LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

IVAN LAKE

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts.

Ivan Lake gives an opportunity to all anglers alike. Bank fisherman as well as boaters can enjoy similar experiences on Ivan Lake due to available shoreline access.

Commercial

The physical characteristics of Ivan Lake do not support a large rough fish species that normally comprise a commercial fishery; therefore, a commercial fishery strategy is not used.

Species of Special Concern

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

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations for all fish species

Commercial

Statewide regulations on all species

Fishing Gear

Any legal commercial or recreational fishing gear.

Parish Regulations

None

SPECIES EVALUATION

Recreational

Ivan Lake has been the subject of minimal sampling due to its small size and close proximity to other lakes with higher public utilization. Electrofishing samples were conducted in 1992, 1993, 1997, 1998, and 2001 to collect information on largemouth bass and crappie populations. Largemouth bass and crappie are targeted as species indicative of the overall fish population health due to their high position in the food chain.

Ivan Lake was completely dewatered while undergoing a drawdown for hydrilla control in 2004 (Figure 1). A fish kill followed this accidental dewatering, and an investigation showed a large number of sport fish died as a result of this event. Subsequent sampling to evaluate the remaining fish population in the lake was conducted in 2004 and 2005, utilizing gill nets, electrofishing and seining. These samples indicated low abundances of all species in the reservoir. The gill net samples conducted in 2004 had predominately rough fish. Electrofishing samples in the spring of 2005 produced a total of 2.6 largemouth bass/hour and 1.3 black crappie/hour, as only two individual largemouth bass and one black crappie were collected during 45 minutes of sampling effort at three different stations on the lake. Seine sampling conducted in the summer of 2005 revealed some sport fish reproduction, but numbers were low.

Figure 1. Ivan Lake, LA following accidental complete dewatering in the fall of 2004. View looking west along Ivan Creek from dam at the water control structure.

Ivan Lake has needed lake bed renovation for several years and this unfortunate circumstance yielded an opportunity to implement such a plan. The reservoir was experiencing symptoms associated with the aging or eutrophication process of a lake. Bottom sediments were comprised largely of fine silts, sands, and organic material from the excessive aquatic plant growth and terrestrial leaf litter. The lake was maintained in various stages of drawdown until the needed repairs were made to the dam and outflow conduit. This extended drawdown allowed for excellent drying conditions on the lake bed. The prolonged desiccation helped to control aquatic vegetation and improved the bottom habitats as the organic muck underwent aerobic decomposition and bottom sediments were compacted. During this time improvements were made to fisheries habitat and channel marking was also completed.

On October 12, 2010 an application of 5% liquid rotenone was made to the remaining pockets of water found within the lake bed (Figure 2). The application was made by LDWF personnel with assistance from local USACE personnel (Figure 3). This fish eradication effort was to remove any undesirable fish prior to future restocking efforts. Moribund fish observed following the treatment included spotted gar, bigmouth buffalo, largemouth bass, channel catfish, and gizzard shad. Several weeks after the treatment, 800 yards of 2" flag webbing was deployed in the creek and borrow pit, then checked periodically over the course of a month. One decomposed spotted gar was collected during this effort. A follow up application of rotenone was conducted during the fall of 2011 in order to try and eradicate any fish which may be left in the creek and borrow pit since the previous effort. Fishes removed during this effort included young of the year crappie, fliers, largemouth bass and bullheads. Small crappies were the predominant species with several hundred being eliminated during this effort.

Figure 2. Application of liquid rotenone to water remaining in creek channel at maximum drawdown in an effort to eradicate the existing fish population prior to restocking following renovations to Ivan Lake, LA fall 2010.

Figure 3. Liquid rotenone applied to creek channel and other areas not accessible by boat in order to remove existing fish population prior to refilling and restocking in Ivan Lake, LA, fall 2010.

The following discussion of fisheries data refers to the population which was present in Ivan Lake prior to the accidental complete dewatering of the lake in 2004.

Largemouth bass

Largemouth bass are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain. Electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of large fish (i.e.,> 5 lbs.). Sampling with gill nets provides better assessment of large bass and other large-bodied fish species (e.g., bowfin or carp).

Catch Per Unit Effort and Size Distribution-

Electrofishing has been the primary sampling technique utilized on Ivan Lake. Results from electrofishing samples for stock-size largemouth bass from 1992 – 2001 are presented in Figure 4 below. The trend line from data collected during this time period indicates a moderate decline in stock-size fish in Ivan Lake.

