LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

KEPLER LAKE

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sport fish species, other than bass, are managed to provide sustainable populations while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts. Bass anglers are afforded the opportunity to catch quality-size largemouth bass through the introduction of Florida largemouth bass.

Commercial

Commercial harvest is allowed; however, there is no indication of an active commercial fishery.

Species of Special Concern

No threatened or endangered fish species are found in this lake.

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations for all fish species, the 2013 recreational fishing regulations may be viewed at the link below:
http://www.wlf.louisiana.gov/fishing/regulations

Commercial

The 2013 commercial fishing regulations may be viewed at the link below:
http://www.wlf.louisiana.gov/fishing/regulations

Species of Special Concern

No threatened or endangered fish species are found in this waterbody.

SPECIES EVALUATION

Recreational

Largemouth bass (*Micropterus salmoides*) and crappie (*Pomoxis* spp.) are targeted in standardized sampling in Kepler Lake as species of interest due to their popularity with recreational anglers and their high positions in the food chain. In years past, bass and other fish species were sampled using rotenone to derive biomass estimates. Biomass (rotenone) sampling was used extensively in Kepler from as early as 1961 until 1991. Biomass sampling is an excellent method for determining standing crop for all fish species, predator-prey ratios and relative sizes of various fish species. However, recent increases in lakeshore residents and changes in public attitudes have made the use of fish toxicants controversial. Consequently, biomass sampling has been discontinued, being replaced by electrofishing, netting and other non-lethal sampling methods. Of the sampling methods presently used, electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of larger sized bass. Gill net sampling is used to determine the status of large

bass and other large fish species. Shoreline seining and fall electrofishing are used to collect information related to bass reproduction.

Largemouth Bass

Standing crop estimates-

The black bass population in Kepler Lake consists primarily of largemouth bass. Spotted bass (*Micropterus punctulatus*) represent <1% of the black bass population in Kepler Lake, as only one individual has been collected during standardized sampling efforts. Figure 1 below indicates the standing crop of largemouth bass in pounds per acre from rotenone sampling from 1969 to 1991. The largemouth bass standing crop for 1969 of 19.82 pounds per acre was the highest recorded in 7 years of biomass sampling conducted from 1969 to 1991. There is a significant decline in the standing crop of largemouth bass over this time period on Kepler Lake. Generally, this decline in production is associated with aging impoundments that tend to lose fertility over many years, and may have been affecting the reproductive potential of the overall bass population.

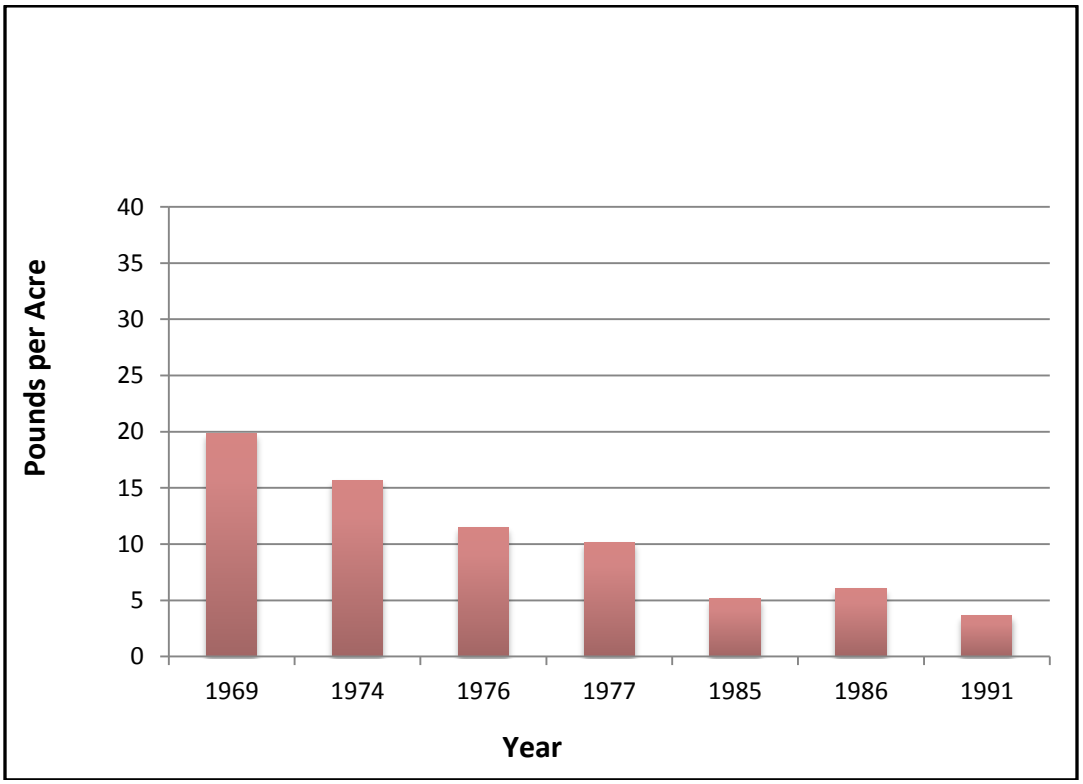

Figure 1. Average standing crop estimates (pounds per acre) for largemouth bass collected from biomass (rotenone) sampling in Kepler Lake, LA from 1969 to 1991.

Catch per unit effort, structural indices and size distribution-

Electrofishing has been the primary sampling technique utilized on Kepler Lake since 1991. Electrofishing is the best indicator of largemouth bass relative abundance and size distribution, with the exception of large fish (> 5 lbs.). Sampling with gill nets provides better assessment of large bass and other large-bodied fish species.

Two key size groups of largemouth bass collected during electrofishing samples from 1991 – 2009 are depicted in Figure 2 below. The 8" – 12" group is indicative of recruitment in the largemouth bass population and the 12" and up is the quality-sized fish favored by anglers. Although both figures are relatively low the trend lines indicate an increase in both size groups of largemouth bass over the time period 1991 – 2009 in the spring electrofishing samples on Kepler Lake.

