Five Year Sardis Lake Fisheries Management Plan – 2011

Oklahoma Department of Wildlife Conservation (ODWC)

Background

Sardis Lake is located approximately 3 miles north of Clayton in Latimer and Pushmataha Counties, southeast Oklahoma (Figure 1). The lake is operated by the U.S. Army Corps of Engineers (USACE), Tulsa District. Congress authorized the project with the Flood Control Act approved 23 October 1962 for flood control, water supply, recreation and fish and wildlife. Construction began in 1975 and was completed in December 1982 impounding Jackfork, Anderson and Buffalo Creeks. The conservation pool was filled to 599 ft. asl. The reservoir contains 274,330 acre-feet of water with 13,610 surface acres. Elevation at the top of the flood control pool is 607 ft. asl with the capacity to store 396,897 acre-feet of water. The watershed consists of 275 square miles within Latimer, Pittsburg and Pushmataha Counties. Lake levels are controlled with the gate tower by two wheel gates, emergency gates and stop-log slots. Water discharge is further controlled by slide gates for low flow and water supply. An uncontrolled spillway is designed to release 29,400 cfs at maximum pool, elevation 611 ft. asl. Sardis Dam releases follow the pre-existing Jackfork Creek channel southward to the Kiamichi River confluence. The Kiamichi River is impounded at Hugo Lake before reaching the Red River. Physical and chemical characteristics of Sardis Lake are listed in Table 1. For more information, visit http://www.swt-wc.usace.army.mil/SARD.lakepage.html.

A recent Sardis Lake storage contract agreement could transfer Oklahoma's water storage rights to Oklahoma City. On 8 January 2007, the Supreme Court of the United States decided against reviewing the case of United States vs. Oklahoma and the Oklahoma Water Resources Board (OWRB). An Order of the District Court required Oklahoma to pay the $27.8 million dollars owed to the federal government for construction of Sardis Lake within five years. The first court ordered payment was expected by 1 July 2010. On 7 June 2010, Oklahoma City Water Utilities Trust (OCWUT) agreed to purchase the State's existing obligation and reimburse the State for past Sardis water storage payments and costs. In exchange, the OCWUT would like to acquire 136,000 acre-feet of drinking water per year for central Oklahoma communities. Local communities surrounding Sardis Lake are reserved 20,000 acre-feet for their needs. A lake level management plan is also required of the agreement having potential to benefit the fisheries of Sardis Lake. The agreement still requires federal approval.

The incredible surrounding landscape coupled with great fishing opportunities make Sardis Lake a prime destination for outdoor enthusiasts. Three USACE campgrounds offer general RV hookups, restrooms, showers, swim beaches, boat ramps and fishing areas. Campgrounds are also equipped with covered picnic areas and outdoor grills. Campground operating dates are 1 April through 31 October. Day use fees for beaches and boat ramps are charged at Potato Hills South and Sardis Cove year round. Two courtesy docks are designed for the physically challenged at the Potato Hills South and Sardis Cove boat ramps. The docks, buffalo creek fishing pier and the gate tower at the dam are all wheelchair-accessible with handrails. All of the camping area restrooms were designed with the physically challenged in mind. For more information, contact the Sardis Lake project office at 918-569-4131.

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Habitat

Fish habitat consists primarily of aquatic vegetation, rock and flooded timber. Water willow (*Justicia americana*) provides cover along the shallow perimeter. Additional habitat includes man-made structures such as rip-rap along embankments and bridges. Marked brush pile fish attractors are present at 15 locations (Figures 2 and 3) and publicized on the ODWC's Interactive Digital Wildlife Atlas at http://www.wildlifedepartment.com/wmas2.htm. Brush piles were refurbished in July 2011. Water level fluctuations vary little with only 8 ft. of flood control storage and average secchi depth is 28.4 in., which is approximately 1/3 the depth of the photic zone. This means critical light will reach depths of 7 ft. below the surface (Figure 4) making Sardis Lake a candidate for aquatic vegetation enhancement.

