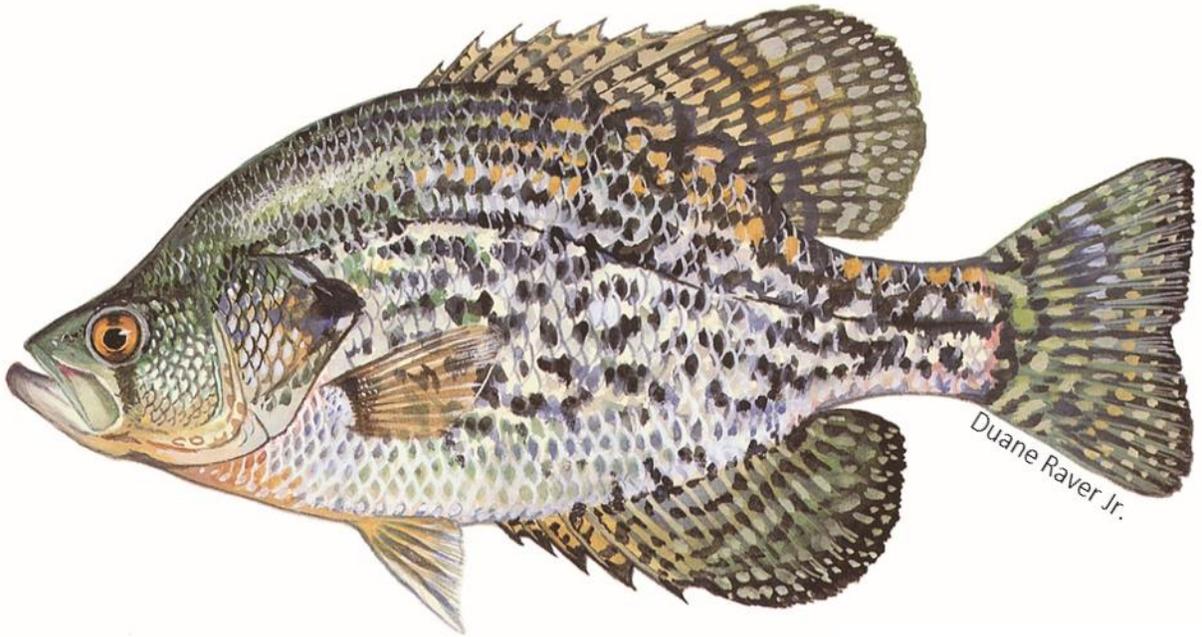


BLACK CRAPPIE MANAGEMENT PLAN



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

OCTOBER 21, 2019



Black Crappie Management Plan

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VISION

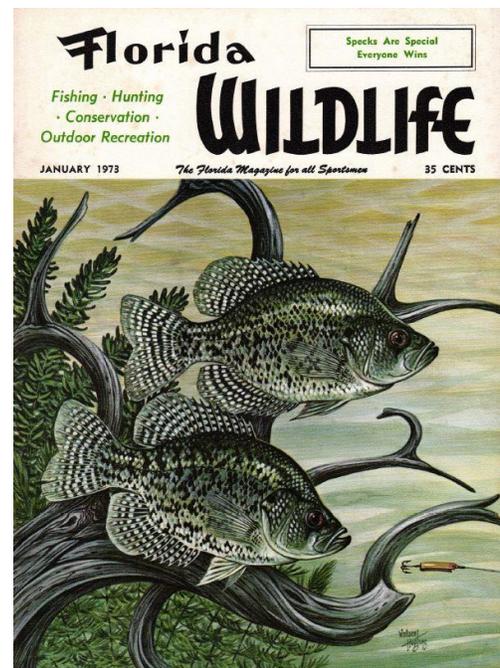
Florida’s Black Crappie fisheries will continue to be highly desirable to anglers, providing substantial economic benefit and contributing to Florida’s status as the “Fishing Capital of the World.” These fisheries will be managed by leveraging expertise from many FWC divisions guided by the principles of fisheries science, Florida-specific research, angler desires, and sustainability.

GOAL

The goal of the Black Crappie Management Plan (BCMP) is to use existing scientific information and **stakeholder**¹ input in the development of priorities and strategies that maintain or enhance Black Crappie fisheries in Florida to meet the desires of stakeholders.

INTRODUCTION

Black Crappie (*Pomoxis nigromaculatus*) is a highly valued **game fish** throughout much of North America, including Florida, where the species is most commonly known as “speckled perch” or “specks”. Florida’s Black Crappie fisheries are seasonal, largely occurring during winter and spring, making Florida a popular winter destination for traveling anglers. Black Crappie fisheries have historically been managed through harvest regulations (e.g., size and bag limits). Beyond these harvest regulations, there has been relatively little directed management for this species in Florida. Black Crappie fisheries are typically harvest oriented and are known to have highly variable **recruitment**, making it attractive to consider the possibility of using more resource-specific management to improve these fisheries. The BCMP was created by Florida Fish and Wildlife Conservation Commission (FWC) staff from multiple divisions and offices and with input from a wide range of public stakeholders to provide the best direction for management and research for this popular game fish. The BCMP seeks to apply traditional management tools and develop new and innovative tools and techniques that achieve conservation more efficiently and provides a variety of management goals tailored to diverse stakeholders. From the outset, stakeholder input was important to the formation of the BCMP. Stakeholder input was gathered through online and paper surveys, open house events, and in-person interviews. These outreach techniques included resident and non-resident anglers, tournament anglers, and local businesses. FWC will use this plan to guide future management and research directed towards Black Crappie.



¹ Please note that words in bold text are included in the glossary, which begins on page 29.

BACKGROUND

CURRENT STATUS

Florida maintains its status as the “Fishing Capital of the World” by consistently leading the nation in the number of anglers (3.1 million) and being the top recreational fishing destination in the United States (USFWS 2006; USFWS 2011; Southwick Associates 2012). Florida also leads the way in fishing-related expenditures, with over \$9 billion a year in economic impact due to recreational fisheries (USFWS 2006; USFWS 2011; Southwick Associates 2012). Abundant and fertile freshwater resources are one component of Florida’s appeal to recreational anglers, as Florida has three million acres of freshwater lakes, ponds, and reservoirs and over 12,000 miles of rivers, streams and canals. In terms of freshwater fishing alone, Florida has over 1.2 million freshwater anglers, who enjoy 25.7 million fishing days and generate nearly one billion dollars in economic impact each year (USFWS 2011).

Black Crappie are found throughout Florida and represent one of the state’s most popular freshwater fisheries, with many anglers targeting these fish for sport and as a food fish. A 2016 survey showed that approximately 16% of licensed freshwater anglers in Florida fish primarily for Black Crappie, and up to 62% of freshwater anglers target them at least occasionally. **Creel surveys** across Florida estimated that 25% of the anglers interviewed had a license exemption, so the 2016 survey of license holders alone may underrepresent Florida anglers who fish for Black Crappie.

Black Crappie are designated as **game fish** in Florida, where there is no commercial harvest, and recreational harvest is regulated by the FWC. Until July 1998, Florida’s harvest regulation for Black Crappie was a daily limit of 50 fish per person. In 1998, the statewide daily bag limit was reduced to 25 Black Crappie per person per day. There is no state-wide minimum length limit, but there are some special length or possession limits in effect around the state (Table 1).

Table 1. Special length and possession limits for Black Crappie in Florida. FMA = fish management area; WMA = wildlife management area

Special length limit	Special daily bag limits	Special combos
<u>10-inch minimum length limit:</u>	<u>30-fish harvest limit:</u>	<u>10-inch minimum length limit + 10-harvest limit:</u>
Lake Griffin	Jim Woodruff Reservoir/Lake Seminole	Bobby Hicks Park Pond
Lake Okeechobee	Lake Jackson (Walton County)	Fitzhugh Carter WMA
Lake Talquin	Perdido River	Gadsden Park Pond
Lang Lake	St. Mary’s River	Hardee County Park
Suwannee Lake		Largo Central Park
		Middle Lake
<u>12-inch minimum length limit:</u>		Montgomery Lake
Lake Jackson (Osceola County)		Mosaic FMA
		Tenoroc FMA
		Walsingham Park Lake
		Watertown Lake

BIOLOGY

GENERAL OCCURRENCE

Black Crappie is the predominant crappie species found in Florida, which is at the southern end of its distribution in North America (Lee et al. 1980; Robbins et al. 2018). Black Crappie live in a variety of waterbody types, including lakes, reservoirs, ponds, streams, and canals throughout Florida. The better-known Black Crappie fisheries in Florida tend to be large, productive waterbodies (Bachmann et al. 1996; Allen et al. 1998). Some of these systems are tied to moving water, such as the major lakes along the St. Johns River. However, many of these systems are large, standalone waterbodies that may have high concentrations of **phytoplankton**, which serve as the base of the food chain and causes low water clarity. While Black Crappie can be found anywhere in a waterbody, many individuals spend much of their time in open water, where anglers often target them by drifting and trolling baits. In the spring, Black Crappie typically move closer to shore to spawn in shallow waters.

FYI: White Crappie (Pomoxis annularis) have occasionally been collected in Florida, but only in a few Panhandle rivers.

REPRODUCTION

Black Crappie usually start **spawning** in Florida in early spring. Peak spawning varies across the state, but generally progresses from south to north as water temperatures warm. Spawning often continues into May in the Panhandle. FWC biologists have also documented Black Crappie spawning in the fall after a large rise in lake water levels (Nagid et al. 2004), and there have been numerous angler reports of Black Crappie spawning in the summer after large rain events increase water levels after droughts. The size and age at which Black Crappie reach **sexual maturity** varies among waterbodies based on differences in growth rates, but they typically reach sexual maturity at two or three years of age (Huish 1954; Dutterer et al. *in prep*). Black Crappie can spawn as young as one year of age, but that usually only happens under conditions of extreme crowding or in newly-introduced populations that have only a few fish. Spawning females lay their eggs in small nests on firm substrates, like sand, that support rooted vegetation or on the root bases of the plants themselves. Black Crappie spawning in the spring is associated with migration of adults from open water to shoreline habitats. Each female may produce 11,000 to 188,000 eggs depending on her size and age, and eggs hatch within two to three days after being fertilized by the male (Hammers and Oakley 2009).

IRREGULARITY IN SPAWNING SUCCESS

Throughout their range, Black Crappie are characterized as having “boom-or-bust” spawning success, or recruitment. A “boom” year of high recruitment can be responsible for high catch rates for several years, whereas multiple consecutive years of low, or “bust,” recruitment can reduce **catch** and **angler effort** at a waterbody. Understanding what drives these drastic differences in recruitment success has been difficult for fisheries biologists (Dockendorf and Allen 2005; Siepker and Michaletz 2013). There is evidence that water levels, especially high-water levels before and during spawning, drive successful spawning in reservoirs (Maceina and Stimpert 1998; Sammons et al. 2002), but this is inconsistent, especially in Florida. Biologists don’t yet have a clear link between environmental and population characteristics and reproductive success for Black Crappie. Achieving greater understanding of this part of Black Crappie reproductive ecology would contribute greatly to management of the species.

DIET

Black Crappie eat a variety of prey and undergo several diet shifts in life (Ager 1976). Newly hatched fish are less than 1/10" long. They initially feed on small **zooplankton** until they reach about three or four inches, at which size they start to feed on larvae and pupae of aquatic insects such as midges (Pine and Allen 2001; Tuten 2007; Tuten et al. 2008). Fish and grass shrimp become common prey for Black Crappie when they reach six to eight inches, with fish typically becoming the bulk of the diet once Black Crappie exceed eight inches (Reid 1950). Larger prey, especially shad, contain more energy, and it is important for Black Crappie to shift their diets from invertebrates to fish to increase both growth and survival.

FYI: The Florida state record Black Crappie is 3.83 pounds, from Lake Talquin.

GROWTH

Based on FWC **otter trawl** sampling across multiple years and waterbodies, the average Black Crappie in Florida reaches eight inches in length at age 2, and most have reached 10 inches by age 3 (Figure 1). However, growth varies by waterbody, with some populations growing faster or much slower than average (Miller et al. 1990). Rapidly growing Black Crappie can reach 10 inches at age 2 and 12 inches at age 3. Conversely, in waterbodies that lack the food for good growth, it may take Black Crappie five or six years to reach 10 inches, and most of the fish in those populations do not reach a suitable size to attract anglers (Figure 1).

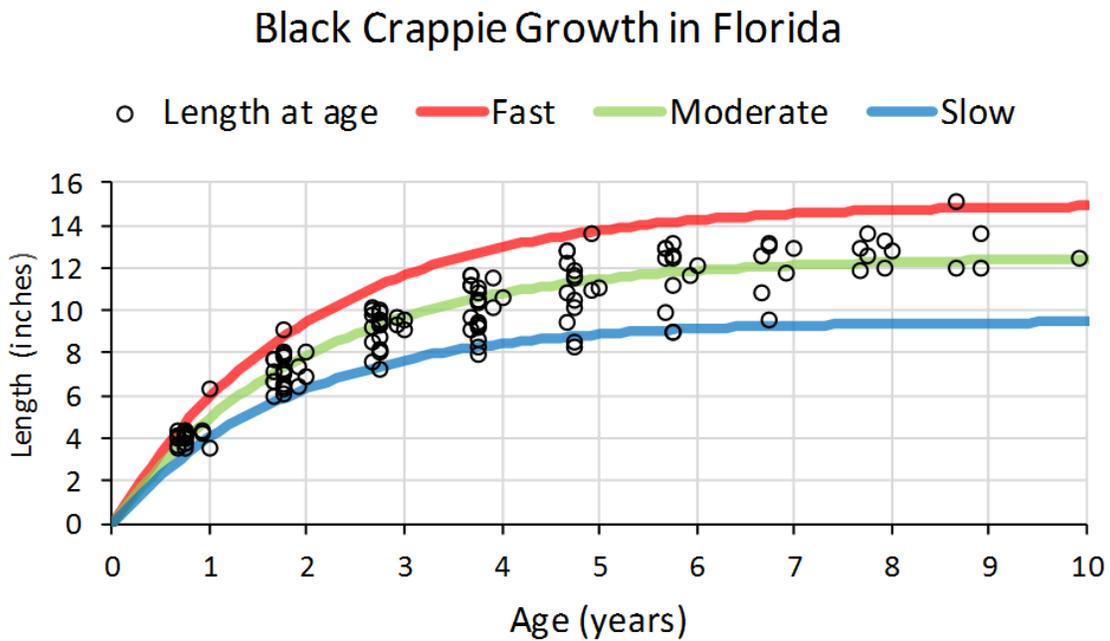


Figure 1. Black Crappie length at age and growth trajectories, based on FWC otter trawl sampling across multiple waterbodies in Florida over the last decade.

