnivorous, heavy-bodied birds known to inhabit open grasslands, pastures, and freshwater marshes. Two subspecies of sandhill crane are known to occur in Florida and the KCOL: the resident Florida sandhill crane and the migratory eastern greater sandhill crane. Additionally, the endangered whooping crane has been documented on the KCOL utilizing abutting wetlands and littoral habitats along the lakeshores.

HABITAT REQUIREMENTS

Sandhill cranes utilize shallow marshes for nesting and roosting. They typically forage in open habitats, including herbaceous wetlands, pastures, prairies, croplands, and golf courses. Still, they will even utilize open lands in developed areas. Sandhill cranes generally nest on thick mats of vegetation and tussocks. Their nesting season is from mid-February to June, though March through May tends to be the most active time of the breeding season. During nesting, sandhill cranes are a cryptic species that lay eggs on a low nest mound made of marsh vegetation and debris, relying on camouflage to protect the nest from predators. Whooping cranes have a very limited range and only inhabit shallow marshes and open grasslands.

LISTING STATUS

The Florida sandhill crane is listed as a state-designated threatened species by Florida's Endangered and Threatened Species Rule. The whooping crane

is protected as an endangered species by the federal Endangered Species Act, except where it is an experimental population. It is also listed as a federally-designated endangered, non-essential experimental population under Florida's Endangered and Threatened Species Rule. Both are protected by the MBTA.

POPULATION DATA

The Florida sandhill crane population, numbering 4,000 to 5,000 individuals, is a non-migratory, year-round breeding resident. Every winter, they are joined by 25,000 migratory greater sandhill cranes, the larger of the two subspecies. It is believed that one breeding pair of whooping cranes utilizes KCOL. Currently, FWC does not collect population data for sandhill cranes on the KCOL.

MANAGEMENT

Sandhill cranes rely on shallow wetlands for breeding, feeding, and sheltering. Therefore, actions that result in the loss of suitable natural wetlands where cranes are foraging, roosting, or nesting can cause significant impairment of essential behavioral patterns. Similarly, actions that degrade occupied suitable natural wetlands through changes in timing, quantity, or quality of water can result in significant impairment of essential behavioral patterns. Flushing cranes from their nests can result in the loss or abandonment of active nests, regardless of whether nests occur in natural or man-made wetlands. This action can significantly impair breeding.

To avoid flushing and nest abandonment, management actions for sandhill and whooping cranes involve habitat management and nest protection, particularly during the breeding season. In addition to the existing goals and objectives outlined in this Plan to protect habitats, FWC has developed guidelines for operators on KCOL to avoid disturbing sandhill crane and whooping crane nests.

When possible, conduct work outside of the breeding season. If work must be conducted during the breeding season, follow these guidelines to avoid the destruction of nests and/or chicks.

- Scan work area for signs of sandhill cranes prior to undertaking work. Pay particular attention to pairs, single birds (which may indicate that the mate is nearby), or a sitting sandhill crane. Any of these may indicate the presence of a nest.
- If you see a sandhill crane pair, a single adult, a sitting sandhill crane, or adults with chicks give the birds a 400-foot berth if possible.
- While operating, be alert! Sandhill cranes may not pop up from nests until you are very nearby. Be on constant lookout for movement near your area of operation. If/when you see a sandhill crane raise its head or pop out of the vegetation, cease operations and back off quickly to a distance of at least 400 feet.
- Remain vigilant for unusual behaviors that may signal the presence of a nest or chicks, including cranes feigning an injury by dragging a wing, facing an intruder with spread wings, or showing reluctance to leave an area.
- If you observe cranes in any of the above scenarios (pairs, single birds, sitting or flushed birds), cease

operations, contact the Project Manager, and maintain a 400-foot setback from the observed birds until FWC can verify the presence/absence of an active nest or chicks.

- All nests should be given a 400-foot buffer until either young have permanently left the nest or the nest fails due to natural causes. The buffer is extremely important to avoid stress to the adults, abandonment or predation of the nest, or heat/cold stress to the eggs.
- When removing vegetation outside the 400-foot buffer around a nest, leave enough vegetation to enable flightless young to reach upland foraging areas (e.g., avoid creating a complete, extensive moat around the nest).

If lake management activities occur during the breeding season, coordinate with FWRI (Tim Dellinger) for locations of known sandhill crane or whooping crane nests.

These guidelines can be followed for whooping cranes as well. There is one known pair that breeds on KCOL.

OTHER SPECIES



River otters snacking on catfish.

Amphibians and reptiles are common inhabitants of water bodies within the KCOL, mainly utilizing the littoral habitats and adjacent wetlands. Several species of mammals are known to use the open water, littoral, and wetland habitats. The river otter, marsh rabbit, beaver, bobcat, white-tailed deer, raccoon, and



A buck peers out among the vegetation.

wild hog commonly occur within the littoral wetlands and adjacent uplands. Many of these species are recreationally and economically significant, attracting hunters, trappers, and wildlife viewers to the area, particularly to the public lands surrounding the lower lakes.

HABITAT

Aquatic and wetland vegetative communities provide many benefits to fish, wildlife and people. This Plan focuses on the management of submersed and emergent vegetation in the littoral zone and the floating plants and tussocks in the open water. Table 9 details aquatic vegetation common to KCOL.



Lake Vegetation Provides Optimal Habitat for Fish and Wildlife.

Table 9: Aquatic Vegetation Common to KCOL.

Common Name	Scientific Name	Status
Emergent Vegetation		
Alligator Weed	<i>Alternanthera philoxeroides</i>	Non-Native
American Cupscale Grass	<i>Sacciolepis striata</i>	Native
American Lotus	<i>Nelumbo lutea</i>	Native
Bald Cypress	<i>Taxodium distichum</i>	Native
Banana-Lily	<i>Nymphoides aquatica</i>	Native
Bulrush	<i>Scirpus spp.</i>	Native
Burhead Sedge	<i>Oxycaryum cubense</i>	Non-Native
Cattail	<i>Typha spp.</i>	Native
Common Arrowhead	<i>Sagittaria latifolia</i>	Native
Duck-Potato	<i>Sagittaria lancifolia</i>	Native
Egyptian Paspalidium	<i>Paspalidium germinatum</i>	Native
Fragrant Water-Lily	<i>Nymphaea odorata</i>	Native
Large-Flower Primrose-Willow	<i>Ludwigia grandiflora (syn. L. hexapetala)</i>	Non-Native
Maindencane	<i>Panicum hemitomon</i>	Native
Pickereelweed	<i>Pontederia cordata</i>	Native
Rush-Fuirena	<i>Fuirena scirpoidea</i>	Native
Smartweed	<i>Polygonum spp.</i>	Native
Southern Watergrass	<i>Luziola fluitans</i>	Native
Spatterdock	<i>Nuphar luteum</i>	Native
Spikerush	<i>Eleocharis sp.</i>	Native
Torpedograss	<i>Panicum repens</i>	Non-Native
Water Primrose	<i>Ludwigia spp.</i>	Both
Water-Pennywort	<i>Hydrocotyle spp.</i>	Native
West Indian Marsh Grass	<i>Hymenachne amplexicaulis</i>	Non-Native
Willow	<i>Salix spp.</i>	Native
Wright's Nut-Rush	<i>Scleria lacustris</i>	Non-Native
Yellow Water-Lily	<i>Nymphaea mexicana</i>	Native
Floating Vegetation		
Duckweed	<i>Lemna spp.</i>	Native
Filamentous Algae	<i>Filamentous algae</i>	Native
Water Fern	<i>Salvinia spp.</i>	Non-Native
Water-Hyacinth	<i>Eichhornia crassipes</i>	Non-Native
Water-Lettuce	<i>Pistia stratiotes</i>	Non-Native
Submersed Vegetation		
American Eelgrass	<i>Vallisneria americana</i>	Native
Bladderwort	<i>Utricularia spp.</i>	Native
Coontail	<i>Ceratophyllum demersum</i>	Native
Hydrilla	<i>Hydrilla verticillata</i>	Non-Native
Illinois Pondweed	<i>Potamogeton illinoensis</i>	Native
Musk-Grass	<i>Chara spp.</i>	Native
Southern Naiad	<i>Najas guadalupensis</i>	Native
Stonewort	<i>Nitella spp.</i>	Native

HABITAT

The KCOL is dominated by a mixture of aquatic and wetland habitat types that can be partitioned into three zones: the pelagic zone (open water), the littoral zone, and watershed wetlands. This document will focus on the submersed and emergent vegetation in the littoral zone and the floating plants and tussocks in the open water within the KCOL. Fluctuating water levels are one of the most important factors determining the type, abundance, and distribution of vegetation in the littoral zone (Hill et al., 1998; Keddy and Fraser, 2000).

In reviewing the general zonation of vegetation within these areas across the KCOL, the littoral plant community begins at the edge of the open water portions of the lake. Within these deepest portions of the littoral zone, the native vegetative community is dominated by bulrush. Moving landward toward the shore, the littoral areas include eelgrass, Illinois pondweed, water lily, spatterdock, spike rush, and knotgrass (i.e., “Kissimmee grass”). Areas further landward typically support a mixture of maidencane, willow, and buttonbush. Exotic species often found in these areas include water hyacinth, water lettuce, torpedograss, hydrilla, and Cuban bulrush.

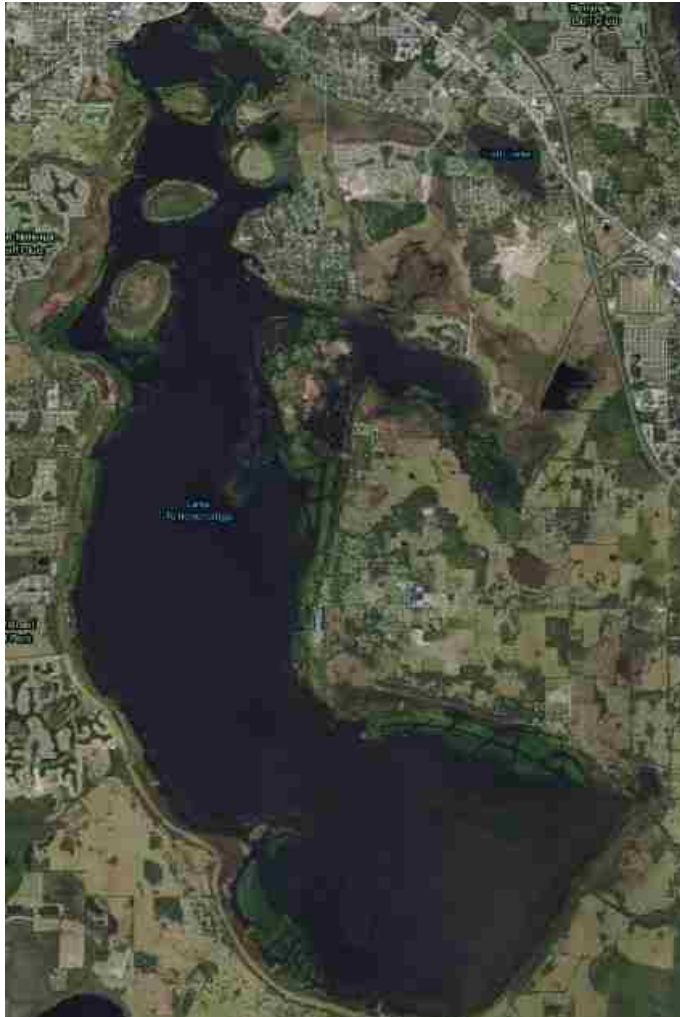
Aquatic plants are a natural and beneficial component of lake systems. As primary producers in the aquatic food chain, aquatic plants convert nutrients in the water and soil into food for other aquatic and terrestrial species. These vegetative communities protect shorelines and lake bottoms from wave action. In turn, the vegetation improves water quality, enhances lakeshore aesthetics, and benefits fish, wildlife, and people.

Vegetative composition is highly influenced by lake water levels. The KCOL experienced major hydrological changes due to the dredging and channelizing that began in the 1880s. Lake stages fell significantly, draining tens of thousands of acres of surrounding wetlands. Water control structures were built at the outlet of each waterbody. They are currently operated according to water control manuals and regulation schedules. These operations have narrowed the range of water level fluctuation from their natural

state. Elimination of the higher water levels reduced the amount of wetland habitat for fish and wildlife. For example, an estimated 5,600 acres of habitat for waterfowl was lost due to the regulation of water levels in Lakes Kissimmee, Cypress, Hatchineha, and Tohopekaliga (Perrin et al., 1982).

Even though aquatic plants provide a variety of benefits to lake communities, they can also hinder or obstruct various uses of the lake when their growth is prolific. Predominantly, this is a problem with exotic species like hydrilla and water hyacinth. Native species may also become nuisance by creating monocultures of emergent and submersed species such as cattail, willow, and pickerelweed (Havens et al., 2005; Interagency Draft, 2011). This nuisance may be attributed to the lack of water level variation from the regulation schedule. Without proper management, the floating tussocks and monocultures of invasive vegetation can result in navigation and access issues, clogging flood control structures. Foraging habitat degradation, including low dissolved oxygen and poor fish habit, is another problem caused by floating tussocks. This can result in reduced foraging habitat for bald eagles, snail kites, and wading birds. Muck accumulation is another effect of prolific vegetative growth, creating additional management challenges.

LAKE TOHOPEKALIGA



Aerial view of Lake Tohopekaliga.

Lake Tohopekaliga is a eutrophic lake heavily used for angling, hunting, airboat eco-tours, and wildlife viewing. The SFWMD and USACE regulate water levels on the lake via the S-61 water control structure. While Tohopekaliga's water levels historically fluctuated upwards of 10 to 12 feet, the lake now only fluctuates three feet. This severely altered hydrology, which began in the 1960s, resulting in accelerated lake succession and habitat degradation. Numerous in-lake disposal islands built during the 2004 drawdown are available for plant/organic storage during harvesting and drawdown projects. Hydrilla occurs in the open waters and littoral areas of the lake. Water hyacinth and water lettuce continue to expand around the perimeter of the lake. Cuban bulrush, cattails, water primrose, and other tussock and tussock precursor species form dense monocultures around the lake, too.

FLOATING PLANTS AND TUSSOCKS

FWC controls floating plants on Lake Tohopekaliga, primarily water hyacinth and water lettuce. Tussocks comprised of exotic and/or nuisance plants and associated organic material build up over time due to the stabilized water levels.

SUBMERSED AQUATIC VEGETATION (INCLUDING HYDRILLA)

Lake Tohopekaliga's most abundant submersed vegetation is hydrilla. It is more prolific in Lake Tohopekaliga than on any other lake on the KCOL. Large-scale management of hydrilla is needed/conducted several times annually by FWC. Common native submersed vegetation in the lake includes Illinois pondweed, eelgrass, bladderwort, and southern naiad.

LITTORAL ZONE

Habitat issues in the littoral area include the build-up of dense cattail monocultures, dense infestations of the exotic water primrose, and the build-up of spatterdock and water lily pads and associated rhizomes/organics. The main cause for these issues is water level stabilization.



Mechanical harvesting near Big Grassy Island on Lake Tohopekaliga.

INVASIVE EXOTIC SPECIES

Main exotic plants include water hyacinth, water lettuce, hydrilla, and water primrose. An exotic apple snail, first seen on Tohopekaliga in the early 2000s, has become abundant and has largely replaced the native Florida apple snail. Although the exotic snail has become a very important food source for the endangered Everglade snail kite, preliminary research indicates the snail has caused a reduction in Kissimmee grass coverage and density (Haller et al., 2017).

LAKE KISSIMMEE

Lake Kissimmee is the largest lake in the KCOL. It is a eutrophic lake and is heavily used by anglers, hunters, wildlife viewers, and airboat ecotours. The SFWMD and USACE regulate water levels via the S-65 water control structure. As with the other lakes in the KCOL, the hydrology is severely altered, with stabilized water levels only fluctuating about three feet. Historically, SFWMD either bought the land or the rights to flood the land from an elevation of 52.5 to 54.0 feet NGVD29. This should allow greater lake fluctuation as the prior high pool elevation was 52.5 feet NGVD29. Although this provides an opportunity for improvement, it still falls short of historical water level fluctuations. Numerous in-lake disposal islands built during the 1996 drawdown are available for plant/organic storage during harvesting and drawdown projects. Increases in nutrient runoff and encroachment of invasive plant species have also contributed to the decline of native vegetative communities. Degradation of littoral wetlands and adjacent wetland habitats negatively impacts fish and wildlife species utilizing these habitats.