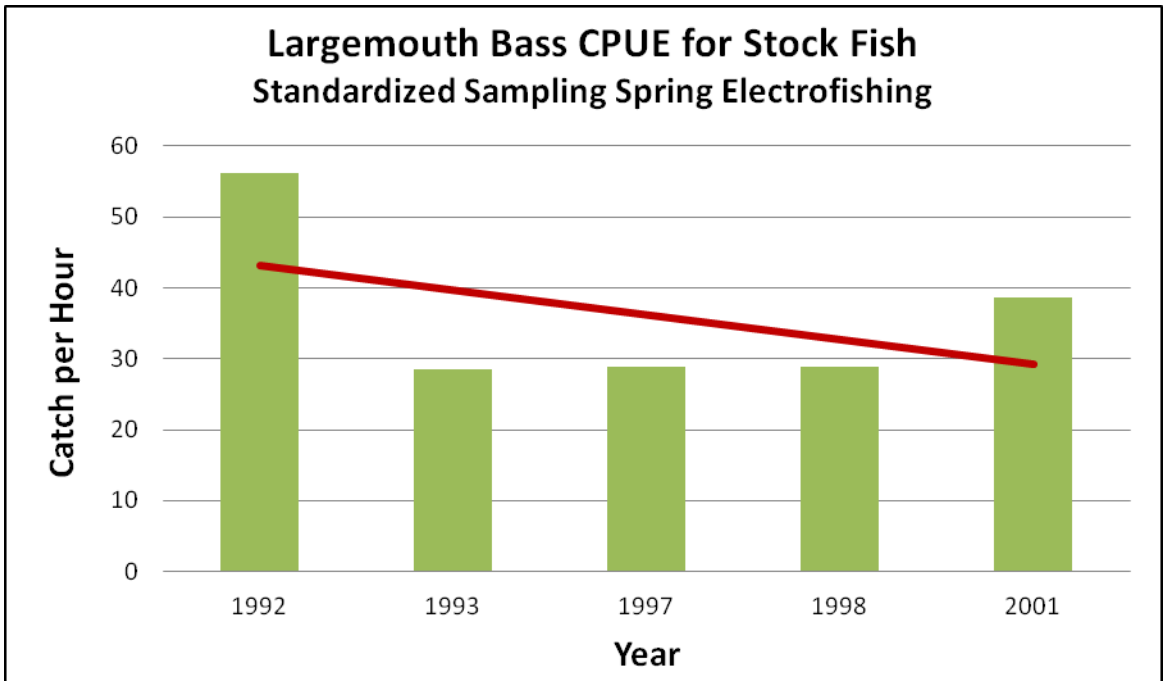

Figure 4. Spring electrofishing catch-per-unit-of-effort (CPUE) for stock-size (8" and up) largemouth bass on Ivan Lake, LA from 1992-2001. The trend line indicates a moderate decline in stock-size fish over this time period.

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 for largemouth bass) to the number of bass of stock-size [greater than 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 5 below. Ideal PSD and RSD-P values for largemouth bass range from 40-70 and 10-40, respectively. There has been a decrease in the proportion of both stock-size and preferred-size fish in Ivan Lake from the period 1992 to 2001.

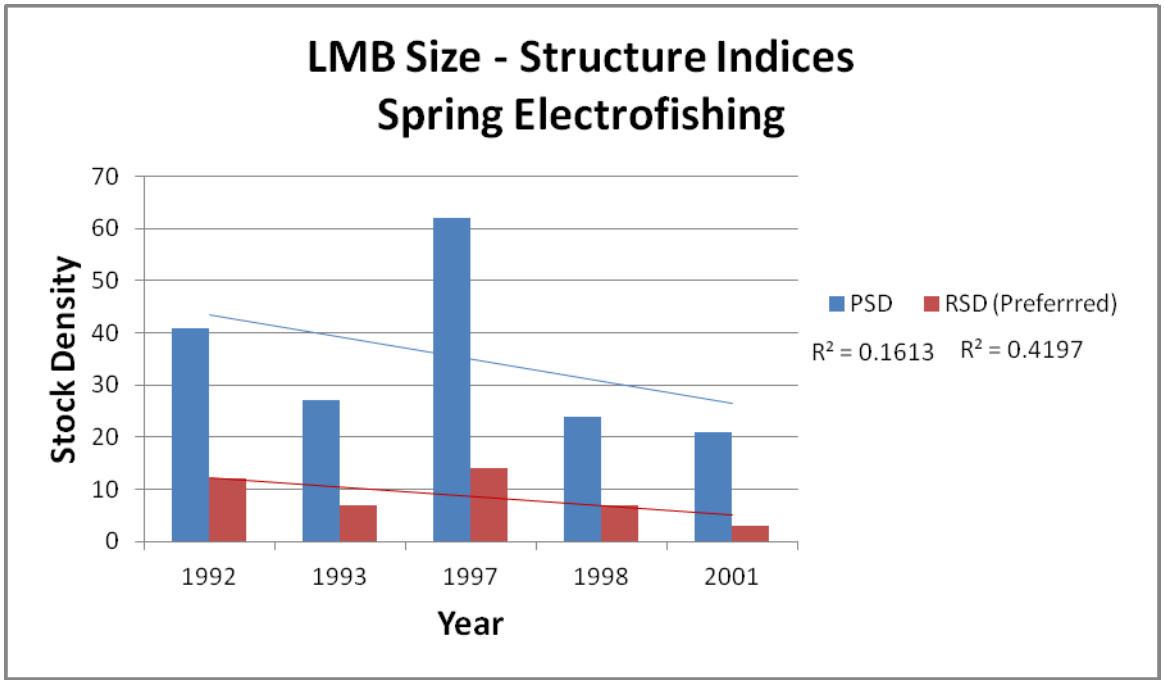

Figure 5. Largemouth bass size-structure indices on Ivan Lake, LA, from 1992 to 2001 for spring electrofishing samples. The trend lines indicate that there is a minor decrease in the proportion of stock-size and preferred-size fish over time ($R^2 < 0.60$).