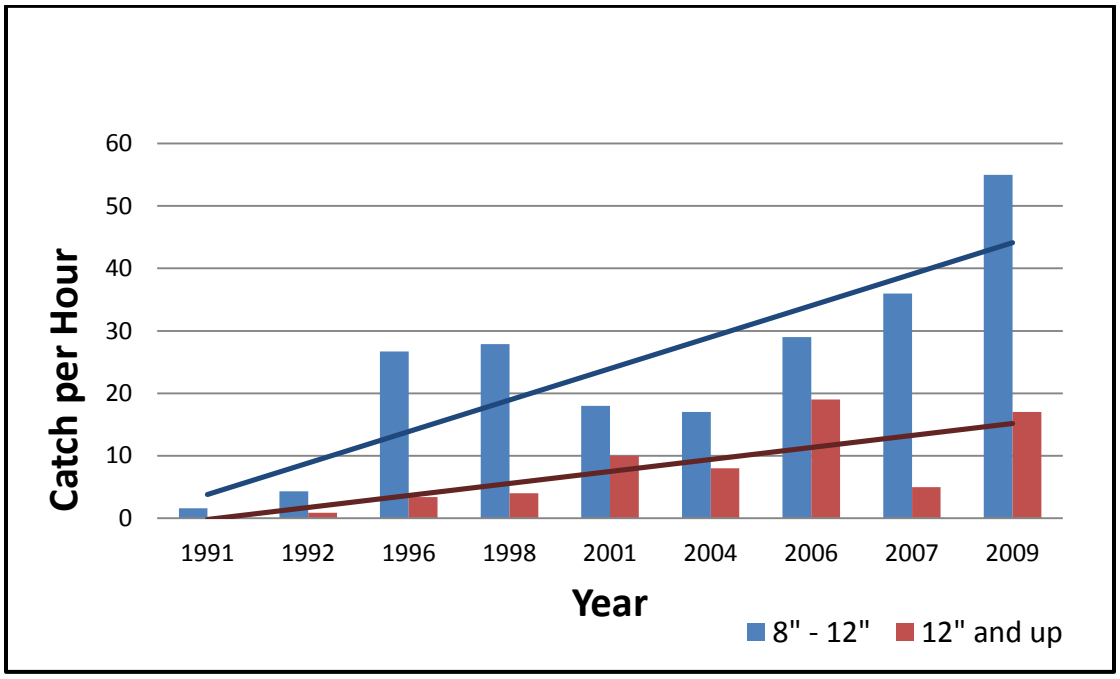

Figure 2. Spring electrofishing catch-per-unit-of-effort (CPUE) for two size groups, stock-size (8" – 12") and quality-size or larger (≥12"), of largemouth bass in Kepler Lake, LA, from 1991 – 2009.

The trend lines indicate an increase in recruitment of fish into the stock-size group along with an increase in the quality-size or larger largemouth bass which is preferred by anglers.

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe size distribution (length) data. Proportional stock density compares the number of fish of quality-size (greater than 12 inches total length (TL) for largemouth bass) to the number of bass of stock-size (> 8 inches in total length TL). The PSD is expressed as a percentage. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. Relative stock density compares the number of fish of a given size range to the number of bass of stock size. A common calculation used in fisheries management is for RSD-Preferred or RSD-P. This value compares the number of largemouth bass > 15 inches TL to the number of stock-size largemouth bass in the population. This is also commonly called RSD-15 values. Values for PSD and RSD – Preferred (> 15 inches in TL), are shown in Figure 3 below. Ideal PSD and

RSD-P values for largemouth bass range from 40-70 and 10-40, respectively. There has been an increase in the proportion of both stock-size and preferred-size fish in Kepler Lake from the period 1991 to 2009, but the average values for both indices fall well below the ideal range.

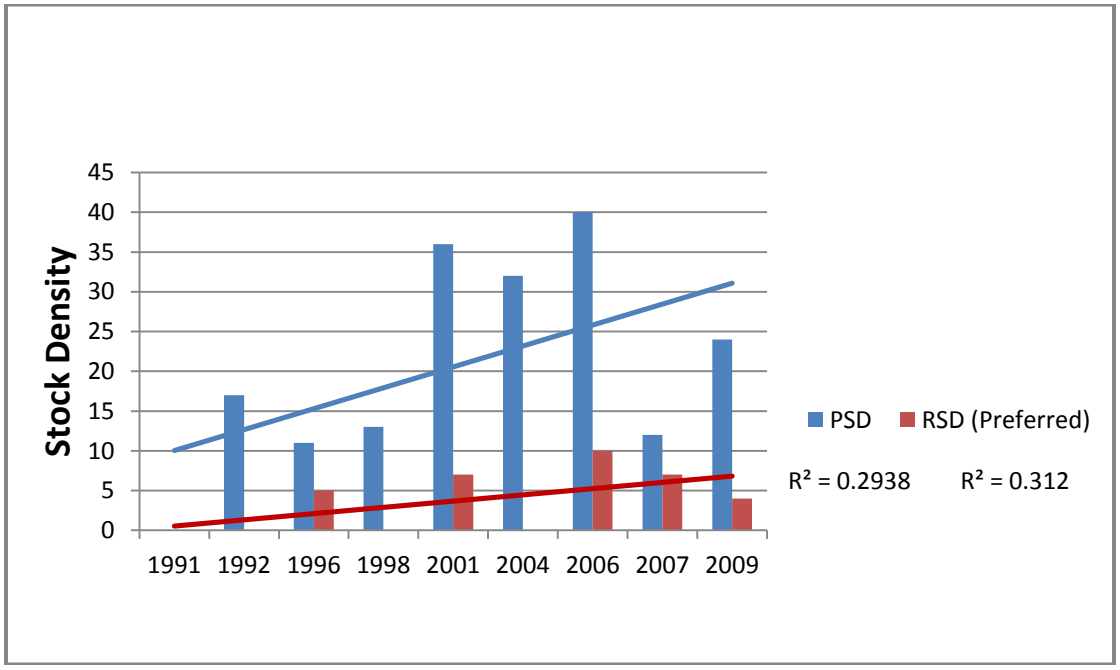

Figure 3. Largemouth bass size-structure indices on Kepler Lake, LA, from 1991 to 2009 for spring electrofishing samples.

The trend lines indicate that there is an increase in the proportion of stock-size and preferred-size fish over time.