LIFESPAN AND MORTALITY

Black Crappie have relatively short lifespans. Only 10–20% will live to age 5 or older; the oldest individuals typically reach 8–12 years of age depending on waterbody, but these are relatively rare. The majority of Black Crappie that anglers catch and keep are 3–4 years old.

As a fish species, Black Crappie populations experience high mortality rates. **Total annual mortality** contains both **natural mortality** and **fishing mortality** and is highly variable among populations. In the southeastern U.S., total annual mortality ranges from 48–94% (Allen and Miranda 1995). For many Florida populations, average total annual mortality is likely to fall within 55–75% (Cross et al. 1996). Ultimately, this means that, on average, an individual Black Crappie is more likely to die naturally or be consumed by a fisherman than to survive to next year.



Black Crappie are popular food fish. A large proportion of what anglers catch is often harvested, and fishing mortality can become substantial. At Florida's most heavily fished lakes, fishing mortality rates can be 40% or greater (Dotson et al. 2009). Generally, Florida's major Black Crappie fisheries experience fishing mortality rates in the range of 10–30%.

Understanding the causes and rates of Black Crappie mortality is critical to management of the species in Florida, as mortality rates influence what types of harvest regulations can be effective. For instance, length and bag limits will be ineffective if high numbers of fish die after being caught and returned to the water. Studies in other states reported significant angler release mortalities from deeper lakes and reservoirs. However, a pond study in Florida, with conditions more representative of Florida's typically shallow lakes, found mortality of crappie caught and released by anglers to be less than 1% (Schaefer 2016). Generally, fish species with high natural mortality, like Black Crappie, tend to be more resilient to fishing pressure. Even when fishing mortality is low, high natural mortality rates cause poor survival. However, as fishing mortality increases, it can replace part of the natural mortality and allow some fish that would normally die naturally to survive because competition has been reduced by fishing.



BLACK CRAPPIE MANAGEMENT TOOLS

FISHING REGULATIONS

Fishing regulations are one of the most common and direct ways to manage a harvest-oriented fishery like Black Crappie. Three types of regulations are most often employed to manage crappie fisheries: bag limits, length limits and gear restrictions. Bag limits restrict the number of fish that can be taken at a time. This helps reduce the amount of harvest and ensures a fairer distribution of harvest among anglers. Length limits restrict the size of fish that can be harvested and are most often employed to protect smaller fish from harvest until they reach maturity. Gear restrictions limit the type and number of gears that can be used to capture fish. In recreational fisheries, gear restrictions tend to reflect societal views on what is considered fair methods of chase and take. Because Black Crappie are managed as a game fish in Florida, their capture and harvest are limited to hook and line methods. Outside of Florida, the number of rods allowed per angler is sometimes also regulated.

HABITAT MANAGEMENT

Black Crappie thrive in waterbodies with diverse habitat and often benefit most from aquatic habitat management that creates a broad range of habitats. Black Crappie have different habitat needs depending on the age of the fish, time of year, and forage availability. Young Black Crappie often depend on the presence of aquatic vegetation to help protect them from predators. Adults spawn in vegetation, but they spend a large part of their lives in open water and along the edges of vegetation to forage for baitfish. Too much vegetation can cause slow growth for crappie populations because adults have difficulty foraging in heavy vegetation (Maceina and Shireman 1982). Dense vegetation is also problematic for Black Crappie anglers, because it makes it more difficult for anglers to find and catch fish. Appropriate vegetation management should maintain a balanced level of vegetation and open water areas.

*FYI: FWC fish attractors
can be made from
brush, rock, or synthetic
materials.*

The creation of **fish attractors** is another habitat management tool that fisheries managers can use to influence Black Crappie fisheries. The addition of this type of cover in open-water usually creates a miniature food-web that helps attract fish. Fish attractors give anglers a place to target Black Crappie and can increase their chances of success (Crumpton and Wilbur 1974; Wilbur 1978). All fish attractors in Florida public waterbodies must be permitted by the Florida Department of Environmental Protection (FDEP) under Part IV, Chapter 373, F.S., even ones installed by FWC.

STOCKING

In Florida, Black Crappie stocking has largely been limited to instances where the Black Crappie populations have been severely reduced or eliminated by drought or other environmental disturbances or recently created waterbodies. In these instances, stocking Black Crappie serves to establish or reestablish a population where suitable environmental conditions have been created or restored. Limited evaluation of the success of Black Crappie stocking in a large, 5,700-acre lake in Florida has shown poor contribution to the fishery, with little to no recaptures of marked fish that were stocked one to two years prior (Nagid et al. 2003). Because Black Crappie have erratic recruitment, if FWC could predict recruitment success and achieve greater survival of stocked fish, stocking during years of poor recruitment may become a viable management technique. Stocking baitfish to establish or enhance forage populations may be another way to benefit Black Crappie populations.

ACCESS AND SHORELINE FISHING OPPORTUNITIES

Fisheries managers can influence Black Crappie fisheries through the availability, improvement, and maintenance of boat ramps, docks, public fishing piers, and other bank fishing opportunities. Boat ramps may increase **angler effort** by providing new or improved access to waterbodies. Conversely, fisheries managers may limit the amount



of access to some waterbodies by restricting the number of boats that can use a ramp, or the days and hours that a ramp is open. Boat ramp restrictions can help lower **fishing mortality** and may also provide less-crowded, special-opportunity trips. Public shoreline fishing opportunities are highly utilized at some waterbodies and provide anglers who may not have a boat the chance to go fishing. Docks, fishing piers, and banks can be built and maintained to provide easier access for disabled and elderly anglers and may also be made large enough to house events such as kids fishing events and tournaments.

STAKEHOLDER ENGAGEMENT

Communicating with and receiving input from stakeholders is vital to fisheries management. For regulations to be effective, anglers must be aware of regulations, support, and follow them. FWC can communicate information from research and monitoring activities that has the potential to affect anglers such as where, when, or how to fish. FWC's outreach takes many forms. Stakeholders are consistently reached through the MyFWC.com website, press releases, and social media. FWC also places a high priority on in-person interaction at public meetings, open houses, and informal



encounters. In addition to providing information to stakeholders, managers also look to receive information from stakeholders to better design management actions or outreach techniques.

BLACK CRAPPIE MONITORING

Black Crappie have been monitored by the state of Florida since the 1950s. Recent monitoring focuses on state-wide standardized annual sampling methods and centralized data storage in FWC's [freshwater fish long-term monitoring program](#) (LTM) database. From 2006 to 2017, this database contained valuable information on 256 lakes and over one million individual fish and continues to grow. This core monitoring program samples 45–60 waterbodies per year and includes many lakes with important Black Crappie fisheries, such as lakes Okeechobee, Istokpoga, Griffin, Lochloosa, Monroe, and Talquin.

TRAWLS



One of the primary methods used by FWC biologists to collect and monitor Black Crappie populations is sampling with an [otter trawl](#). Trawls work well for crappie in Florida because the fish live offshore, and our lakes generally have abundant open water with flat bottoms. FWC annually monitors Black Crappie populations in 11 lakes across the state.

CREEL SURVEYS

The FWC uses [creel surveys](#) to gather information about how the public fishes for Black Crappie. Surveys take place on approximately 25 waterbodies annually. These surveys estimate the total **angler effort**, **catch**, and **harvest**. Standardized creel survey methods allow for comparisons among several important Black Crappie fisheries (Table 2).



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Table 2. Angler hours and fish kept at 10 waterbodies with Black Crappie creel surveys during 2007–2016. Estimates are calculated per acre and in 100-day increments. Numbers in parentheses are the acreage of each waterbody.

<i>Angler hours per acre</i>		<i>Fish kept per acre</i>	
Waterbody (acres)	Angler Hours	Waterbody (acres)	Fish Kept
Kissimmee River at Okeechobee (620)	31.10	Kissimmee River at Okeechobee (620)	37.44
Trafford (1,495)	5.57	Trafford (1,495)	8.81
Lochloosa (5,649)	4.51	Lochloosa (5,649)	4.88
Josephine (1,236)	4.28	Josephine (1,236)	4.12
Talquin (8,851)	3.44	Eloise (1,159)	3.62
Dora/Beauclair (5,587)	2.90	Talquin (8,851)	3.06
Eloise (1,159)	2.14	Dora/Beauclair (5,587)	3.02
Weohyakapka (Walk-in-Water) (7,443)	1.47	Lake Kissimmee (48,947)	2.37
Crescent (15,967)	1.41	Johns (2,439)	2.08
Floral City Lake (605)	1.26	Weohyakapka (Walk-in-Water) (7,443)	1.98

CARCASS SAMPLING

In conjunction with some creel surveys, FWC biologists also use angler-donated carcasses to measure the size and age of harvested crappie. Many anglers prefer to fillet their catch—the remains of which are perfect for measuring length and age. Age is determined from **otoliths**, or ear bones, found in the head.

TAGGING STUDIES

Biologists use tagging studies to measure the proportion of the population that is caught or harvested at select waterbodies. All FWC-generated crappie tags have a monetary reward for reporting the catch of a tagged fish, and all tags are printed with the reward amount, an FWC telephone number, and a unique identification code for tracking that fish.



BLACK CRAPPIE MANAGEMENT PLAN OBJECTIVES AND ACTION ITEMS

The following section outlines the actions FWC will take to effectively manage Black Crappie fisheries throughout Florida. These action items encompass regulation review and consideration, collaborative habitat management, addressing research needs, and engagement with stakeholders. The action items will be incorporated into FWC workplans to grow participation in Black Crappie fishing and expand Florida's reputation for providing excellent Black Crappie fishing opportunities. A condensed table of all objectives and actions is provided in Appendix A.

I. MANAGE SUSTAINABLE BLACK CRAPPIE FISHERIES THAT BALANCE BOTH BIOLOGICAL NEEDS AND STAKEHOLDER DESIRES

OBJECTIVE 1: REVIEW THE EFFECTIVENESS OF BLACK CRAPPIE HARVEST REGULATIONS IN FLORIDA AND IMPLEMENT CHANGES WHERE NEEDED.

ACTION ITEMS:

- i. *Evaluate Black Crappie regulations through comprehensive, science-based, data-driven processes.*

Harvest regulations are intended to ensure sustainable fishing and healthy fish populations with enough mature Black Crappie in a waterbody to spawn successfully and fish of desirable size available to anglers. Population monitoring and regular **creel surveys** have been in place at many of Florida's top Black Crappie fisheries for years. **Stock assessments** and reviews that examine regulations and consider alternative harvest regulation strategies will be conducted, as needed, for specific waterbodies, regions, or the entire state. A fundamental component of our stock assessment process will be use of age-structured **population models** that incorporate known rates for growth, sexual maturation, natural mortality, and fishing mortality. These tools enable us to predict levels of reproductive potential and harvest **yield**, informing choices and tradeoffs among different management options.



- ii. *Evaluate stakeholder support for Black Crappie regulation through sound social-science.*

To be effective, harvest regulations should provide sustainable and desired fish populations and be supported by anglers that use the fishery. **Stakeholder** input will be collected through multiple methods such as surveys, public meetings, focus groups, one-on-one interviews, and online public commenting. These techniques will be designed and applied by FWC staff with social-science expertise. These tools will gather input on stakeholder desires and gauge angler support of Black Crappie harvest regulations. Initial stakeholder input to this management plan indicated that numerous anglers are concerned about current harvest regulations. Therefore, a review of current Black Crappie regulations is warranted.

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iii. Include all relevant FWC Divisions and Sections in a review of Black Crappie regulations.

The diverse expertise of FWC staff will be incorporated into a comprehensive approach to any Black Crappie harvest regulation review. Social scientists will gather information about stakeholders and engage in outreach. Biological scientists will evaluate regulation and harvest scenarios with predictive population modeling. Law enforcement personnel will provide guidance on the enforceability of potential regulation changes. The most effective and thorough review of harvest regulations will result from a well-developed and coordinated process.

iv. Establish regular review of regulation effectiveness and stakeholder opinion.

FWC will establish a 10-year review cycle for Black Crappie regulations. This process will ensure that biological and social science data are collected and assessed at a minimum, regular interval. Biological data will include trends in annual fish population and angler harvest surveys. This information will be used with results from research projects for stock assessments to evaluate regulations. Social data will be collected to evaluate angler desires and opinions. This review process will allow harvest regulations to remain effective through adaptive management of Florida's Black Crappie fisheries with changes in environmental and social conditions.

v. Provide FWC Law Enforcement and customer service staff with the information needed to help educate the public about Black Crappie regulations.

Law Enforcement (LE) is FWC's largest division and encompasses over 800 sworn officers. These officers are regularly on the water interacting with boaters and anglers, many of whom fish for Black Crappie. Officers frequently field questions about fisheries and regulations. FWC biological staff will work with LE to identify information gaps and provide them with the biological information on which harvest regulations are based to help them effectively communicate with stakeholders.

