LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISH SECTION

HODGES GARDEN STATE PARK

LAKE MANAGEMENT REPORT

January 2014

Lake History and General Information

Hodges Garden Lake and surrounding grounds were acquired in 2007 by the Louisiana Department of Culture, Recreation and Tourism. The property now serves as Hodges Garden State Park. Staff from Hodges Garden State Park contacted Louisiana Department of Wildlife & Fisheries regarding a fisheries assessment and management recommendations for the lake. Hodges Garden State Park staff expressed concern that largemouth bass harvest may be excessive. During related meetings, Hodges Garden State Park staff requested guidance for long term management of the lake. To that end, the following management plan for Hodges Garden State Park Lake has been prepared and is respectfully submitted.

Physical Description

Hodges Garden State Park Lake is a 215 acre impoundment in Sabine Parish near Florien, LA. The lake was formed by the impoundment of a rock quarry in 1954. The lake has a watershed of 900 acres. The ratio of watershed to lake is low at 4:1. The shoreline is 4.9 miles in length. Pool stage is 295 feet above mean sea level. Average depth of 20 feet and maximum depth is 50 feet. The control structures includes a 34 foot spillway and two 36 inch standpipe structures. Both standpipe structures are inoperable.

Management Goals

Hodges Garden State Park Lake serves multiple functions, but the primary management goal is related to the renowned aesthetic qualities of the property. Aquatic recreational opportunities, including boating and angling are beneficial by-products of that primary management goal.

Biological Sampling

Standardized sampling is the utilization of identical or nearly identical sampling methodologies on a routine basis to estimate the following characteristics of a fish population and/or community:

1. Relative abundance (no. /acre)
2. Size class structure (no. /length group)
3. Species composition
4. Recreational catch
5. Physicochemical characteristics

The following gears have been used to sample the fish community in Hodges Garden State Park Lake since 2007:

1. Electrofishing – a boat mounted electrofishing unit is used to direct current into the water through a single boom to stun fish for capture. This is an efficient method of collecting fish throughout the littoral zone of a waterbody without harming the fish. Once captured, fish can be identified, measured, and weighed before being returned to the water. This sampling method is used to determine relative abundance and size class structure of largemouth bass and the species composition of fish in a waterbody.

2. Shoreline seine – a 25 foot by 6 foot net with 3/16 diameter mesh is used to collect fish in shallow areas along the shoreline. The net is outfitted with a float line, at the top of the net, a lead line, at the bottom of the net, and two poles at either end of the net. This design allows

two people to haul the net through the water while the lead line keeps the net on the lake bottom and the float line keeps the net stretched throughout the water column. This sampling method is used to determine largemouth bass reproductive success and composition of smaller fish in a waterbody.

3. Gill nets - vertical panels of netting normally set in a straight line. Fish may be caught by gill nets in 3 ways: (1) wedged – held by the mesh around the body (2) gilled – held by mesh slipping behind the opercula, or (3) tangled – held by teeth, spines, maxillaries, or other protrusions without the body penetrating the mesh. Gill nets are size selective depending on mesh size. The LDWF deploy 100 yards of 6 foot deep gill nets of four different mesh sizes, 2.5, 3.0, 3.5, and 4.0 inches. This sampling method is used to determine the relative abundance of gizzard shad, large predatory fish and commercial fish species.

Species Composition

Fish species collected by LDWF: largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), longear sunfish (*Lepomis megalotis*), warmouth (*Lepomis gulosus*), threadfin shad (*Dorosoma petenense*), golden shiner (*Notemigonus crysoleucas*), brown bullhead (*Ictalurus nebulosus*), inland silverside (*Menidia beryllina*), mosquito fish (*Gambusia affinis*), grass carp (*Ctenopharyngodon idella*).

No records are available of sport fish species stocked into Hodges Garden State Park Lake. In the fall of 2009, 5 largemouth bass were collected for genetic testing. The fish ranged in size from 7.5 to 18 inches in total length. All sample fish were determined to be northern strain largemouth bass. No Florida bass genetic influence was noted.