Figure 4 illustrates the CPUE and size distribution of largemouth bass for the fall 1991 electrofishing sample along with the Wr for stock-size fish collected during this sample. The CPUE was very low and reflects the population estimates from the spring 1991 electrofishing sample and the low standing crop of largemouth bass observed during the 1991 rotenone sampling. The relative weights indicate that forage availability was marginal for most size groups of fish during this time. Relative weights and CPUE for the 2001 fall electrofishing sample are shown in Figure 5. The CPUE had increased from the 1991 sample and reflects the improving largemouth bass population indicated by the spring electrofishing samples. Relative weights for stock- size largemouth bass were higher than the 1991 sample indicating sufficient forage was available at that time.

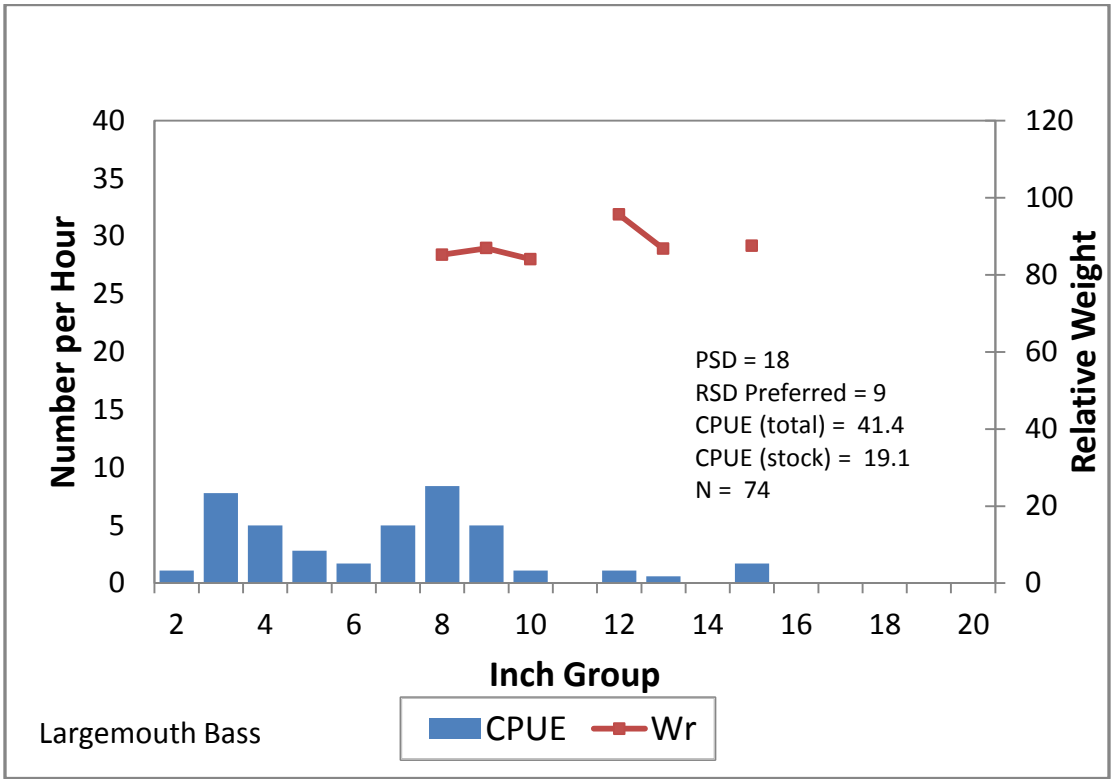

Figure 4. The CPUE, size distribution and relative weights for largemouth bass from fall 1991 electrofishing samples on Kepler Lake, LA.

The CPUE is very low and relative weights indicate marginally adequate forage availability for the stock-size largemouth bass in the reservoir.

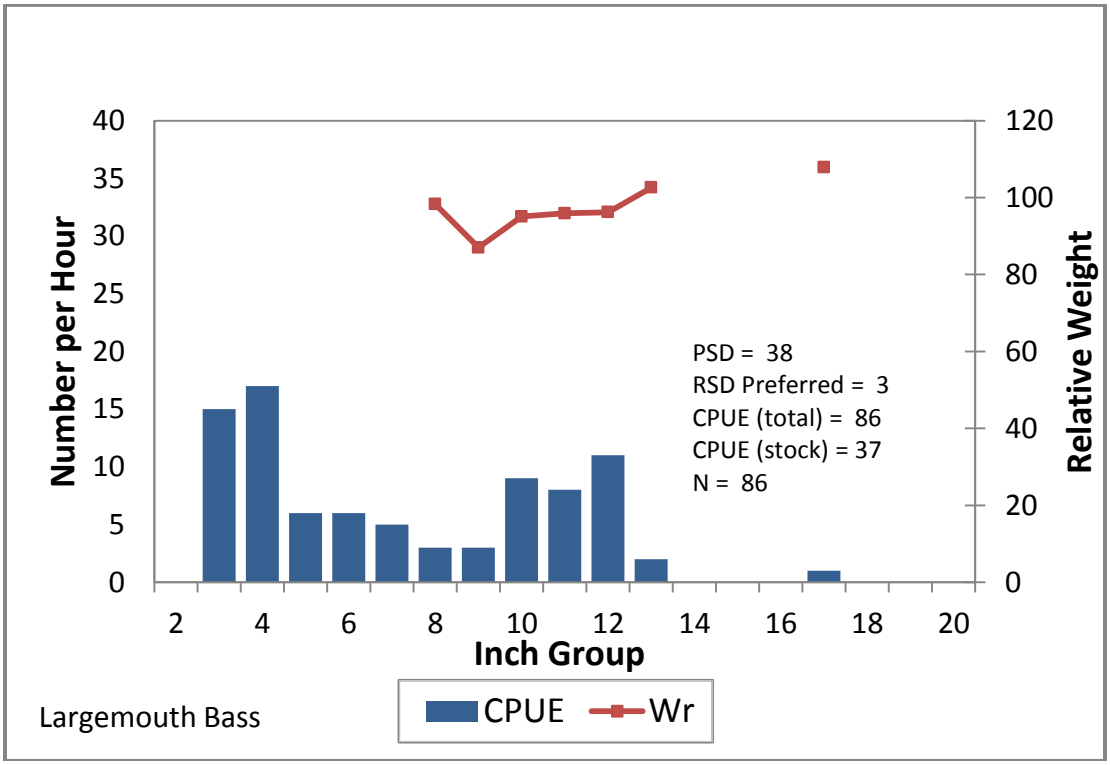

Figure 5. The CPUE, size distribution and relative weights for largemouth bass from fall 2009 electrofishing samples on Kepler Lake, LA.