OBJECTIVE 2: IMPLEMENT HABITAT MANAGEMENT ACTIONS THAT BENEFIT BLACK CRAPPIE FISHERIES IN COLLABORATION WITH INTERNAL AND EXTERNAL PARTNERS.

ACTION ITEMS:

- i. *Collaborate with Aquatic Habitat Restoration/Enhancement Section and local partners to restore or enhance Black Crappie habitats.*



As part of FWC, the Aquatic Habitat Restoration/Enhancement Subsection (AHRES) is responsible for conducting informed, science-based habitat management actions that restore and enhance publicly owned freshwater habitats throughout Florida. AHRES conducts projects such as enhancing vegetation communities by removing unwanted plant species and establishing desirable species, opening access to areas that have been overgrown with woody vegetation or floating **tussocks**, or changing the sediment type to provide **spawning** habitat that may be limited otherwise.

For example, the FWC is involved in an ongoing habitat restoration effort at Lake Trafford. This effort has involved a phased suction dredging project that removed over six million cubic yards of muck from the lake bottom, numerous planting projects to increase desirable native vegetation, and regular monitoring and control of invasive plants, including hydrilla. The suction dredging project was undertaken to increase spawning habitat for native fishes and remove decades of accumulated organic sediments. The nutrient rich organic sediments, along with nutrient inputs from the surrounding watershed, had been causing severe algal blooms that resulted in reduced dissolved oxygen levels and major fish kills. Since completion of the dredging project in 2010, there have been no major fish kills, and the Black Crappie fishery, along with other fisheries, has rebounded. These projects benefit Black Crappie and should be continued.

- ii. *Coordinate with the Invasive Plant Management Section to maintain natural plant communities and open water habitats conducive to Black Crappie fisheries.*

FWC is the lead agency in aquatic plant management in Florida, and FWC's Invasive Plant Management Section manages non-native aquatic plants on several hundred water bodies. Numerous comments from participants in FWC's Black Crappie Angler Surveys were related to aquatic plant management and ranged from too much herbicide spraying, to lakes having too much aquatic plant coverage. Thus, invasive plant management is a sensitive and complex issue. Fisheries managers will coordinate with Invasive Plant managers on actions which benefit Florida's Black Crappie fisheries.



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- iii. *Coordinate with other government agencies and non-government organizations on water level fluctuations and fishing access that best suit Black Crappie fisheries.*

Water level fluctuations are one of the most dynamic and impactful processes on Florida waterbodies. Water level fluctuation can affect a system's sediment types, water quality, plant communities, fish and wildlife abundances, public access, navigation, and recreational opportunities. While water levels at many of our lakes, ponds, and rivers are solely dependent on rainfall, there are numerous waterbodies in Florida whose levels are controlled through canals, levees, and water control structures operated by entities such as water management districts or the Army Corps of Engineers. There is some evidence that changes in water level might affect Black Crappie abundance, which affects **angler effort, catch and harvest**. In addition, access for anglers can be limited by high or low water levels which may render boat ramps unusable.

II. EVALUATE AND ADDRESS BLACK CRAPPIE RESEARCH NEEDS TO INFORM MANAGEMENT DECISIONS

OBJECTIVE 1: ESTABLISH COMPREHENSIVE KNOWLEDGE OF BLACK CRAPPIE LIFE HISTORY TRAITS IN FLORIDA.

ACTION ITEMS:

- i. *Synthesize existing Black Crappie data and study results.*

FWC staff have collected data since the 1940s to describe Black Crappie life history traits, evaluate commercial harvest regulations, and determine recreational fishing effort. Since the 1990s, annual **otter trawls** have been used to monitor abundance, sizes, and ages at numerous systems. While the information that FWC has collected for the last 70 years is vast, much of it is not easily accessible. FWC staff will develop an internal catalog for reports and manuscripts on Black Crappie and will consolidate existing age and growth data for Florida Black Crappie into a single database. Through this organization of information, FWC staff will be better equipped to answer research questions as they arise.

- ii. *Expand studies of reproductive biology.*

Understanding a species' reproductive biology, such as size and age at **sexual maturity**, is important in evaluating **overfishing** and harvest management. If fish mature before they reach harvestable size, then more harvest may be allowed with less concern for overfishing. Conversely, if fish are harvested prior to maturity, there may be a need for stricter harvest regulations to allow fish to reproduce before being harvested. Black Crappie size at age (i.e., growth rate) varies among Florida waterbodies and can change through time for a population at one waterbody. The same variation across time and space may exist for size and age at sexual maturity. Therefore, FWC



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biologists will evaluate size and age at maturity at various waterbodies through time. This information will increase the accuracy of Black Crappie stock assessment models and better inform future management decisions.

iii. Continue to develop and implement tagging studies that measure fishing mortality.

Black Crappie fisheries are harvest-oriented. Therefore, measuring fishing mortality is important when evaluating whether overfishing has occurred and if there is a need for regulation change. Reward tagging studies allow researchers to estimate fishing mortality by measuring the proportion of tagged fish that get caught and harvested by anglers. Estimates of fishing mortality can inform managers faced with a decision. For example, a 10-inch minimum size limit regulation that went into effect in 2012 for Black Crappie at Lake Griffin was supported with data collected in a reward tagging study that indicated relatively high fishing mortality. Such a regulation change has the potential to increase the overall **yield** of the fishery. Reward tagging studies are also greatly appreciated by anglers and business owners, while allowing FWC staff to increase communication with stakeholders. Tagging studies that evaluate fishing mortality will continue to be a valuable tool for FWC scientists as part of stock assessments and decision making for Black Crappie management.

iv. Expand our understanding of natural mortality across diverse waterbodies.

The **total annual mortality** is made up of both fishing- and **natural mortality** and can be roughly estimated from age samples. Biologists can better assess fish populations if both fishing and natural mortality are known. Although fishing mortality can be estimated from tagging studies, natural mortality is difficult to measure. Thus, few studies have attempted to measure natural mortality in Black Crappie populations. Natural mortality can have a large influence on age-structured models that are used to estimate overfishing potential. Thus, it will be a priority for FWC researchers to develop projects to estimate natural mortality of Black Crappie at multiple systems and identify how those levels vary throughout years and with the age of fish.

v. Identify variables that most influence recruitment of Black Crappie in Florida.

Black Crappie have highly variable **recruitment**, with some spawning years contributing many new fish to the population while other years contribute far fewer offspring. This has been observed throughout the range of the species, including Florida. Recruitment variability has been attributed to things like the timing, duration, and intensity of water level changes, particularly on reservoirs outside of Florida. However, there are conflicting results and these systems may not be representative of Florida's waterbodies. FWC biologists will develop projects to address how factors such as water level, water quality, weather, plant coverage, population size, and prey availability may drive recruitment. This research will allow a better understanding of what causes variable recruitment and inform management actions to increase high recruitment years, thereby increasing the overall quality of Black Crappie fisheries.



OBJECTIVE 2: DEVELOP BLACK CRAPPIE STOCK ASSESSMENTS TO INFORM MANAGEMENT DECISIONS

ACTION ITEMS:

- i. *Use age-structured population models and Virtual Population Analysis (VPA) to evaluate overfishing, harvest restrictions, and other fishery characteristics.*

Age-structured models and VPA are commonly used in fisheries science for stock assessments and to evaluate overfishing. Age-structured models serve as computer-generated Black Crappie populations that can be tuned with empirical data to simulate specific fisheries and predict effects of future regulations. VPA relies on detailed harvest and recruitment data to reconstruct Black Crappie populations of the past, achieving high-confidence estimates of fishing- and natural mortality. Both modeling techniques require data and parameters that may be system specific. FWC has used both approaches and will expand their use to evaluate potential overfishing of Florida's Black Crappie fisheries.

OBJECTIVE 3: UNDERSTAND OPTIMAL HABITAT CONDITIONS FOR BLACK CRAPPIE AND THEIR PREY IN FLORIDA

ACTION ITEMS:

- i. *Identify which types of aquatic vegetation and substrate Black Crappie prefer for spawning habitat.*

Habitat is key to the success of a fishery and can be highly influential for Black Crappie spawning. Research in other states has described Black Crappie spawning areas, but selection of vegetation, woody structure, or substrate types for spawning is unstudied in Florida. FWC biologists will develop projects that determine optimal spawning habitat for Black Crappie in Florida to better protect or enhance these habitats.

- ii. *Determine the optimum ratio of open water to vegetation coverage for Black Crappie populations and fisheries.*

Aquatic plant communities have diverse effects on Black Crappie fisheries in Florida. Plant species and coverage may affect reproduction, abundance, or growth. Likewise, plant species and coverage may impact anglers, affecting access or angling techniques. FWC is the state agency responsible for managing aquatic plants in Florida; thus, FWC researchers will investigate optimal plant coverage for Black Crappie fisheries and provide that information to habitat managers.

- iii. *Identify habitat and forage relationships of Black Crappie.*

Black Crappie change their diets as they grow, first feeding on microscopic **zooplankton**, then insect larvae and pupae, and finally consuming grass shrimp and fish. The habitat provides cover for Black Crappie, as well as feeding habitat and cover for prey. These relationships can also influence the areas

FYI: specks, sac au lait, slabs, papermouths, & white perch are all names for the same fish—Black Crappie

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where Black Crappie are located within a lake and how fast they grow. Understanding these relationships will allow FWC to better manage habitat for Black Crappie fisheries.

- iv. *Identify the optimal types, sizes, and locations of fish attractors to maximize their utility to Black Crappie and anglers.*

FWC has deployed **fish attractors** in Florida's lakes and ponds to provide habitat to attract fish and create locations for anglers to target. Research has shown increased density of the fish community and increased angler catch rates at fish attractors (Crumpton and Wilbur 1974; Wilbur 1978). Further research should evaluate how fish attractors specifically influence Black Crappie. Information about the types of attractors most suitable for Black Crappie and angler responses to attractors would be beneficial to fisheries managers.



OBJECTIVE 4: EVALUATE HATCHERY AND STOCKING STRATEGIES FOR CREATING AND ENHANCING BLACK CRAPPIE FISHERIES IN FLORIDA

ACTION ITEMS:

- i. *Assess the efficacy and efficiency of current hatchery production techniques.*



FWC biologists will assess hatchery techniques used for Black Crappie stock enhancement programs. Projects that identify the best methods for culturing fish at the hatchery, as well as determining size of fish, time of year, and which stocking methods work best to maximize survival of hatchery fish would be beneficial information for fisheries managers. FWC biologists will determine the best ways to identify hatchery fish that are recaptured from stocked systems to evaluate stocking success.

Information from these studies can ultimately improve Black Crappie stocking efforts whenever they are deemed necessary

- ii. *Determine waterbody characteristics that foster the best opportunities for successful stocking.*

Historically, stocking Black Crappie in Florida was largely focused on introducing new populations or improving fisheries in decline. These past stocking events usually occurred on a small scale, with little post-stocking population monitoring. To potentially expand the use of stocking as a management tool, FWC biologists will develop projects that determine which conditions and types of waterbodies benefit from Black Crappie stocking. Variables such as waterbody size, system productivity, water quality, prey availability, plant coverage, and angler use will be considered.

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- iii. *Assess genetic characteristics of Black Crappie populations across Florida and ensure that stocking practices preserve genetic integrity.*

It is the policy of the FWC that all activities involving the release of finfish shall be undertaken with full consideration of their impact on natural biological diversity and in ways that do not threaten the state's natural biological heritage. For example, research into Largemouth Bass genetics in Florida showed some genetic variation across the state and resulted in identification of genetic management units that FWC does not intermix through stocking (Barthel et al. 2010). Future stocking of Black Crappie in Florida should follow this model.

III. ENGAGE WITH INTERNAL (FWC) AND EXTERNAL (NON-FWC) STAKEHOLDER GROUPS TO IMPROVE UNDERSTANDING AND SUPPORT OF BLACK CRAPPIE MANAGEMENT IN FLORIDA

OBJECTIVE 1: ESTABLISH THE ROLE OF STAKEHOLDER INVOLVEMENT IN MANAGEMENT DECISION MAKING.

ACTION ITEMS:

- i. *Identify appropriate stakeholders and their interests.*

FWC will rely on local and regional staff to identify potential stakeholders (e.g., anglers, fishing clubs, and business owners) and invite them to provide input for management decisions. Staff will advertise and solicit input through mass distribution channels such as press releases, public meetings, and surveys to recognize additional stakeholders and build new relationships. Stakeholder input will be incorporated in Black Crappie management and any future planning.

- ii. *Ensure the appropriate level of stakeholder involvement in management decisions.*

When working with stakeholders, it is important to determine how much influence they will have on management decisions. The appropriate level depends on the situation but is not usually at the extremes of merely informing stakeholders of decisions or empowering them to make final decisions. FWC staff will first consider the desired level of stakeholder involvement and then engage with stakeholders to communicate this level. Stakeholders will be encouraged to be involved regardless of their level of control in a final decision. The responsibility will be on FWC staff to establish diverse lines of communication throughout the decision-making process. It is important to involve FWC staff with social science expertise and stakeholder communications training to achieve this.



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iii. *Determine when stakeholders are best involved.*

The timing of stakeholder involvement is situation-specific and depends on many variables. Some issues are stakeholder driven, and stakeholder input occurs from start to finish. Conversely, some management projects or decisions may require years of FWC work to gather biological data before stakeholder incorporation can begin. Determining the best time to include stakeholder input ultimately depends on good communication and guidance by staff with social science expertise. However, stakeholders should always be included in the process as early as possible.

iv. *Utilize diverse methods to communicate with and engage stakeholders.*

FWC staff understand that stakeholders have diverse preferences for how they receive and communicate information about Black Crappie management. Therefore, it is important to use a suite of communication tools to reach and effectively communicate with all stakeholders. Randomized, email-based license holder surveys; on-the-water, targeted surveys; focus groups; one-on-one interviews; and online commenting were all used to incorporate stakeholder input for this management plan. FWC staff will continue to implement these tools and others to engage as many stakeholders as possible in Black Crappie management decisions.