Electrofishing was conducted in 2007, 2008, and 2013 to evaluate the Hodges Garden State Park Lake fish population. Due to their high position in the food chain, largemouth bass were targeted for sampling as an indicator species. Largemouth bass catch from these sampling efforts was highly variable (range: 35– 363 bass/hour). The variance is attributed to high water clarity and low electrical conductivity. Electrofishing is only efficient if the sampling target is within a few feet of the equipment. In clear water, fish are likely to evade the electrofishing boat and avoid capture. Electrofishing gear is also less efficient when low conductivity inhibits the flow of electrical current through water. Despite the challenges, results from the sampling efforts were sufficient to provide a reasonably accurate description of the largemouth bass population. Length distribution information is presented in Figure 1.

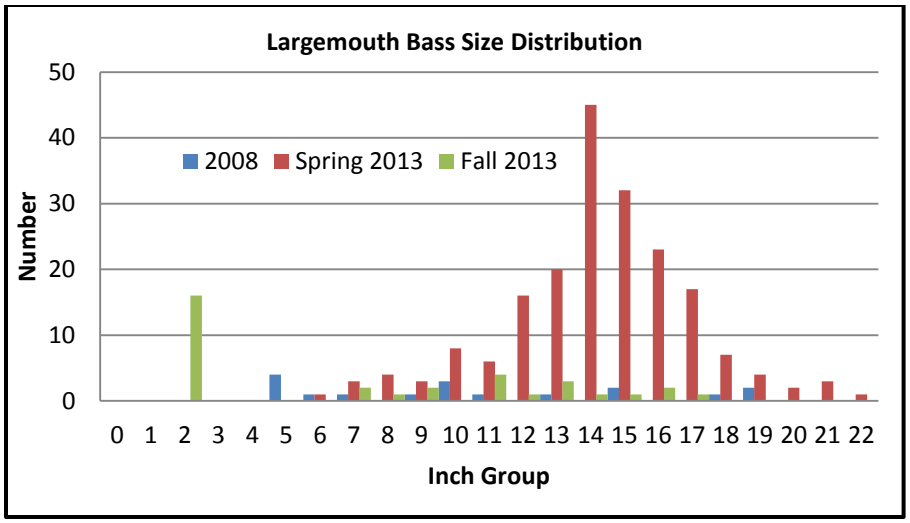

Figure 1. Size distribution for largemouth bass collected with electrofishing gear at Hodges Garden State Park Lake during Fall 2008, Spring/Fall 2013.

Physical characteristics of fish can provide insight into overall population health. For example, an index of fish body condition or robustness is often used as an indirect measurement of forage availability. Fish that receive adequate forage typically achieve normal body weight. Fish populations or even sub groups of a population that are less robust than normal may not be receiving adequate forage. Fish samples are measured individually to provide the necessary data for analysis of body condition. Relative weight (Wr) is a term to describe the ratio of fish weight to the weight of a "standard" fish of the same length. The index is calculated by dividing the weight of a fish by a standard weight for length, and multiplying the quotient by 100. Neumann et al. (2012) recommends a mean Wr range of 95-105 and suggests that lower values may indicate problems with prey availability. Mean Wr for largemouth bass collected from Hodges Garden State Park Lake are considered to be slightly less than normal (Figure 2).

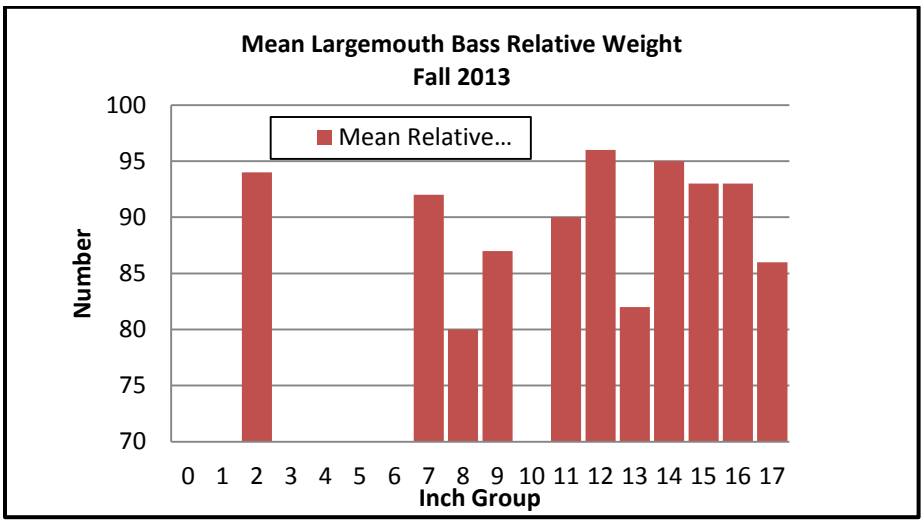

Figure 2. Mean relative weight by inch group for largemouth bass collected by electrofisher at Hodges Garden State Park Lake during fall 2013.