Relative weights indicate sufficient forage availability for the stock-size fish present in the lake at this time, and the CPUE of largemouth bass had increased some from the 1991 sample.

Forage

Bluegill (*Lepomis macrochirus*), redear (*L. microlophus*) and longear sunfish (*L. megalotis*) are abundant in Kepler Lake and provide the primary forage base for the largemouth bass population. Brook silversides (*Labidesthes sicculus*), topminnows (*Fundulus* spp.) and Western mosquito fish (*Gambusia affinis)* are also important components of the forage base in Kepler Lake. Efforts to introduce threadfin shad (*Dorosoma petenense*) have not been successful even after several stockings. Benthic invertebrates that live on the bottom substrate such as insect larvae, worms and crawfish are also utilized by predatory fish species. The chart in Figure 6 below gives a summary of fingerling size fish which are available as forage collected during rotenone sampling from 1969 to 1991 on Kepler Lake.

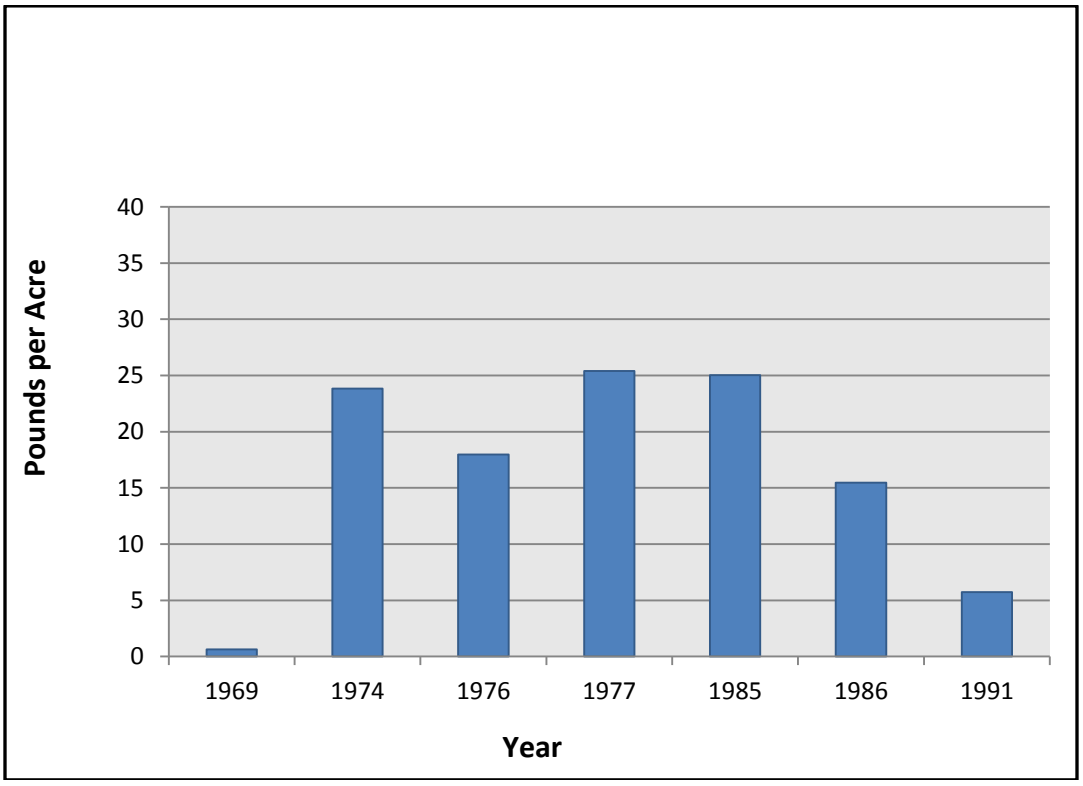

Figure 6. Pounds per acre of fingerling size fish which are available as forage collected during biomass (rotenone) sampling on Kepler Lake, LA from 1969 to 1991.

In recent years, biomass (rotenone) sampling has been discontinued. Forage is now sampled by shoreline seining, electrofishing and indirectly by the measurement of largemouth bass relative weight (Wr). Relative weight (Wr) is the ratio of a fish's weight to the weight of a "standard" fish of the same length. The index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Relative weights for largemouth bass in Kepler Lake typically measure between 80 and 100 for all size groups, indicating a bass population with adequate forage available. Largemouth bass Wr values

below 80 indicate a shortage of available forage. Relative weights from fish measured during the fall of the year are more indicative of the available forage in the lake than relative weights obtained in the spring. The chart in Figure 7 below gives Wr values for largemouth bass of different size groups captured in fall 1991 and fall 2009 electrofishing samples.