OBJECTIVE 2: FOSTER AWARENESS OF FWC MANAGEMENT AND RESEARCH TECHNIQUES AND HOW THEY ARE INCORPORATED INTO BLACK CRAPPIE MANAGEMENT DECISIONS.

ACTION ITEMS:

i. *Inform internal divisions and sections about the importance of Black Crappie fisheries in Florida.*

Internal communication can increase the overall awareness within FWC about the importance of Black Crappie fisheries in Florida. In-reach about the importance of Black Crappie fisheries will be communicated by way of presentations, internal articles, and inclusion in intra-agency teams and working groups focused on waterbody and habitat management. This will ensure that Black Crappie fisheries are considered in routine waterbody and habitat decisions across Florida.

ii. *Make better use of existing outreach tools to communicate with stakeholders.*

Three of the most easily available outreach channels for FWC are its website, press releases, and social media posts. Staff will assemble relevant information and work to develop content within [MyFWC.com](https://www.myfwc.com) that specifically addresses Black Crappie biology and management. A keystone feature of the web content will be the Black Crappie Management Plan document. Additional content will include information about life history, monitoring and **creel surveys**, habitat improvement projects, research projects, social science data, and economic surveys. As additional information and results become available, it will be a priority to have them incorporated into press releases and social media posts that go directly to stakeholders.

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iii. *Expand outreach capacities on Black Crappie management.*

Implementing new or under-utilized outreach techniques will help FWC staff reach more Black Crappie stakeholders. Survey results show that Black Crappie anglers in Florida predominantly exchange information about fishing through in-person communication. Based on this, FWC staff will use bait and tackle stores and fish camps to disseminate information to anglers. FWC field biologists, creel clerks, and law enforcement officers encounter freshwater anglers daily. These encounters provide opportunities to answer questions and engage with anglers about current issues in Black Crappie management. Thus, current management issues and decisions will be shared with relevant FWC staff. FWC will also increase the frequency of participatory outreach events like open houses and workshops. These events allow FWC staff from multiple areas of expertise to come together to share information and answer questions in-person and on a one-on-one basis.

iv. *Encourage the formation of organized stakeholder groups to foster communication.*

Organized groups allow stakeholders to come together over shared interests and values and speak with one voice, which makes communicating their desires to FWC more efficient. Likewise, FWC staff can more easily communicate management decisions or strategies to groups that physically meet or have organized communication. Groups also tend to build lasting, professional relationships with FWC staff that keep communication open over the long term. Friends of Istokpoga is an example of a stakeholder organization that has good communication with FWC regarding Black Crappie research and management issues.

OBJECTIVE 3: INVOLVE OTHER GOVERNMENT ENTITIES AND NON-GOVERNMENT ORGANIZATIONS IN BLACK CRAPPIE MANAGEMENT TO PROMOTE SHARED INTEREST AND SUCCESS.

ACTION ITEMS:

i. *Identify organizations and agencies that may affect or be affected by Black Crappie management activities or decisions.*

State agencies such as water management districts or the Florida Department of Environmental Protection can affect the quantity and quality of water at many Black Crappie fisheries across Florida. The public and private institutions that operate water control structures in Florida also can affect water level schedules at several resources. Boat ramp, pier, and shoreline access can be installed or enhanced by city, county, state, or federal entities. Growth or declines of Black Crappie fisheries affect the number of anglers using ramps and access points. The quality of Florida's biggest Black Crappie fisheries affects local economies, which are often represented by city and county tourism boards. Stakeholder organizations and agencies are unique to each waterbody and fishery, and FWC staff will strive to identify and build relationships with these groups having shared interest.



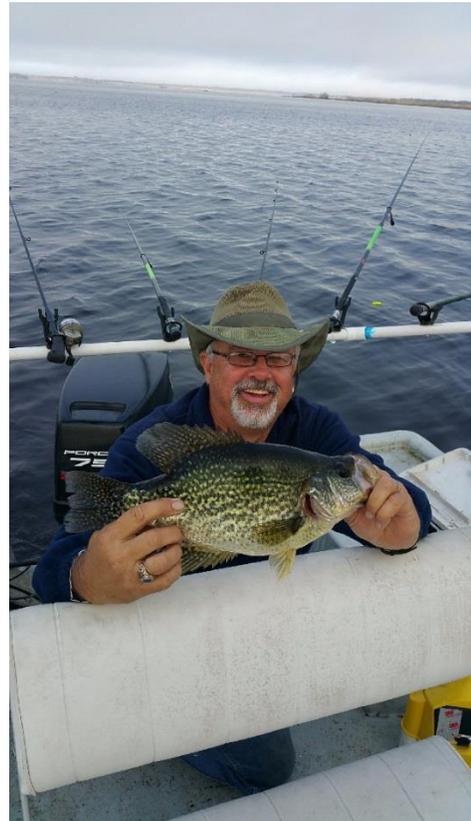
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- ii. *Communicate shared benefits of partnering in Black Crappie management to develop and enhance working relationships with other government agencies and non-government organizations.*

Black Crappie management can be beneficial for more than just Black Crappie anglers. Recreational fishing generates a positive economic impact. Black Crappie occur state-wide, so their fisheries impact both local and state economies. Economic benefits can be used to attract potential partners in Black Crappie management. In addition, Black Crappie thrive in diverse ecosystems, and management initiatives that benefit Black Crappie likely provide benefits to other species too. Likewise, projects that seek to achieve balanced and diverse ecosystems also help Black Crappie fisheries. Therefore, by partnering on Black Crappie management initiatives, outside groups, such as local governments and environmental-interest groups, and FWC will share in the ecosystem benefits.

- iii. *Collaborate with other state fish and wildlife agencies that manage Black Crappie.*

Black Crappie has an extensive range across much of North America, and many other state fish and wildlife agencies have expertise on this species. FWC will continue to take advantage of professional organizations such as American Fisheries Society and Southeastern Association of Fish and Wildlife Agencies and their meetings to connect with biologists who manage Black Crappie in other states. Further, FWC staff will use these professional meetings to organize and promote symposia focused on Black Crappie management, especially regarding the species' life history, angler harvest, and habitat improvement.



IV. ENSURE LONG-TERM PARTICIPATION IN BLACK CRAPPIE FISHING IN FLORIDA

OBJECTIVE 1: INCREASE PARTICIPATION IN BLACK CRAPPIE FISHING FROM TRADITIONAL AND NON-TRADITIONAL GROUPS.

ACTION ITEMS:

- i. *Utilize social science techniques to determine traits and interests of non-traditional groups and then tailor outreach accordingly.*

Participants in FWC's Black Crappie angler survey were largely male Caucasians over the age of 55. However, many women, children, younger adult males, and minority anglers also participate in Florida Black Crappie fisheries. By learning more about their desires, requirements, and values, FWC will be better equipped to tailor outreach and promotional material towards them, thus increasing participation

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in Black Crappie fishing in Florida. For example, by better understanding and tapping into localized food consumption—or *locavore*—trends, Black Crappie fishing could be promoted as another healthy component of a locally-sourced diet.

- ii. *Include Black Crappie fishing techniques in existing programs targeting angler recruitment.*

FWC will incorporate information and hands-on experiences that focus on how to fish for Black Crappie into programs such as Becoming an Outdoors Woman or the Florida Youth Conservation Centers Network. While programs like these are currently set up to teach outdoor skills associated with fish and wildlife, they may not have directed efforts aimed at participating in Florida’s Black Crappie fisheries.



- iii. *Partner with tourism boards and chambers of commerce to promote fishing.*

Collaboration with external groups to start programs that give incentive to fish for Black Crappie is a great way to increase participation in Black Crappie fisheries. Programs such as tagging fish with reward tags have previously inspired traditional and non-traditional Black Crappie anglers to take advantage of the natural resources Florida has to offer. One such program was the Crappiethon, now Crappie USA, which marked and released crappie with reward tags in the 1990s at various central Florida lakes, giving anglers the chance to win rewards by catching tagged fish. Partnering with the local chambers of commerce or tourism boards would be beneficial to promote events like these.

- iv. *Coordinate with FWC’s Boating-as-a-Gateway Strategic Initiative Team to incorporate crappie fishing in their programs.*



FWC survey results have shown that most anglers fishing for Black Crappie in Florida do so by boat. FWC has been charged with strengthening and promoting the conservation connections of boating while protecting people and natural resources and improving boating opportunities. Thus, FWC will work to increase and improve our messages to staff and other stakeholders involved with Black Crappie fisheries and boating activities. This may be in the form of educational, training, promotional, or outreach tools. FWC will also work to improve boating opportunities and access for

Black Crappie fisheries. This will build trust and relationships that can expand responsible boating practices of Black Crappie anglers and staff for the long-term benefit of our natural resources.

v. *Promote quality fisheries to retain anglers.*

Florida is considered the Fishing Capital of the World because of the quality and quantity of its resources. For Black Crappie fisheries to continue to contribute to the retention of Florida’s premiere fishing status, FWC will promote Black Crappie fisheries through education, outreach, and encouraging conservation of Florida’s aquatic resources. If Black Crappie fishing is better than usual at a waterbody or if staff can predict when a fishery will produce high quality results for anglers based on data collected, FWC staff will share that information through various avenues of outreach and media. Making the public aware of quality fishing opportunities will help increase angler participation and satisfaction.

OBJECTIVE 2: INCREASE, MAINTAIN, OR ENHANCE OPPORTUNITIES FOR BLACK CRAPPIE FISHING

ACTION ITEMS:

- i. *Work with local governments as well as state and federal agencies to increase the quantity and quality of access to Florida’s waterways.*

Increasing and enhancing freshwater fishing access is the most direct way to increase fishing opportunities and **angler effort**.

Florida has over 7,700 lakes, ponds, and reservoirs that collectively encompass over three million acres, and the state has close to 12,000 miles of fishable rivers, streams, and canals. While access points for launching a boat and opportunities for shoreline fishing may be plentiful in certain areas, some areas lack them. FWC survey results have shown that most Black Crappie anglers were not satisfied with the number and quality of shoreline fishing opportunities in Florida. By collaborating with local governments and other state and federal agencies (e.g., Florida State Park Service, U.S. Department of Forestry, or Water Management Districts), FWC can help provide additional access opportunities and improve current access for anglers to participate in and enjoy the aquatic natural resources Florida has to offer. FWC staff should work with local comprehensive planners to include projects such as fishing piers, boat ramp construction or improvements, paved parking lots at ramps and shoreline fishing areas, restroom facilities, and improved access for anglers who are elderly or have disabilities.

- ii. *Partner with industry or local governments to create or enhance fishing opportunities at selected water bodies and promote opportunities.*

Cooperative programs provide an avenue for building relationships, increasing ideas through expert opinions and local knowledge, broadcasting opportunities and successes to a wider audience, and gaining financial- and service-related support to accomplish goals. An example of a cooperative freshwater fish program is the partnership between The City of Orlando, Bass Pro Shops, and FWC through which fishing was opened to the public at Turkey Lake. Through this partnership anglers can rent boats equipped with live wells, trolling motors, anchors and depth finders. Concessionaires are present on site to provide anglers with rental fishing poles and bait and tackle. Floating fishing piers and fish attractors have been added to enhance fishing opportunities and satisfaction. Unique management strategies have also been used, such as limiting the number of days anglers can access and fish Turkey Lake by boat, along with

FYI: The [Florida Boating Improvement Program](#) provides funding for public boating access projects.

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limiting the number of anglers who can fish by boat each day. Turkey Lake is also promoted via premiere fishing media outlets such as *Bassmaster* and *Florida Sportsman* magazines. FWC staff will establish and improve relationships with businesses and local governments to create more cooperative programs that increase and enhance unique fishing opportunities.

- iii. *Place fish attractors for Black Crappie in areas that are easy to reach for shore anglers or smaller boats.*

Fish attractors provide quality cover for Black Crappie and their prey, creating fish aggregations that anglers can easily target. There are about [50 freshwater waterbodies in Florida where FWC has installed fish attractors](#). Many fish attractors were strategically placed to maximize their effectiveness for boat anglers, whereas others were installed near piers and bank access areas. Considering that bank angling and fishing from small craft are often starting points for new anglers, enhancing fishing for these methods of angling may recruit and retain more new anglers. As FWC staff continue to install fish attractors around the state, it will be a priority to install attractors that enhance fishing for anglers using shoreline access, piers, and small boats.



- iv. *Improve the quality of Black Crappie fishing in urban waterbodies.*

Freshwater fishing is one of the most popular activities on ponds, lakes, and canals. Many new or casual anglers begin fishing on resources close to home. As urbanization increases in Florida, quality fishing areas in accessible neighborhoods or local parks that provide a safe and friendly atmosphere are crucial to expanding participation in fishing. [Fish Orlando](#) is one example of a program in which FWC staff has worked with local municipalities to develop and improve fishing opportunities to increase angler use and satisfaction. New efforts will be geared towards shoreline fishing opportunities and may include additional fishing areas and piers, fish stocking programs, habitat improvement, family fishing events and tournaments, and incentive-based programs such as reward tags. Focus on urban waterbodies has the potential to positively impact Black Crappie angler recruitment and can benefit future Black Crappie fisheries in Florida.

OBJECTIVE 3: RETAIN EXISTING CONNECTIONS WITH BLACK CRAPPIE ANGLERS

ACTION ITEMS:

- i. *Hold annual regional open houses to promote information exchange.*

Establishing better communication between FWC staff and Black Crappie anglers is important for FWC to understand angler desires and for anglers to stay informed. In-person communication is effective and builds trust. Open house events promote in-person communication and allow FWC staff to present

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current projects, plans for future work, relevant results, and other information that may be of interest to Black Crappie anglers. Open houses also give anglers a chance to express their experiences, offer opinions, make comments, and ask questions. FWC is committed to using more open houses and will promote and plan them to maximize attendance.