Results from electrofishing samples indicate the presence of an adequate forage base for largemouth bass. The samples are primarily comprised of sunfish species. Threadfin shad are also present as available forage in open water habitat. Figure 3 depicts the percentage of forage sample weight by species for 2013.

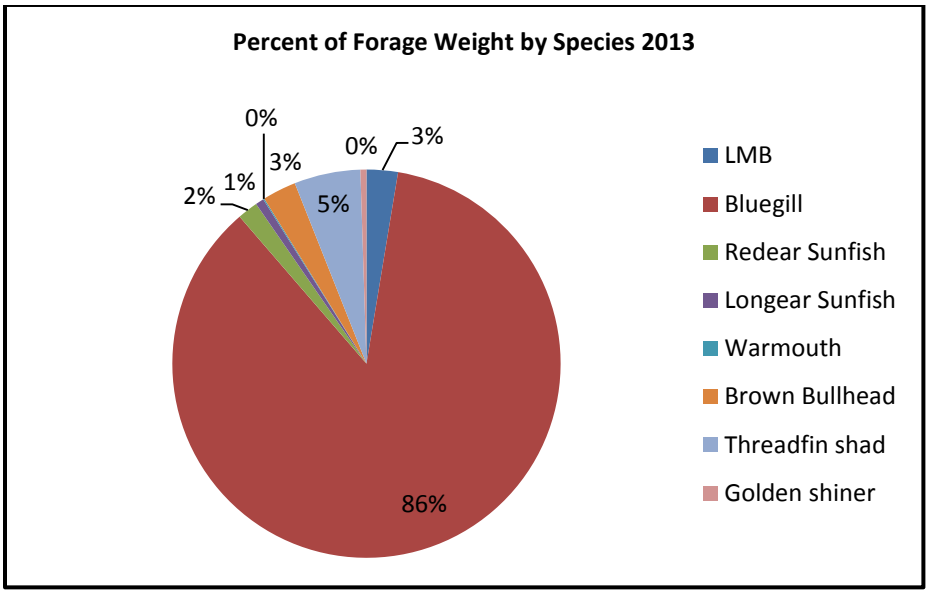

Figure 3. Percent of forage weight by species collected with electrofishing gear at Hodges Garden State Park Lake in 2013 during 1 hour of sampling effort (total weight = 57 lbs/hour).

Angler Creel Surveys

Hodges Garden State Park staff implemented angler creel surveys in 2009. Survey forms were handed out and collected from fisherman at the park entrance office. Three complete years (2010 to 2012) of creel data were collected and analyzed. Summaries are provided in Table 1.

Table 1. Angler creel survey results from 2010 -2012

Year	# of Surveys	# of anglers	#of bass harvested	# of crappie harvested	# of bream harvested	# of catfish harvested
2010	176	374	291	29	174	4
2011	327	731	1023	89	527	47
2012	129	238	474	20	39	0

Bass harvest averaged 1.38 per trip during the three years surveyed. The highest harvest rate was 1.99 (2012) and lowest was 0.77 (2010). Hodges Garden State Park Lake anglers were most likely to target bass (2010-44.9%, 2011-43.7%, and 2012-73.6%). Anglers targeting the combination of bass and bream comprised the only other preference value higher than 10% (10.7% in 2011).

Aquatic Vegetation

Aquatic plant species observed: hydrilla (*Hydrilla verticillata*), eel grass (*Vallisneria americana*), parrot feather (*Myriophyllum aquaticum*), torpedo grass (*Panicum repens*), alligator

weed (*Alternanthera philoxeroides*), water primrose (*Ludwigia* species), and dollarweed (*Hydrocotyle umbellata*).

Hydrilla is the dominant aquatic vegetation species and is established to depths of 24 feet. Eel grass was found throughout the east arm of the lake, but is being shaded out by hydrilla. All other species occur only in a small fringe along the shoreline. Torpedo grass is the only species that comprises more than 5% of total aquatic vegetation.