Increases in nutrient runoff and encroachment of invasive plant species have also contributed to the decline of native vegetative communities. Degradation of littoral wetlands and adjacent wetland habitat negatively impacts fish and wildlife species utilizing these habitats.

FLOATING PLANTS AND TUSSOCKS

Floating plants such as water hyacinth and water lettuce and tussocks occur on Lake Kissimmee. FWC conducts herbicide treatments on floating plants regularly on Kissimmee. Constant maintenance control is necessary.

SUBMERSED AQUATIC VEGETATION (INCLUDING HYDRILLA)

Common native submersed vegetation in the lake includes Illinois pondweed, eelgrass, bladderwort, and southern naiad. Hydrilla has required little to no management by FWC for years.



Aerial view of Lake Kissimmee.



Dense cattail and tussocks (floating mud mats with plants growing on them) due to stabilized water levels in the lake. At high levels, this creates low-quality habitat for most fish and wildlife.

LITTORAL ZONE

Habitat issues in the littoral area include floating plants, tussocks, and a decline in submersed and emergent aquatic plant coverages/abundance, particularly Kissimmee grass. This decline is believed to be due to primarily stabilized water levels and nutrient input and, to a lesser extent, the exotic apple snail.



Non-native snail (left) vs. native snail (right).

INVASIVE EXOTIC SPECIES

Similar to Lake Tohopekaliga, main exotic plants include water hyacinth and lettuce, hydrilla and water primrose. Additionally, exotic apple snails invaded Kissimmee a few years later than Tohopekaliga.

KISSIMMEE GRASS

In recent years, there have been widespread concerns regarding the lack of bulrush and native grasses, particularly Kissimmee grass, on Lake Kissimmee. The loss of Kissimmee grass has been attributed to exotic apple snail herbivory and encroachment of tussocks and various floating-leaved species. In an effort to confirm the cause of the Kissimmee grass decline, FWC provided funding to the University of Florida (UF) Center for Aquatic and Invasive Plants (CAIP). Their research demonstrated that exotic apple snail grazing appears to be the main cause of the Kissimmee grass loss.

Management activities to mitigate the loss of Kissimmee grass include herbicide application and/or harvesting of tussock communities and floating-leaved species. The tussocks and floating-leaved species are displacing Kissimmee grass populations. Some areas have been cleared and/or are open

enough for planting desirable species. A more expansive and long-term solution would be a managed drawdown to expose littoral zone substrate, which allows plants to germinate from seed. This has been demonstrated in past drawdowns conducted by FWC. The last drawdown on Lake Kissimmee was conducted in 1996. It would be beneficial to conduct a drawdown in the near future.



Kissimmee grass. Revegetation of desired species, like Kissimmee grass, enhance habitat for fish and wildlife.

LAKES HATCHINEHA AND CYPRESS

Hatchineha and Cypress are eutrophic lakes that receive less fishing and hunting pressure than Tohopekaliga or Kissimmee. Airboat ecotours are common on both lakes, particularly Cypress, where there is a zoo and a large-scale ecotour business. Cypress Lake has in-lake disposal islands on the eastern shore, while Hatchineha has none. Stages on both lakes are controlled by the same water control structure as Kissimmee (S-65) and are regulated the same as Kissimmee.

Primary management activities are hydrilla, floating plant, and water primrose herbicide treatments. FWC has conducted herbicide treatments and controlled burns targeting cattail on both lakes.

LAKE HATCHINEHA



Aerial view of Lake Hatchineha.

Water hyacinth, water lettuce, Cuban bulrush, and water primrose are troublesome plant species that occur along the shoreline of Lake Hatchineha. These species damage the native plant community due to excessive growth and continued expansion of invasive plants.

Current treatment consists of selective herbicides applied via airboat to treat floating plants, Cuban bulrush, and water primrose within mixed areas of more desirable native vegetation. Mechanical harvesting is not an option as the treatment areas are too shallow for the harvesting equipment. There are no spoil islands or upland disposal sites located nearby, and/or the targeted invasive plants are densely mixed in with beneficial native plant communities. Harvesting would not allow for selective treatment.

CYPRESS LAKE



Aerial view of Cypress Lake.

Problematic plant species on this lake include hydrilla, water hyacinth, water lettuce, Cuban bulrush, West Indian marsh grass, water primrose, and cattail. In Cypress Lake, hydrilla is a fluridone-tolerant plant. It poses threats to navigation, flood control, and the reduction of native species, particularly eelgrass. The other species commonly form monotypic stands, tussocks, and floating islands, limiting access, navigation, and habitat utilization by out-competing native plant communities.

MANAGEMENT

The highly productive ecosystems of the KCOL support fishing, hunting, wildlife viewing, and other recreational and commercial activities. The health of this chain is critical to the health of the rivers, lakes, and estuaries it supplies, including Lake Okeechobee. As Florida's population grows, freshwater habitats and the wildlife that depend on them are in greater peril. Management activities on the KCOL include a difficult balance of preserving healthy habitats for fish and wildlife while allowing year-round navigation and flood control. The FWC uses a variety of techniques, including biological controls, mechanical removal, and herbicide treatments, to manage invasive aquatic plants. The goals and objectives regarding habitat management are aimed at providing optimal habitat for fish and wildlife while ensuring cost-effectiveness and stakeholder support.

INVASIVE PLANT MANAGEMENT

FWC is the lead agency in Florida responsible for coordinating and funding two statewide programs controlling invasive aquatic and upland plants on public conservation lands and waterways throughout the state. This work is carried out by the Invasive Plant Management (IPM) Section within the Division of Habitat and Species Conservation. The section also ensures that beneficial native aquatic plants in Florida's ponds, lakes, and rivers are protected. While FWC is the lead agency, many agencies, including the USACE, Water Management Districts, and local governments, have the authority to manage aquatic plants in certain areas. This Plan will focus on the aquatic plant management section and permitting done by FWC on the KCOL.

Invasive plants harm Florida's natural environment, leading to a loss of biodiversity and ecosystem health. Some invasive aquatic plants pose a serious threat to human welfare by impeding flood control and affecting access and navigation, impacting the recreational use of waterways and the economy. They usually cannot be eradicated and will grow back quickly if not managed consistently. FWC does not try to manage all nonnative plant species; instead, it prioritizes the management of the most problematic species.

Many stakeholders have expressed their concerns about aquatic herbicide applications in Florida, including in KCOL. In 2019, FWC temporarily paused its aquatic herbicide treatment program throughout the state. FWC collected public comments regarding the aquatic plant management program during the pause. Invasive plants expanded during that period.

An outcome of the pause and stakeholder feedback was initiating a fish, wildlife, and management planning process for KCOL and other waters. FWC took additional steps to monitor their contractors by having them submit GPS tracks for all plant management actions. FWC continued periodic site inspections and oversight of their aquatic plant management contractors. Additional information on aquatic plant management can be found in, *Management of Aquatic Plants* (Appendix B). Alternatively, readers can view frequently asked questions about aquatic plant management at <https://myfwc.com/wildlifehabitats/habitat/invasive-plants/faqs/>.

AQUATIC PLANT MANAGEMENT (APM) PROGRAM

FWC cannot manage all exotic aquatic plants due to the sheer size and volume of the lakes. Instead, they prioritize the management of the most problematic species. The goals of FWC's Aquatic Plant Management Program are to:

- Reduce the abundance of invasive aquatic plants infesting Florida public water bodies by:
 - emphasizing control of water hyacinth, water lettuce, and hydrilla;
 - eradicating new infestations of invasive aquatic plants;
 - maintaining established invasive plant populations at low levels;
- Initiating management of established stands of other invasive aquatic plants;
- Sustaining public waterbody attributes such as navigation, flood control, and recreation while conserving or enhancing diverse native vegetation communities for fish and wildlife habitat;

- Evaluating biological, chemical, mechanical, and physical control techniques and integrating appropriate tools into cost-effective invasive plant management strategies that are compatible with the uses and functions of each waterbody; and,
- Reviewing current management strategies and assessing and incorporating new technologies and techniques that enhance invasive aquatic plant management objectives where appropriate.

Development of annual aquatic plant work plans for the KCOL identify the basic management objectives and plant control methods for the upcoming year. The aquatic plant work plans contain input from cooperating agency staff and interested private-sector stakeholders. Following plan implementation, sites within each management area are monitored at least once per year to assess the effectiveness of the activities and determine if any adverse impacts have occurred. These work plans are revised annually according to conditions in each management area.

FWC biologists use hydroacoustic mapping and point-intercept sampling to analyze changes in the emergent and submersed plant communities. Hydroacoustic mapping produces heat maps of general vegetation on the lakes, with no specific species indicated. Point-intercept sampling provides species presence and density ranking. SAV naturally fluctuates from year to year, and long-term monitoring of this resource helps assess the stability of the vegetation on the KCOL.

AQUATIC PLANT CONTROL PERMITS

The FWC issues aquatic plant control permits statewide under Chapter 68F-20, F.A.C. Most of these permits are issued to riparian property owners and local governments. The permits generally authorize controlling plants within small areas to gain shoreline access to water bodies. In support of these permits, FWC staff conducts site inspections related to permit requests and permits issued and maintains records of permittees and actions related to aquatic plant control activities.

EARLY DETECTION AND RAPID RESPONSE

The Early Detection and Rapid Response (EDRR) program provides general resources for detection methods for invasive species and coordinated responses to these threats. EDRR can stop the spread of new and emerging invasive species before they become established. It is one of the most cost-effective and ecologically viable methods for controlling invasive species. It is well worth the effort to protect natural resources.

Dwarf papyrus was found in Lake Kissimmee for the first time in 2021. FWC applied EDRR protocol, treating a total of 0.75 acres in March 2021. They will continue monitoring the population for regrowth until the population is eradicated.

HYDRILLA MANAGEMENT

It is the position of the FWC that native aquatic plant communities provide ecological functions that support diverse native fish and wildlife communities in Florida water bodies. FWC considers hydrilla to be an invasive, non-native aquatic plant. At high densities, it can adversely impact native plant abundance, sportfish growth, recreational use, flood control, and dissolved oxygen. Once established, hydrilla has proven difficult if not impossible to eradicate with current technology and is expensive to manage. Therefore, FWC opposes the deliberate introduction of hydrilla into water bodies where it is not currently present.

The FWC prefers to manage native aquatic plants but recognizes that in waterbodies where native submersed aquatic plants are absent or limited, hydrilla at low to moderate densities can be beneficial to fish and wildlife. FWC will manage hydrilla on an individual water body basis, using a risk-based approach to determine the level of management.

AQUATIC HABITAT RESTORATION AND ENHANCEMENT

Human activities such as development, exotic introductions, and water level stabilization have made it impossible to restore the KCOL back to its historical conditions. Aquatic Habitat Restoration and Enhancement's (AHRE) enhancement activities on Lake Tohopekaliga include mechanical harvesting, herbicide treatments (primarily cattail), prescribed fire, revegetation, and lake drawdowns (with or without mechanical plant and organic removal such as "scraping"). Drawdowns were conducted on Lake Tohopekaliga in 1971, 1979, 1987, and 2004.

AHRE enhancement activities on Lake Kissimmee primarily include mechanical harvesting of tussocks/pads, revegetation, and lake drawdowns (with and without mechanical scraping). Herbicide treatments and shredding of native nuisance plants have rarely been conducted over the last seven years by AHRE staff. A drawdown of Lake Kissimmee is greatly needed to stimulate beneficial aquatic plant growth for both emergent and submersed species. Revegetation projects would also be beneficial during low lake stages. The last drawdowns conducted on Lake Kissimmee were in 1977 and 1996.

DRAWDOWNS

FWC utilizes extreme drawdowns to mitigate the degradation of the KCOL. Simulation of high-water events can no longer occur due to development in the historic floodplain. However, extreme low water levels can be produced. An extreme drawdown is a management technique that mimics a natural low-water event. These actions temporarily restore lake bottom sediments, plant communities, and fish and wildlife communities. FWC can mechanically remove nuisance aquatic plants and accumulated organic sediment on the lake bottom during these drawdown events. These management activities enhance habitat for fish and wildlife while also improving lake access for anglers, boaters, and hunters.

DIVISION OF LAW ENFORCEMENT

The FWC Division of Law Enforcement (LE) protects Florida's natural resources and people through proactive and responsive law enforcement services. This Division is the largest section within FWC, with over 800 sworn officers. FWC officers are responsible for uniformed patrol and investigative law enforcement services.

MISSION STATEMENT



Protecting Florida's natural resources and people through proactive and responsive law enforcement services.

FWC LE patrol efforts are based on four core missions: resource protection, environmental protection, boating and waterways, and public safety. FWC officers have full police powers and statewide jurisdiction. They patrol rural, wilderness, inshore, and offshore areas and are often the sole law enforcement presence in many remote parts of the state. FWC officers are charged with enforcing state and federal laws and also with protecting Florida's wildlife and habitats, including rescuing injured animals. In so doing, they maintain viability for educational, recreational, and commercial activities on the KCOL.

FWC officers use a modern, multi-faceted approach to law enforcement. FWC LE is committed to bias-free policing so that all citizens can enjoy and use Florida's natural resources. This includes safeguarding public safety and enriching the outdoor experience of residents and visitors. They must also enforce laws to protect the resources of Florida and the safety of people using these resources. FWC officers enforce boating and waterways laws and promote educational activities to enhance boating safety for residents and visitors, including performing safety checks while on the water.

In addition to law enforcement, the division:

- Provides support for the state Emergency Operations Center including readiness for natural disasters and mutual aid requests;
- Conducts search and rescue operations;
- Engages in targeting illegal black markets and trafficking in fish and wildlife;
- Conducts federal fisheries enforcement patrols;
- Assists to regulate the Florida seafood industry;
- Enforces rules related to captive wildlife; and,
- Encourages the next generation of conservationists and enhances outdoor experiences through education, public outreach partnerships, and youth-oriented programs.



Florida Fish and Wildlife Conservation Commission law enforcement officer on water patrol.

RECREATION

FWC recognizes that the KCOL offers abundant recreational opportunities. The open water and adjacent habitats provide value to the economy and improve the quality of life in Florida. These lakes are world-renowned for their fishing and hunting opportunities and are a major ecotourism destination.

There are many public parks and recreational facilities that provide additional recreational opportunities, including hiking, camping, picnicking and scenic beauty. FWC is committed to providing diverse recreational opportunities on the KCOL.



The rich habitats of the KCOL provide a variety of recreational activities for all to enjoy.

ANGLING

All four lakes in this Plan are designated by the FWC as FMAs. They are known for their Largemouth Bass, Black Crappie, and bream fisheries, valued in the millions of dollars to the local economy. Florida leads the nation in the total number of anglers and the total days fished. The Division of Freshwater Fisheries Management is responsible for directing the management and identifying the research needs of freshwater fisheries. Their efforts focus on improving the fish populations and their habitats to benefit anglers and other stakeholders. Anglers support fisheries conservation and quality management of the state's fish and aquatic species through purchasing fishing licenses, fishing and boating equipment, and fuel. It is critical to increase participation in the sport of fishing and recruit the next generation of anglers to sustain benefits from multiple funding sources. The goals and objectives in this Plan aim to ensure the long-term sustainability of the KCOL fisheries while creating or enhancing angling opportunities.