- ii. *Partner with external organizations to incentivize participation in Black Crappie angler-recognition programs.*



Incentivized angler recognition programs such as TrophyCatch and ShareLunker have been very successful at promoting Largemouth Bass fishing in Florida and Texas, respectively. Currently, an angler who catches a Black Crappie over 14 inches can submit that fish to FWC's Big Catch program and receive a certificate. A considerable component of the popularity of TrophyCatch has been the incentives given for participation such as gift cards, free tackle, discounts, entry into a bass boat drawing, and a free replica mount for bass weighing at least 13 pounds. Getting the support of external organizations and businesses is a critical part of incentive-based programs to provide prizes and increase publicity, which should ultimately increase angler participation. Initiating an incentive-based program that recognizes anglers and focuses on unique catches of Black Crappie in Florida would highlight to a wide audience what Florida has to offer.

V. MAKE CERTAIN FLORIDA IS RECOGNIZED AS A WORLD CLASS LOCATION TO FISH FOR BLACK CRAPPIE

OBJECTIVE 1: ENSURE THAT BLACK CRAPPIE MANAGEMENT IN FLORIDA IS SOUND, ADAPTIVE, AND INNOVATIVE.

ACTION ITEMS:

- i. *Apply good science, that also addresses social components, to Black Crappie management.*

A component of sound Black Crappie management is that decisions and actions are science-based and data-driven. FWC staff expend considerable effort conducting annual population surveys, **creel surveys**, tagging studies, and other research projects. Results from these efforts are used to verify that Black Crappie management is biologically appropriate and sustainable. To fully complement biologically-based science, FWC staff will also implement social-science techniques in Black Crappie management. Understanding stakeholder opinions, desires, and concerns and ensuring that management decisions and actions address these is equally necessary for effective management.

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ii. Adapt Black Crappie management as needed.

FWC staff expect biological and social conditions associated with Black Crappie fisheries to change through time and will adapt management to meet change. This is facilitated through annual monitoring, regular stakeholder input, and establishing periodic regulation reviews.

iii. Develop and utilize new management approaches.

FWC staff will use biological and social-science data to develop and adopt innovative management techniques. Based on stakeholder input, FWC staff have identified a range of desires that Black Crappie anglers have for their fisheries and the management of those fisheries. Though minimum length limits and reduced bag limits are harvest regulations that many anglers have requested, not all stakeholders are satisfied with uniform management options. Florida has thousands of waterbodies which create the opportunity to offer different or new management strategies at some lakes, perhaps accommodating the desires of more stakeholders within the state.

OBJECTIVE 2: PROMOTE THE RELEVANCE OF FLORIDA'S BLACK CRAPPIE FISHERIES ON LOCAL, REGIONAL, AND NATIONAL LEVELS.

ACTION ITEMS:

i. Seek exposure in print and online media.

Many anglers and outdoor enthusiasts continue to get information through traditional print media. To best feature Florida's superb Black Crappie fisheries, their management, and research, it will be a priority among FWC staff to develop and submit press releases, articles, and updates to media outlets. These will include local newspapers, Florida-specific magazines, national



magazines and web-based publications. Staff will seek to develop professional relationships with outdoor writers to enable FWC to regularly provide updates on current fisheries, highlight exceptional catches, and inform stakeholders of research and management actions.

ii. Create and update relevant sections of www.myFWC.com that feature information on Black Crappie.

MyFWC.com should be the leading online resource for highlighting extraordinary Black Crappie fisheries in Florida. Staff will contribute relevant information on current outstanding fisheries including updates

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about where Black Crappie are being caught, what baits are effective, where to purchase bait, and how to access the waterbodies. This management plan will be a prominent feature on the agency's website and easily accessible. Summaries about life history, monitoring and creel survey results, habitat improvement projects, social science surveys, and research project results will also be included.

- iii. *Publish findings and approaches in appropriate professional journals and conferences.*

Over time, researchers have built a substantial knowledge base of Black Crappie in Florida in professional, peer-reviewed journals. Many of those articles reflect projects conducted by FWC biologists. Staff will continue designing and implementing studies to high scientific standards and strive to share their results through peer-reviewed journals and professional conferences.

- iv. *Seek partnerships and collaborative ventures with outdoor video production companies to highlight Black Crappie fisheries in Florida.*

Anglers and outdoor enthusiasts increasingly share and consume fishing information and experiences through television and online video. FWC staff will take advantage of existing video production resources within FWC and seek external partners to share information about Black Crappie research and management in Florida with the public. Video outlets would provide FWC the opportunity to share Florida-specific Black Crappie biology, research results, and management techniques with thousands of viewers simply by providing knowledge and expertise to existing outlets.



- v. *Increase coordination with tourism boards and chambers of commerce.*

Marketing of Florida's recreational fisheries occurs from local to international scales, but Black Crappie fisheries haven't been heavily featured. However, there are several things that FWC is already doing that would likely be of interest to tourism and promotional groups in Florida that could lead to more marketing focus on Black Crappie. Population monitoring and creel survey data demonstrate the quality of Florida's Black Crappie fisheries. Existing stakeholder survey results show that many of Florida's Black Crappie anglers come from other states and countries. Distribution patterns of these anglers may help focus advertising and marketing efforts. FWC staff will work more with marketing groups, such as VISIT FLORIDA and local tourism boards, to share knowledge and advertise Florida's Black Crappie fisheries.

- vi. *Determine and promote the economic impact of Black Crappie fishing in Florida.*

Development of economic impacts from Black Crappie fishing will help tourism and marketing groups understand the value of promoting these fisheries. Conveying the positive economic impacts that Black Crappie fishing provides to counties, municipalities, corporations, and other local groups will increase interest in working with FWC staff to improve fisheries. This could lead to opportunities to build fishing

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piers, open new access areas, or conduct habitat improvement projects. FWC staff will determine the economic impact of Black Crappie fishing in Florida and provide that information to potential partners to promote and improve Black Crappie fishing opportunities.

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We dedicate this plan to our former colleague, Andrew J. Schaefer (1986–2019). Andrew started his career as a fisheries biologist with FWC in 2011, working first in the Fish and Wildlife Research Institute and, later, in the Division of Freshwater Fisheries Management. Andrew was part of the BCMP team prior to his departure from our agency in 2016 to join the Kansas Department of Wildlife, Parks, and Tourism. He was instrumental in getting this endeavor started. We are grateful for his contributions to the BCMP, to Black Crappie research in Florida, and for his strong commitment to FWC’s mission during his time with us.



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GLOSSARY

angler effort: the amount of time, usually measured in hours, spent fishing.

catch: the quantity of fish caught, including all that are released and all that are kept.

creel survey: a systematic method of interviewing anglers to measure the quantity and species of fish they've caught, kept, and released and the duration of their fishing trip. Creel surveys often occur on the water, called roving creels, as FWC staff use a boat to locate and interview anglers. Access-point creel surveys occur at boat ramps, and FWC staff interview anglers as they return from their fishing trips.

fish attractor: objects placed in the water to provide cover and habitat that concentrate fish in a given area. Fish attractors can be made of many different materials including: brush, rocks, or synthetic materials.

fishing mortality: the proportion of a fish population that dies each year because of fishing, including direct harvest, bycatch, and catch-and-release deaths. Fishing mortality is a component of total annual mortality.

game fish: freshwater species defined as game fish in Florida include: black bass, crappie, bluegill, redear sunfish, warmouth, redbreast sunfish, spotted sunfish, flier, mud sunfish, longear sunfish, shadow bass, peacock bass, white bass, striped bass, and sunshine bass. Freshwater game fish may be taken only by hook and line or rod and reel unless otherwise provided. (Florida administrative code 68A-23.002)

harvest: the quantity of fish caught and kept, which does not include any fish released.

natural mortality: the proportion of a fish population that dies each year due to natural causes, like disease and predation. Natural mortality is a component of total annual mortality.

phytoplankton: microscopic, single-celled plants. Phytoplankton live suspended in the water column at any depth that receives sunlight and serve as the base of the aquatic food chain.

otolith: bones at the base of the skull in bony fishes that help with equilibrium. Because otoliths typically form annual rings, they are reliable for aging most fish.

otter trawl: a large, funnel-shaped net that is towed by a boat to capture offshore fish.

overfishing: fishing mortality that occurs at a level at which reproduction is insufficient for adult fish to replace themselves or excessive harvest of small and young fish, reducing the overall yield of harvest.

recruitment: a measure of reproductive success, usually in terms of the number fish that survive to one year of age or to a catchable size.

sexual maturity: the point in development at which a fish produces viable eggs or sperm.

spawning: reproductive behavior of fish.

stakeholder: any person or group who is significantly affected by or significantly affects wildlife or wildlife management decisions or actions.

stock assessment: the synthesis and interpretation of all available data in evaluating current and alternative fisheries management.

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total annual mortality: the proportion of a fish population that dies per year.

tussocks: floating islands of live plants and muck. Tussocks often continue to grow as more plants, and even trees, establish and add leaf litter to the muck base.

yield: the cumulative weight of fish harvested in a fishery for one year. Yield can be maximized allowing fish to grow before harvest and by harvesting them prior to natural mortality.

zooplankton: microscopic, invertebrate animals that inhabit the water column, feeding on suspended phytoplankton or detritus along the bottom.

APPENDIX A

OBJECTIVES AND ACTION ITEMS OF THE BLACK CRAPPIE MANAGEMENT PLAN

I. MANAGE SUSTAINABLE BLACK CRAPPIE FISHERIES THAT BALANCE BOTH BIOLOGICAL NEEDS AND STAKEHOLDER DESIRES	
Objective 1: Review the effectiveness of Black Crappie harvest regulations in Florida and implement changes where needed.	
Action item i.	Evaluate Black Crappie regulations through comprehensive, science-based, data-driven processes.
Action Item ii.	Evaluate stakeholder support for Black Crappie regulation through sound social-science.
Action Item iii.	Include all relevant FWC Divisions and Sections in a review of Black Crappie regulations.
Action Item iv.	Establish regular review of regulation effectiveness and stakeholder opinion.
Action Item v.	Provide FWC Law Enforcement and customer service staff with the information needed to help educate the public about Black Crappie regulations.
Objective 2: Implement habitat management actions that benefit Black Crappie fisheries in collaboration with internal and external partners.	
Action Item i.	Collaborate with Aquatic Habitat Restoration/Enhancement Section and local partners to restore or enhance Black Crappie habitats.
Action Item ii.	Coordinate with the Invasive Plant Management Section to maintain natural plant communities and open water habitats conducive to Black Crappie fisheries.
Action Item iii.	Coordinate with other government agencies and non-government organizations on water level fluctuations and fishing access that best suit Black Crappie fisheries.
II. EVALUATE AND ADDRESS BLACK CRAPPIE RESEARCH NEEDS TO INFORM MANAGEMENT DECISIONS	
Objective 1: Establish a comprehensive knowledge of Black Crappie life history traits in Florida.	
Action Item i.	Synthesize existing Black Crappie data and study results.
Action Item ii.	Expand studies of reproductive biology.
Action Item iii.	Continue to develop and implement tagging studies that measure fishing mortality.
Action Item iv.	Expand our understanding of natural mortality across diverse waterbodies.
Action Item v.	Identify variables that most influence recruitment of Black Crappie in Florida.

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Objective 2: Develop Black Crappie stock assessments to inform management decisions.	
Action Item i.	Use age-structured population models and Virtual Population Analysis (VPA) to evaluate overfishing, harvest restrictions, and other fishery characteristics.
Objective 3: Understand optimal habitat conditions for Black Crappie and their prey in Florida.	
Action Item i.	Identify which types of aquatic vegetation and substrate Black Crappie prefer for spawning habitat.
Action Item ii.	Determine the optimum ratio of open water to vegetation coverage for Black Crappie populations and fisheries.
Action Item iii.	Identify habitat and forage relationships of Black Crappie.
Action Item iv.	Identify the optimal types, sizes, and locations of fish attractors to maximize their utility to Black Crappie and anglers.
Objective 4: Evaluate hatchery and stocking strategies for creating and enhancing Black Crappie fisheries in Florida.	
Action Item i.	Assess the efficacy and efficiency of current hatchery production techniques.
Action Item ii.	Determine waterbody characteristics that foster the best opportunities for successful stocking.
Action Item iii.	Assess genetic characteristics of Black Crappie populations across Florida and ensure that stocking practices preserve genetic integrity.
III. ENGAGE WITH INTERNAL (FWC) AND EXTERNAL (NON-FWC) STAKEHOLDER GROUPS TO IMPROVE UNDERSTANDING AND SUPPORT OF BLACK CRAPPIE MANAGEMENT IN FLORIDA	
Objective 1: Establish the role of stakeholder involvement in management decision making	
Action Item i.	Identify appropriate stakeholders and their interests.
Action Item ii.	Ensure the appropriate level of stakeholder involvement in management decisions.
Action Item iii.	Determine when stakeholders are best involved.
Action Item iv.	Utilize diverse methods to communicate with and engage stakeholders.
Objective 2: Foster public awareness of FWC management and research techniques and how they are incorporated into Black Crappie management decisions.	
Action Item i.	Inform internal divisions and sections about the importance of Black Crappie fisheries in Florida.
Action Item ii.	Make better use of existing outreach tools to communicate with stakeholders.
Action Item iii.	Expand outreach capacities on Black Crappie management.
Action Item iv.	Encourage the formation of organized stakeholder groups to foster communication.