Figure 6 illustrates the CPUE and size distribution of largemouth bass for the fall 1992 electrofishing sample along with the Wr for stock-size fish collected during this sample. 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 7. Relative weights for stock- size largemouth bass were slightly higher than the 1992 sample indicating sufficient forage was available at that time.

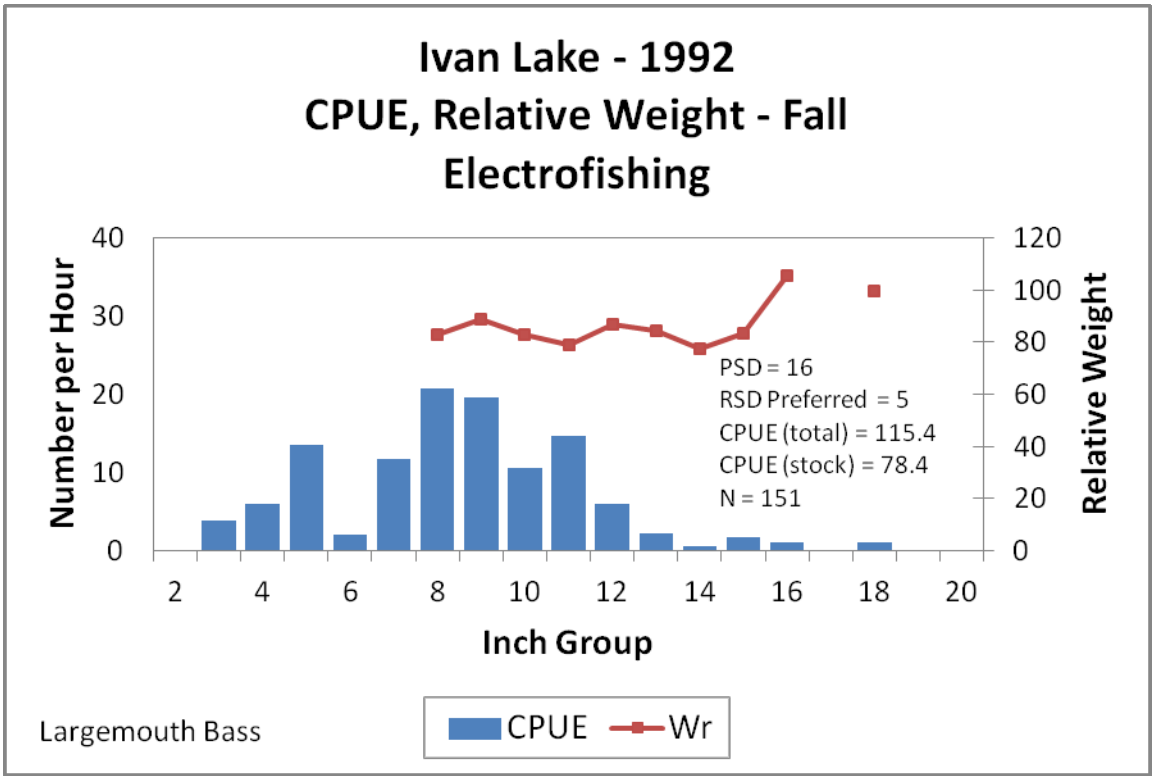

Figure 6. The CPUE, size distribution and relative weights for largemouth bass from fall 1992 electrofishing samples on Ivan Lake, LA. Relative weights indicate marginally adequate forage availability for the stock-size largemouth bass in the reservoir.