Water Quality

Water quality data collected through the OWRB as part of their Beneficial Use Monitoring Program (BUMP) classifies Sardis Lake as fully supporting the outlined Fish and Wildlife Propagation (FWP) beneficial uses. Numerical criteria are assigned to protect and maintain the beneficial use classification where the water quality and habitat are adequate to support climax communities of fish and shellfish. A BUMP fact sheet is available at http://www.owrb.ok.gov/quality/monitoring/bump/pdf_bump/Current/Lakes/Sardis.pdf. The most recent sampling period was December 2007 – August 2008.

Thermal and Chemical Stratification

Sardis Lake does not stratify during the winter and spring. Thermal stratification occurs in the summer typically between 16 and 19 ft. Near the dam, dissolved oxygen (DO) concentrations were < 2 mg/L for up to 42% of the water column during August 2008 sampling. The DO levels during the sampling period were all sufficient to fully support FWP beneficial use.

Productivity

The trophic state index (TSI) calculated using Carlson's TSI (chlorophyll-a) was 46, classifying the lake as mesotrophic (TSI = 41-50) with moderate to high primary productivity and nutrient conditions. Compared to previous sampling results, this value does not indicate significant changes in productivity. Runoff from the wooded, mountainous watershed contains little nutrients compared to drainages within agricultural land. Sediment loading is observed following storm events. Rainfall is attributed to the turbidity peak in May 2008 likely skewing the data to 30% lake-wide turbidity values > 25 Nephelometric Turbidity Units (NTU). Because the average lake-wide turbidity concentration was 15 NTU, the lake is considered fully supporting FWP beneficial use.

Conductivity

Specific conductance ranged from 47 – 81 µS/cm during the sampling period, indicating low concentrations of ionized salts in the lake. These values are much lower than other regions of Oklahoma.

pH

Values were neutral ranging from 6.6 – 7.7 pH units. Sardis Lake's pH range is considered to fully support FWP beneficial use.

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Fishery

Biologists use a variety of gear types and standardized sampling procedures (SSP) to monitor resident fish populations. Information gathered by the ODWC is used to propose fishing regulations as a management tool. Managers may also introduce fish species as a management tool or to increase angling opportunities. The fish stocking history for Sardis Lake is included in Table 2.

The major sportfish found in Sardis Lake include largemouth bass (*Micropterus salmoides*), spotted (kentucky) bass (*Micropterus punctulatus*), white crappie (*Pomoxis annularis*), black crappie (*P. nigromaculatus*), white (sand) bass (*Morone chrysops*), walleye (*Stizostedion vitreum*), channel catfish (*Ictalurus punctatus*), blue catfish (*Ictalurus furcatus*) and flathead catfish (*Pylodictis olivaris*). Forage species include a variety of sunfish (*Lepomis spp.*), gizzard shad (*Dorosoma cepedianum*) and threadfin shad (*D. petenense*).

Please visit http://www.wildlifedepartment.com/fishregs.htm to review current license requirements and fishing regulations. Copies of "Regulation Guides" are available where hunting and fishing licenses are sold.

Lake Records Program

Potential lake record fish may be weighed in at Clayton Country Store, 918-569-7577. Fish can be weighed in alive, on ice or frozen. Current and former Sardis Lake record fish and stories are available at http://129.15.97.19/fishsite/.

Black Bass

The ODWC evaluates bass abundance on a regular rotation with electrofishing surveys. The surveys are scheduled to correspond with bass spawning activity.

Largemouth Bass

Electrofishing surveys in 2008 showed total abundance of largemouth bass (*Micropterus salmoides*) and abundance of quality size largemouth bass ($\geq$ 14 in.) was low compared to statewide averages. Body condition was also poor but growth was acceptable. Catch rates (C/f) and size structure are included in Table 4 and Figure 5, respectively. Average C/f from 1987 – 2008 of 47 bass per hour is acceptable for a quality fishery. Otoliths were collected during 2008 electrofishing surveys to determine a baseline for average length at age. Average length at age-3 (14.4 in.) was above quality size (Table 7, Figure 6). Relative weights (W_r) are consistently below acceptable values for all length groups.