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Objective 3: Involve other government entities and non-government organizations in Black Crappie management to promote shared interest and success.	
Action Item i.	Identify organizations and agencies that may affect or be affected by Black Crappie management activities or decisions.
Action Item ii.	Communicate shared benefits of partnering in Black Crappie management to develop and enhance working relationships with other government agencies and non-government organizations.
Action Item iii.	Collaborate with other state fish and wildlife agencies that manage Black Crappie.
IV. ENSURE LONG-TERM PARTICIPATION IN BLACK CRAPPIE FISHING IN FLORIDA	
Objective 1: Increase participation in Black Crappie fishing from traditional and non-traditional groups.	
Action Item i.	Utilize social science techniques to determine traits and interests of non-traditional groups and then tailor outreach accordingly.
Action Item ii.	Include Black Crappie fishing techniques in existing programs targeting angler recruitment.
Action Item iii.	Partner with tourism boards and chambers of commerce to promote fishing.
Action Item iv.	Coordinate with FWC's Boating-as-a-Gateway Strategic Initiative Team to incorporate crappie fishing in their programs.
Action Item v.	Promote quality fisheries to retain anglers.
Objective 2: Increase, maintain, or enhance opportunities for Black Crappie fishing.	
Action Item i.	Work with local governments as well as state and federal agencies to increase the quantity and quality of access to Florida's waterways.
Action Item ii.	Partner with industry or local governments to create or enhance fishing opportunities at selected water bodies and promote opportunities.
Action Item iii.	Place fish attractors for Black Crappie in areas that are easy to reach for shore anglers or smaller boats.
Action Item iv.	Improve the quality of Black Crappie fishing in urban waterbodies.
Objective 3: Retain existing connections with Black Crappie anglers	
Action Item i.	Hold annual regional open houses to promote information exchange.
Action Item ii.	Partner with external organizations to incentivize participation in Black Crappie angler-recognition programs.

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V. MAKE CERTAIN FLORIDA IS RECOGNIZED AS A WORLD CLASS LOCATION TO FISH FOR BLACK CRAPPIE	
Objective 1: Ensure that Black Crappie management in Florida is sound, adaptive, and innovative.	
Action Item i.	Apply good science, that also addresses social components, to Black Crappie management
Action Item ii.	Adapt Black Crappie management as needed.
Action Item iii.	Develop and utilize new management approaches.
Objective 2: Promote the relevance of Florida's Black Crappie fisheries on local, regional, and national levels.	
Action Item i.	Seek exposure in print and online media.
Action Item ii.	Create and update relevant sections of www.myfwc.com that feature information on Black Crappie.
Action Item iii.	Publish findings and approaches in appropriate professional journals and conferences.
Action Item iv.	Seek partnerships and collaborative ventures with outdoor video production companies to highlight Black Crappie fisheries in Florida.
Action Item v.	Increase coordination with tourism boards and chambers of commerce.
Action Item vi.	Determine and promote the economic impact of Black Crappie fishing in Florida.

APPENDIX B

BEHAVIORS, ATTITUDES, AND PERSPECTIVES OF FLORIDA’S BLACK CRAPPIE ANGLERS

INTRODUCTION

The Florida Fish and Wildlife Conservation Commission (FWC) has developed a Black Crappie Management Plan that outlines objectives for managing sustainable Black Crappie (*Pomoxis nigromaculatus*) fisheries by balancing biological needs and stakeholder desires. As part of the effort to include stakeholder input into the management plan, FWC conducted a state-wide survey of Black Crappie anglers as well as semi-structured interviews with businesses that are associated with these fisheries. The surveys sought to understand Black Crappie angler fishing behaviors and their attitudes towards management actions. The interviews sought to better understand the impacts of Black Crappie fisheries on local businesses and to gain insight into business owners’ and managers’ interactions with Black Crappie anglers.

METHODS

We used a mixed-mode survey consisting of an online survey of 10,000 licensed Florida freshwater anglers as well as approximately 3,500 printed surveys distributed by various methods across Florida. Approximately 1,600 printed surveys were left for anglers to pick up at bait and tackle shops, fish camps, and other retail locations. Over 1,300 printed surveys were handed to Black Crappie anglers during creel surveys at 19 waterbodies (Table B.1). Additional printed surveys were handed out by FWC staff at Black Crappie tournaments, fishing club meetings, and other non-organized encounters with Black Crappie anglers. The online survey was available for response from November 2017 to May 2018. Printed survey distribution occurred during October 2017–May 2018. An initial pilot survey was sent to a sample of about 500 crappie anglers. The pilot survey was used to test the reliability and validity of survey items with a subset of the target population.

Table B.1. Locations of angler creel surveys used in distributing the Black Crappie angler survey.

Waterbody – (County)
Big Henderson/Tsala Apopka – (Citrus)
Crescent Lake – (Putnam)
L-67A canal – (Broward)
Lake Bryant – (Marion)
Lake George – (Volusia)
Lake Griffin – (Lake)
Lake Harris – (Lake)
Lake Okeechobee – (Okeechobee)
Lake Talquin – (Leon)
Lake Tarpon – (Pinellas)
Lake Trafford – (Collier)
Lake Weir – (Marion)
Lochloosa Lake – (Alachua)
Mosaic FMA – (Polk)
Newnans Lake – (Alachua)
Rodman Reservoir – (Putnam)
Santa Fe Lake – (Alachua)
St. Johns River – (Seminole)
Tenoroc FMA – (Polk)

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The survey covered an array of behaviors and preferences from frequency and location of trips, preferences for size at harvest, motivations to fish, and opinions about various management actions (Complete survey included as Appendix C below).

Statistical analyses included t-tests, ANOVA with Tukeys post-hoc comparisons, and Fisher's exact tests. JMP 14 software was used for all statistical analyses.

In addition to the angler survey, interviews were conducted with 14 local businesses associated with Black Crappie fishing. A sample of business owners who had interacted with the FWC was chosen. We used a snowball method of referrals, wherein business owners referred FWC staff to additional contacts that would be interested in participating.

Survey Results

ANGLER CHARACTERISTICS

Respondents were overwhelmingly white males, but 9% of respondents were female and 8% were non-white. The greatest percentage of respondents (45%) fell within the 45–64 age demographic, followed by 65+ (43%). Ten percent of respondents fell between ages 25–44; only 2% were age 24 or younger. Anglers were well distributed across the state (Figures B.1 and B.2). Seventy-six percent were Florida residents. Non-resident anglers were largely from midwestern states, but numerous anglers came from other locations across the U. S., with survey participants from a total of 26 states (Figure B.2).

Thirty-five percent of survey respondents fish for Black Crappie with a license exemption. These anglers were largely (76%) exempted as Florida residents over the age of 65.

Twenty-four percent of Black Crappie anglers were not Florida residents. Among those visiting anglers, 84% said Black Crappie fishing was an important reason for their decision to visit Florida.

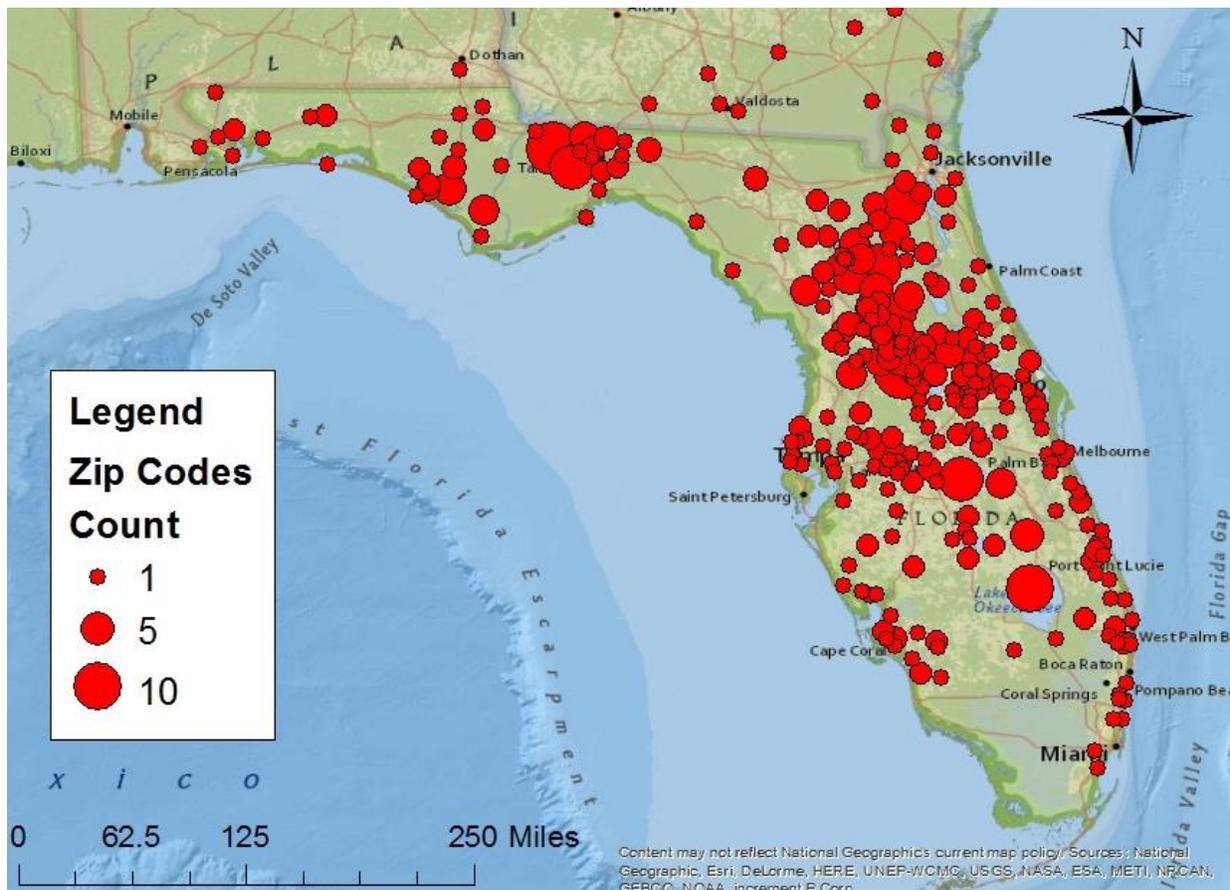


Figure B.1. Respondents in Florida by zip code.

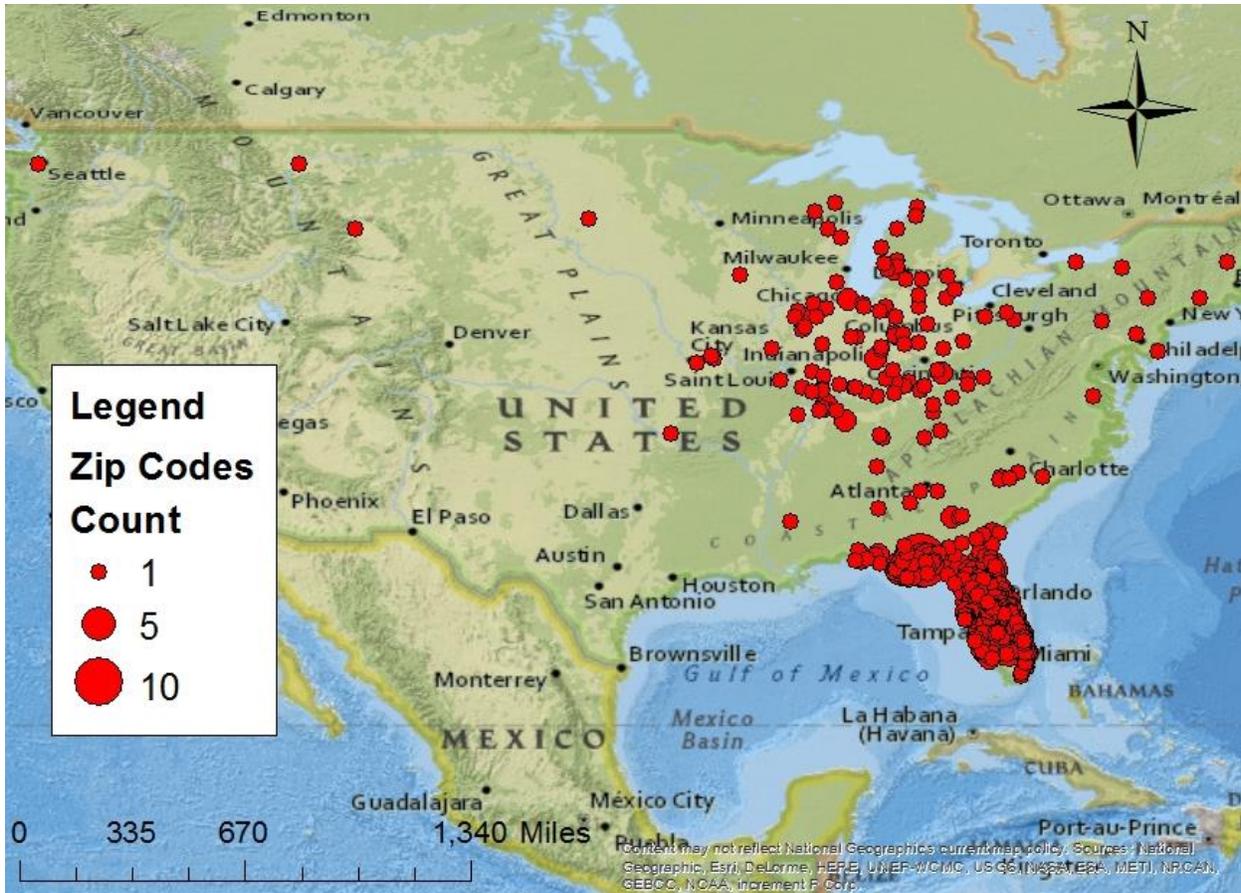


Figure B.2. Respondent locations by zip code, nationwide.