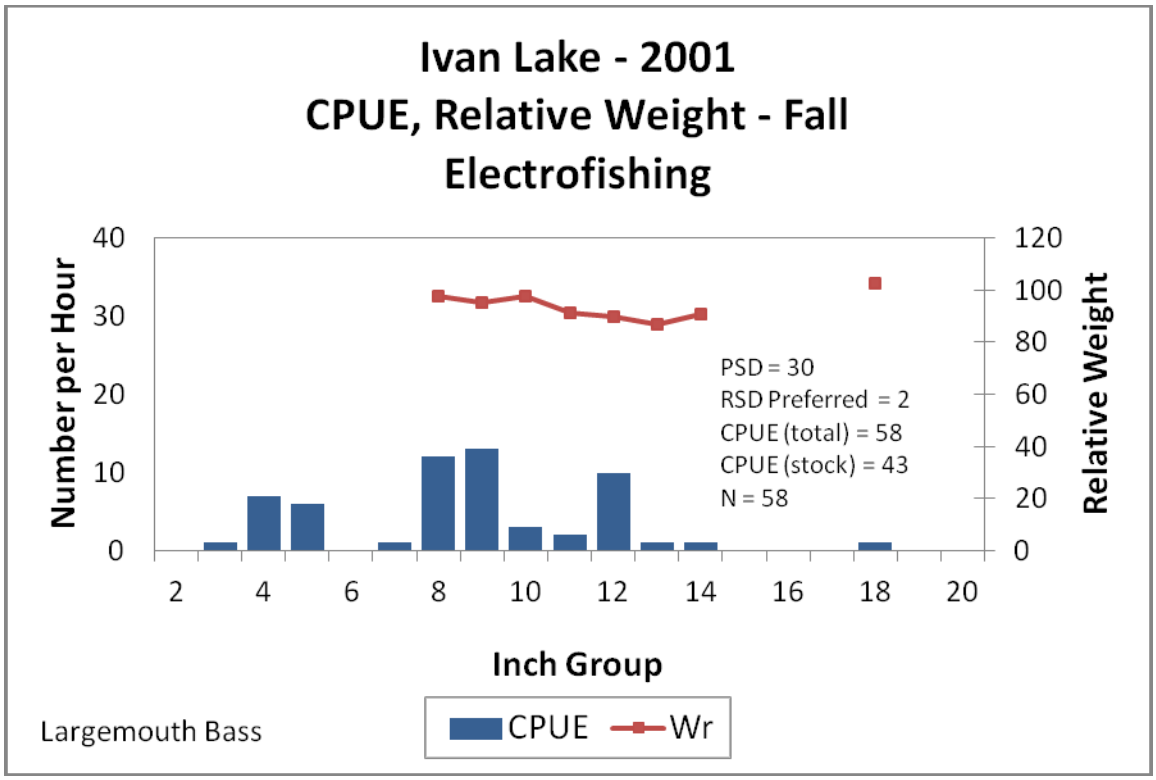

Figure 7. The CPUE, size distribution and relative weights of largemouth bass from fall 2001 electrofishing samples on Ivan Lake, LA. Relative weights indicate sufficient forage availability for the stock-size fish present in the lake at this time.

Age and growth data from largemouth bass has not been collected in the past, but will be done beginning in 2014 as part of a 3 year evaluation stocking of Florida largemouth bass fingerlings which began in 2012. In conjunction with this stocking effort, genetic analysis will also be performed to determine the effectiveness of the Florida largemouth bass genome introductions.

Forage

Forage availability is measured directly through fall forage electrofishing sampling and indirectly through measurement of largemouth bass body condition or relative weight (Wr). Relative weight is the ratio of a fish's weight to the weight of a ''standard'' fish of the same length. The Wr index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth bass Wr below 80 indicate a potential problem with forage availability.

Forage samples were collected in conjunction with fall electrofishing samples in 1992 and 2001. Only fishes ≤ 5 inches TL are considered as forage for the purpose of evaluating the available forage in the reservoir. *Lepomis spp.* and fishes in the "Forage" category which consisted almost entirely of brook silversides, (*Labidesthes sicculus*) comprised the majority of the forage available in the lake by number (Figure 8). *Lepomis spp.* comprised the majority of the biomass collected in these samples with nearly 6 pounds of bream ≤ 5 inches TL captured in the fall 1992 forage sample and over 10 pounds collected in the 2001 sample (Figure 9).

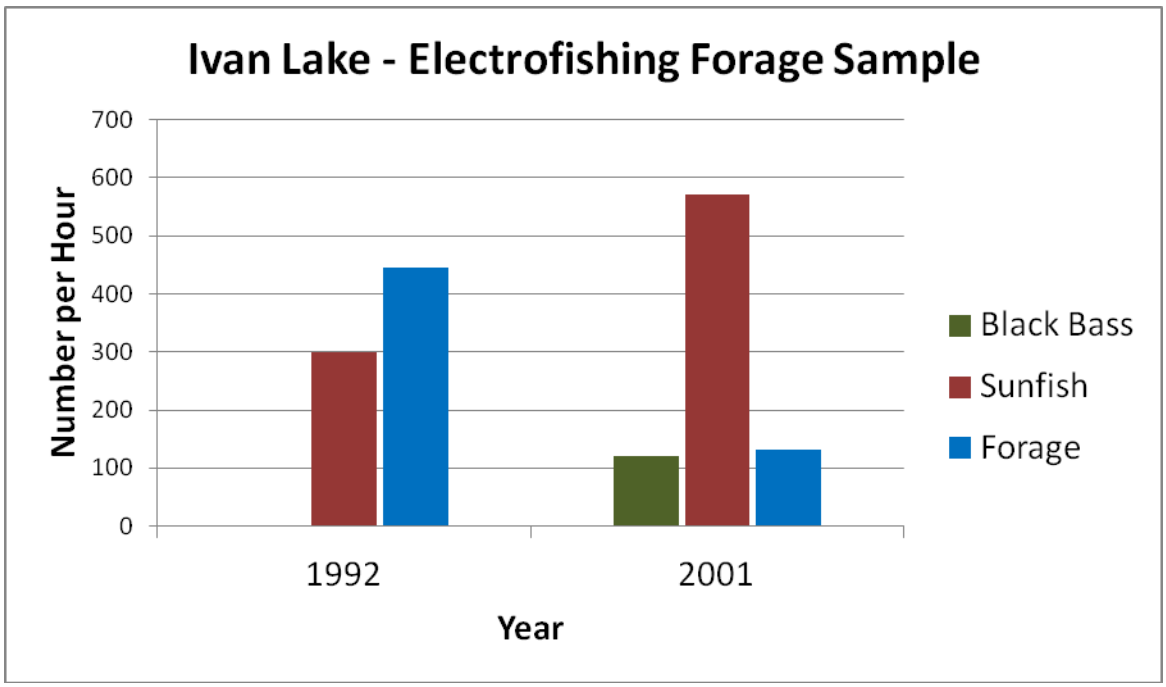

Figure 8. The CPUE in number per hour of fishes ≤ 5 inches TL from forage samples captured in Ivan Lake, LA in 1992 and 2001. Sunfishes (*Lepomis spp.*) and brook silversides comprised the majority of the species available as forage for the largemouth bass in the reservoir.