An outbreak of epistylus impacted black bass causing some mortality during the summer of 1991 and to a lesser degree in 1992. This external parasite attaches to the skin or gills of the host causing loss of appetite and labored gill activity. Catch rates of the < 8 and 8 – 12 in. size groups declined in 1991 as possible proof that the infestation had negative impacts to the population. Increased water flow, reduced fish densities or increased water temperatures can all control external parasites. The protozoan has not been found since the early 1990s.

More recently, samples from the summer of 2001 indicated the presence of Largemouth Bass Virus (LMBV). Symptoms of the virus include irritated to over inflated swim bladders triggered

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by various stressors. During the summer of 2003, 36 more samples were collected with 19% of those testing positive for LMBV. Fish that survive the initial infection develop immunity to the virus. Catch rates indicate little impact to the overall population but a slight decrease in the ≥ 14 in. group was observed in the 2004 sample. The aftermath of the virus was even more apparent in tournament results (Table 3). Bass > 5 lbs. caught per tournament were reduced from 22.0 (2005) to only 1.7 (2006), taking 2,326 angling hours per bass > 5 lbs. in 2006.

Environmental conditions at Sardis Lake are favorable to introduced Florida Largemouth Bass (*Micropterus salmoides floridanus*; FLMB) and they are stocked regularly for their potential to reach trophy size. The lake has a long history of producing 10-pound plus bass. The current largemouth bass Sardis Lake record is 11.8 lbs. caught on 30 March 2010 by Mark Wiles. Genetic evaluation is required following stocking FLMB. Fin clips were taken from 92 largemouth bass in 2009 for analysis. Pure Florida (F) plus first generation hybrids (F1) totaled 32.6% of the sample (Table 5); Samples with ≥ 30% F + F1 phenotypes indicate a successful introgression into the population. A FLMB stocking rate experiment is being conducted from 2009 through 2011 at Sardis Lake. The research project was designed to evaluate stocking rates of 10,000, 50,000 and 100,000 FLMB fingerlings. Oxytetracycline was used to mark otoliths prior to stocking. Stocking sites were separated by distances sufficient to keep introduced fish from different rates from mixing. Each site was revisited in the fall following the summer stocking and again the next spring. At least 50 largemouth bass < 8 in. were collected by electrofishing from each site to determine survival of stocked FLMB. At the conclusion of the experiment, optimal stocking rates will be identified and incorporated into ODWC protocol.

Spotted Bass

Total abundance of spotted bass (*Micropterus punctulatus*) and abundance of quality-size fish (≥ 14 in.) is low (2008 electrofishing; Table 6, Figure 5). Growth is slower than the largemouth bass, taking 4 years to reach quality size (2008 age and growth; Table 7, Figure 6). Daily creel limits and size limits were removed from spotted bass in 2010, to encourage angler harvest. Sardis Lake does not currently have a lake record spotted bass. A minimum weight of 2 lbs. is required to qualify.

Attempts to establish reservoir strain smallmouth bass (*Micropterus dolomieu*) in Sardis Lake were unsuccessful. Smallmouth stocking occurred intermittently from 1983 – 2005 (Table 2).

Sardis Lake placed 9th between 1994 and 2009 among Oklahoma bas tournament lakes and routinely produces 2 – 3 bass per year > 8 lbs. caught during tournaments (Table 3). The USACE issues around 30 permits for Sardis Lake bass tournaments each year but tournament reports are only received half the time. ODWC tournament report webpage is at http://129.15.97.41/Bass/. Bass tournament results for Sardis Lake are summarized in Table 3.

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Crappie
Another very popular sport fish is the crappie. The ODWC samples crappie with gill nets and trap nets. Samples are collected in the fall.

White Crappie
Total abundance of white crappie (*Pomoxis annularis*) is moderate to high and W_r are acceptable for all length groups except the ≥ 12 in. group. Quality sized (≥ 8 in.) abundance is very high. Catch rates and size structure are included in Table 8 and Figure 7, respectively. Age and growth was routinely evaluated during the 1990s. Crappie growth was acceptable with quality size attained by 2.5 years of age (1992-1999 trap netting; Table 9). Sardis Lake does not currently have a lake record crappie. A minimum weight of 2 lbs. is required to qualify. Black crappie (*P. nigromaculatus*) were not found during the 2009 gill net sample.