HUNTING

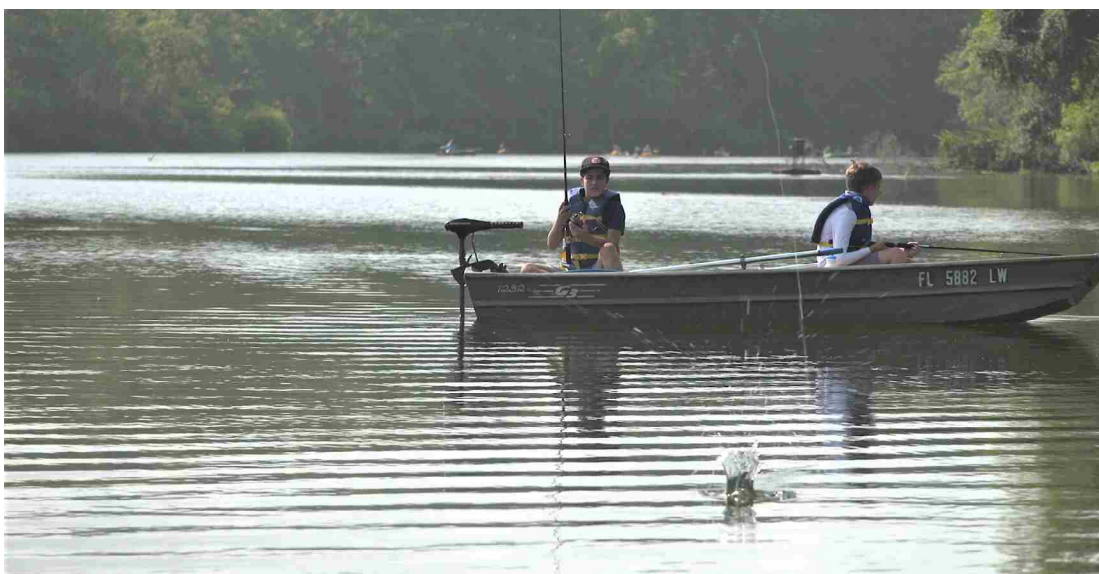
Hunting on the KCOL, particularly for duck, frog, alligator, and turkey, is a popular activity and boosts the economy. The Division of Hunting and Game management uses scientifically proven game-management strategies and professional expertise to conserve game wildlife and perpetuate sustainable

hunting opportunities on public and private lands. In addition to managing wild game populations, FWC works with partners and stakeholders to support and promote hunting-related activities and provide hunter safety courses and special events. The Kissimmee Chain of Lakes Area Wildlife Management Area (WMA) and the Three Lakes WMA encompass much of Cypress Lake, Lake Hatchineha, and Lake Kissimmee.



Waterfowl hunter.

These WMAs provide ample hunting opportunities. The FWC website, www.myfwc.com, provides specific information regarding regulations, licenses, and permits, season dates and bag limits, public hunting opportunities, hunter safety, etc. This Plan includes an objective to create or enhance hunting opportunities on the KCOL.



Young anglers fishing from a boat. The KCOL attracts anglers from all over the world.

WILDLIFE OBSERVATION

Wildlife viewing draws millions of residents and tourists alike, contributing billions of dollars to Florida's economy. The lakes and adjacent lands provide habitat for various wildlife, including protected species like the Everglade snail kite, bald eagle, whooping crane, and wading birds. They also provide opportunities for wildlife viewing, bird watching, and ecotourism. The WMAs within the KCOL offer many opportunities for wildlife viewing. Three GFBWT sites are located within the KCOL. Fishing and wildlife observation piers are popular spots for viewing. This Plan includes an objective to create and enhance wildlife viewing opportunities on the KCOL.



People observing wildlife at the Joe Overstreet Landing at Lake Kissimmee. This is a location on the Great Florida Birding and Wildlife Trail.

BOATING

Stakeholders enjoy many water-related activities including boating, kayaking, water skiing, jet skiing, boat racing, and sightseeing. Boaters, like anglers, are an important economic resource and provide funding through licensing and boating equipment sales. The Boating and Waterways Section of the FWC works to provide safe and enjoyable boating on the water bodies of Florida. They identify potential sites for new boat ramps, facilities that need renovating or expansion, construction and renovation of existing boating facilities on state-owned lands. They also grant opportunities for boating access and boating activities. Visit the FWC Florida Boat Ramp Finder at <https://myfwc.com/boating/boat-ramps-access/> to find a boat ramp or access with descriptive information and maps for your destination.



The KCOL provides miles of lakes for boaters to enjoy.

CHAPTER 4

COMMUNICATION



OUTREACH AND EDUCATION

FWC believes that current and future generations are more likely to aid in protecting and managing fish and wildlife resources if they better understand and appreciate those resources. With that in mind, FWC has various tools that are meant to inform the public about the agency, the resources FWC manages, current and future management, and upcoming opportunities for the public to engage or participate in activities that further promote FWC's mission. The following are just some of the ways in which FWC interacts with the public and other partners.

FWC WEBSITE

The FWC website is www.myfwc.com. The website allows users to stay informed on upcoming Commission meetings and review the minutes from prior meetings. It is a place to apply for and order recreational fishing and hunting licenses and permits, or apply for commercial harvesting licenses and permits. The website provides information about fish and wildlife that occur in the state, including the research that FWC is doing to manage these resources. People can stay up-to-date on current and future regulations and volunteering opportunities. It is also a place to view current plans, including Florida's State Wildlife Action Plan, Florida's Black Bass Management Plan, the Imperiled Species Management Plan, and previous lake management plans.

Recently, FWC developed the "What's Happening on my Lake?" tool to consolidate all information about any waterbody they manage. This tool is found at <https://myfwc.com/lake>. People can find all of the data

FWC collects, including habitat or plant management, historical and current fish populations, fishing or hunting regulations, and even upcoming events on the water. This management plan will be provided on the "What's Happening on my Lake?" tool, in addition to the lake management plans webpage at myfwc.com/lake-plans.

SOCIAL MEDIA

Follow Us:



See a full list of our Social Media accounts

Subscribe:

FWC maintains an active social media presence on multiple platforms.

FWC maintains an active social media presence on multiple platforms. The main Facebook handle, @MyFWC, is where FWC may highlight a species of the day and inform the public about fishing and hunting seasons and associated regulations. It is also used to remind people about boater safety during active seasons and provide information on upcoming engagement opportunities. Other FWC Facebook pages include the Fish and Wildlife Research Institute, TrophyCatch, HuntFlorida, and the GFBWT, among a few others.

FWC manages three Instagram accounts, with the main handle @myfwc having over 90,000 followers.

Other Instagram pages, such as @fwcresearch and @fishreelflorida, covers scientific research and freshwater fishing, respectively. The freshwater Instagram handle, @fishreelflorida, promotes TrophyCatch submissions, youth fishing programs, freshwater conservation, and our efforts to improve Florida's bass fisheries.

FWC manages two Twitter accounts, including the main handle, @MyFWC. The second Twitter handle, @FLBirdingTrail, is used to highlight the GFBWT program. FWC maintains five YouTube channels. The videos on the main FWC channel, @MyFWCvideos have been grouped into several categories, including alligators, Florida panther, Florida black bear, pythons, turtles and tortoises, research, boating safety, and law enforcement. FWC also maintains a limited presence on Flickr, Vimeo, Periscope, Snapchat, and LinkedIn.

EMAIL DISTRIBUTION

An important part of FWC's mission is public outreach. FWC utilizes email distribution lists to connect with the public on a variety of subjects. People can sign up at www.public.govdelivery.com/accounts/FLFFWCC/subscriber/new. They can receive email or text messages from FWC regarding volunteer opportunities, information, and current events. The subscription is easy, free, and you can unsubscribe at any time.

EDUCATION

FWC is committed to providing educational opportunities for educators, youth, adults, and families to learn more about Florida's diverse fish and wildlife resources. Through education or recreational experiences, people can become more interested in knowing their role in conserving Florida's resources. With that knowledge, the public may become better stewards of the land and the fish and wildlife resources and help influence others to cherish and enhance Florida's natural heritage. Here are just a few of the opportunities relevant to this Plan:

TrophyCatch

TrophyCatch is an incentive-based conservation program designed for anglers who catch-and-release Largemouth Bass heavier than eight



pounds in Florida. More information on this program is found at www.trophycatchflorida.com.

Big Catch

Big Catch is designed to encourage anglers to enjoy the full variety of freshwater fishes in Florida and to try new locations, techniques, and target new species. Additional information on this program is found at www.bigcatchflorida.com.



High School Fishing Program

The High School Fishing Program was developed to help students learn how to become effective, conservation-minded anglers. The goal is to teach students about ethical angling, conservation, Florida's aquatic habitats, basic fishing gear, and general fishing concepts to help create confident and responsible anglers. Students interested in the program should contact R3Fishing@MyFWC.com or (850) 617-6012 to get started. Your school will need a program sponsor such as a teacher, coach, or parent who will oversee the High School Fishing Program, usually as an extracurricular club or a team.



Success! Local high schooler holding his big catch.

PUBLIC INVOLVEMENT

The public has a variety of ways to stay informed and engaged on FWC's management and regulation of the state's fish and wildlife resources. For example, FWC Commissioners meet five times each year to hear staff reports, consider rule proposals, and conduct other business. Because public involvement is an important part of the process, Commission meetings are conducted at different locations across the state and offer people the opportunity to address the Commission about issues under consideration. In a less formal setting, people can refer to www.myfwc.com/contact/tell-us where they can see answers to common questions, participate in surveys, and offer ways to improve how we manage fish and wildlife resources.

INTERAGENCY COORDINATION

It is important to recognize that FWC partners with numerous government agencies to provide lake management activities within the KCOL. These activities include aquatic plant management, hydrologic management, water quality improvement, habitat preservation and enhancement, and recreation and public use. Coordination among these agencies is vital to ensure the success of the lake management responsibilities. This Plan includes goals and objectives aimed at enhancing coordination with partner agencies to improve fish and wildlife resources. The following summarizes the major roles of the participating state and federal partners, including the FWC.

FWC – manages fish, wildlife, and their habitats and manages aquatic plants, particularly invasive aquatic plants, to conserve the multiple uses and functions provided by the lakes and waterways within the KCOL.



SFWM – manages and protects water resources in the KCOL region by regulation of water quality, flood control, water supply, and protection of natural systems. The SFWM physically manages the lake levels through the water control structures.



FDEP – regulates water quality and monitoring activities, including the National Pollutant Discharge Elimination System (NPDES) program, develops Total Maximum Daily Loads (TMDLs) for impaired waters, and develops Basin Management Plans (BMPs), which include measures to restore water quality.



USACE – manages and monitors the operations of locks, pump stations, spillways, canals, reservoirs, culverts, and water conservation areas; provides federal regulation to protect wetlands and waterways through regulatory permitting; and leads restoration projects, including the KRRP.



USFWS – protects fish and wildlife species and ensures these resources receive consideration in water resource planning activities and are included in mitigation plans which avoid, minimize, or compensate for impacts to wetlands that affect federally protected species.



Osceola County – conducts lake-related activities performed by the County's Community Development and Public Works Departments. Programs managed by the County include capital projects for boat ramp renovations and amenities, boat ramp and navigation sign maintenance and capital expenditures for drainage and water quality improvement projects, particularly related to the FDEP impaired water rules and the Lake Okeechobee BMAP.



Cities of Kissimmee and St. Cloud – located on the northern bank of Lake Tohopekaliga and the southern bank of East Lake Tohopekaliga, respectively, the cities provide capital expenditures for the state's first Nutrient Reduction Plan and other water quality improvement projects. In addition, they conduct stormwater-related education and outreach and lake cleanup opportunities.



CHAPTER 5

FISH, WILDLIFE, AND HABITAT PLANNING PROCESS



As the lead agency for managing fish and wildlife and their habitat on Florida's aquatic resources, FWC determined that management plans were needed for high-priority waterbodies. The development of this Plan allowed local stakeholders and FWC staff to jointly craft management targets and approaches that will benefit fish and wildlife resources and people. Public meetings, surveys, focus groups, and interviews were conducted to better understand stakeholder concerns and management desires for KCOL.

The development of this Plan was executed to create stakeholder trust in the process, encourage stakeholder engagement, and provide transparency. Significant manpower and financial resources were required to produce an accurate, operational, and timely plan. FWC staff identified deliverables tailored to the unique management challenges and stakeholders within the KCOL. Regional working groups in the FWC worked with

Inwood to create agendas, facilitate meetings, record notes, and draft/edit the Plan. FWC staff tailored their outreach strategies to local KCOL communities using surveys, public meetings, focus groups, informational workshops, and stakeholder interviews.

KICK-OFF MEETING

A stakeholder kick-off meeting was held in February 2020. The purpose of the meeting was to introduce the public to the FWC Stakeholder Engagement Process required to develop a management plan for the KCOL.

A presentation was given during the kick-off meetings outlining the different stakeholder engagement techniques that would be used during the subsequent Plan development process. An overall schedule outlining the upcoming phases and timeframes for the Plan development process was also included.

PROCESS & TIMELINE



STAKEHOLDER WORKSHOPS

The FWC held seven stakeholder workshops between July and August 2020. Due to concerns related to the COVID-19 pandemic, these workshops were held virtually. Over 70 stakeholders representing various groups and NGOs such as local and national fishing clubs, waterfowl groups, local sportsman's and boating clubs, the Audubon Society, and homeowners attended at least one of the various stakeholder workshops.



Common concerns from the workshops were primarily centered around the following issues:

Habitat issues that can be greatly influenced by FWC management activities

- By far, the most discussed habitat condition was hydrilla. Overall, people agree that hydrilla is an exotic plant and can be problematic; however, it must be managed for its benefits rather than attempting to eradicate it. Although some supported complete hydrilla coverage and others advocated for zero coverage, there was a consensus that a “balance” of coverage is needed. Several comments indicated that a range of 20-40% of SAV is a good target. Also, hydrilla should be throughout the lake but predominantly offshore so the littoral zone is accessible. Hydrilla also helps with water quality and clarity issues on the KCOL.
- There was some discussion of improving native plant communities, including submersed species, but it was limited relative to the discussion of hydrilla. Essentially, in their opinion, if FWC effectively managed hydrilla, most stakeholders would be happy with the plant community of the lakes regardless of the amount and/or diversity.

- Overall, most people wanted us to be vigilant and ensure that we control floating plants, especially water hyacinth, in the system due to their invasive nature. A percentage of anglers would like to see some floating plants for angling. Water lettuce was mentioned as a plant that could possibly be managed in such a way.
- Management tools employed should be chemical, mechanical, and biological, if available. Some people preferred mechanical over chemical, but most people wanted to use a mix of control methods. Most participants indicated that herbicide use is a necessity. Mechanical harvesting may be a good tool for floating plants, but most agreed that it was inefficient and ineffective for hydrilla management. Herbicides should be used for managing hydrilla.
- Timing of herbicide applications is important for duck hunting and fish spawning. There was also discussion on doing monthly/quarterly “maintenance control” management of hydrilla rather than one or two large treatments annually.
- Lake drawdowns were overwhelmingly popular as a tool to improve lake habitat. Most agreed that sediment removal coupled with a drawdown was advantageous as well.
- There is a lack of SAV and a significant loss of Kissimmee grass on Lake Kissimmee. This loss needs to be addressed.

Habitat conditions that are Primarily influenced by other agency management activities

- Poor water quality and water clarity were a consistent concern by most participants. Nutrient input from stormwater runoff was a major concern. Uncontrolled urban development impacts were a concern.
- Water level management was discussed as a concern. Homeowners advocated for deeper water and even more stabilization. Hunters and anglers were advocates for more lake fluctuation to improve fish and wildlife habitat.

Fisheries Management

- Most stakeholders seem to be content with current fisheries management efforts.
- When prompted, some indicated that a size limit might improve Black Crappie size structures, but it was not a big topic of discussion.

- Fish attractors were viewed favorably.
- The current Largemouth Bass regulation was viewed favorably.

Communication

- Overall, FWC is doing a good job.
- Smaller video workshops with fewer people were seen as a huge success and should be used in the future. Large public meetings are a necessity but usually not very productive.
- Email was generally the most preferred means of written communication.
- Social media may be helpful to reach people we don't typically interact with, especially younger people.
- FWC should attempt to communicate with youth to develop the next generation of lake advocates.
- Video vignettes and/or a Youtube channel may be an effective tool to educate the public on the lakes and lake management.
- An FWC "Lake App" may be a good tool to notify people of what is happening in real time.
- Feedback received from the workshops was used to help formulate questions asked in later surveys.