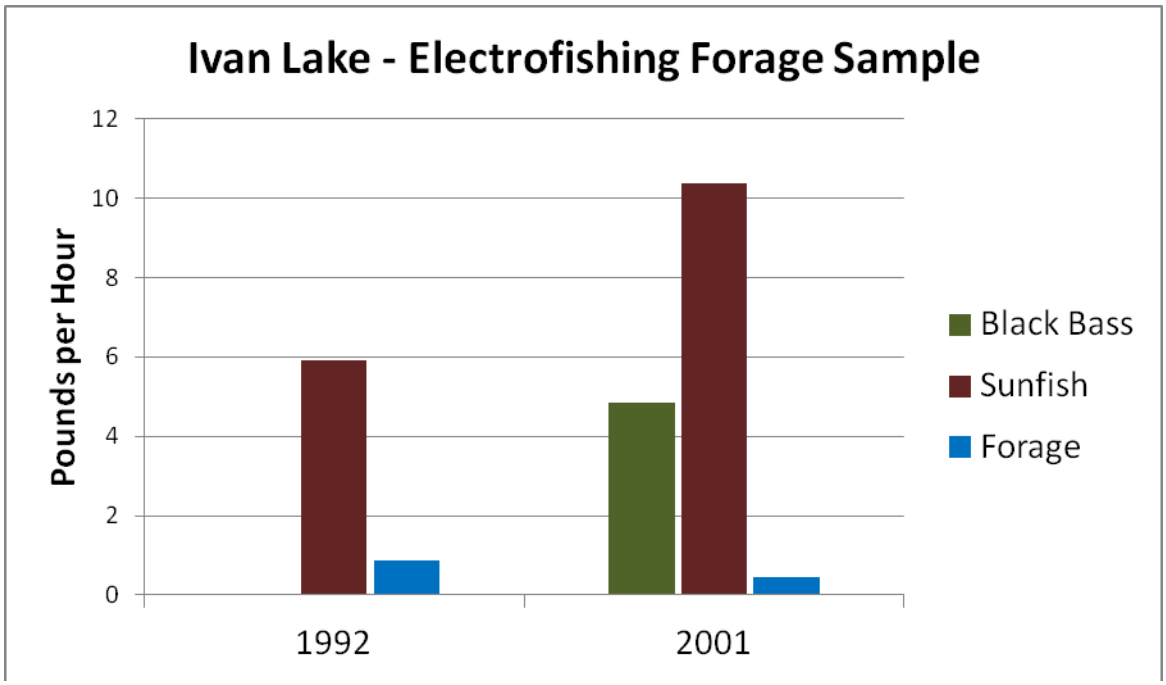

Figure 9. The catch in pounds per hour of fishes ≤ 5 inches TL from forage samples captured in Ivan Lake, LA in 1992 and 2001. Sunfish (*Lepomis spp*.) comprised the largest component by weight of the available forage in the lake. Fishes in the "Forage" category consisted primarily of brook silversides.

Crappie

Few crappie were collected during spring electrofishing samples from 1992 – 2001 as depicted in Figure 10. The population consisted primarily of black crappie with only one white crappie collected in the 1998 sample. Anecdotal information from fishermen indicates that Ivan Lake once was a popular lake for crappie and supported a good population of these fish in the earlier years of the reservoir.