Temperate Bass
A spring spawning run of white bass (*Morone chrysops*) congregates fish on shallow rocky shoals in tributaries of Sardis Lake. The ODWC samples these fish with gill nets arranged with different sized meshes to capture all length groups. Samples are collected in the fall. Abundance is moderate to high and W_r are acceptable for all length groups except the ≥ 12 in. group. Catch rates and size structure are included in Table 10 and Figure 8, respectively. Sardis Lake does not currently have a lake record white bass. A minimum weight of 3 lbs. is required to qualify.

Walleye
During the early 1990s walleye (*Stizostedion vitreum*) were introduced to Sardis Lake. Almost 11.5 million fry were stocked in effort to establish a self-sustaining population. Fall gill netting is used by ODWC to monitor the small population of walleye that still exists today. Stocking additional walleye remains optional when certain stocking criterion is gathered. Total abundance is low but at times quality (≥ 16 in.) abundance is moderate. Catch rates and size structure are included in Table 11 and Figure 9, respectively. The current walleye Sardis Lake record is 7.0 lbs. caught on 16 May 2010 by Henry Wells.

Catfish
Channel catfish (*Ictalurus punctatus*) and blue catfish (*I. furcatus*) are sampled with gill nets during the fall. Flathead catfish (*Plyodictis olivaris*) are sampled by summer electrofishing.

Channel Catfish
Catch rates from 2009 fall gill netting was above the minimum acceptable value for a quality fishery (C/f = 0.2). Quality sized (≥ 16 in.) abundance was low. All size groups except the < 12 in. group had undesirable W_r values. Catch rates and size structure are included in Table 12 and Figure 10, respectively. Sardis Lake does not currently have a lake record channel catfish. A minimum weight of 15 lbs. is required to qualify.

Blue Catfish
Blue catfish were stocked in the early 1980s and again in 1991. Total abundance is moderate. Quality sized (≥ 16 in.) abundance was moderate to high in 2009 with satisfactory W_r for the ≥ 12 in. group. Gill net C/f and electrofishing C/f are included in Tables 13 and 14, respectively. A length frequency distribution from gillnetting is shown in Figure 11. Active vs. passive

DRAFT

capture techniques are often used for blue catfish and C/f can differ greatly between the two. For example, 2000 fall gill netting captured 0.9 blue catfish ≥ 12 in. per 24 hours compared to 2000 summer electrofishing results of 147.2 ≥ 12 in. per hour. Electrofishing satisfies statistical analyses and offers a more accurate depiction of availability. Sardis Lake does not currently have a lake record blue catfish. A minimum weight of 40 lbs. is required to qualify.

Flathead Catfish

Only two flathead catfish were collected during 2009 fall gillnetting (Table 15). However, both were in the ≥ 20 in. length group with W_r of 102, well above acceptable values (≥ 90). Very few flatheads are sampled using gill nets. Summer electrofishing surveys can provide better information regarding flathead catfish population structure (Table 16). The current flathead catfish Sardis Lake record is 80.0 lbs. caught on 2 May 2010 by H.L. Harris.

Sunfish

Some common species of sunfish in Sardis Lake include: bluegill (*Lepomis macrochirus*), redear (*L. microlophus*), longear (*L. megalotis*) and green (*L. cyanellus*). Bluegill sunfish are present in greatest numbers.

Bluegill

According to 2008 electrofishing results, bluegill sunfish are present but in low total abundance and low quality sized (> 6 in.) abundance. The largest bluegill in the 2008 sample was 6.9 in. and 0.3 lb. Catch rate and size structure are included in Table 17 and Figure 12, respectively. Sardis Lake does not currently have a lake record bluegill sunfish. A minimum weight of 1 lb. is required to qualify.

Shad

Sampling forage fish has proven to be inconsistent between electrofishing and gill nets. Sinking gill nets were used prior to 2010. Floating gill nets were used for the first time in September 2010 to target shad. The new gear is used between August and October.