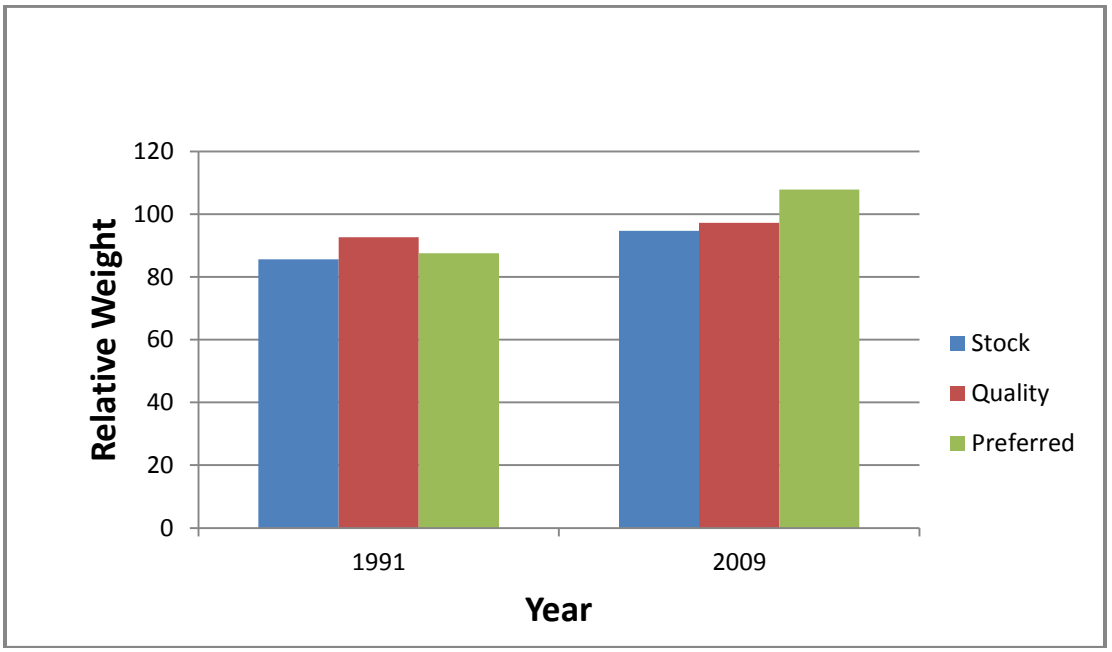

Figure 7. Relative weights for stock- (8" – 12"), quality- (12" – 15"), and preferred-size (15" – 20") largemouth bass collected during fall electrofishing sampling on Kepler Lake, LA in 1991 and 2009.

Shoreline seine sampling conducted during the summer months on Kepler Lake provides insight into the primary components of the forage base. The chart in Figure 8 indicates that sunfish are the primary component of the forage base. Brook silversides, topminnows and mosquitofish are also available as forage. Similar results were observed through earlier biomass sampling.

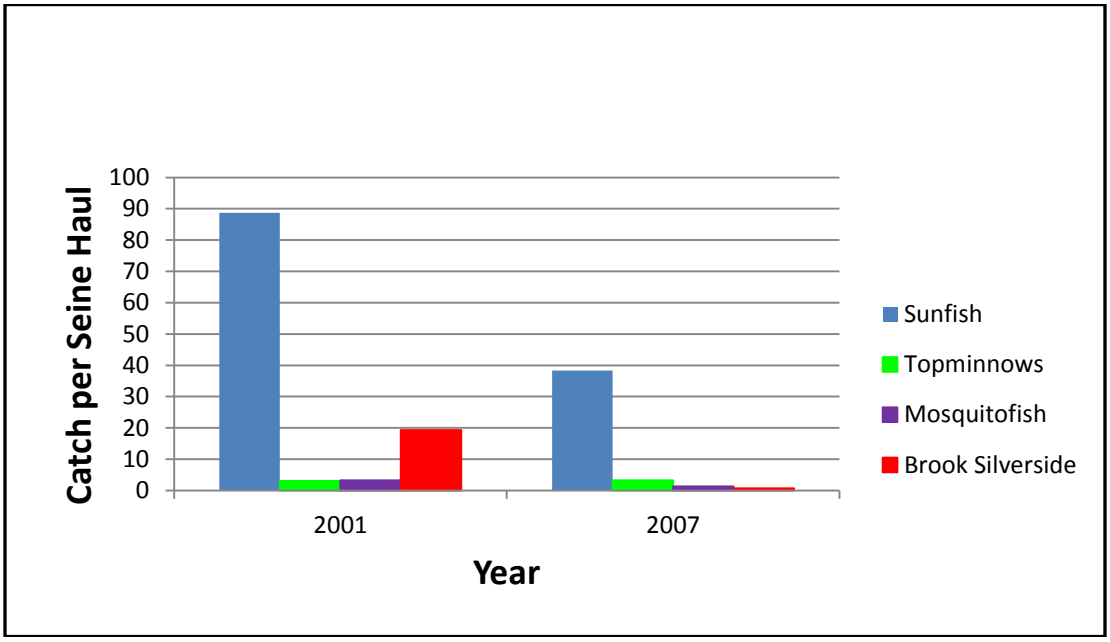

Figure 8. Haul seine sampling results on Kepler Lake, LA for 2001 and 2007.

An electrofishing forage sample was conducted during the fall of 2009. The results of this sample are presented in Figure 9 below. The primary forage species 5" and less in TL are included in the graph below. The results indicate that sunfish (all *Lepomis* spp.) are the primary forage base found in Kepler Lake.

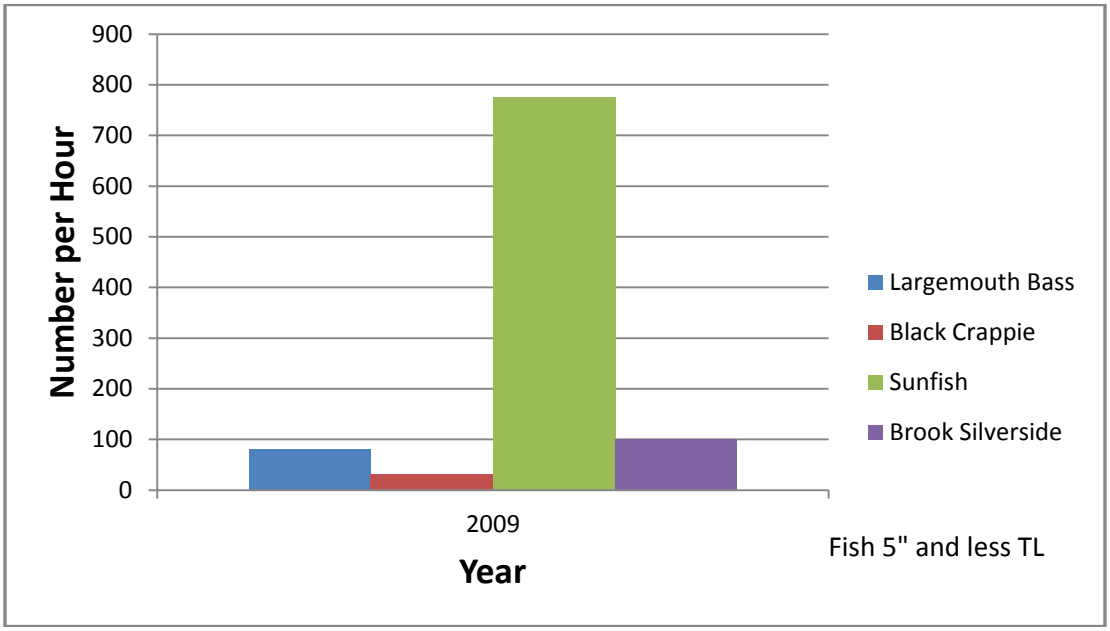

Figure 9. Catch per unit effort for forage fish groups from Kepler Lake, LA.