STAKEHOLDER INTERVIEWS

Between August and October 2020, the FWC hosted 16 interviews with 14 different stakeholders. Included in these interviews were five commercial businesses, four local government representatives, and five agency groups.

Common concerns expressed during the interviews were primarily centered around the following issues:

- concern over human impacts
- concerns related to the condition of the lakes and their wildlife
- impacts on local businesses and the economy related to habitat and vegetation management
- concerns related to invasive fish
- negative impacts from floating plants
- overall ecosystem health
- improvements to communication and coordination with the FWC

STAKEHOLDER SURVEY

The FWC performed a stakeholder survey consisting of 27 multiple choice and open-ended questions between December 2020 and January 2021. The survey was used to determine how respondents interact with the KCOL. In addition, respondents were asked to answer questions and rate aquatic plant management, hydrilla management, fish management, and overall FWC communication. Of the total 967 respondents, approximately 22% were residents or homeowners that live on or near the lake. Other groups surveyed include those involved in angling and other recreational usages. Surveys were distributed to stakeholders via email, press releases, and in-person interactions on the water.

PUBLIC MEETING #1

A public meeting was held on Tuesday, March 23, 2021, at 6:00 p.m. and included 69 attendees. As a result of the global pandemic caused by COVID-19, the meeting was conducted as a virtual public meeting. The purpose of the meeting was to provide an update on the ongoing planning process, present an overview of the findings from previous stakeholder engagement efforts, provide an overall project schedule with important key steps, and receive public input regarding the proposed updates to the Plan.

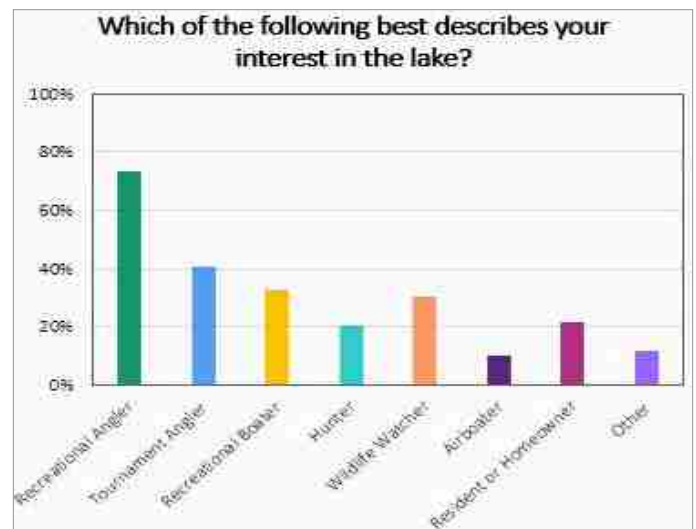


Figure 8: KCOL Stakeholder User Respondents Results.

INVITATIONS

Project representatives from FWC and Inwood were available to answer questions and address comments. An invitation to join and/or participate in the public meeting was posted to the project webpage

(myfwc.com/lake-plans). A separate announcement was posted to the FWC's news webpage (<https://myfwc.com/news/all-news/kcol-321/>) on March 3, 2021. In addition, an invitation to register for the public meeting was emailed to property owners, business owners, government officials, and other interested parties (i.e., stakeholders) known to the FWC. Information in the email summarized the lake management planning effort and the reason for the public meeting. A separate invitation was emailed to elected officials, appointed officials, and agency officials with a vested interest in the project area.

SUMMARY OF COMMENTS

A total of 89 comments and questions were received during the virtual public meeting and within the 10-day comment period following the public meeting. A breakdown of comments received by topic is as follows:

- 12 comments related to hydrilla or the mechanical or chemical removal of hydrilla
- 9 comments related to overall water quality and habitat
- 4 comments related to the Plan
- 34 comments classified as "other"

FOCUS GROUP MEETINGS

FOCUS GROUP MEETINGS OVERVIEW

A total of 8 focus group meetings were hosted between June and July 2021. Prior to the meetings, a survey was provided to stakeholders to determine what days, times, and platforms (in person or virtually) were preferred. Based on the survey results, the focus group meetings were offered both virtually

and in person on the dates and times that reflected the majority of responses. The focus groups were conducted as guided group discussions to gain feedback on the draft Goals and Objectives and present relevant information that would be utilized to refine the Goals and Objectives. The input gathered during the focus group meetings was considered when preparing the second draft of the Plan.

FOCUS GROUP MEETINGS STATISTICS

Approximately 80 stakeholders were invited to participate in the survey and corresponding focus group meetings. A summary of focus group meeting statistics is provided in Table 10.

FOCUS GROUP MEETINGS COMMENT SUMMARY

Miscellaneous stakeholder concerns included airboat noise and the issue of shoals/hydrilla in canals. Overall, there was positive feedback for holding the focus group meetings. Many stakeholders mentioned that they were pleased to be part of the conversation and requested more frequent and detailed communication. Some stakeholders inquired if the goals and objectives were in any order of importance or preference and indicated that they read the document that way.

FOCUS GROUP MEETINGS LESSONS LEARNED

There were many challenges in preparing for and conducting the focus group meetings. Due to COVID-19 and social distancing guidelines from the CDC, Inwood sent a questionnaire to stakeholders that had expressed an interest in participating in the focus group meetings. The questionnaire asked stakeholders about their willingness to attend an in-

Table 10: Focus Group Meeting Statistics.

Focus Group Date	Time	Location	Number of Attendees
June 10, 2021	6 PM	GoToMeeting (Virtual)	5
June 14, 2021	6 PM	GoToMeeting (Virtual)	5
June 28, 2021	1 PM	GoToMeeting (Virtual)	7
June 30, 2021	9 AM	GoToMeeting (Virtual)	3
June 30, 2021	6 PM	Lake Wales Tourist Club	11
July 14, 2021	6 PM	GoToMeeting (Virtual)	1
July 15, 2021	9 AM	Osceola Council on Aging	9
July 15, 2021	6 PM	Osceola Council on Aging	8

person or virtual meeting. In addition, it asked what date, day, time, and location best fit their schedules. Based on the responses, FWC and Inwood prepared a matrix with potential meeting venues, dates, etc., to maximize attendance and participation at the focus group meetings.

Despite that effort, the focus group meetings were poorly attended. In some cases, more than 70% of respondents who said they would attend a particular meeting did not. The lack of attendance exasperated those that did attend, with some stating they had friends who had complained about the current management of the lake. The well-attended meetings resulted in good, productive discussions about the Plan. However, some stakeholders were not prepared or comfortable discussing the Plan in a small group. They may prefer a more public, community forum.

PUBLIC MEETING #2

A public meeting was held on Wednesday, November 10, 2021, at 6:00 p.m. and included a total of 34 attendees. This meeting was conducted in person at the Kissimmee Civic Center, 201 E Dakin Ave, Kissimmee, FL 34741. A link to the recording of the meeting was posted to the project website following the meeting. The purpose of the meeting was to provide an update on the ongoing planning process, present an overview of the findings from previous stakeholder engagement efforts, provide an update to the overall project schedule with important key steps, and receive public input regarding the draft management plan. After a brief presentation of the draft management plan, the attendees were given the opportunity to provide comments or ask questions to the FWC and Inwood staff in attendance. Comments and questions were collected after the public meeting via email during the comment period ending December 17, 2021.

INVITATIONS

An invitation to participate in the public meeting was posted to the FWC's news webpage (<https://myfwc.com/news/all-news/kcol-management-1121/>) on November 3, 2021. A separate announcement seeking input following the public meeting was posted to the FWC's news webpage (<https://myfwc.com/news/all-news/lake-plans-1221/>) on December

7, 2021. In addition, an invitation to attend the public meeting was emailed to property owners, business owners, government officials, and other interested parties (i.e., stakeholders) known to the FWC.

SUMMARY OF COMMENTS

A total of 9 participants provided verbal comments during the public meeting. Most of the comments expressed concerns with hydrilla and spraying. Commenters wanted detailed information about spraying side effects, costs of spraying to meet the Plan's goals, and a cost-effective comparison between spraying and mechanical harvesting.

A total of 90 comments and questions were received during the public meeting and within the comment period following the public meeting. A breakdown of comments received by topic is as follows:

- 14 comments related to hydrilla or the mechanical or chemical removal of hydrilla
- 21 comments related to overall water quality and habitat
- 35 comments related to the Plan
- 20 comments classified as "other"

All comments and questions received in response to the KCOL draft management plan have been included in Appendix C. Many have been incorporated into the Plan. Other comments and suggestions need additional consideration or refinement, which will require some time to implement. Therefore, these comments will be included in the review process within the 5-year time horizon of the current Plan.

Many comments received during the public meetings echoed comments that stakeholders provided during interviews, focus groups, and the online survey. FWC factored the comments into the draft goals and objectives. For example, FWC heard stakeholder desire to use less aquatic herbicide while controlling invasive plant cover. To address those comments, FWC prepared Objective E-2 to explore new methods for controlling invasive plant cover. One possible solution, mentioned in several Actions, would be a drawdown of the KCOL. In addition, FWC created Objective E-5 to maintain contractor oversight for herbicide applications.

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WILDLIFE COMMON TO KCOL

Common Name	Scientific Name	Status	Listing Status	Conservation Plan
Amphibians				
Bullfrog	<i>Rana catesbeiana</i>	Native		
Cuban Treefrog	<i>Osteopilus septentrionalis</i>	Non-native		
Eastern Narrowmouth Toad	<i>Gastrophryne carolinensis</i>	Native		
Greater Siren	<i>Siren lacertina</i>	Native		
Green Treefrog	<i>Hyla cinerea</i>	Native		
Peninsula Newt	<i>Notophthalmus viridescens</i>	Native		
Pig Frog	<i>Rana grylio</i>	Native		
Southern Cricket Frog	<i>Acris gryllus</i>	Native		
Southern Dwarf Siren	<i>Pseudobranchius axanthus</i>	Native		
Southern Leopard Frog	<i>Rana sphenoccephala</i>	Native		
Southern Toad	<i>Anaxyrus terrestris</i>	Native		
Squirrel Treefrog	<i>Hyla squirella</i>	Native		
Two-toed Amphiuma	<i>Amphiuma means</i>	Native		
Birds				
American Bittern	<i>Botaurus entiginosus</i>	Native/Migratory	SGCN	SWAP
American Coot	<i>Fulica americana</i>	Native/Migratory		
American White Pelican	<i>Pelecanus erythrorhynchos</i>	Native/Migratory		
American Wigeon	<i>Anas americana</i>	Native/Migratory		
Anhinga	<i>Anhinga anhinga</i>	Native/Resident		
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Native/Resident		
Belted Kingfisher	<i>Megaceryle alcyon</i>	Native/Resident		
Black Skimmer	<i>Rynchops niger</i>	Native/Resident	ST	ISMP; SAP
Black-bellied Whistling Duck	<i>Dendrocygna autumnalis</i>	Native/Resident		
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	Native/Resident		
Black-necked Stilt	<i>Himantopus mexicanus</i>	Native/Migratory		
Blue-winged teal	<i>Anas discors</i>	Native/Migratory		
Boat-tailed Grackle	<i>Quiscalus major</i>	Native/Resident		
Brown Pelican	<i>Pelecanus occidentalis</i>	Native/Resident	No longer SSC; SGCN	SAP; ISMP
Bufflehead	<i>Bucephala albeola</i>	Native/Migratory		
Canvasback	<i>Aythya valisineria</i>	Native/Migratory		
Caspian Tern	<i>Hydroprogne caspia</i>	Native/Migratory		
Cattle Egret	<i>Bubulcus ibis</i>	Native/Resident		
Common Gallinule	<i>Gallinula galeata</i>	Native/Resident		

APPENDIX A

WILDLIFE COMMON TO KCOL (CONT.)

Common Name	Scientific Name	Status	Listing Status	Conservation Plan
Common Grackle	<i>Quiscalus quiscula</i>	Native/Resident		
Brown Pelican	<i>Pelecanus occidentalis</i>	Native/Resident	No longer SSC; SGCN	SAP; ISMP
Bufflehead	<i>Bucephala albeola</i>	Native/Migratory		
Canvasback	<i>Aythya valisineria</i>	Native/Migratory		
Caspian Tern	<i>Hydroprogne caspia</i>	Native/Migratory		
Cattle Egret	<i>Bubulcus ibis</i>	Native/Resident		
Common Gallinule	<i>Gallinula galeata</i>	Native/Resident		
Common Grackle	<i>Quiscalus quiscula</i>	Native/Resident		
Common Yellowthroat	<i>Geothlypis trichas</i>	Native/Resident		
Double-crested Cormorant	<i>Nannopterum auritum</i>	Native/Resident		
Eastern Phoebe	<i>Sayornis phoebe</i>	Native/Migratory		
Everglade Snail Kite	<i>Rostrahamus sociabilis plumbeus</i>	Native/Resident	FE	Federal Recovery Plan
Fish Crow	<i>Corvus ossifragus</i>	Native/Resident		
Florida Sandhill Crane	<i>Grus canadensis pratensis</i>	Native/Resident	ST	ISMP; SAP
Forster's Tern	<i>Sterna forsteri</i>	Native/Migratory		
Gadwall	<i>Anas strepera</i>	Native/Migratory		
Glossy Ibis	<i>Plegadis falcinellus</i>	Native/Resident		
Gray-headed Swampphen	<i>Porphyrio poliocephalus</i>	Non-native		
Great Blue Heron	<i>Ardea herodias</i>	Native/Resident		
Great Egret	<i>Ardea alba</i>	Native/Resident		
Green Heron	<i>Butorides virescens</i>	Native/Resident	SGCN	SWAP
Green-winged teal	<i>Anas crecca</i>	Native/Migratory		
Hooded Merganser	<i>Mergus cucullatus</i>	Native/Migratory		
King Rail	<i>Rallus elegans</i>	Native/Migratory	SGCN	SWAP
Least Bittern	<i>Ixobrychus exilis</i>	Native/Resident	SGCN	SWAP
Least Tern	<i>Sternula antillarum</i>	Native/Resident	ST	ISMP; SAP
Lesser Scaup	<i>Aythya affinis</i>	Native/Migratory	SGCN	SWAP
Limpkin	<i>Aramus guarauna</i>	Native/Resident	No longer SSC; SGCN	SAP, ISMP
Little Blue Heron	<i>Egretta caerulea</i>	Native/Resident	ST	ISMP; SAP
Marsh Wren	<i>Cistothorus palustris</i>	Native/Resident	ST (Marian's & Worthington's)	ISMP; SAP
Mottled Duck	<i>Anas fulvigula</i>	Native/Resident	SGCN	SWAP
Northern Harrier	<i>Circus hudsonius</i>	Native/Migratory		
Northern Pintail	<i>Anas acuta</i>	Native/Migratory		
Northern Shoveler	<i>Anas clypeata</i>	Native/Migratory		
Osprey	<i>Pandion haliaetus</i>	Native/Resident		
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Native/Resident		

APPENDIX A
WILDLIFE COMMON TO KCOL (CONT.)