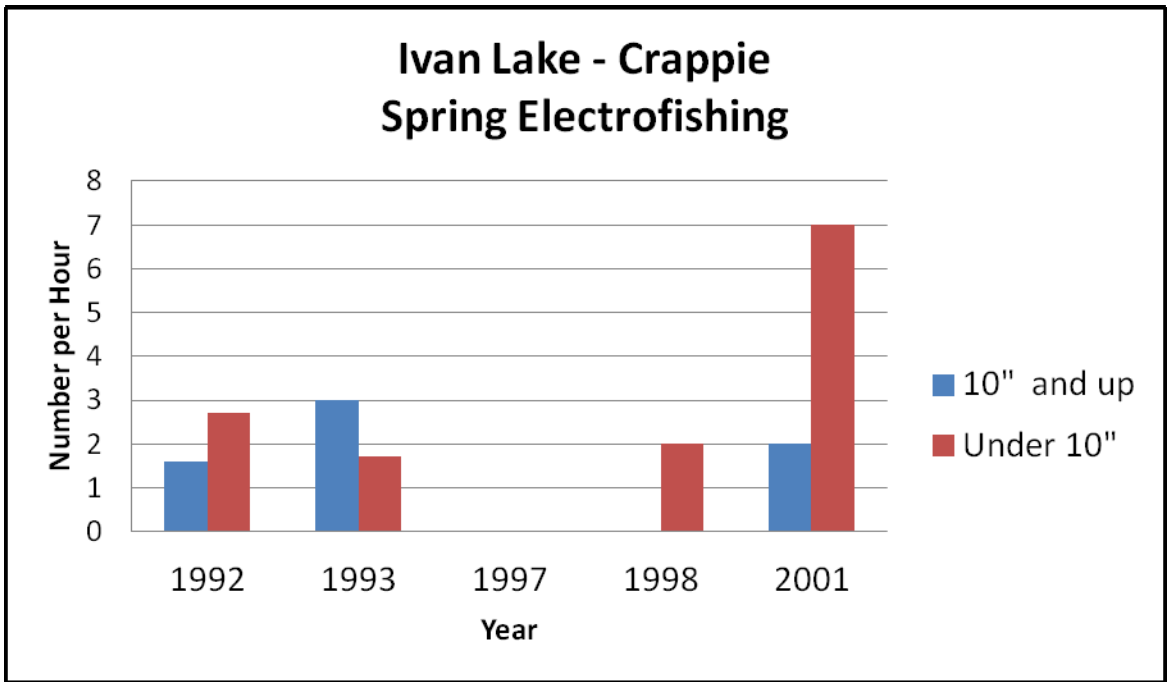

Figure 10. The CPUE of crappie captured during spring electrofishing samples from Ivan Lake, LA from 1992 to 2001. Overall numbers are low and no crappies were collected in the 1997 sample. Black crappie is the predominant species in the reservoir as only one white crappie was collected during the years sampled.

Commercial

Rough fish species that normally comprise a commercial fishery were removed by rotenone treatments made during the fall 2010 and fall 2011. Ivan Lake has not historically supported commercial species in large enough numbers to support commercial activity.

HABITAT EVALUATION

Aquatic Vegetation

Ivan 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 the early 1960's. It is suspected that aquatic growth increased over time as the lake aged and the eutrophication process accelerated.

An overabundance of aquatic vegetation is typical in this shallow water. Emergent species such as fragrant water lily (*Nymphaea odorata*), American Lotus (*Nelumbo lutea)* and alligator weed (*Alternanthera philoxeroides*) are typically present in severe to moderate infestations in this reservoir (Figure 11). Hydrilla (*Hydrilla verticillata*), variable leaf milfoil (*Myriophyllum heterophyllum*) and coontail (*Ceratophyllum demersum*) are the most troublesome submersed species in Ivan Lake and are often present in moderate to severe amounts in a fringe around the lake out to the six foot contour. The area of the lake approaching the Highway 529 Bridge is most severely impacted by aquatic vegetation with boating access often restricted to the creek channel. Bladderwort (*Utricularia spp*.), water-shield (*Brasenia schreberi*), water primrose (*Ludwigia octovalvis*), and fanwort (*Cabomba caroliniana*) are also often present in problematic levels throughout the lake. The shoreline is typically lined by lizard's tail (*Saururus cernuus*), giant cutgrass (*Zizaniopsis miliacea)*, cattail (*Typha spp.)* and smartweed (*Polygonum spp*.).

Figure 11. Aquatic vegetation is often problematic in many areas of Ivan Lake, LA due to the large expanses of shallow water. LDWF file photo - July 15, 2003.

By 2002, hydrilla infestations were severe enough that a series of drawdowns were recommended as a control measure. Surveys conducted in 2003 revealed submerged vegetation covered approximately 35% of the lake, with the most problematic species being hydrilla. In 2004, a control plan was implemented to reduce hydrilla infestations. During the first in a planned series of five consecutive drawdowns the lake was accidentally completely dewatered. Ultimately a lake renovation project was developed and implemented beginning in 2011 (Appendix I).

Substrate

The substrate of Ivan Lake is composed of sandy loam. 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

The complex cover in Ivan Lake consists primarily of stumps and aquatic vegetation. In an effort to attract fish to areas more accessible to anglers, artificial cover has been added to the lake. Submerged pallet tree type structures and large structures of plastic feed pallets such as the one depicted in Figure 12 were placed in the lake bottom in the summer of 2011. These artificial fish habitats were constructed to provide complex cover and contain a large number of interstitial spaces to attract fish to a specific area.

Figure 12. Artificial fish attractor constructed of plastic feed pallets in Ivan Lake, LA. Photo taken in 2011 – LDWF file.

CONDITION IMBALANCE / PROBLEM

Impounded in 1955, Ivan Lake provided excellent fishing opportunities for many years. The excellent fishing of past decades deteriorated due to an unbalanced fish population with undesirable species, habitat degradation and excessive aquatic vegetation.

CORRECTIVE ACTION NEEDED

Renovation of the entire impoundment including structural repairs to the water control structure and dam was required to restore infrastructure integrity. Water within the lakebed was treated with rotenone to eliminate undesirable fish. An extended dry out period was provided to remediate undesirable aquatic plant infestations and firm up bottom substrates through compaction and oxidation. Restocking is ongoing with desirable sportfish species, including Florida largemouth bass, black crappie, bluegill, redear, and channel catfish. Threadfin shad will be stocked as an additional forage species.