ECONOMIC IMPACTS

On average, anglers spent \$69 on a single Black Crappie trip and, overall, spent \$872 on fishing trips in a year. These estimates include items like fuel, food, lodging, tolls, entrance/ramp fees, rental boats, bait, and small tackle (hooks, sinkers, floats). They spent an additional \$1,510 per year on durable goods (large tackle such as rods and reels, boats, boat parts and maintenance). The estimated total statewide trip expenditures on Black Crappie fishing was \$66,274,616 per year and \$114,764,530 was spent on durable goods. The 2017 Florida fishing license database included 475,020 freshwater anglers and a 2016 statewide survey of Florida’s freshwater anglers showed that 16% said they targeted Black Crappie most or all of the time. Therefore, these economic expenditure estimates are based on 76,000 Black Crappie anglers in Florida. The expenditure estimates only considered licensed anglers and 35% of survey respondents had license exemptions. Thus, these expenditure estimates are likely lower than actual expenditures based on survey results.

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FISHING BEHAVIORS AND PREFERENCES

The median number of trips taken in the past year was 9.11, and there was a significant difference in the number of trips by age ($F = 6.50$, $p < 0.01$, Table B.2). Post hoc analyses showed that anglers over 65 fished significantly more than all other ages ($p < 0.01$). Those under 24 were not considered in the analyses due to the low number of responses. Additionally, anglers who fished primarily by boat had significantly more trips ($N = 654$, $M = 22.55$) than anglers who fished primarily from shore ($N = 95$, $M = 14.94$, $t = -2.80$, $p < 0.01$). Overall, anglers spent an average of 5 hours fishing per trip.

Table B.2. Mean number of trips taken by angler age.

Age	Number	Mean	Std Dev	Std Err Mean
16 and younger	3	N/A	N/A	N/A
17–24	8	N/A	N/A	N/A
25–34	15	5.80	6.55	1.69
35–44	35	9.11	11.66	1.97
45–54	72	8.24	9.01	1.06
55–64	180	27.02	46.13	3.44
65 and older	267	30.96	35.23	2.16

The average distance to the nearest Black Crappie waterbody was 18 miles, but anglers normally traveled an average of 33 miles (one way) to fish for crappie and were willing to travel 62 miles (one way) if they knew the bite was good. Anglers who fished most often from shore did not travel as far for a normal trip, nor were they willing to travel as far if the fishing was good (Table B.3). The lakes listed as being fished most based on survey responses are outlined in Table B.4. However, it is important to consider that the lakes listed as fished are likely dependent on the number of surveys handed out at particular waterbodies or areas of the state.

Table B.3. Distances traveled for shore and boat anglers

	<u>Shore</u>		<u>Boat</u>		t-test	p
	M	SD	M	SD		
Distance normally traveled	19.28	34.98	35.30	96.76	-3.10	0.00
Distance willing to travel	51.67	47.48	63.41	96.76	-1.91	0.02

Table B.4. Top 10 Florida waterbodies for Black Crappie fishing based on survey respondents.

Lake	Total Responses
Lochloosa	118
Okeechobee	100
Orange	77
Newnans	67
Talquin	66
St Johns River	62
Griffin	59
Kissimmee	50
Crescent	37
Monroe	32

Anglers were asked to rank the reasons they chose particular waterbodies among seven choices. Access was the top choice, with past success and a good fishing report rounding out the top three (Figure B.3).

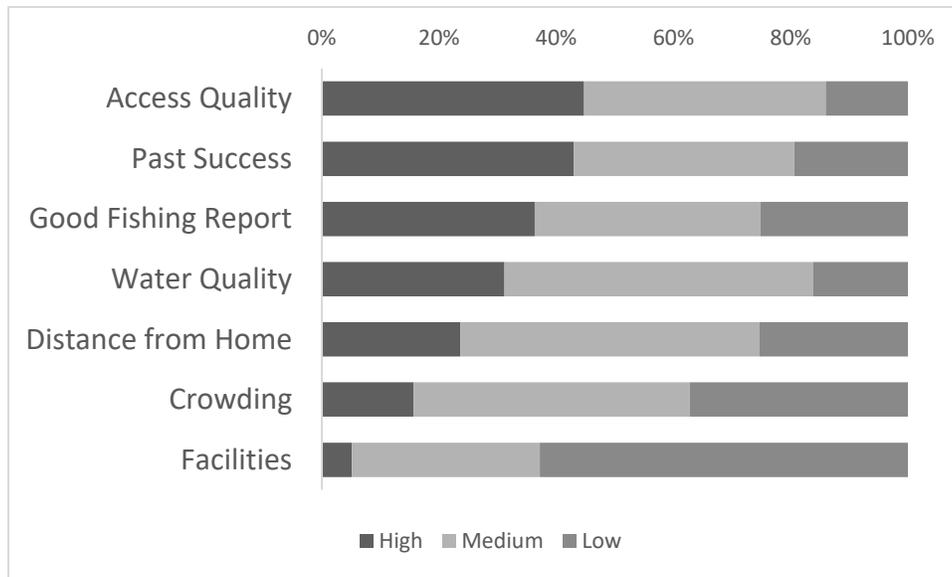


Figure B.3. Factors affecting angler decisions to fish particular waterbodies. Rankings were condensed from seven to three choices to create High (1–2), Medium (3–5), and Low (6–7).

MOTIVATIONS TO FISH FOR BLACK CRAPPIE

When asked to rank factors that contribute to a successful day of fishing, there was a diversity of rankings, with “being out on the water” as the top motivation, while “keeping a limit” was the lowest ranked factor (Figure B.4). Most anglers (58%) thought that keeping between 6 to 10 and 11 to 15 crappie in a trip would make them feel as if they had a successful day (Figure B.5). Anglers aged 35–44 were significantly more likely to say they didn’t need to keep any fish to have a successful day ($p < 0.05$). Residents were significantly more likely than non-residents to say they didn’t need to keep any fish to have a successful day ($p < 0.05$). Anglers that fished frequently from the shore

were also significantly more likely than boat anglers to say they didn't need to keep any fish to have a successful day (p < 0.05).

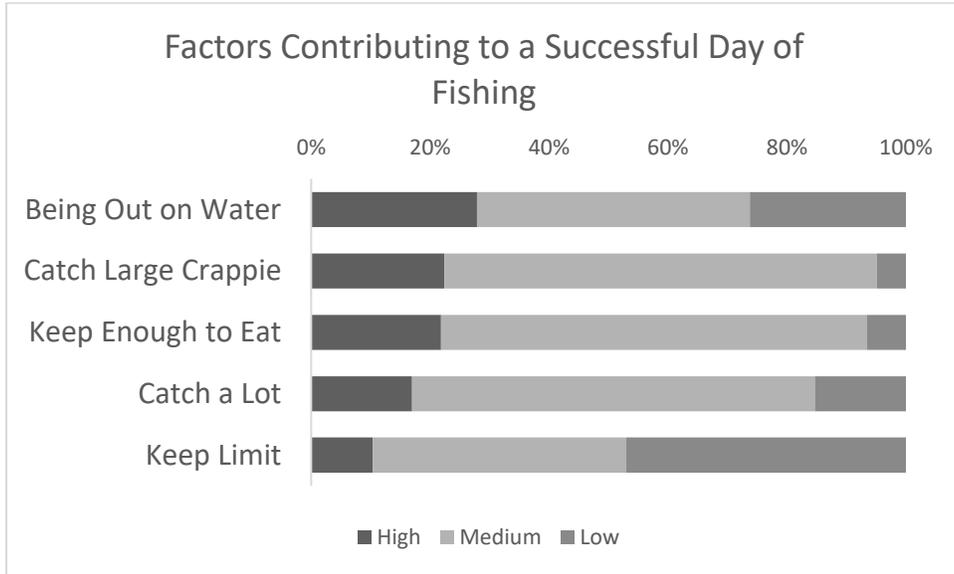


Figure B.4. Ranking of factors that contribute to a successful day of fishing. Rankings were condensed to High (1), Medium (2–4), and Low (5).

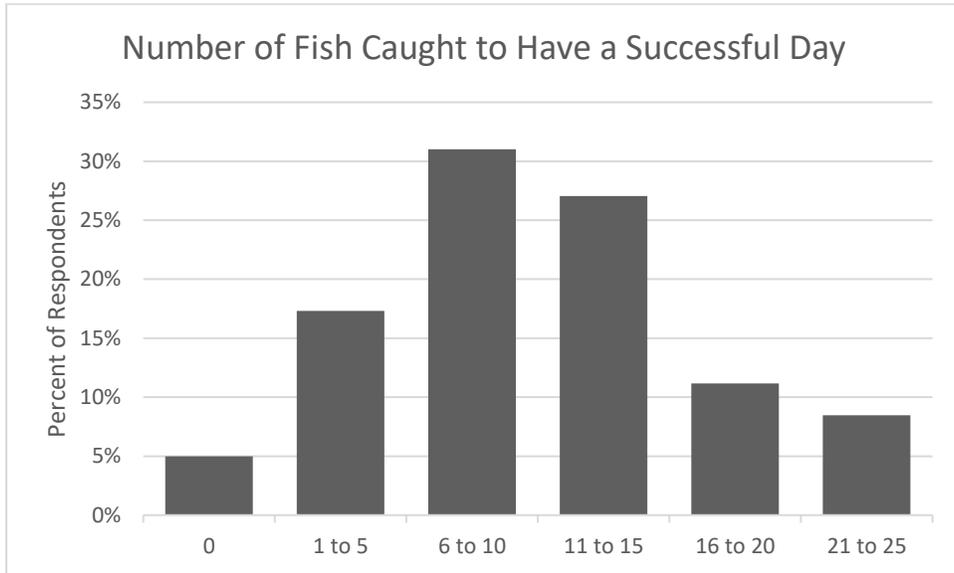


Figure B.5. Number of fish anglers would need to catch to have a successful day of fishing.

PATTERNS IN HARVEST

Most anglers (56%) indicated they never caught and kept their limit (25 per person). Twenty-one percent indicated catching and keeping a limit about once in every 10 trips; 15% did so once in five trips; 6% once in every two trips; and only 2% caught and kept a limit every trip. There were no significant differences by angler characteristics (e.g., age, race, residency) of whether they caught and kept their limit except frequency of fishing. Anglers who fished less than 10 times per year were significantly more likely to never catch and keep a limit of fish than anglers who fished more often ($p < 0.05$).

To estimate vulnerability to harvest, anglers were given a range of Black Crappie sizes from 4–15 inches and asked to indicate which sizes of fish they would usually keep or release. Anglers indicated very little harvest for Black Crappie less than 10 inches in length, and sizes between 4 and 9 inches were much more likely to be released than harvested (Figure B.6). Anglers indicated the highest probability of harvest for 12-inch Black Crappie. Interestingly, the probability of harvest decreased slightly for sizes 13-inches and greater.

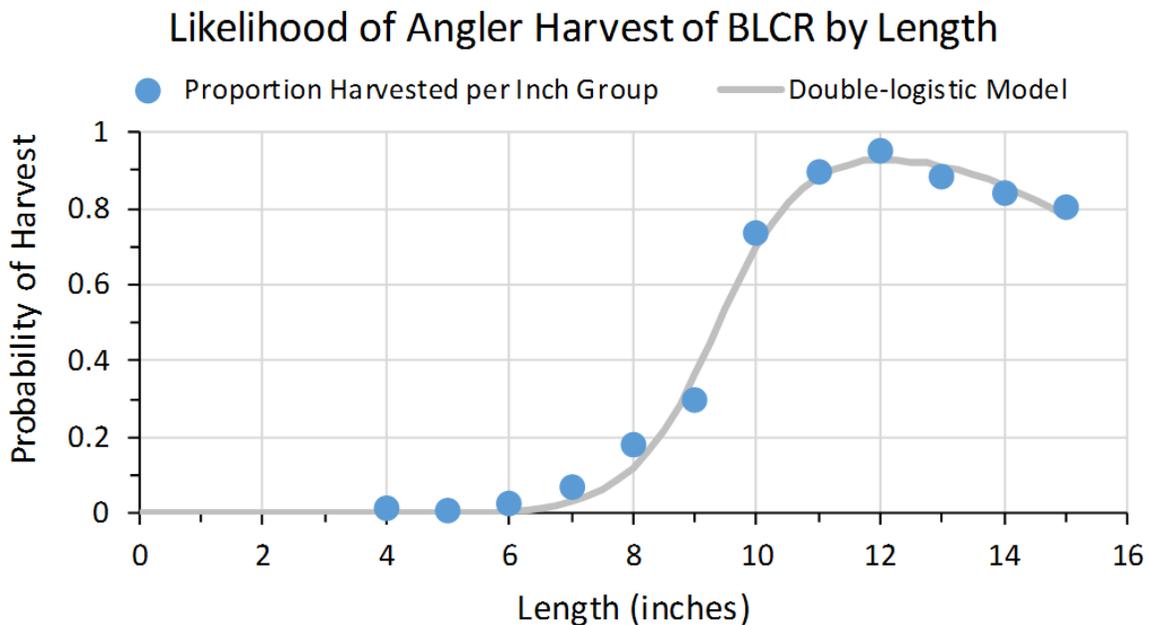


Figure B.6. Likelihood of harvest across length for Black Crappie.

OPINIONS ABOUT MANAGEMENT OF BLACK CRAPPIE

The majority (62%) of anglers were satisfied (satisfaction being a response of 1 or 2) with the overall quality of Black Crappie fishing. Half of respondents indicated that they only fished by boat. Among those anglers who did not exclusively fish by boat, 35% were (somewhat to very) dissatisfied and 42% were (somewhat to very) satisfied with the number of shoreline opportunities, with 23% neutral opinions (Figure B.7). Forty percent were dissatisfied and 34% were satisfied with the quality of shoreline opportunities with 26% neutral opinions.