Common Name	Scientific Name	Status	Listing Status	Conservation Plan
Purple Gallinule	<i>Porphyrio martinica</i>	Native/Resident	SGCN	SWAP
Redhead	<i>Aythya americana</i>	Native/Migratory		
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Native/Resident		
Ring-necked duck	<i>Aythya collaris</i>	Native/Migratory		
Roseate Spoonbill	<i>Platalea ajaja</i>	Native/Resident	ST	ISMP; SAP
Ruddy Duck	<i>Oxyura jamaicensis</i>	Native/Migratory		
Snowy Egret	<i>Egretta thula</i>	Native/Resident	No longer SSC; SGCN	SAP, ISMP
Sora	<i>Porzana carolina</i>	Native/Migratory		
Swallow-tailed Kite	<i>Elanoides forficatus</i>	Native/Resident	SGCN	SWAP
Tricolored Heron	<i>Egretta tricolor</i>	Native/Resident	ST	ISMP; SAP
White Ibis	<i>Eudocimus albus</i>	Native/Resident	No longer SSC; SGCN	SAP, ISMP
Wilson's Snipe	<i>Gallinago delicata</i>	Native/Migratory		
Wood Duck	<i>Aix sponsa</i>	Native/Resident		
Wood Stork	<i>Mycteria americana</i>	Native/Resident	FT	Federal Recovery Plan
Mammals				
Marsh rabbit	<i>Sylvilagus palustris</i>	Native		
Raccoon	<i>Procyon lotor</i>	Native		
River otter	<i>Lontra canadensis</i>	Native		
Roundtail muskrat	<i>Neofiber alleni</i>	Native	SGCN	SWAP
Reptiles				
American Alligator	<i>Alligator mississippiensis</i>	Native	FT(S/A)	
Black Racer	<i>Coluber constrictor</i>	Native		
Black Swampsnake	<i>Liodytes pygaea</i>	Native		
Brown Watersnake	<i>Nerodia taxispilota</i>	Native		
Common Snapping Turtle	<i>Chelydra serpentina</i>	Native		
Dusky Pygmy Rattlesnake	<i>Sistrurus miliarius</i>	Native		
Eastern (Yellow) Ratsnake	<i>Pantherophis quadrivittatus</i>	Native		
Eastern Gartersnake	<i>Thamnophis sirtalis</i>	Native		
Eastern Glass Lizard	<i>Ophisaurus ventralis</i>	Native		
Eastern Mudsake	<i>Farancia abacura</i>	Native		
Eastern Musk Turtle	<i>Sternotherus odoratus</i>	Native		
Florida Cottonmouth	<i>Agkistrodon conanti</i>	Native		
Florida Green Watersnake	<i>Nerodia floridana</i>	Native		
Florida Mud Turtle	<i>Kinosternon steindachneri</i>	Native		

APPENDIX A

WILDLIFE COMMON TO KCOL (CONT.)

Common Name	Scientific Name	Status	Listing Status	Conservation Plan
Florida Red-bellied Cooter	<i>Pseudemys nelsoni</i>	Native		
Florida Softshell Turtle	<i>Apalone ferox</i>	Native		
Green Anole	<i>Anolis carolinensis</i>	Native		
Peninsula Cooter	<i>Pseudemys floridana</i>	Native		
Peninsula Ribbonsnake	<i>Thamnophis saurita</i>	Native		
Red-eared Slider	<i>Trachemys scripta elegans</i>	Non-native		
Ring-necked Snake	<i>Diadophis punctatus</i>	Native		
Southern Watersnake	<i>Nerodia fasciata</i>	Native		
Striped Crayfish Snake	<i>Liodytes alleni</i>	Native		

SGCN – Species of Greatest Conservation Need

ST – State Threatened

SSC – Species of Special Concern

FE – Federally Endangered

FT – Federally Threatened

FT (S/A) - Federally Threatened due to Similarity of Appearance

SWAP – State Wildlife Action Plan

ISMP – Imperiled Species Management Plan

SAP – Species Action Plan

(All species with a SAP are included in the ISMP and SWAP; all federally listed species are also included in the SWAP)



Florida Fish and Wildlife Conservation Commission Management of Aquatic Plants

Invasive plants harm Florida's natural environment and lead to a loss of biodiversity and ecosystem health. They usually cannot be completely eradicated and will grow back quickly if not managed consistently. The FWC does not manage all non-native plants and instead prioritizes the management of the most problematic species. **The goals of FWC's Aquatic Plant Management Program are to:**

- Reduce the abundance of non-native invasive aquatic plants infesting Florida public waterbodies;
 - emphasize control of water hyacinth, water lettuce, and hydrilla;
 - eradicate new infestations of invasive aquatic plants;
 - maintain established invasive plant populations at low levels;
- Initiate management of established stands of other invasive aquatic plants.
- Sustain public water body attributes such as navigation, flood control, and recreation while conserving or enhancing diverse native vegetation communities for fish and wildlife habitat.
- Evaluate biological, chemical, mechanical, and physical control techniques and integrate appropriate tools into cost-effective invasive plant management strategies that are compatible with the uses and functions of each water body.
- Review current management strategies and assess and incorporate new technologies and techniques that enhance invasive aquatic plant management objectives where appropriate.



Native habitat on Lake Okeechobee



Invasive water hyacinth infestation on Lake Okeechobee

Aquatic Plant Management Techniques

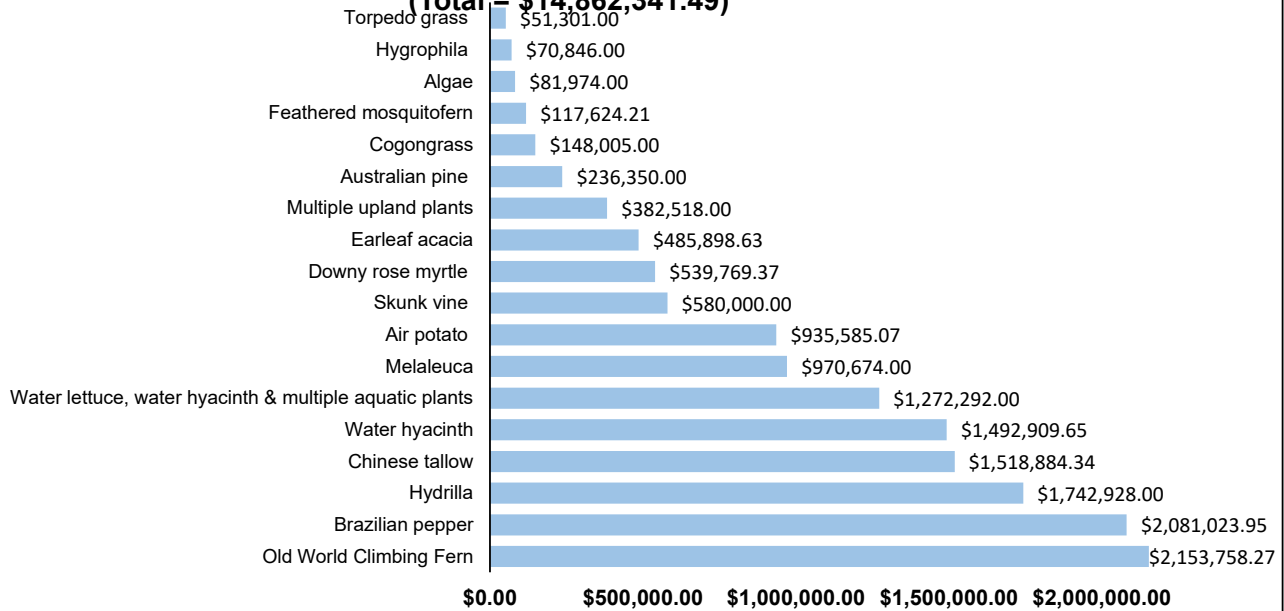
Biological Control:

Biological control agents are insects, fish or pathogens that target a specific invasive plant (host-specific) and increase the competitive advantage of native plants. The development of a successful biological control agent begins with rigorous procedures for identifying and testing potential organisms. Development requires a significant amount of resources and involves international cooperation. There are many species that feed on the target plants, but only a few are selected to be potential candidates. Often many of these candidates fail to meet the criteria and are never released. Only successful host-specific agents can produce effective results. A few successful aquatic biological control agents include triploid grass carp and alligator weed flea beetles. Biological control can effectively reduce the population but cannot eradicate the invasive plant population.

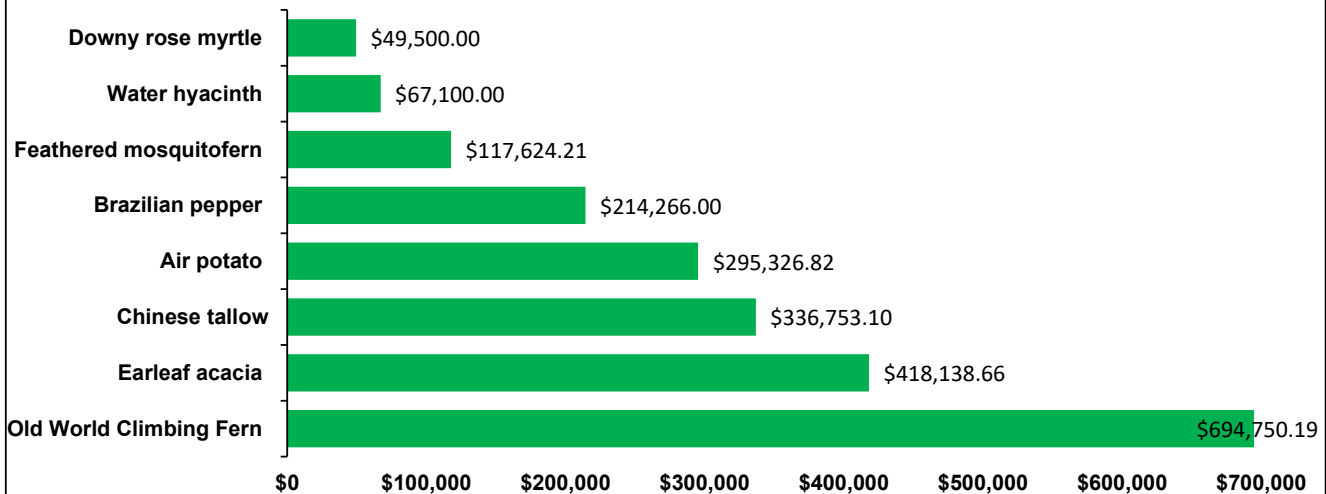
In the past 51 years, numerous projects were focused on the research and development of biological control agents for hydrilla and water hyacinth. Three biocontrol insects have been released for water hyacinth. However, they are not able to control water hyacinth effectively enough to eliminate the need for additional management tools. As for Hydrilla, four biological control insects were introduced to Florida, but these species were unsuccessful at establishing a population to be used as a control method. Triploid grass carp remains to be the most successful biocontrol agent for Hydrilla though grass carp are only slightly species specific. The graphs shown below show the historical funding allocated to biocontrol research by species followed by the funding allocated to biocontrol research by species in the last 5 years. Within the last five years, biological control research shifted towards transitional wetland and upland invasive plants. Aquatic biocontrol research shifted from water hyacinth to feathered mosquitofern, an EDRR species that is beginning to spread in Florida. Also included below, are the number of public waterbodies stocked with triploid grass carp, the number of TGC stocked and the cost of those stocking efforts for a 5-year period. The numbers provided do not include information on hydrilla acres controlled or efficacy.

Total Funded for Biological Control for 1970 – 2021

(Total = \$14,862,341.49)



Biological Control for FY 2017-2021 (Total = \$2,193,458.98)



Triploid Grass Carp Stocking for Public Waterbodies from FY2017 – 2021

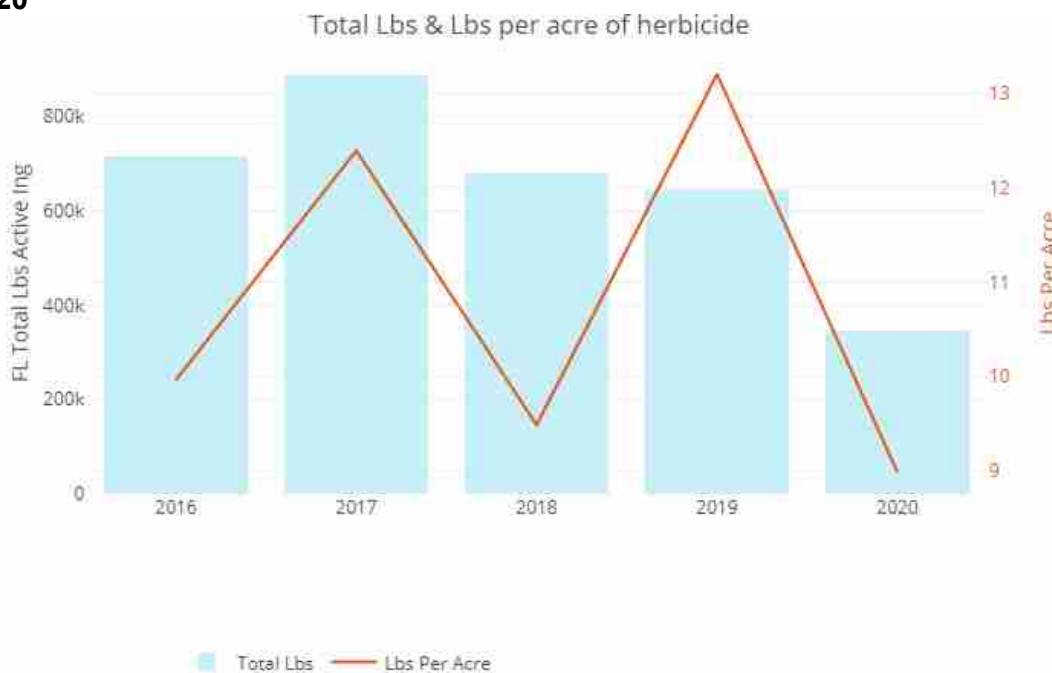
Fiscal Year	Lakes Stocked	TGC Stocked	Cost
FY 2017	16	3641	\$29,543.15
FY 2018	23	7345	\$27,799.25
FY 2019	23	6752	\$40,812.50
FY 2020	26	5905	\$25,617.00
FY 2021	15	4767	\$35,250.00* estimated cost
Total	103	4767	\$123,771.90

Chemical Control

Chemical control refers to the use of specially formulated herbicides to manage plants. All herbicides must complete a multi-year review by the United States Environmental Protection Agency, the Florida Department of Agriculture and Consumer Services and are rigorously tested by universities. These products are then re-reviewed at regular intervals to ensure their safety in the environment. State and federal laws require pesticide users to explicitly follow label directions and participate in continuing education.

When using herbicides to manage invasive plants, the FWC practices Maintenance Control. This management strategy was developed through decades of research to maximize the control of invasive plants while using as little herbicide as possible and is still considered the most ecologically and economically responsible way to manage invasive plants like water hyacinths. Maintenance is simply routine management intended to maintain invasive plant populations at low levels. Routine management allows managers to treat small populations of invasive plants and the result is less overall herbicide use. Many stakeholders do not recognize the need to manage invasive plants when populations are low and suggest that management should occur only when impacts are observable. Managers refer to this approach as Crisis Management. Invasive plants like water hyacinth are not benign and any attempt to allow them to co-exist unmanaged with native plants results in ecological harm. These invasive plants simply grow and reproduce at tremendous rates compared to native plants and easily displace native plant communities, change community structures, alter ecological functions, water composition, dissolved oxygen, acidity, and increase sedimentation rates. Also, as invasive plant populations expand, more herbicide is needed to control them. The graph below shows the total pounds and pounds per acre applied in FWC's Aquatic Plant Management Program for a 5-year period.

Total lbs Active Ingredient used in the FWC's Aquatic Plant Management Program FY16-20

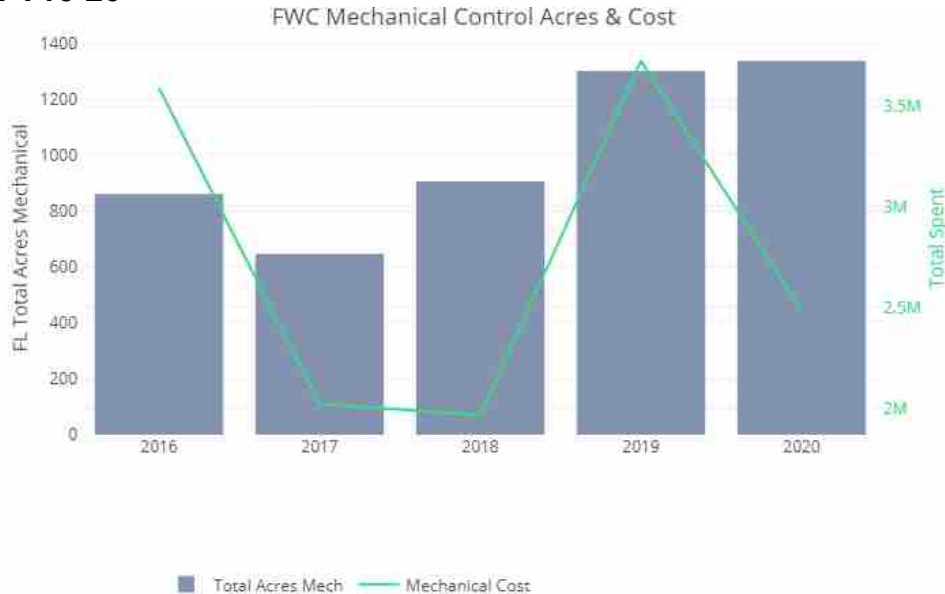


Mechanical Control:

Mechanical control refers to the use of machinery designed to cut, shear, shred, crush, press, lift, convey, transport, and remove invasive plants and associated organic material from water bodies. Mechanical controls range from shredders, small cutting boats to 90-foot long harvesters to track hoes and drag lines stationed on shorelines or mounted on barges that lift plants and debris out of the water.