Genetics-

Florida largemouth bass have been stocked into Kepler Lake in an attempt to increase the genetic potential for production of large bass. Florida bass have been stocked in Kepler nine times. The initial introductions were made in 1998. Stocking rates have been low (10 per acre) and the size of the fingerlings were small (< one inch). Genetic analysis was conducted in 2004 and 2009 with a return of 0% Florida and 0% hybrid in 2004 and 0% Florida and 8% hybrid in 2009 (Table 1). Greater success has been seen in lakes stocked at higher rates over more consecutive years and with larger fingerlings. The table below shows ratios of Florida, native and hybrid largemouth bass from Kepler Lake sampling.

Table 1. – Largemouth Bass Genetic Analysis from Kepler Lake, LA for 2004 and 2009.

Year	Number	Northern %	Florida %	Hybrid %
2004	56	100	0	0
2009	39	92	0	8

Crappie

Crappies are very popular with recreational anglers in Kepler Lake. The population consists primarily of black crappie which is better adapted to reservoir habitat. Considerable interest has been expressed in improving crappie fishing in the lake. Crappie populations and angler satisfaction have varied considerably over the years indicating both the cyclic nature of the species and the difficulty in obtaining reliable population data with standard sampling

techniques. Crappie populations were sampled in Kepler using biomass (rotenone) techniques from 1961-1991. The chart in Figure 10 below shows crappie standing crop estimates in pounds per acre for 1961-1991. Crappie standing crop was highest in 1969, 1976 and 1977 following drawdown events.

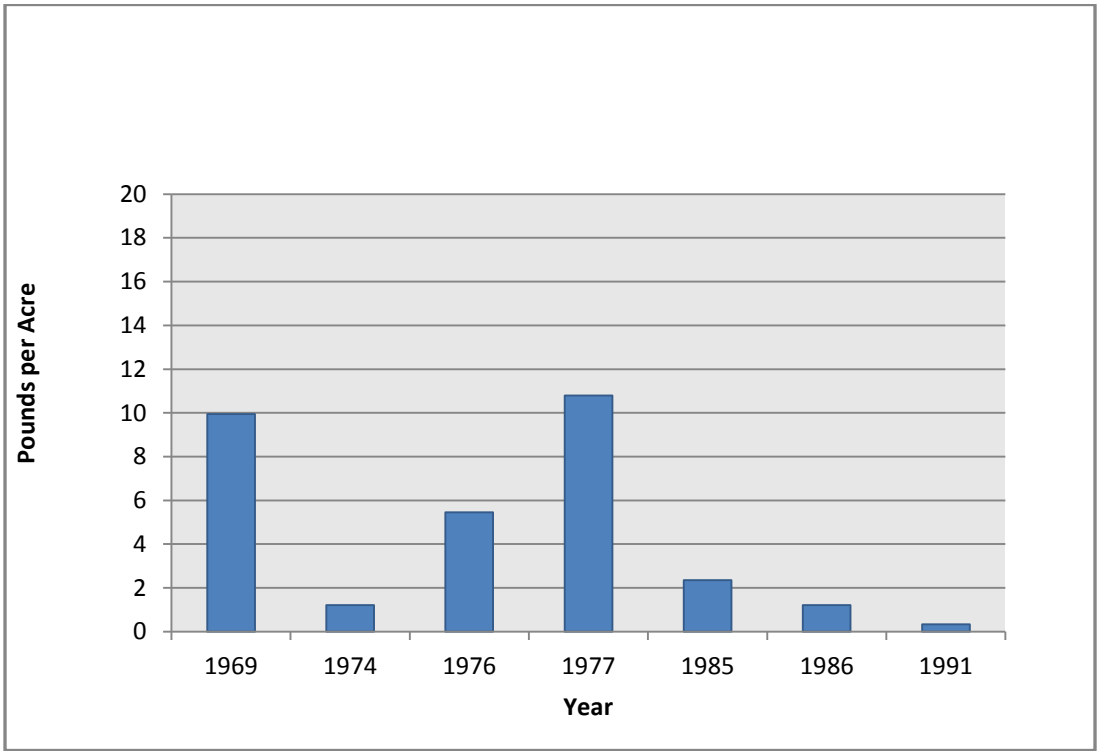

Figure 10. Standing crop estimates in pounds per acre of black crappie from Kepler Lake, LA biomass sampling conducted from 1969 – 1991.

From 1989 to the present we have targeted crappie (secondary target species with bass as the primary) in our spring and fall electrofishing samples. Crappie catch in electrofishing sampling has been highly variable, even between spring and fall sampling of the same year. Sampling inconsistency is suspected as the cause more so than actual population change. Electrofishing sampling in Kepler Lake has yielded very few crappie with 8 black crappie collected in the spring 1992 sample, 1 black crappie in the spring 2006 sample, 1 black crappie collected in the spring 2009 sample, and 6 black crappie collected in the fall 2009 sample. Electrofishing sampling in Kepler Lake has not provided suitable insight into the crappie population due to the low catch rates. Anecdotal information from anglers and preliminary lead net data indicates that while the crappie population is not highly abundant, crappie are more common than the electrofishing samples reveal.

Sampling crappie with lead nets has recently been used with success in other lakes. Preliminary sampling was conducted on Kepler Lake in 2010 and this technique will be used to sample Kepler Lake in the future. Figure 11 below shows the CPUE of black crappie, bluegill and redear from the 2010 lead net results. Lead net sampling may also provide insight into sunfish.