Figure B.7. Satisfaction with the number of opportunities to fish from shore and the quality of shore fishing opportunities.

Fifty-eight percent agreed that FWC does a good job managing Black Crappie, 27% had neutral responses, and 15% disagreed. When asked if no minimum length limit was appropriate, 54% of anglers disagreed, 14% were neutral, and 31% agreed. In other words, most anglers would like to see a length limit. Most anglers also agreed that FWC does a good job enforcing Black Crappie regulations (56%), with 23% neutral and 21% disagreeing.

In terms of maintaining healthy Black Crappie fisheries in Florida, most anglers believed that adopting a state-wide size limit (53%) and managing habitat (69%) were very important (Figure B.8). The majority (55%) thought adopting tackle restrictions were not at all important and opinions about changing the bag limit were split with 40% thinking it was somewhat to very important, 39% thinking it was not important to not at all important and 22% responding with neutral opinions.

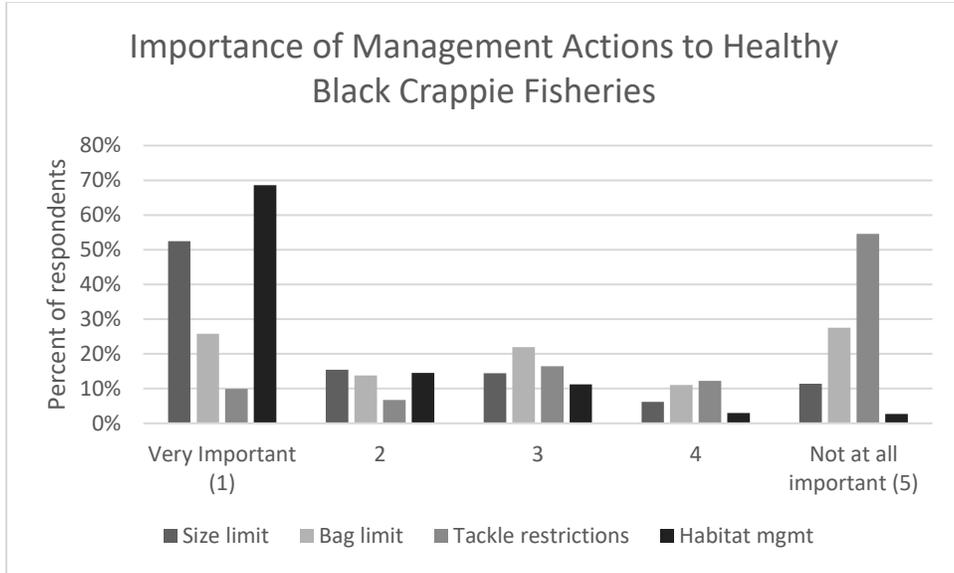


Figure B.8. The importance of various management actions to maintaining healthy Black Crappie fisheries.

When asked about their satisfaction with FWC marked fish attractors, most anglers had neutral opinions regarding the number and quality of these devices. However, when asked if they wanted to see more fish attractors and if FWC should improve the quality of attractors, 55% of anglers agreed there should be more attractors and 50% thought they should be improved. Twenty percent disagreed that FWC should put additional attractors out with 24% having a neutral opinion. Additionally, 20% disagreed that the attractors needed to be improved with 30% having neutral opinions.

PERCEPTIONS OF THREATS TO BLACK CRAPPIE

When asked to identify the severity of different threats (on a scale of 1 to 4 with 1 being no threat and 4 being a serious threat) to Black Crappie populations in Florida, anglers identified each item as a moderate threat (Table B.5).

Table B.5. Threats to Black Crappie populations.

Threat	Mean Score	SD
Reduced water levels	2.78	0.96
Too many crappie being kept	2.79	1.07
Aquatic plant infestations	2.88	0.95
Diminished water quality	2.89	1.00
Herbicide (spraying of aquatic plants)	2.97	0.97
Non-native fish displacing crappie	3.00	1.01
Illegal harvest (exceeding daily bag limits)	3.04	1.02
Too many small crappie being kept	3.15	1.02

INTERVIEW RESULTS

Staff conducted 14 interviews of business owners involved in the Black Crappie fishery across the state. Most of the businesses were bait and tackle shops with several offering additional services such as cabins, RV spots, guide services, boat rentals, and boat maintenance and repair. Most of these businesses were family owned with some having over 50 years of service at their locations.

The Black Crappie fishery is largely seasonal, and respondents noted that crappie related sales occurred between November and April. This also coincides with an influx of seasonal residents from out of state. Respondents noted that winter residents and vacation anglers tend to come from the Midwest and Southern states. During peak season, Black Crappie sales accounted for up to 75% of some businesses' sales. Because of the wide variety of supplies and services offered, there was a diversity of sales from bait (minnows) and tackle to snacks, boat rentals, ramp fees, and lodging.

Six businesses explicitly mentioned lasting impacts from Hurricanes Irma and Maria when asked about the status of fisheries in their areas. Five businesses noted a decline in the quality of the fishery while eight mentioned good seasons this past year. Some noted that the Black Crappie fisheries are inconsistent or that some waterbodies in their areas were doing well while others were not. Three business owners mentioned that their out-of-town anglers thought Florida's Black Crappie were larger overall than in their home states and they believed that was a driver for these anglers to stay in Florida. Concerns they've heard from anglers included the threat of overharvest, concerns about plant management and spraying, water clarity (noting that some areas have been murky or muddy since the hurricanes), and lack of enforcement presence.

Overall, businesses were happy with the materials FWC provides but would like to have access to more regulation books. Four businesses said it was sometimes difficult to get enough regulation books, with one respondent suggesting that there should be a way to order these books directly from FWC instead of relying on FWC staff to drop them off regularly. One business owner requested more information about TrophyCatch and would like to see a Black Crappie angler recognition program.

Most of the business owners mentioned the regulations were easy for anglers to understand and the only point of confusion was on resources that had a 10" minimum length limit. A business owner in Okeechobee mentioned that some anglers either did not know about the 10" minimum length limit or they didn't know it only applied to Lake Okeechobee and was not a statewide regulation. Five business owners mentioned their anglers would like to see a size limit in addition to the bag limit and three mentioned that they know of anglers who have self-imposed size limits. They argued that since anglers are already releasing smaller fish, they would be likely to support a state-wide minimum length limit. Ten respondents noted a lack of enforcement, with three of them mentioning that they recognize officers are spread thin throughout the state. One interviewee thought that Law Enforcement was more concerned with safety issues such as obeying speed limits than they were with enforcement of fishing regulations. Another interviewee mentioned that the consequences for exceeding the bag limits were not severe enough and would not prevent anglers from risking citation. Twelve of the business owners said their anglers complained of overharvest, mainly anglers who "double dip" by getting their bag limits then returning to the water the same day to get multiple limits. While some business owners mentioned that their anglers mostly complained of out of state anglers overharvesting, some also mentioned that this was an issue with local anglers as well and suggested that it could be tied to illegal sales of Black Crappie.

APPENDIX C

ANGLER SURVEY

2017/18 Black Crappie Angler Survey



The Florida Fish and Wildlife Conservation Commission (FWC) is in the process of developing a new statewide black crappie (also called speckled perch or specks) management plan. We want to know your thoughts about black crappie fishing as well as FWC management of this species.

Please take 10–15 minutes to give us your feedback. This will help FWC develop our management strategies in the future.

We greatly appreciate your time and effort.

You may also complete this survey online at <https://goo.gl/EtxZ94>



Black Crappie Management Plan

- 1.) About how many fishing trips did you take (in Florida) in the past 12 months where you primarily fished for crappie? _____ trips
- 2.) Of the following choices, what do you consider a successful day of crappie fishing? Please rank the following from 1 (most contributes to a successful day) to 5 (least contributes to a successful day):
 - _____ Catching a lot of fish
 - _____ Keeping your limit of fish
 - _____ Keeping enough fish to eat
 - _____ Catching large crappie
 - _____ Just being out on the water
- 3.) On an average trip, how many crappie would you need to keep (per person) to feel like you've had a successful day?
 - 0 1-5 6-10 11-15 16-20 21-25
- 4.) How often do you catch and keep your limit of 25 crappie per person per day?
 - Every trip Once in every 2 trips Once in every 5 trips
 - Once in every 10 trips Never
- 5.) We want to know what size crappie you usually keep versus throw back. Across the range of lengths **mark an "X" over sizes that you would keep** if you caught a crappie that size. For sizes that you would throw back, leave that box blank.

5"	6"	7"	8"	9"	10"	11"	12"	13"	14"	15"
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- 6.) How often do you fish for crappie:

	Very often (1)	2	3	4	Very rarely (5)	N/A
From banks, docks, or piers	<input type="checkbox"/>					
From non-motorized boats (canoes, kayaks, etc.)	<input type="checkbox"/>					
From motorized boats	<input type="checkbox"/>					

For questions 7–10, please answer using your home base or lodging in Florida as your reference.

- 7.) Approximately, how close is your nearest crappie fishing lake in Florida (one way)? _____ miles
- 8.) How far do you normally travel to fish for crappie in Florida (one way)? _____ miles
- 9.) If you knew the bite was good, what is the farthest you would travel (in Florida) to fish for crappie (one way)? _____ miles
- 10.) Tell us the 3 lakes/bodies of water you most frequently fish for crappie:

- 11.) Rank the relative importance of the following factors that could affect your decision to fish a specific water body from 1 (most important) to 7 (least important).
- _____ Access quality (boat ramps, piers, or shore)
 - _____ Water quality
 - _____ Crowding
 - _____ Facilities (restrooms, parking, etc.)
 - _____ Distance from home
 - _____ A good fishing report (you've heard the bite is good)
 - _____ Past success
- 12.) How satisfied are you with the following?

	Very satisfied (1)	2	3	4	Very dissatisfied (5)	I only crappie fish by boat
The number of shoreline fishing opportunities (including docks and piers) near me	<input type="checkbox"/>					
How good the shoreline fishing is near me (including docks and piers)	<input type="checkbox"/>					

Black Crappie Management Plan

13.) Of the following choices, rank these sources of fishing information by what you're most likely to use from 1 (most likely to use) to 4 (least likely to use).

- _____ In-person conversation
- _____ Social media (Twitter, Instagram, YouTube, Facebook)
- _____ Online resources (websites, forums)
- _____ Traditional media (newspaper, TV, radio)

14.) How much time do you normally spend fishing for crappie **per trip**? _____ hours

15.) Approximately, how much do you normally spend **per crappie fishing trip**? This should include items like fuel, food, lodging, tolls, entrance fee, rent/charter boat, bait, small tackle (such as hooks, sinkers, and floats) but **not include** large tackle (such as fishing rods or tackle boxes), and durable goods. \$_____

16.) Approximately, how much did you spend in total on durable goods used for crappie fishing **in the past 12 months**? This should include large tackle (such as fishing rods or tackle boxes), and other equipment such as boats and boat parts but **not include** items listed in question 15. \$_____

17.) To what extent do you agree or disagree with the following statements about crappie fishing and FWC?

	Strongly agree (1)	2	3	4	Strongly disagree (5)
I am satisfied with the general quality of crappie fishing in Florida.	<input type="checkbox"/>				
FWC does a good job managing crappie.	<input type="checkbox"/>				
FWC does a good job enforcing crappie regulations.	<input type="checkbox"/>				
The current state-wide regulation of 25 crappie per angler per day is appropriate.	<input type="checkbox"/>				
The current state-wide regulation of no length limit for crappie is appropriate.	<input type="checkbox"/>				

Black Crappie Management Plan

18.) How much of a threat are the following, in your opinion, to healthy crappie populations in Florida?

	Not a threat at all (1)	2	3	A serious threat (4)
Diminished water quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Illegal harvest (exceeding daily bag limits)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many crappie being kept	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many small crappie being kept	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Herbicide (spraying of aquatic plants)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic plant infestations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced water levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-native fish displacing crappie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (describe) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19.) How important are the following, in your opinion, to maintaining healthy crappie fisheries in Florida?

	Very important (1)	2	3	4	Not important at all (5)
Adopting a state-wide size limit	<input type="checkbox"/>				
Changing the state-wide bag limit	<input type="checkbox"/>				
Adopting restrictions for tackle/equipment	<input type="checkbox"/>				
Managing habitat	<input type="checkbox"/>				

Black Crappie Management Plan

20.) How satisfied are you with the following?

	Very satisfied (1)	2	3	4	Very dissatisfied (5)	N/A
The number of FWC-marked fish attractors on lakes I crappie fish	<input type="checkbox"/>					
The quality of FWC-marked fish attractors on lakes I crappie fish	<input type="checkbox"/>					

21.) To what extent do you agree or disagree with the following statements?

	Strongly agree (1)	2	3	4	Strongly disagree (5)
I would like to see more FWC-marked fish attractors on lakes I crappie fish.	<input type="checkbox"/>				
FWC should improve the quality of fish attractors.	<input type="checkbox"/>				

22.) Do you currently fish for crappie by way of a license exemption?

- No, I do not qualify for a license exemption
- Yes, over 65 Florida resident
- Yes, under 16
- Yes, cane pole in my county of residence
- Yes, Florida resident disabled person hunting and fishing certificate
- Yes, other

23.) What is your gender?

- Male Female

24.) Which of the following best represents your race/ethnicity? (check all that apply)

- White Black/African American Hispanic
 Asian American Indian/Alaskan Native
 Native Hawaiian or Pacific Islander
 Other (please indicate) _____

25.) In what year were you born? _____

26.) What is your home zip code? _____

27.) Are you a Florida resident?

- Yes No



If no, how important was crappie fishing to your decision to visit Florida?

- Very important
 Moderately important
 Slightly important
 Not at all important

We greatly appreciate your participation in this survey. If you have any additional comments, please write them in the space provided.

To mail this survey back to FWC, please seal booklet with the adhesive tabs provided.