Mechanical control is an important tool in FWC's Aquatic Plant Management Program. Harvesting is most effective for the removal of tussocks or floating islands of vegetation and associated organic material. Harvesting is rarely used as the primary tool for hydrilla or floating plant management because harvesters alone cannot keep up with the exponential growth of these plants, most of the time have difficulty working in shallow areas in the littoral zone where floating plants frequently grow and are not selective. Also, harvesters may spread invasive plants to other areas of the lake from fragmentation and transport. The graph below shows acres controlled and cost for a 5-year period in FWC's Aquatic Plant Management Program.

Total Mechanical Acres controlled in FWC's Aquatic Plant Management Program FY16-20



Harvester removing floating plants on Lake Okeechobee

Physical Control:

Physical control in aquatic plant management refers to the physical manipulation of plants or their habitat. This approach includes a number of different techniques such as pulling plants out of the water by hand; hand netting floating plants and plant fragments; cutting them with a hand-held blade; or controlling them with environmental alterations such as water level manipulation, bottom barriers or prescribed fire.

The following charts include acres controlled and associated costs for a 5-year period for Drawdown projects, hand removal efforts and prescribed fire.

Draw downs:

Year	Acres	Cost
2016	6	\$124,200.00
2017	5	\$171,593.00
2018	65	\$833,206.00
2020	11,968	\$3,261,097.45

Hand Removal:

Year	Acres	Cost
2015	2.1	\$1,165.44
2016	2.3	\$3,277.23
2017	0.4	\$2,964.79
2019	0.9	\$595.83
2020	1.0	\$1,143.98

Prescribed Burn Name	FY	Acres	Cost
Aerial Contract Burn			
Lake Okeechobee - Moonshine	20/21	upcoming	
Lake Okeechobee-Burnt Bridge(aerial)	18/19	200	\$5,325
Lake Okeechobee Moonshine - Nov. 2015	15/16	6500	\$5,675
Lake Okeechobee Moonshine - March 2019	20/21	600	
In-house Staff Burns			
Lake Okeechobee - Indian Prairie (airboat)	20/21	100	
Lake Okeechobee-Dyess Ditch(airboat)	18/19	200	
Lake Okeechobee - Clewiston (airboat) - June 2018	17/18	300	
Lake Okeechobee Cochran's Pass- (airboat) - Jan 2015	15/16	300	
East Lake-North Shore Unit	20/21	200	
East Lake-Western Shore Unit	20/21	160	
Indian Prairie-Snail Kite Treatment Area Unit	20/21	400	
Lake Hatchineha	19/20	60	
Lake Cypress-All Units	19/20	259	
Lake Toho-North Steer Beach Unit	18/19	315	
Lake Toho-West Makinson Island Unit	18/19	370	
Lake Okeechobee-Gourd Island	19/20	30	
T.M. Goodwin-Borrow Pit Unit	16/17	145	



Photo taken during the East Lake Toho drawdown

Impacts of Management Techniques

Biological Control

- Very selective and plant specific
- Once established, it becomes a continual and self-sustaining management practice
- Requires more than 10 years of research and is considered expensive by experts
- Not effective for eradication and populations of the agent may not become established

Chemical Control

- Considered by experts to be more effective and cost efficient than other methods
- Selective in which plants are targeted
- Decaying plants release some nutrients back into the water
- Has a negative public perception

Mechanical Control

- Removes plants and associated nutrients from the water body
- Reduces muck from decaying plants
- Not selective in which plants are targeted and cannot access some areas where they grow
- By-catch of fish and other organisms occur
- Usually considered to be more expensive compared to other techniques

Physical Control

- Considered to be a more natural plant removal process
- Prescribed burning can be good for the regrowth of native plant populations
- Can take a significant amount of time and human cooperation
- Can lead to new infestations of invasive plants if the plants are not disposed of properly

- Most Florida lakes are not suitable for versions of this technique such as lake draw downs

Integrated Plant Management Provides the opportunity to use the strengths of various control methods to complement one another. This type of management requires continual ecosystem evaluation in order to weigh the pros and cons of each management method and combination. Regularly implementing integrated plant management will reduce the overall environmental and economic damage and help maintain healthy habitats for native plants and animals.

COMMENTS AND QUESTIONS RECEIVED DURING THE COMMENT PERIOD FOR THE KCOL LMP DRAFT

Comment Type	Comment
10/28/2021 Email	Thanks for sending your local news to Lake Wales News.net. We will be in contact with you as necessary to confirm story details.
11/8/2021 Email	How do we receive email notifications about the meetings for the Kissimmee basin? Just trying to figure out how we can keep the navigation channels open and clear of hydrilla. Tired of over heating my motor.....Also want to hear what is going on on Lake Kissimmee. Lake water quality is horrible and the vegetation loss is amazing.
11/10/2021 Public Meeting - Comment Form	What facilities are available to the handicapped, such as wildlife viewing/docks and other facilities?
11/10/2021 Public Meeting - Comment Form	1. It would be good to visually share the "historical lake water chemistry" data with everyone so we can understand why/how vegetation has overtaken KCOL lakes in addition to water level fluctuation. 2. What is the probability of Increasing water level fluctuations and periodic drawdown?
11/10/2021 Public Meeting - Comment Form	I would like to renegotiate the price per acre to spray the lake. I don't believe it. Also the amount to harvest it. Please show me the costs for each and their effectiveness.
11/10/2021 Public Meeting - Submitted Letter	Attached Below
11/10/2021 Public Meeting - Verbal Comment	I am a fisherman (bass/crappie) on Lake Toho resort, also live on HCOL; I get stuck while fishing in my regular size boat and rescue jetskiers; if you are not a professional boater it is very difficult to navigate, especially if storms are coming and you need to head in; More homes are being built and additional users of the lake will also complain about not being able to access the lake - it doesn't have to be perfect, just better. 2nd Verbal Comment: How long before action is taken on removal of hydrilla?
11/10/2021 Public Meeting - Verbal Comment	I need more info than the report provides; what can we do about the fish/wildlife on the lake, control the weeds, and get the money to achieve the goals? Reiteration of above comments. More information on cost comparison between mechanical and spray of hydrilla so stakeholders can make an intelligent decision on what they would like to see; solid info on spraying is it dangerous/cause problems (get more info out to educate people); lake Toho info should include more info on crappie, not bass heavy information (page ii); percent of hydrilla to be tolerated (toho specifically)
11/10/2021 Public Meeting - Verbal Comment	Comments on behalf of Audubon. This is a great step in the right direction. Lots of good information, good start to a management plan, fairly comprehensive list of fish, good approach. The lake also has birds, amphibians, reptiles, and mammals, there should be lists for those also. We'd like to see those lists and a discussion of each as for the fish. BIRDS: Limpkin, yellow rail, black rail, purple gallinule, king rail, dunlin, lesser yellowlegs, american bittern, least bittern, green heron; singling these out because these species are listed as "of greatest conservation concern" in FWC's own State Wildlife action plan document. Please incorporate the above document in this plan and comprehensive species lists of all vertebrates in this document. specifically address your own species of concern in this document. The management goals - 3.1 - where that number comes from, not spelled out - goal is arbitrary not science based. Look at original condition of lakes, and how you would get them as close to that as possible to preserve the biodiversity. Those birds mentioned need some of the vegetation (line up species of greatest concern with percent of vegetation). Bugs: entomologist (blatchley) doing beetle study, keep the lake as natural as possible to conserve the full biodiversity of the lake. Lastly, make this document as rigorous, credible as possible. (very important to Audubon) We would like to see an outside, independent peer-review of this document and the other lake plans for more scientific input, credibility with the public, We will submit a list of people who could review it.

COMMENTS AND QUESTIONS RECEIVED DURING THE COMMENT PERIOD FOR THE KCOL LMP DRAFT (CONT.)

Comment Type	Comment
11/10/2021 Public Meeting - Verbal Comment	Fisherman on KCOL, Lake Toho, everglades for 20 years, fish every 2-4 days. Story about woman in a boat mapping hydrilla on the lake, says she did it every 3-4 weeks. Harvesting on SE side of the lake. Can you share records of trends of how much hydrilla is in the lake? Engineers from Shingle creek work on Jet skis getting stuck in vegetation. 2nd verbal comment: Differentiate "pepper grass" as native or non native
11/10/2021 Public Meeting - Verbal Comment	Live on the lake, very frustrated, has voiced opinion, Now affecting fish, not just recreation. Affects life on the lake, will this be a swamp?
11/10/2021 Public Meeting - Verbal Comment	On the right track, but have a long way to go. Compared to other lake management plans he's read, show a graph on water content (25 year record) phosphorus, nitrogen, chlorophyll, and secchi depth, Publish the 25 year history of the key water plants.
11/10/2021 Public Meeting - Verbal Comment	Duck season, treating shingle creek area. Looks like a pretty fair plan, thank you for all your hard work. As a duck hunter, I would like to see more sav, but this has something for everyone
11/10/2021 Public Meeting - Verbal Comment	What is the cost to get to your goals listed in the plan? How much is needed to be spent to meet these targets?
11/10/2021 Public Meeting - Verbal Comment	Is there anything we can do to help you get additional funds (some from the infrastructure bill) to help direct those funds to you.
11/11/2021 Phone	Phone Call: Request for video link to rewatch public meeting

COMMENTS AND QUESTIONS RECEIVED DURING THE COMMENT PERIOD FOR THE KCOL LMP DRAFT (CONT.)

Comment Type	Comment
11/22/2021 Email	<p>I have read the KCOL management plan draft and wanted to give you my input as a stakeholder of the Kissimmee Chain of Lakes (KCOL)</p> <p>I have taken the time to read the Management plan and it appears very well thought out and written. I too hold the Kissimmee chain of lakes a valuable resource that should be enjoyed by all. With this being said the most important factor of this plan is to ensure that the plan is actually being completed as described and agreed upon. I believe an oversight committee should be established much like the Orange County Lake Butler or Lake Conway Navigational boards. They would be made up of folks from all walks of life with an vested interest in the KCOL. The members would be appointed by state and/or local elected officials for 2 year terms. They could meet each month and review the progress being made by the agencies tasked with managing the water way.</p> <p>Secondly a defined funding source from the state should be established to ensure the goals of the KCOL Management plan are met. I think a great funding source would be tapping into the T.D.T. Funds from all counties that contribute stormwater to the KCOL basin. There is currently a plan by State Representative Anna Eskamani to move some of the TDT funds to transportation. I feel that the current rules of the T.D.T would allow for the use of the funds for Management of the KCOL based on its importance to the Eco and Outdoor Tourism that the Systems enjoys. I have copied Rep Eskamani to see if she could help champion this cause.</p> <p>Lastly the KCOL management plan is wonderful plan with some hefty goals, but if the lake does not have consistent manged navigational channels to safely navigate the chain what good is it? Twice this year alone the navigational channels on Lake Toho and Cypress have become impassable due to excessive vegetation (hydrilla). From what I have been told by FWC staff and its contractors that there are political and bureaucratic issue's that hinder the FWC's ability to maintain an open channel. The maintenance and ability to keep a navigational channel open should be exempt from any regulatory or stakeholder objections.</p> <p>As for Lake Kissimmee I hope you can find a way to improve the fishery and habitat in Lake Kissimmee itself. The lake appears to be suffer from a loss of vegetation, declining water quality which is leading to declining fishery. I do believe a drawdown as proposed would be the most effective. I also believe that better control on aquatic plant management activities on the chain is also needed. I have personal seen some questionable applications the past two years. I have attached a photo from May that shows what appears to me as improper application to native grass on Lake Kissimmee. I make this claim based on my 33 years experience in aquatic plant management.</p> <p>I make the above statements as constructive criticize from a stakeholder who has enjoyed the KCOL since the late 1970's and a stakeholder that has managed lakes for over 30 years. Your job is a tough one in todays environment and I thank you for all you do. But every now and then you have to step back and review "how you are doing things". I think the KCOL management plan is a good start.</p>
11/22/2021 Email	<p>Thank you for your advocacy. Definitely count me in to help. In fact, the TDT reform bill we have filed would allow counties to allocate funds to be used for "public facilities that benefit tourism" and I feel confident that what you are proposing would absolutely be considered as public facilities that benefit tourism as many visitors come to Florida to experience our incredible environment. Brevard County is already using TDT funds for the Indian River Lagoon too. In this case, I imagine there could be a partnership between multiple counties to help create a stable source of funding.</p>

COMMENTS AND QUESTIONS RECEIVED DURING THE COMMENT PERIOD FOR THE KCOL LMP DRAFT

Comment Type	Comment
12/7/2021 Email	Do these plans address taking of alligator eggs?
12/13/2021 Email	<p>Save the Manatees While the FWC is trying to get rid of the water “weeds”, these “weeds” could help feed the starving Manatees, since they are all fresh/brackish water organisms. I understand the problem with the water plants, both native and invasive - there are too many nutrients. I personally don’t see that problem going away any time soon...not unless we can radically change the way people view “their” yards...and many other interconnected things. With the continued starvation of the Manatees, and I understand there are over 1500 deaths and counting, wouldn’t it be better to allow the feeding of these iconic critters than to “let nature take its course”? Cattails are edible for humans, so why not for Manatees?</p> <p>Water lettuce, cattails, and many other species are a continuing problem because the lakes are acting just like LARGE hydroponic “farms”. And while ridding the water of the plants may seem like a worthwhile project, the nutrients are still present, and will be for decades. WHY NOT USE THESE PLANTS FOR THE GREATER GOOD? Killing (or stifling the growth of) these water plants STILL leaves the basic nutrients in place. As soon as the herbicides break down, new plants take off. Herbicides take P out of the plants, but doesn’t bind it to anything rendering it unusable. (If I have my information right.) Some herbicides may separate the NPK out of the plants, but whatever methods the herbicides use, it is going to be a continued and progressively MORE EXPENSIVE endeavor, with less and less robust results, and more and more accumulation of the nutrients. I realize that harvesting these plants is also expensive, but the harvest could be used to sustain many Manatees. The general public would be willing to participate in a volunteer project if one is created. People LOVE OUR Manatees (except some boaters), and would be willing to feed them and take care of the ones they see...this is a fact, and you can see for yourself. Please do not let this wonderful opportunity pass without trying your best to alleviate the suffering of these beautiful creatures, endemic to Florida. We have the wherewithal to do this. You or your choice of contact can enlist truckers, boaters, and wildlife enthusiasts. There are MANY organizations who are willing and able to help, too many to name here, but Audubon is one.</p> <p>With the Space Coast Birding and Wildlife Festival www.aba.org/event/25th-annual-space-coast-birding-and-wildlife-festival coming up in the New Year (however late that may be for many Manatees), that might be a great opportunity to introduce the idea, but if you eradicate the plants from Harris Chain of Lakes (for however short a period of time), Manatees cannot eat them. The next problem is that IT IS ILLEGAL to feed wildlife, including MANATEES. This needs to change forthwith! These are mammals, and can eat nearly any vegetation we can (I would exclude onions, grapes, and other things that dogs cannot eat), but Manatees have been photographed eating Red Mangrove roots to stay alive! Leftover produce, will not be enough to do the job (I don’t think), but without lifting the “no feed” rule, people will be risking fines and jail time to keep these beautiful animals alive. Many people, including children will do this, and it is commendable, but shouldn’t be illegal in this circumstance. Out West, even the bison and other critters are allowed to be fed in very lean times, and in winter. Surely WE can do that here! Please lift the “no feed” rule, and organize a “Save the Manatee” program using the natural plants available for them to eat. Thank you for your time and consideration!</p>
12/17/2021 Letter via Email	Attached Below
12/17/2021 Letter via Email	Attached Below