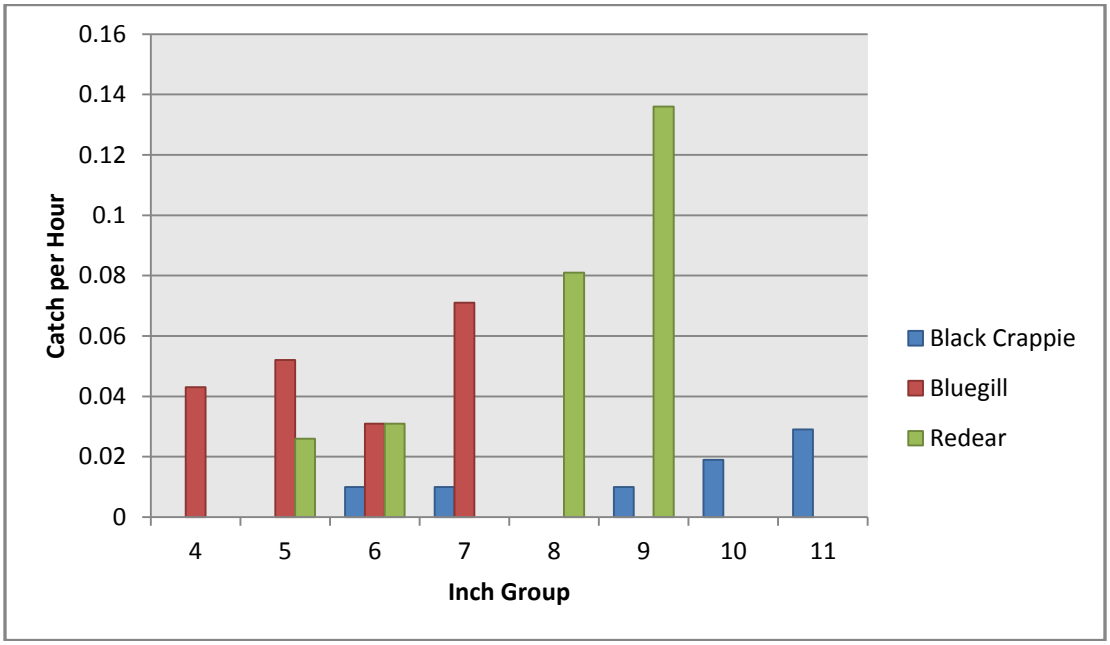

Figure 11. The mean CPUE for black crappie, bluegill, and redear captured in lead nets from Kepler Lake, LA, for 2010.

Commercial

No commercial fishery exists on Kepler Lake.

Species of Special Concern

No threatened or endangered species are known to occur in Kepler Lake.

HABITAT EVALUATION

Aquatic Vegetation

Kepler Lake has extensive areas of shallow water that are susceptible to aquatic vegetation infestations. Emergent and submergent aquatic vegetation has been problematic in the lake since impoundment. This can create issues for shoreline property owners due in part to large expanses of shallow water found near the inhabited shoreline. It is suspected that aquatic growth increased over time as the lake aged and the eutrophication process accelerated. Additionally, high water clarity compounds the problem of submerged aquatics, allowing the vegetation to grow at greater depths.

An overabundance of aquatic vegetation is typical in this shallow water. Emergent species such as fragrant water lily (*Nymphaea odorata*), American Lotus (*Nelumbo lutea)*, alligator weed (*Alternanthera philoxeroides*), water shield (*Brasenia schreberi*) and water primrose (*Ludwigia octovalvis*) are typically present in severe to moderate infestations in this reservoir. Bladderwort (*Utricularia spp*.), fanwort (*Cabomba caroliniana*), variable leaf milfoil (*Myriophyllum heterophyllum*), Brazilian elodea (*Egeria densa*), naiad (*Najas spp*.), coontail (*Ceratophyllum demersum*) and muskgrass (*Chara spp*.) are the most troublesome submersed species in Kepler Lake and are often present in moderate to severe amounts out to depths of 6 to 8 feet.

The reservoir has a long history of frequent fall drawdowns which have not proven to be successful in providing long term control of nuisance aquatic vegetation. In fact, only six months after the most recent drawdown (gates open from July 17, 2006 to January 16, 2007), an aerial survey revealed that there was approximately 25% coverage of submerged vegetation in the reservoir. The majority of the vegetation was located above the bridge on the upper end of the lake. In addition to the estimated 500 acres of submerged aquatic vegetation observed during this survey, a fringe of emergent vegetation was noted along most of the shoreline of the lake which extended well out from the shoreline on the upper end of the lake. Observations made in the summer of 2008 revealed that approximately 50% of the area above the bridge, or 400 acres, was covered in submerged and emergent vegetation, primarily consisting of coontail (*Ceratophyllum demersum*), fanwort (*Cabomba caroliniana*), bladderwort (*Utricularia spp*.), naiad (*Najas spp*.), alligator weed (*Alternanthera philoxeroides*), American lotus (*Nelumbo lutea*) , and water lily (*Nymphaea spp*.). Triploid grass carp were stocked in 2009 at a rate of 2 fish per acre and have been moderately effective, but a supplemental stocking is needed. .

This same pattern of rapid re-growth of the submerged and emergent vegetation has been repeated in many previous drawdowns. Despite the complete drawdown capability that the control structure on Kepler Creek Lake offers, it is apparent that drawdowns which often provide several years of vegetation control on other lakes, do not offer solutions for long term vegetation control on this reservoir.

Generally, 15% - 30% coverage of submersed aquatic vegetation is considered desirable for fisheries production. Vegetation coverage at these levels has proven unacceptable to the Kepler Creek Recreation and Water Conservation District (KCRWCD) and user groups of the lake. Frequent requests for drawdowns in the past are evidence to that end. With coverage levels in the 15% to 30% range of submerged aquatic vegetation, access is impeded for a majority of the shoreline property owners and recreational use of the lake is reduced.

Giant salvinia (*Salvinia molesta*) was observed and documented on Kepler Lake in March, 2009. LDWF Inland Fisheries Biologists found tertiary stage giant salvinia on the lower end of the reservoir. Control efforts are ongoing by LDWF spray crews using foliar applications of glyphosate and diquat. Subfreezing temperatures during the winters of 2010 and 2011 were instrumental in reducing the amount of giant salvinia present in the lake.

A vegetation assessment was performed on March 25, 2011. Variable-leaf milfoil (*Myriophyllum heterophyllum*), bladderwort (*Utricularia spp*.), and fanwort (*Cabomba caroliniana*) were still found to be at problematic levels during this survey, and will likely increase in coverage and density throughout the growing season. Approximately 500 acres of submerged vegetation was present at the time of the assessment. The submerged aquatic vegetation was not topped out at that time. The majority of the vegetation was located on the upper end of the reservoir. Water shield (*Brasenia schreberi*), fragrant water lily (*Nymphaea odorata*), water primrose (*Ludwigia octovalvis*) and American lotus (*Nelumbo lutea*) were found along the shoreline areas of the lake. At the time of the survey, coverage was not preventing access for shoreline property owners. Total coverage of emergent aquatic vegetation was approximately 60 acres, most of which was on the upper end of the lake. Giant salvinia (*Salvinia molesta*) was not noted during the survey but was likely present in very low quantities following the freezing temperatures over the winter.