Gizzard Shad

Floating gill nets captured 46 gizzard shad (*Dorosoma cepedianum*) over 15 net nights. All were < 6 in. in length. Electrofishing C/f and gill net C/f are included in Tables 18 and 19, respectively.

Threadfin Shad

Adult threadfin shad (*D. petenense*) rarely exceed 6 in. in length, but are temperature sensitive with die-offs reported at temperatures below 45ºF. They were introduced to Sardis Lake in the mid 1980s and 1992. Gill netting in the fall of 2009 collected 50 and floating gill nets set in 2010 collected zero. Electrofishing C/f and gillnetting C/f are included in Tables 18 and 20, respectively.

DRAFT

Fish Consumption Advisories
Advisories are issued by the Oklahoma Department of Environmental Quality (ODEQ). Current advisories can be viewed at http://www.deq.state.ok.us/CSDnew/fish/index.htm.

Mercury
Southeast Oklahoma's annual rainfall totals are high, making atmospheric mercury deposition higher than other parts of the state. The ODEQ Air Quality Division funded a survey in 2008 to test mercury concentrations in fish tissue. The target species was black bass. Sardis Lake bass had mercury levels which exceeded U.S. Environmental Protection Agency (EPA) guidelines. Tissue from 16 largemouth bass was collected in July 2008. The average concentration was 0.8 µg/g. At this concentration, the advisory cautions pregnant women and young children (sensitive population) to limit their fish consumption to 2 meals per month of largemouth bass > 14 in. or walleye > 21 in. and over. There are no advisories on any species from Sardis Lake for males age 15 and older and women past childbearing age. More predator fish typically harvested by anglers were collected in 2009 so species-specific advisories could be issued. There are no consumption advisories for spotted bass, white crappie, white bass, any catfish or bluegill.

Threats to the Fishery

Aquatic Nuisance Species (ANS)
People often visit different bodies of water within the same day. It is very easy for invasive species to hitchhike from one lake to another unless the following precautions are taken: 1) Remove any visible mud, plants, fish or animals before transporting equipment. 2) Drain all water from boat and equipment including bilges, bait buckets, live wells and coolers. 3) Clean and dry anything that comes into contact with water (boats, trailers, equipment, clothing, dogs, etc.). 4) Never release plants, fish or animals into a body of water unless they came out of that body of water.

The ODWC follows strict Hazard Analysis and Critical Control Point (HACCP) procedures to avoid transporting invasive species to uninfected water bodies.

Zebra Mussels
Zebra mussels (*Dreissena polymorpha*) are spreading across Oklahoma. These invaders are transported by anglers, boaters and other outdoor enthusiasts. Zebra mussels can cause significant ecological and economic harm once a population is established. Large numbers attach themselves to water intake pipes, boats and native plants and animals. They filter feed nutrients that native organisms require for growth and survival. Sardis Lake does not have a documented population of zebra mussels. Report all suspicious sightings to ODWC or USACE personnel.

Asian (Grass) Carp
Grass carp (*Ctenopharyngodon idella*) are commonly used in private ponds as a biological control for aquatic vegetation. Unfortunately, sometimes they escape when water is overflowing, so fish barriers at spillways are recommended. In addition, state law only allows the release of sterile triploid forms. These fish can harm native plants if released into public waters. Grass carp have not been confirmed in Sardis Lake. Documenting sightings will be critical to monitoring their expansion.

DRAFT

Bighead Carp

Adult bighead carp (*Hypophthalmichthys nobilis*) are invasive fish that feed on plankton and compete for food with larval fishes and mussels. Bighead carp have not been confirmed in Sardis Lake, but have been reported in the Kiamichi River below Hugo Lake and the Red River. Anglers should not catch and transport bait from one area to another. Bighead carp could spread upstream to Sardis Lake if bait is collected from infested water and transported for use in the lake. Juveniles look similar to native baitfish. Documenting sightings will be critical to monitoring their expansion. Please retain (do not release) and report any bighead carp to the ODWC.