RECOMMENDATIONS

1. Implement the renovation plan that was developed in cooperation with other local, state and federal agencies to address the problems outlined above. This plan includes repairs to the dam, shoreline improvements for bank fishing access, constructing gravel beds, artificial reefs, and fishing piers and the restocking with desirable sportfish and forage species (**Appendix I**).

2. Implement regulations to restrict the use of commercial fishing gear in the reservoir.

3. Survey the fisheries population annually through standardized sampling to document and describe the developing fishery, post-renovation.

4. Aquatic vegetation control: due to the shallow nature and history of aquatic vegetation problems associated with Ivan Lake, an integrated approach to control and maintain desirable aquatic habitat is recommended. Control measures available to LDWF for Ivan Lake include water level fluctuation, the stocking of triploid grass carp, and herbicidal applications. It is recommended that these measures be implemented as needed to achieve a balance of fishing access and fisheries production in the lake.

Appendix I – Ivan Lake Renovation Plan

Ivan Lake Renovation

Need:
Ivan Lake is a 520 acre impoundment created in 1954. Once known for its excellent bluegill and bass fisheries this lake located in central Bossier Parish, North Louisiana, has declined in productivity over the years. The lake has served as one of the major economic contributors to that portion of the parish and the town of Cotton Valley. The lake, located wholly within the confines for the Bodcau Wildlife Management Area, is currently under a long term lease agreement with the U.S. Army Corps of Engineers (USACE). In an effort to rehabilitate the lake the Louisiana Department of Wildlife and Fisheries (LDWF) entered into partnerships with the USACE, the Bossier Parish Police Jury and the Department of Transportation and Development.

Objective:
Restore the habitat and fisheries resources to Ivan Lake.

Approach:
LDWF has entered into an agreement with the USACE, Bossier Parish and the Department of Transportation and Development to renovate the habitat and fisheries resources of Ivan Lake. As part of the agreement, the Bossier Police Jury has dedicated $250,000 to the replacement of the water control structure. LDWF's plans include:

1) Support Berm Construction – After the water control structure has been replaced, LDWF will contract work to remove approximately 8,300 cubic yards of soil from approved locations within the lake bed in order to create a stability berm on the downstream side of the dam. The attached map shows the zone in which the soil will be excavated.
2) Bank Improvement—several areas of Ivan Lake will be improved for bank fishing access by removing unwanted vegetation near the shoreline with a dozer (map attached – Figure 1). LDWF and local USACE personnel will enter into an MOU or cooperative endeavor in order to complete this task.
3) Gravel Beds—Gravel beds will be spread in strategic locations to improve spawning substrate. LDWF habitat barges will transport and deposit the gravel in the desired locations after the water has reached pool level.
4) Boat Lane Construction—each of the two arms of the lake extending westward contain dense stump fields which impede safe boat travel. The attached map (Figure I-A) shows an approximate boat road which will be created by a dozer. The removed stumps will be pushed to the side and heaped into piles for fish attraction. The boat lane boundaries will be marked with buoys in order to promote safe boating operation. Again, this will be completed within a cooperative endeavor between LDWF and local USACE personnel.
5) Artificial Reefs—artificial reefs will be constructed and placed by LDWF personnel into suitable deep water locations. These locations will be marked with buoys in order to promote use by anglers. The attached map shows possible reef locations (Figure I-A).
6) Fishing Piers—LDWF will contract construction of several handicapped accessible fishing piers. The piers will be placed near borrow ditches for winter fishing opportunities and near creek bed channels/improved banks for spring & summer fishing. Piers may be enhanced with automatic fish feeders. The map in Figure I-A shows probable locations.
7) Land Improvements—the forested area south of the levee may be improved for parking,

picnicking, and bank access. This area will be adjacent to one of the newly constructed piers.

8) Nuisance Aquatic Vegetation Protection—the boat ramp will be surrounded by a screened fence which will allow a small entrance/exit canal from the boat ramp to the main lake. This fence will be constructed of heavy-duty screened aquaculture material, pilings, cables, and buoys. The boat ramp area will be inspected for invasive aquatic vegetation on a routine basis. Any such vegetation will be removed by net in an effort to diminish introduction potential.

9) Rotenone Applications—LDWF employees will rotenone and flag net the small creek channel and borrow ditches that have held water in order to remove any remaining fish populations. The attached aerial photograph (Figure I-B) shows the extent of residual channel in need of rotenone application.

10) Fish Stocking— LDWF will provide and stock sportfish and forage species into Ivan Lake after water reaches pool elevation. The restocking effort should take place as soon as fish become available in order to establish a balanced population of desirable sportfish in the reservoir prior to natural reestablishment of fishes from the creek which may include undesirable rough fish. Plans are to stock desirable species at the following rates; approximately 100 Florida largemouth bass per acre, 1600 bluegill per acre, 400 redear per acre, 25 black crappie per acre, 20 channel catfish per acre, and 1000 threadfin shad per acre.