COMMENTS AND QUESTIONS RECEIVED DURING THE COMMENT PERIOD FOR THE KCOL LMP DRAFT

Comment Type	Comment
12/17/2021 Plan Markup with Comments via Email	<p>Add Black Rail, Least Tern, Tricolored Heron. Misplaced text, first sentence defining drawdown. "monoculture" species diversity threshold, size, how to tell if it is a natural monoculture, which are common, or anthropogenic. "diverse native plant community" is a commonly-expressed goal that must be defined, otherwise, how would anyone know if the goal is reached? Goals are arbitrary. Is this for coverage of plants in vegetated areas (small scale) or percent of littoral zone with any plant coverage (larger scale). And why half? what will the other "half" be? Can't tell what this is based upon. Typo - diking should be discing - and FWC should not do this, it kills wildlife directly (like snakes) and FWC should be protecting these species, not killing them. Willow cannot survive continuous inundation. need to include other birds, herps, amphibians, mammals? maybe inverts too, Chironomids, Ephemeroptera and other bugs can be a huge part of the food chain and should be considered. Good, this biological list is greatly needed. add "fledging." this is a time when young birds may have left the nest but cannot leave the area yet and need continued protection. the high level is moving to 54 feet with the River restoration. This document should discuss what might change with new water levels. how? the management plan should spell out what FWC plans to do to increase SAV. hemi-marsh concepts do not apply to Florida wetland systems. not redish egret, they are strictly coastal. add FL Sandhill Crane, Least Tern, Black Skimmer. this section must be MUCH longer. we need comprehensive lists of all vertebrate species and notes on their status and habitat needs. lettuce is native, its pollen in in pre-Columbian lake cores and archeological sites near Vero Beach. degradation for some species, critical habitat for others, such as rails, bitterns, nesting Sandhill Cranes and gators, frogs, snakes turtles, low oxygen fish like mosquito fish and so on. The Plan needs to offer a more balanced ecological description of these ecosystem processes and result. Just calling it "degradation" is not technically sound. The Plan needs a historical perspective of the original hydrology of these lakes. All the hydrographs are post-drainage which made the lakes more flashy. The extensive organic soils in the region belie rather stabilized levels before drainage. Again, labeling this "undesirable" or "unnatural" needs technical support. there is no evidence of "replacement" in snail studies to date. this claim comes from a non-peer reviewed report and relied on correlations. I would reword, "There is anecdotal evidence the reductions were caused by non-native snail grazing" and include the citation. this might not be true, Whitmore et al (2020) concluded Lake K did not fluctuate as widely as the upper lakes, It is typical in watersheds that the headwaters are more flashy. these habitats are great for many wildlife species, especially amphibians, snakes, turtles, and birds, like gallinules, snipe, gulls, terns, black-bellied plovers, marsh rabbits, round-tailed muskrats and others. The Plan should not be denigrating valuable habitat types, rather should promote their contribution to biodiversity conservation. this type of approach should be expanded to all exotic/invasive species that are controlled. The goal would be to prevent the cure (control) from being worse than the current situation. Comment was blank. Typo - should be school. it would be helpful to attach web links to these documents.</p>

COMMENTS AND QUESTIONS RECEIVED DURING THE COMMENT PERIOD FOR THE KCOL LMP DRAFT

Comment Type	Comment
12/23/2021 Email	<p>All, thank you for allowing the Service to comment on the FWC Lake Management Plans. We appreciate all the work that FWC and its contractor have done to engage stakeholders in this process. The Service has the following comments on the Kissimmee Chain of Lakes Management Plan: Page 11: Focal Area 2, Objective 3, Action 5.3.4 appears to contradict Objective 3 of Goal 4 in Focal Area 2 on page 10. Namely, Objective 3 of Goal 4 indicates that more widespread treatments will be done in October and February, and smaller, less widespread hydrilla treatments will be done in September, December, January, and March-May. However, Action 5.3.4 states that the majority of littoral hydrilla management is preferred between February to May. The Service was wondering whether this apparent contradiction can be further clarified. We previously commented on the difficulties of hydrilla treatments in the littoral zone during the snail kite breeding season (see below). Page 13: Focal Area 4, Goal 7, Objective 1: This refers to the Harris Chain of Lakes and is probably a typo. Page 39: In the Management section, it states that "Care is take to avoid encroaching within 500 ft of an active nest as to not disturb the nesting kites". The Service suggests adding a phrase that indicates that activity is also limited within 500 meters of nests to avoid negative impacts to foraging habitat near nests. For example, page 36 the FWC Lake Okeechobee Plan states: "Management actions that may alter foraging habitat are restricted near an active nest and avoided within 500 feet of an active nest when practicable". Can a similar statement regarding foraging habitat be included in KCOL Plan to make it clear that snail kite foraging habitat is also considered during management actions? Page 44: The end of the paragraph at the bottom of the page on the right-hand column is cut off. It reads: "Although the exotic snail has become a very important food source for the endangered Everglade snail kite, it is believed the snail has caused a reduction", then the following page starts a new section. I was wondering what the missing text would be. Thanks again for all your efforts and for allowing the Service to comment on the Lake Management Plans. Please feel free to contact me if you have any questions.</p>

My name is Thomas Fichtel. I live at 4715 Kissimmee Park Road, St. Cloud, in Lake Toho Resort, which old timers still refer to as Red's Fish Camp. I live full time on the shores of West Lake Tohopekaliga, and fish for both Largemouth Bass and Crappie. I have attended several input meetings earlier in this process. I guess that makes me a stakeholder. Most of my remarks will refer to Toho, since that is the lake I am most familiar with, but in the main can apply to all the lakes in the Kissimmee Chain.

I have read through the entire report under discussion tonight. It's 63 pages represent a lot of time and effort. However, I feel compelled to raise some issues tonight as the draft approaches its final stages. Many times after an exhaustive stakeholder involvement process like this one, any subsequent dissent is brushed off with the comment, "why didn't you speak up when we had the meeting process." So it is time to speak up.

First, I have a few editorial suggestions. I have passed them on to the head table folks so I won't red them to you.

Page 10, 5.1.2 and 5.1.3 are identical,

Page 26, two paragraphs are nearly identical at the bottom of the first column and top of the second. They begin with "The most recent data. . ."

Page 44, bottom of the second column ends in an incomplete sentence with "reduction."

Page 13, Objective 1 refers to "Harris Chain of Lakes." When was it added to KCOL??

On page 4, explain the meaning of 40K and 75K in objectives 1 and 2.

I suggest a thorough reproofing by someone outside the author group not so familiar with the content.

Second, I suggest that you consider adding some items that would help the reader understand and evaluate the report and recommendations, such as:

A map showing the location of places referred to in the text, such as "North Steer Beach" and "Brahma Island."

Such as Information about the relative cost per acre to spray hydrilla vs. mechanical harvesting. Because there is much hand-wringing about funding shortages throughout the document, this would seem to be essential information.

Such as How surveys of hydrilla density are conducted, and how frequently throughout the year.

Such as Information about whether herbicides are harmful to the lake, to people, etc. These days people make unproven assumptions based on words like "natural" and "organic." It may be that the herbicides are quite safe. I have certainly been told they are by FWC personnel. Also needed is information about herbicide application methods, and the durability of treatment.

Such as Information about the effectiveness, limitations, and durability of mechanical harvesting.

Such as Information about identifying problem weeds, their growth characteristics.

To avoid having this document become just a shelf-filling showpiece, or a chance to pay a private contractor a bunch of money, it should instead be an action document. There needs to be a summary of actions needed. It should include things the excellent FWC staff is doing now that work, (we don't

want to throw the baby out with the bath water), and actual changes in present practices that might improve future outcomes. These specific recommendations are a logical result from the time, effort and expenditure this document represents.

Third some comments about the content of the report. Pages 4 through 15 are the main point of the report, the Goals and Objectives. They are the meat and potatoes, Most of the rest of the content is parsley, relatively speaking.

From reading the draft report, the major issues that spread throughout the document but are never sharply focused are:

1. The war against weeds and invasive plants, especially hydrilla. The problems are primarily a result of too many nutrients, plus regional water flow issues. Think of beautiful, green, irrigated and fertilized lawns; and, on the other hand, red tide on the beaches of South Florida.
2. Maintaining healthy fish and wildlife populations in the face of a rapidly changing environment around the lakes. For example, residential development is going wild at the north end of Toho.
3. The problem of inadequate funding setting severe limits on achieving the desired outcomes above.
4. The need for greater inter-agency cooperation to address these issues.
5. The need to establish better communication with “stakeholders.”

Fourth, I have some issues with the content of the Draft Plan.

1. West Lake Toho is in terrible hydrilla trouble. The problem gets worse every year. A few years ago the lower half, from 24 marker to the lock was nearly hydrilla free. Because of recent rains the water is up and boats can get through, but when it drops back a couple of feet, we may see a Blue Heron walk a straight line from Browns Point to the lock without getting his feet wet.

Seriously, if you drop off plane and come to a stop down there you may have to trim up and chop weeds at idle for ½ mile to find an open spot. We don’t all have 250hp plus outboards. If you have a small horsepower outboard, forget it. We need our hydrilla treated! We hope the cost of this study didn’t come out of the funding pot needed to kill the weeds! Most control plans focus on the homes and the marina on the north end of the lake, plus Goblets cove. We have no problem with that. However, don’t forget the folks at Bella Lago, Lake Toho Resort, Southport and Whaley’s landing.

Goal and Objective items tied to other lakes in the chain talk about keeping Hydrilla down in the 25% coverage range. (page 5, 1.6.5) The allowable percentages on Toho are much higher. (page 24, 60% on Toho) (page 9, objective 1) A document on the FWC website entitled “Hydrilla on Lake Tohopekaliga” apparently from 2020 opens with the statement “Hydrilla is present in more than 65% of Lake Toho.” That is very different from the 25% referred to for the other lakes.

Bass Pros like hydrilla, but for your average fisherman it is a big deterrent. They like anchoring near fish attractors and fishing with live bait. Is the future a completely hydrilla filled lake, except for limited lanes opened for navigation and water flow? Have we given up on Toho?

2. Many of us at Lake Toho Resort fish daily for black crappie during the winter and spring. It appears that bream and crappie are off the FWC menu on Toho. On page ii the target fisheries line only includes Largemouth Bass. For the other three lakes the species box includes Black Crappie and Bream. In Focal area 1, objective 1, it talks only about managing the Largemouth bass population on Toho. Compare that to Focal Area 1, Objective 6, which talks about crappie on Kissimmee. There is no such mention for Toho. The report implies that almost no one fishes for crappie on Toho. This is certainly not true. The crappie we catch are of good size, but numbers are shrinking.

3. My impressions of mechanical harvesting are at odds with the content of the report. At the top of page 8, it states, "Stakeholder desires (eg., less herbicide treatments and more mechanical harvesting)" Not this stakeholder, nor any I know! Our experience has been that mechanical harvesting is slow and expensive. It is useful for cutting lanes to boat docks and shallow areas, but not for hydrilla control. Hydrilla grows right back.

4. There are lots of additional duties listed in the Goals and Objectives. No mention is made of the need for additional, specialized personnel to perform them.

I would consider a speakers bureau with different staffers offering pre-packaged programs in their area of expertise, rather like ranger talks in national parks. Local churches, and civic groups always need new ideas for programs. Make them short, snappy and interesting.

5. How much is the budget for KCOL now? How much is needed to confront the problems lake managers face? What does the future of the lakes look like if no new funding is provided? No information like this is provided. This is much more important than the nesting habits of sand hill cranes! This is the kind of information that advocates for lake welfare need in order to be active in the political arena.

In summary,

The report is probably too long and unfocused. Few people will ever read this whole document. Find a way to summarize results clearly so someone with five minutes to spend can get the gist of the problems and what needs to be done.

It needs to say we are in trouble, these are the problems, and these are the changes in management and funding we need to fix them.

For those of us at Lake Toho Resort, aggressively reduce Toho's hydrilla, and restore the declining crappie and bream populations, as well as the bass.

Please don't treat the first lake in the chain as an orphan child doomed to become a weed pond!



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December 17, 2021

Submitted by email to: Kissimmeechainoflakes@myfwc.com

To whom it may concern:

These comments concern the draft, “Fish, Wildlife, and Habitat Plan: Kissimmee Chain of Lakes” (Plan) published October 25, 2021. Audubon commends the Florida Fish and Wildlife Conservation Commission (FWC) for developing this and other lake plans that will increase the transparency, accountability, and rigor of lake management. For many lake users, management actions are governed by unclear goals and objectives and this Plan can help fill that gap by providing an explanation of the goals and objectives, with supporting technical information of how they are decided upon.

As written, the Plan contains a large body of work with significant information. The coverage of the fish community is comprehensive and includes all species known to occur in these Lakes. However, the coverage of other important vertebrate taxa is not as detailed, with almost no reference to the bird, herpetofauna and mammal species that should be present. Additionally, it is a considerable omission that FWC’s 2019 “Florida’s State Wildlife Action Plan” is not mentioned. The Action Plan identifies many “Species of Greatest Conservation Concern,” that inhabit these lakes, and that would be directly harmed by many of the proposed management actions. This could put managers at odds with agency goals.

Marsh structure and management goals are expressed as percent-coverage of the marsh for plants and open water, and desired percent of different densities of plants. We can find no technical explanation for these goals. The same goals also are applied to four very different water bodies. We encourage FWC to develop technically-based goals tailored to each waterbody.

In the attached analysis, we make the case for expanding consideration to all vertebrates likely to inhabit these lakes and we articulate a different approach for setting lake management goals that is more technically based and could enhance and protect habitat for a broader range of species under FWC jurisdiction.

Our recommendations include the following:

- 1) FWC should adopt a management goal for the Kissimmee Chain of Lakes ecosystems to sustain the lakes’ original biodiversity
- 2) FWC should develop precise definitions in the glossary for terms used in the Goals and Objectives

- 3) The Plan should include all vertebrate taxa and account for their needs in the goals and actions sections. Accounting for these taxa also will help FWC avoid conflicts between lake management actions and agency goals.
- 4) The Plan should abandon goals for marsh structure based on arbitrary percent coverages; marsh goals should be based on historical condition to the greatest extent possible.
- 5) Because the Kissimmee Chain of Lakes historically appeared to have had contiguous bands of marsh around them, comprised of the same dominant species of today, the Plan should create and protect this marsh structure as a central goal.
- 6) The Plan should set habitat structure goals in a manner similar to the SFWMD (2020) and strive for contiguous bands of vegetation around the Lakes, to the greatest extent possible.

In addition to the analysis, we attach the DRAFT Plan with notes on specific topics.

We strongly urge FWC to conduct an independent, third-party peer review of the Plan to gain outside expertise, increase the scientific rigor of the Plan, and to increase the credibility of FWC's approaches to the public. Appendix 1 contains a list of potential reviewers.

Many of the concepts herein also are complex, and sometimes over-simplified for brevity. We are more than happy to have further discussions with FWC consultants and biologists about these issues.

Sincerely,



Paul N. Gray, Ph.D.
Science Coordinator

Comment and review of
DRAFT “Fish, wildlife, and habitat plan: Kissimmee Chain of Lakes”
Released October 25, 2021

Audubon Florida
December 17, 2021

Establishing management goals

Audubon believes that FWC’s overarching goal should be to manage these lake ecosystems in a manner that sustains their original biodiversity, to the maximum extent possible. We recognize that there have been changes in hydrology and nutrient profiles, and that invasive species have become established, but lake marshes comprised mostly of annual and perennial herbaceous growth adapt very quickly to habitat conditions and can remain quite similar to pre-disturbance conditions. The Headwaters Revitalization Project will increase water level fluctuation for the lower three lakes, which should improve plant community dynamics.