Silver Carp

Silver carp (*Hypophthalmichthys molitrix*) were imported to use in the aquaculture industry. This species competes for plankton with larval and juvenile fishes as well as shad. They also jump out of the water when startled by boat engines making them a hazard for boaters. Silver carp have not been confirmed in Sardis Lake, but have been reported in the Arkansas and Red Rivers in Oklahoma. Documenting sightings will be critical to monitoring their expansion. Please retain (do not release) and report any silver carp to the ODWC.

Snakehead Fish

The northern snakehead (*Channa argus*) was introduced by asian fish markets. They can spawn up to five times a year and the young receive care from both parents (unlike native fish), which improves their survival rate. They are aggressive predators, eating most fish species including their own. With the recent discovery of snakeheads in Eastern Arkansas, the Arkansas Game and Fish Commission attempted unsuccessfully to eradicate the population with rotenone. Oklahoma does not have snakeheads. The bowfin (*Amia calva*) inhabits the Kiamichi River drainage and closely resembles the long, cylindrical body of the snakehead. Please retain (do not release) and report any snakeheads to the ODWC.

Aquatic Plants

Alligator weed (*Alternanthera philoxeroides*) is one example of an imported plant used for backyard water gardens. Once established elsewhere, the plant can easily displace native species by producing thick stands or floating mats. Aquatic stems are hollow, leaves are lance shaped and flowers are ½ in. wide and white. The alligator weed flea beetle (*Agasicles hygrophila*) is used as a biological control agent to slow the spread of alligator weed. The ODWC and Department of Agriculture tranplanted the South American beetles to Spring Creek, near Oklahoma City, OK from a quarantine facility in Florida. Releases in 2006 reduced the plants by over 75%. Oklahoma winter temperatures will likely prevent over-wintering of the beetles so annual releases will be necessary to maintain control. Alligator weed has not been confirmed in Sardis Lake but can spread by seed or fragmentation from invaded bodies of water.

When non-native plants find their way into ponds, lakes and rivers they can quickly spread across the surface or beneath the surface. Special aquatic herbicide can be used if invasive plant sightings are reported before the problem is beyond control. For a complete ANS watch list in Oklahoma, visit www.wildlifedepartment.com/nuisancespecies.htm.

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Water Diversions/Withdrawls

The ODWC is responsible for fish and wildlife resources and the users of those resources. Water level manipulation plans can sustain quality recreational fishing by providing crucial spawning and nursery habitat. Popular sportfish species rely on shallow, vegetated habitat during critical periods for optimal spawning and survival of offspring during their first year of life. Success of any beneficial water level plan is dependent on the timing and magnitude of water level fluctuations and the ability to control them. Significant deviation from the plan, especially during spawning and nursery periods and times of terrestrial vegetative growth, will adversely affect future fish populations. Water level plans should be considered with equal value to other beneficial public uses as future water diversions are proposed. A generalized beneficial water level plan and designed purposes are described below:

1. 1 January to 28 February – maintain reduced lake levels (4 ft. below normal) to preserve shoreline vegetation established the previous summer and fall. This vegetation will be subsequently flooded during spring and summer.

2. 1 March to 31 March – slowly increase water levels to at or above normal pool elevation. The flooded vegetation previously established below the normal pool elevation will provide maximum opportunities for fish spawning and recruitment.

3. 1 April to 31 August – maintain pool elevations at normal levels or allow them to slightly increase above normal. Vegetation previously established below the normal pool elevation should remain flooded to provide maximum opportunities for fish spawning and recruitment.

4. 1 September to 31 December – reduce lake levels slightly (about 4 ft.) to allow for natural or supplemental re-vegetation of shoreline habitat. The new vegetation will be subsequently flooded the following spring and summer.

Management Objectives

Goals

- Use sampling procedures to monitor major sportfish and forage species.
- Improve aquatic plant diversity.
- Monitor water quality.
- Develop and/or maintain boating and fishing access.
- Conduct public outreach and solicit feedback regarding fisheries management issues.
- Improve response from bass tournament directors.
- Follow all fisheries related issues in the region.

Strategies

1) Fishes

- Conduct SSP spring 2012 electrofishing survey for largemouth bass and spotted bass to evaluate their abundance and body condition. Continue using the 14 in. minimum length limit on largemouth bass to reduce harvest until fish reach quality size. Investigate below average C/f and W_r from most recent samples. Finish FLMB stocking research and implement changes to stocking protocol.