Emergent and floating vegetation was not a major problem along the inhabited shoreline of

the lake as only 50 acres were treated by LDWF spray crews during 2012. Submersed vegetation remained problematic in the lake during 2012.

Recent aquatic plant control measures have included foliar herbicide applications for giant salvinia (using 0.75 gal per acre of diquat in addition to a 3:1 mix of Aquaking surfactant to Thoroughbred surfactant totaling 1 qt. per acre) along with limited foliar herbicide applications for emergent vegetation along the inhabited shoreline areas. Aquamaster (at 1 quart per acre) and Clearcast (at 0.5 gallons per acre) were used in addition to 1 quart per acre of Red River 90 surfactant to control shoreline species.

Substrate

The substrate of Kepler Lake is composed of relatively infertile sandy and light clay soils. Organic content is generally high in the upper end of the lake due to the long term overabundance of aquatic vegetation. Suitable fish spawning substrate is available along the shoreline in the lower end of the lake.

Complex Cover

Complex cover in Kepler Lake consists primarily of stumps and aquatic vegetation. The majority of the lake contains submerged stumps which provide some cover for fish, but are a major navigation hazard as the creek channel is poorly marked. Many local anglers add artificial cover in order to attract fish to a particular location.

CONDITION IMBALANCE / PROBLEM

Excessive aquatic vegetation has been a chronic problem in Kepler Lake since impoundment. The clear infertile water is almost universally associated with increased submerged aquatic vegetation coverage. The problem of excessive aquatic vegetation has become even more acute with the introduction of non-native invasive species, including egeria, milfoil, and giant salvinia. Currently, submersed vegetation covers more than 50% of the upper end (above the bridge) of the lake, while emergent species plague the shallow shorelines and giant salvinia is scattered throughout. The potential loss of fisheries production and public use of the lake is even more alarming with the introduction of giant salvinia.

CORRECTIVE ACTION NEEDED

In consideration of the shoreline owners and in the best interest of fisheries production, a more realistic and balanced approach should be to provide submerged aquatic vegetation in a range of 5% to 10% coverage instead of the customary 15-30% thought to be best for fisheries production. Emergent vegetation has historically been and continues to be a problem near the inhabited and developed shoreline areas of the lake. However, strategic foliar herbicide applications at key access points along the shoreline can be effective at providing property owners boating access to their homes and camps.

Controls for aquatic vegetation are generally categorized into three broad groups; chemical, physical, and biological. Because of the tremendous expense associated with chemical treatments to submerged vegetation, LDWF herbicide applications are primarily confined to emergent species (i.e., water lily, alligator weed, and salvinia), which in the case of Kepler Lake is confined primarily to the shorelines and shallow upper end. Some control of

emergent species is needed where they impede boating access to developed shorelines and boat launches.

Physical controls include actions to contain and even harvest vegetation, but the most common involves water level fluctuation. Past corrective actions have included both summer and fall drawdowns during the life of the reservoir. However, a review of Kepler Lake drawdowns reveals that vegetation control has been sporadic, and only short term benefits have been realized. The narrative on aquatic vegetation and schedule of previous drawdowns (Table 3) in MP-A provides evidence that both summer and fall drawdowns have produced only short term vegetation control (one or two years) in most instances. The KCRWCD has also recognized that the frequent drawdowns of Kepler Lake have not provided long term control of the submerged vegetation in the reservoir and have sought alternative control methods. These repeated drawdowns have led to considerable loss in recreational opportunities to the public, and should be discontinued for the sole purpose of vegetation control.

Biological control of aquatic plants typically includes the introduction of herbaceous species such as triploid grass carp (TGC) and salvinia weevils. In 2009, the KCRWCD purchased and stocked 2,000 TGC that ranged from 8 to 10 inches in total length to provide control of submerged aquatic vegetation. However, little to no reduction of plant material has been observed since this stocking. The proper stocking application of TGC has produced the desired results in many waterbodies and a higher density stocking of larger 10-12 inch TGC may be necessary to achieve results. Giant salvinia weevils have shown the potential to reduce or slow the spread of giant salvinia and may be used in conjunction with herbicide applications.

RECOMMENDATIONS

1) Triploid grass carp (TGC) should be stocked in 2013 at a rate of 3 fish per vegetated acre to control submersed aquatic vegetation. TGC greater than twelve inches in length should be utilized to reduce mortality due to predation. Stocking should be conducted in the upper end of Kepler Lake above the bridge.

2) Conduct strategic foliar herbicide applications to giant salvinia as needed. Diquat will be used from November 1 through March 31 at a rate of 0.75 gallons per acre mixed with a total of 1 qt. per acre of surfactant being comprised of 1 part Thoroughbred and 3 parts Aqua King. Outside of that time frame, giant salvinia will be controlled with a mixture of glyphosate (0.75 gal/acre) and diquat (0.25 gal/acre) with Aqua King Plus (0.25 gal/acre) and Thoroughbred (8 oz. /acre) surfactants. Alligator weed will be controlled with Imazapyr (0.5 gal/acre) in undeveloped areas and with Clearcast (0.5 gal/acre) near houses and developed shorelines.

3) Aquatic vegetation assessments will be conducted annually.

4) Stocking of Florida largemouth bass should be resumed using higher stocking rates or larger fish.

5) Continue standardized fisheries sampling on Kepler Lake to monitor fish populations, especially TGC growth and survival.

6) Coordinate with LADOTD and the KCRWCD for a drawdown in 2014. The KCRWCD requested a drawdown in a letter dated 3/1/14. The drawdown shall be conducted for the purposes of shoreline maintenance and vegetation control. Additionally, LADOTD needs to perform some repairs to the dam/spillway structure. The drawdown should be performed under the following recommendations:
    a. Begin dewatering on June 15, 2014 at a rate of 4 inches per day.
    b. Dewater to 5 feet below pool stage. Once the target depth of 171.5 MSL is reached, the level shall be maintained until September 15, 2014.
    c. The lake shall be further dewatered to 8 feet below pool (168.5 MSL) beginning on September 15, 2014 or to a level necessary to facilitate repairs to the structure by LADOTD. The level shall be maintained until December 1, 2014.
    d. Close the control structure on December 1, 2014 to allow for refill.