Discussion

Hodges Garden State Park is a recent addition to the Louisiana State Parks system and one of the most unique. The clear water of Hodges Garden State Park Lake is pumped through the gardens to waterfalls, pools, a geyser, fountains, and to the watering system before it is recycled back into the lake. Boating and angling are significant benefits provided by the impounded rock quarry. The aesthetic quality of the State Park is a primary management goal. Management efforts to maintain aesthetic quality should have precedence over efforts toward secondary benefits.

The results of LDWF sampling describe a balanced predator-prey relationship, primarily characterized by largemouth bass and sunfish. Physical conditions of Hodges Garden State Park Lake include high water clarity and low conductivity. Those factors contributed to significant variance in electrofishing sample size. However, upon consideration, the results as provided in Figure 1 are sufficient to provide a representative description of the fish population. The absence of fingerling size fish is typical for electrofishing samples and is not cause for concern. Each sample includes representation from at least three separate age groups. As a result, annual recruitment is confirmed.

Despite the fact that Hodges Garden State Park Lake supports a suitable forage base, largemouth bass display body condition that is less than robust. Analyses of forage composition and of the current habitat provide an explanation. Forage in the lake is dominated by sunfish, a family well adapted to take protective advantage of complex cover. Hodges Garden State Park Lake has excessive cover in the form of submerged vegetation. The forage is adequately abundant, but may not be sufficiently available to predation by largemouth bass.

Hydrilla is the dominant aquatic vegetation species and the primary form of complex cover in Hodges Garden State Park Lake. Complex cover is an important component of a productive sport fishery. Area coverage of 15-30% is considered to be most beneficial. Levels of complex cover above and below 15-30% are progressively detrimental. Current area coverage of hydrilla is excessive at 75%, but a direct relationship still exists between hydrilla as the primary form of complex cover and productivity of the lake. A reduction in hydrilla would be associated with a reduction in sunfish abundance. Threadfin shad and silversides would likely have a corresponding increase in abundance, but a net reduction in forage is likely. A subsequent reduction in largemouth bass abundance is also likely.

Hydrilla exhibits unrestrained growth without the control factors that exist in its native habitat. The high water clarity of Hodges Garden State Park Lake allows sufficient sunlight for the invasive species to negatively impact utilization of the lake. Control of hydrilla is necessary to preserve the scenic qualities for which the property has long been renowned. Tools to control

hydrilla in this situation are limited to the introduction of triploid (sterile) grass carp. Due to the longevity of grass carp and natural variables of influence, control of submerged vegetation to a specified range is not a reasonable expectation. Results typically include removal of submerged vegetation, or not. Given the significance of Hodges Garden State Park Lake to the aesthetic quality of the State Park, the introduction of triploid grass carp is considered to be appropriate.

Hodges Garden State Park Lake supports a marginally active recreational fishery and angler efforts are primarily directed toward largemouth bass. Angler survey data clearly shows that some Hodges Garden State Park Lake anglers enjoy highly successful fishing trips. It is likely that those are anglers that have invested the time to learn the necessary locations and tactics for success. However, average angler harvest per trip is modest and total harvest is not cause for concern.

Recommendations

1. The introduction of triploid grass carp at 10 fish per vegetated acre is recommended to control hydrilla. The fall 2013 estimate of hydrilla coverage is 160 acres. A total of 1,600 triploid grass carp should be introduced into Hodges Garden State Park Lake in early 2014. To reduce loss through predation, the stocked fish should be at least 12 inches in length.

2. Glyphosate herbicide, at label directions is recommended to control emergent vegetation. A non-ionic surfactant should be added to improve herbicide translocation into target plants.

3. Available data show no basis for concerns of angler overharvest. Current fishing regulations are appropriate for maintenance of a healthy sport fishery. No regulatory action is recommended at this time.

4. A continuing program of data collection is recommended. On request, LDWF will include Hodges Garden State Park Lake into a schedule for fish population sampling. Continued collection of angler catch data is also recommended.

5. Routine communication between Hodges Garden State Park staff and LDWF is strongly encouraged. LDWF staff will be available to discuss sampling results and management recommendations.

Literature Cited

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Appendix A – Area Map