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Work with bass tournament directors on safe handling and release procedures and ask that more reports are received.

- Conduct SSP fall 2012 gill netting and fall 2011 trap netting surveys for crappie to evaluate their abundance, body condition and age/growth. There is no apparent need at this time to propose daily and/or length limit regulations on crappie. Abundance is acceptable. Determine length at age to conclude that growth rates remain acceptable. Investigate low weights of quality sized individuals.
- Conduct SSP fall 2012 gill netting surveys for white bass to evaluate their abundance and body condition. Investigate low weights of quality sized individuals.
- Conduct SSP fall 2012 gill netting surveys for walleye to evaluate their abundance and body condition. Supplemental stocking may be requested.
- Conduct SSP fall 2012 gill netting surveys for channel catfish and blue catfish to evaluate their abundance and body condition.
- Conduct SSP summer 2012 electrofishing surveys for flathead catfish to evaluate their abundance and body condition.
- Conduct SSP summer 2011 floating gill netting surveys for gizzard shad and threadfin shad. Forage abundance appears low but will rebound during periods of abundant food and favorable habitat. Rainfall will naturally return optimal lake conditions with nutrients and necessary water levels for shad to thrive. Shad prey on plankton, a resource that can be limited in moderately productive lakes. Fertilizer is occasionally used in smaller impoundments to feed plankton blooms which provide food for juvenile sportfish and forage fish species. However, the feasibility of fertilizing an area like Sardis Lake is inconceivable.

2) Habitat

- Maintain fish attractors utilizing eastern red cedars (*Juniperus virginiana*) from ODWC property surrounding Lake Nanih Waiya in 2013. Replace fish attractor buoys in Anderson Creek arm in 2012.
- Select only one area to attempt aquatic vegetation enhancement and sample existing biota there and at a control site where similar preexisting habitat is found.
- Fish attractors benefit the angler, not the fish, so intensive efforts will be concentrated on establishing aquatic plant communities to increase habitat diversity for juvenile fish. Plants will be transplanted from ODWC nurseries. Assistance will be provided at the aquatic vegetation nurseries. Successful establishment of new plant communities depends greatly on their protection and light availability. Emergent candidate species include: pickerel weed (*Pontederia cordata*), bull tongue (*Sagittaria platyphylla*), arrowhead (*Sagittaria latifolia*) and softstem bulrush (*Schoenoplectus tabernaemontani*). Some advantages of emergent vegetation are nutrient uptake and shoreline stabilization. Submerged species, such as american pondweed (*Potamogeton nodosus*), eel grass (*Vallisneria americana*) and water stargrass (*Heteranthera dubia*) provide beneficial nursery habitat for many aquatic organisms.
- Resample aquatic communities at the enhanced site and control site and report any significant differences.

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- Perform a fisheries habitat evaluation of the entire shoreline with GPS equipment and design a map with GIS applications.

3) Water Quality
- Monitor several water quality parameters in the lake and tailrace as needed. Increase sampling frequency during extreme conditions of summer to monitor D.O. and water temperatures. Fish and mussel kills have occurred below Sardis Dam related to water quality. Results from each year will be summarized and provided to appropriate resource agencies.

4) Boating and Fishing Access
- Find an organization to partner with ODWC and USACE to install a covered fishing dock on Sardis Lake. The cooperator will be responsible for the continued maintenance on the dock, parking and facilities. Lake level fluctuations are minimal decreasing the likelihood of flood damage to the dock. A location out of the wind and over sufficient depth will be necessary.

5) Public Outreach
- Coordinate and assist with the education, documentation and monitoring of ANS. Investigate and report all sightings of ANS to the ODWC ANS biologist, USACE, other resource agencies and the media when appropriate. Conduct one public meeting to present agency efforts and fisheries management plans. Conduct one public meeting in the future to discuss the progress of the fisheries management plans.

6) Public Input
- Meet with bass clubs to explain the importance of submitting tournament reports. Suggest post-tournament reporting as part of USACE tournament permit process.
- Solicit public feedback on fisheries management efforts.