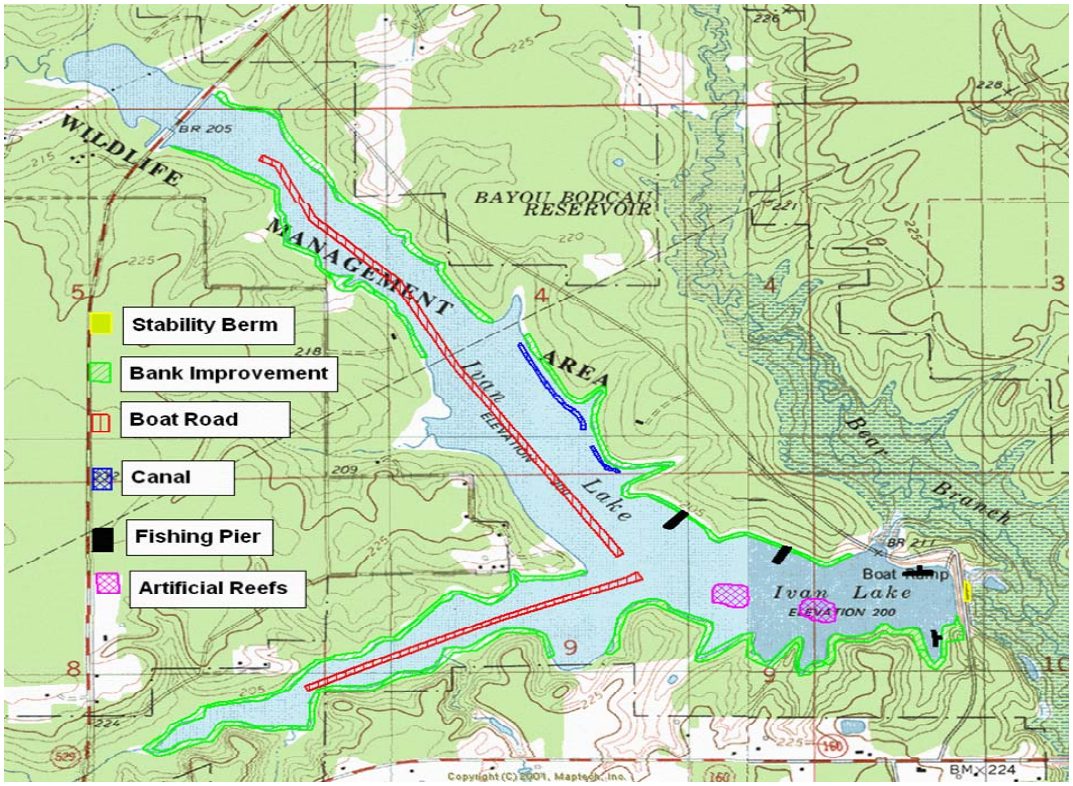

Figure I-A. Proposed improvements to fisheries habitat and for fishing access on Ivan Lake, LA.

Figure I-B. Areas on the bed of Ivan Lake, LA, which retain water during maximum drawdown and will require an application of rotenone to remove existing fish populations prior to restocking efforts. LDWF file photo.

The progress made to date (6-26-12) on items outlined in the Ivan Lake Renovation Plan above is reflected in **Appendix II** – Progress Report on the Ivan Lake Renovation Plan.

Appendix II - Progress Report on the Ivan Lake Renovation Plan

Update on June 26, 2012.

Rotenone applications were made during the fall of 2010 with a follow-up treatment in the fall of 2011 in order to eliminate the existing fish population in the water remaining in the creek channel and borrow pits during the maximum drawdown. Item 9 of the Ivan Lake Renovation Plan has been completed.

The bank improvements outlined in item 2 of the renovation plan have been completed, along with access roads to these bank fishing areas.

The outflow pipe depicted in Figure II-A was replaced by the Bossier Parish Police Jury. Following this work the support berm described in item 1 of the renovation plan was completed.

The boat lane described in item 4 of the renovation plan has been completed. The boat lane was created by a bulldozer and is easily visible in the aerial photograph in Figure II-B. This boat lane is well marked with navigational day marks mounted on pilings in accordance with the U. S. Aids to Navigation System (ATON).as shown in Figures II-C and II-D

Figure II-A. Outflow pipe for Ivan Lake, LA, following replacement by the Bossier Parish Police Jury. Photo taken in the spring 2012.

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Figure II-B. Aerial photo of the newly created boat lane in Ivan Lake, LA. Stumps and obstructions were cleared by a bulldozer and the edges marked with pilings. Photo taken in fall 2011.

Figure II-C. Edges of the boat lane in Ivan Lake, LA were marked with day marks in accordance with the U.S. Aids to Navigation System (ATON). Photo taken in spring 2012.

Figure II-D. Boat lane markers on Ivan Lake, LA, at the intersection of Phillips and Caney Creeks. Photo taken in spring 2012.

Artificial reefs have been constructed by LDWF personnel as described in item 5 of the Ivan Lake Renovation Plan.

Restocking of the lake began in early 2012 when 186,357 bluegills and 84,192 redear sunfish were stocked during February and March. These fish were 3" – 4" and were almost one year old at the time of stocking. Ivan Lake received 42,003 Florida largemouth bass fingerlings in April 2012. The restocking plans outlined in item 10 of the renovation plan are ongoing with channel catfish and black crappie scheduled to be stocked in the near future.

Other items mentioned in the renovation plan are ongoing at this time.