The reduction in water level fluctuation, combined with nutrient enrichment, increases the rate of organic sediment accumulation, and would allow for greater standing crops of vegetation than likely was natural. Thus, we agree with the idea of making drawdowns a more common management tool, as well as increasing the use of controlled burns. Wegener and Williams (1974a, 1974b) helped pioneer lake drawdowns for FWC, and documented a reduction in organic material, and other ecological benefits. More recent drawdowns have included bulldozing lake bottoms to accelerate organic removal. This approach is much more expensive and has drawbacks including entombing aestivating marsh species, a myriad of which exist and some of whom are long-lived (Waller 2009; more discussion of this point is in the discing discussion below) and creating spoil piles that permanently fill lake marshes and become nuisance features for navigation, invasive plants, and aesthetics. Some species appear to recover slowly after these treatments (Kitchens et al. 2008). Audubon finds drawdowns without mechanical treatment are vastly preferable.

Recommendation: FWC should adopt a management goal for the Kissimmee Chain of Lakes ecosystems to sustain the lakes’ original biodiversity.

Terminology

Many terms describing desired conditions are undefined and thus have limited value. Terms such as: health, sustainability, integrity, condition, diverse, and desirable, are used widely throughout the Plan and need to be clearly defined (none of these terms are in the glossary but many describe Goals and Objectives in Chapter 2 and therefore need precise definitions). Without definitions or measurable parameters, there is no way to document if those conditions are being attained. Karr, et al. (2007) have recommendations that can help reduce ambiguity in this report.

Recommendation: FWC should develop precise definitions in the glossary for terms used in the Goals and Objectives.

Taxonomic coverage

The coverage of fish in the Plan is much more detailed than for other vertebrate taxa. There are eight fisheries Objectives including seven pages of text on fisheries with a complete species list and data on occurrence. Just a handful of other vertebrates, namely alligators, waterfowl, wading birds, Bald Eagles, Snail Kites and Cranes are addressed in the plan, but the vast majority of vertebrates in these lakes receive little to no consideration. FWC is responsible for all wildlife and, as such, all vertebrate taxa in these lakes should receive comparable treatment to fish, including complete species lists and habitat needs. An important reason to expand consideration of vertebrate groups is that most of the management considerations in this plan are for aquatic plants associated with the littoral zone, which is where most of these non-fish vertebrate taxa live.

The SFWMD (2020) Kissimmee River water reservation document contains about 170 species of birds and good amphibian, reptile and mammal lists which FWC should consider adopting and building upon. SFWMD (2020) also identifies general habitat needs of all the vertebrates that should be incorporated into this Plan. Kitchens et al. (2008) identified 102 species of birds in West Lake Toho which may also supplement the SFWMD list. In addition, all birds considered in this Plan should include a catalog of migratory status to ensure both residents and migrants are duly addressed in management considerations.

Notably, FWC's "Florida's State Wildlife Action Plan" (2019) is not referenced in this Plan. It lists freshwater species of "Greatest Conservation Concern," most of which also are not mentioned in the Plan. Avian species include Limpkins, Yellow Rails, Black Rails, Purple Gallinules, King Rails, Black-bellied Plovers, Black Skimmers, Least Terns, Lesser Yellowlegs, American Bittern, Least Bittern, Green Heron, White Ibis, and several songbirds including, neotropical migrants should be addressed in the Plan. Of additional concern, and as elaborated upon below, many of the management objectives in this plan would systematically eliminate critical habitat for many of these species.

Similarly, frogs are a major component of lake ecosystems in Florida but are mentioned just once in the Plan, and only as a target for hunting. Turtles and snakes also are major lake faunal components and are mentioned only as inhabiting alligator holes and not discussed as a management objective or consideration. Round-tailed muskrats are another species of conservation concern and are omitted from consideration.

Recommendation: The Plan should include all vertebrate taxa and account for their needs in the goals and actions sections. Accounting for these taxa also will help FWC avoid conflicts between lake management actions and agency goals.

Goals for habitat management

Goal 3, Objective 1 of the Plan states, "Manage greater than half of the littoral zone at moderately high (40-70%) vegetation coverage of desirable native plants for foraging habitat." Similarly, Goal 3, Objective 2 states, "Maintain greater than 10% of the littoral zone at moderately high vegetation coverage to occur in depth of 0-3' to benefit wading birds and

dabbling ducks.” The Plan has similar percentage metrics for alligator and bird nesting habitats and other measures of interest.

These percentage goals have no apparent technical justification or support, are applied generically to different lakes, and appear arbitrary. Importantly, they would actively destroy or degrade essential habitat for many species in these lakes. For example, the above list of species of greatest conservation concern includes rails, bitterns, Purple Gallinules and round-tailed muskrats, all of which need contiguous areas of dense vegetation. A littoral zone artificially manipulated to have only 40-70% vegetation would significantly, or completely, eliminate these species from these lakes.

A secondary question is whether FWC is proposing to eliminate native vegetation to achieve interspersed levels as low as 40%? If so, that would appear to conflict with Rule 68F-20.0015 that defines:

“(4) “Beneficial aquatic plants” means indigenous aquatic plant species that provide fish and wildlife habitat, water quality protection, and shoreline stabilization.”

Many plants such as pickerweed naturally form dense monocultures (in little to no open water) that are invaluable to pollinators, nesting Florida Sandhill Cranes, rails, bitterns, Round-tailed Muskrats, snakes, turtles, frogs, and other species. Eliminating native plants to this spatial extent which would functionally remove habitat for these species would require robust justification, which presently is not in the Plan.

Similarly, the Plan identifies a waterfowl goal to reduce “dense perennial emergent vegetation in nearshore areas for the creation of a hemi-marsh with desirable interspersed of plants and open water” that would provide, “a desirable density and interspersed of open water and emergent plants.” This is a misapplication of the hemi-marsh concept. Hemi-marshes form in prairie pothole lakes (Weller and Spatcher 1965, Weller and Fredrickson 1974), not in Florida wetlands. As Weller (1987) describes, hemi-marshes are a short-term stage of wetland succession that take years to develop and are driven by drought, floods and muskrat eat-outs in prairie pothole marshes. The marsh succession goes from dense marsh after a drought, to open water as muskrats eat cattails out, and the in-between hemi-marsh stage of this succession is a productive, and usually short-lived, one. Muskrats do not occur in these Florida lakes nor does this succession pattern.

Euliss et al. (2008) commented extensively on this, stating, “The hemi-marsh concept is an important example of a management goal frequently at odds with ecological fit...the hemi-marsh, a 50-50 mixture of open water and vegetation, is one of the most poorly understood and misapplied goals of wetland managers.... Managers often replicate the physical appearance of hemi-marshes by intense management (i.e., mowing, herbicides, and water-level manipulations). However, without recreating the hydrological processes that form and maintain hemi-marshes naturally through wet/dry cycles, they may lack the desired biotic productivity.” In other words, eliminating emergent plants to create interspersed would not result in hemi-marsh, but rather a half-dead marsh.

Artificially creating hemi-marsh habitat structure would also have the adverse effect of habitat fragmentation for wildlife. Scientific literature documents that smaller habitat patches hold fewer

numbers of individual animals and fewer species (e.g., Harris 1984), and that the further patches are apart, the harder it is for extirpated species to recolonize them (Simberloff and Wilson 1969). Connected habitat patches, or corridors, are essential to biological conservation (Harris 1984), at large and small scales. Aquatic snakes and frogs, turtles, grass shrimp, crawdads and other marsh-dwelling organisms can have substantial biomass, are preyed upon by many organisms, and need protective cover to survive. Loftus and Eklund (1994) note that in the Everglades, “It is likely that small fishes use the densely vegetated marshes as refuge from predation.” Not only will the open water areas not support these species, but the vegetated remnants likely cannot either, due to predator exposure. Fragmenting marsh communities could result in important ecosystem components operating functionally at maintenance control levels (very low levels), which usually is a management strategy employed only on undesirable organisms.

Recommendation: The Plan should abandon goals for marsh structure based on arbitrary percent coverages; marsh goals should be based on historical condition to the greatest extent possible.

Setting technically-based wetland structure goals

Lakes tend to be surrounded by concentric zones of vegetation, varying by hydroperiod/depth (Cowardin et al. 1992, Keddy and Fraser 2000, SFWMD 2020). The zones tend to be contiguous except when disturbed by wave energy, ice, inflows, and anthropogenic disturbance (e.g., riparian rights). Lakes Kissimmee and West Lake Toho are large enough to have wind/wave disturbance at times, but generally disturbances in these lakes are limited. The following information supports the idea that historically and ideally, the Kissimmee Lakes should have contiguous bands of vegetation along the shorelines.

Historical accounts of habitat

Historical accounts can help establish native conditions but also can be challenging to interpret. The authors usually had a different focus than a modern interpreter and could be prone to an unknown amount of exaggeration and inaccuracy. Thus, inferences must remain general, but can still inform assessments of the natural conditions of these lakes.

In March of 1886, Henri Dauge recorded a voyage originating from the town of Kissimmee (that had but 16 houses) down to Lake Kissimmee on a boat 19 feet long and five-and-a-half feet wide. The connector stream between Lakes Toho and Cypress wound for 12 miles between the water bodies where the 8 foot oars “struck lily leaves on each side as we went down the current.” He continued, “...after long stretches of cane break and of marsh and willows...” they reached Lake Cypress. They could not find the outlet stream, and after much searching for the outlet and/or dry ground, they anchored and slept on the boat.

On Lake Hatchineha, he remarked, “All around this lake we circled...whenever we saw what appeared to be a high bold shore we put for it, and, arrived there, the pines had always receded a mile or two, and impassable marsh and bog divided us from land.” However, they did find a sandy beach with oaks growing above it to camp upon. The channel connecting Hatchinehaw to Kissimmee was concealed by “bonnets.” Upon reaching Kissimmee, he wrote, “...the lake gave its usual tokens of being near—wide stretches of marshy land and willows...” They “pushed through some yellow grassy stretches” and found white water lilies.

W. S. Blatchley, an entomologist from Indiana, toured the Kissimmee Lakes in February 1913. (Blatchley 1932). He started from the town of Kissimmee and noted of Tohopekaliga that, "...water hyacinth covers vast areas..." The four mile canal from West Lake Toho to Cypress had been completed and "...runs through a vast marsh, an incipient prairie, and its banks were covered with pickerel-weed, arrow-head, spatterdock and other aquatic herbs, all in full blossom." Lake Cypress's edges, "on all sides merged into the surrounding marsh." On the canal between Cypress and Hatchinehaw, he noted, "...the country on every side was a vast marsh..." In Hatchinehaw, "...low shores almost everywhere merge into the marshy prairie." Between Hatchinehaw and Kissimmee, "...its margins densely covered with semiaquatic plants." Brahma Island had sandy beaches but were too shallow to approach closely so they rounded the western shore to find, "The sand of the beach was in time replaced by muck with no sign of a decent camping spot..."

The above descriptions of vegetation around these lakes is typical of central Florida flatwoods lakes--surrounded by dense herbaceous marshes, with the same dominant species of today, white water lilies, *Nuphar*, grasses, willow, *Phragmites*, *Sagittaria*, and *Pontederia*. Although the lake levels have been lowered and marsh area has been greatly reduced, the dominant plant species and structure of contiguous surrounding marshes largely remain.

Whitmore et al. (2020) examined sediment cores to assess early conditions in these lakes. They concluded the lakes originally were meso-trophic to eutrophic, which lead to "naturally high productivity" leading to abundant vegetative growth. They note that stabilized water levels and nutrient enrichment have increased stand crops of vegetation and organic materials but emphasize the need to maintain marshes to buffer the effects of these changes. They also concluded the lakes above Kissimmee experienced extreme drawdowns, but Kissimmee had more stable levels, as would be expected of a waterbody lower in the watershed.

Recommendation: Because the Kissimmee Chain of Lakes historically appeared to have had contiguous bands of marsh around them, comprised of the same dominant species of today, the Plan should create and protect this marsh structure as a central goal.

Technical estimates of habitat structure

The SFWMD (2020) used a different approach to setting marsh structure goals -- a hydrological approach. Their peer reviewed document divided littoral zones into four general communities from short to long hydroperiod, namely: shallow marsh, broadleaf marsh, pads, and deep grasses. Section **4.3.3 Linkages between hydrology and biology** contains a concise review linking the biology of marsh organisms to the hydrology, that shapes plant communities while driving movement and access of predators and prey, as well as breeding cycles for all the vertebrate taxa of the Lakes.

Using plant zonation also will help avoid the practice of managers eliminating emergent littoral vegetation to cultivate submergent vegetation in its place. This practice not only artificially destroys the habitat that should be there, along with the wildlife that depend on it, but wastes resources. It also allows floating aquatic vegetation to invade in the absence of shade, leading to further treatments. In most Florida lakes, and the Kissimmee Chain in particular, the emergent plant zone should extend to a depth of at least three feet at high pool, or essentially to the bulrush

line, where the gradation to pads and subaquatic vegetation occurs. The SFWMD (2020) approach describes it similarly with maps unique to each lake's form.

Recommendation: The Plan should set habitat structure goals in a manner similar to the SFWMD (2020) and strive for contiguous bands of vegetation around the Lakes, to the greatest extent possible.

Individual topics

- 1) Goal 3, Objective 2, Action 3.2.5 notes: "Investigating using disturbance methods such as discing and fire in the non-persistent zone of the littoral zone to stimulate annual seed producing plants."

Fire is an essential ecosystem process in Florida marshes and we strongly support its use as a management tool in this plan. Discing, however, is artificial and does not replicate natural processes on these lakes. Mechanically treating lake sediments directly harms wildlife like snakes, frogs, turtles (Waller 2009), their nests, and young. For example, mud turtles can live more than 40 years (Audubon of South Carolina), commonly aestivate, and feed and nest in the mud near water bodies. Their eggs are laid above the water and incubate for an average of 120 days, making them vulnerable to mechanical treatments. After the scraping process in the 2004 Toho drawdown, mud snakes, striped crayfish snakes and peninsular cooters remained absent from samples 3 years after the treatment, and seven other herptofauna had such low capture rates that a population estimate could not be made (Kitchens et al. 2008; page 227). Audubon asserts that discing should not be planned, or allowed, in these ecosystems.

- 2) Page 49 "AQUATIC PLANT CONTROL PERMITS" (Riparian rights): More information should be included about riparian inspections conducted by FWC staff, specifically, "how often is permit compliance checked" and, "is there a form that is filled out to document the inspections?" And if no inspection records or forms exist, a process should be developed as part of this Plan.
- 3) *Pistia stratiotes* management: The Plan continues to mislabel this plant as exotic. Quillen et al. (2013) found *Pistia* pollen in Lake Annie (Highlands County) in sediment strata between 7,000-11,000 years old, and Evans (2013) cites Quillen's work and work at a pre-Columbian archaeological site near Vero Beach that also found pre-Columbian spores, which along with other evidence in Evans (2013), makes a very compelling case that *Pistia* is a Florida native. This plant hosts a rich diversity of bird, amphibian, reptile, fish, and invertebrate communities and should be protected from significant control or eradication. Control is warranted when it becomes a bona fide navigation nuisance, but otherwise FWC should stop expending resources to eliminate such a valuable plant and the communities it supports.
- 4) Monitoring plans: An overarching monitoring plan should be developed to evaluate "success," and allow for adaptive management. Attributes that presently are being monitored regularly include fisheries, fishing, Snail Kites, wading birds, alligators, SAV, and EAV. Other important ecosystem components such as amphibians, reptiles and most avian species have no monitoring, leaving their status, and FWC's success in

management, unknown. Because there are not enough resources to monitor everything, representative species often are monitored as indices to ecosystem status. FWC should develop a suite of species monitoring protocols, considering all vertebrate taxa and trophic levels, to facilitate management evaluation and improvement.

- 5) Kissimmee Headwaters Revitalization Project: This project will soon allow Lakes Kissimmee, Cypress, and Hatchinehaw rise to 54 feet, 1.5 feet higher than present maximums. The Plan should discuss how this is expected to change these lakes, and how FWC expects to respond in their management.
- 6) The Plan should discuss how climate change may affect the lakes and if pro-active measures should be taken.

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