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Table 1. Physical and chemical characteristics of Sardis Lake.

Operating Agency	USACE
Impoundment Date	**1982**
Surface Area	**13,610 acres**
Shoreline	**117 miles**
Shoreline Development Ratio	**6.9**
Average Depth	**21.3**
Maximum Depth	**49.5**
Water Exchange Rate	**0.9**
Watershed	**275 square miles**
Secchi Disk	**28.4**
Conductivity	**47 – 81 µS/cm**
pH	**6.6 – 7.7; Neutral**
Carlson's TSI (chlorophyll - a)	**46; Mesotrophic**

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Table 2. Species, number and fish stocked in ***Sardis Lake***, 1982 – 2010.

Date	Species	Number	Size
1982 – 1984	Smallmouth Bass	235,598	Fingerlings
1983	FLMB	277,598	Fingerlings
1983	Northern LMB	244,700	Fingerlings
1983 – 1984	Channel Catfish	474,600	Fingerlings
1983 – 1985	Blue Catfish	209,863	Fingerlings
1983	Bluegill Sunfish	1,009,470	Fingerlings
1983 – 1985	Threadfin Shad	15,847	Adults
1986 – 1988	Smallmouth Bass	58,999	Fingerlings
1990 – 1991	Walleye	11,419,000	Fry
1991	Blue Catfish	278	Adults
1992	Threadfin Shad	14,000	Adults
1993 – 2000	FLMB	2,182,922	Fingerlings
2001 – 2003	Smallmouth Bass	104,722	Fingerlings
2002 – 2003	FLMB	574,795	Fingerlings
2005	Smallmouth Bass	31,875	Fingerlings
2005	FLMB	287,325	Fingerlings
2007	FLMB	287,318	Fingerlings
2009	FLMB	191,284	Fry
2010	FLMB	381,349	Fry

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Table 3. ***Sardis Lake*** Tournament Results from 1994 – 2009. Ranking of lakes statewide with 8 or more tournament reports received.

Year	Number of Reports	Total Number of Anglers	Number of Bass Caught	Number of Bass Weighed In / 8-hr Day and Rank		Bass / Tourn	Bass Weighed In / Angler	Percent Successful Anglers and Rank		Average Weight / Bass (lbs.) and Rank		Number of Bass > 5 lbs.	Angler Hours / Bass > 5 lbs. and Rank		Number of Bass > 8 lbs.	Big Bass	Avg. 1st Place Weight (lbs.) and Rank		Overall Rank
1994	32	1,143	1,237	1.0	.	38.7	1.1	66	.	2.3	.	38.0	.	.	5.0	12.4	12.3	.	12
1995	26	1,096	939	0.8	.	36.1	0.9	62	.	2.3	.	42.0	.	.	5.0	11.1	11.7	.	15
1996	34	1,075	569	0.9	.	16.7	0.5	52	.	2.3	.	36.0	.	.	1.0	8.2	8.6	.	19
1997	16	544	550	0.9	.	34.4	1.0	65	.	2.3	.	32.0	.	.	4.0	9.9	13.1	.	8
1998	22	1,015	964	0.9	.	43.8	1.0	73	.	2.2	.	64.0	.	.	6.0	10.1	13.9	.	6
1999	20	1,088	964	0.9	.	48.2	0.9	67	.	2.4	.	56.0	.	.	6.0	9.2	15.3	.	14
2000	21	695	548	0.7	20	26.1	0.8	63	11	2.6	6	38.0	.	11	5.0	10.3	13.9	9	14
2001	12	393	453	1.0	15	37.8	1.2	64	9	2.3	5	19.0	.	1	1.0	8.4	12.8	3	1
2002	18	693	488	0.7	17	27.1	0.7	51	12	2.5	2	20.0	.	4	5.0	9.1	10.9	6	7
2003	15	394	498	1.2	12	33.2	1.3	67	8	2.2	10	14.0	144	9	0.0	7.4	12.6	6	3
2004	18	561	726	1.1	10	40.3	1.3	68	9	2.1	13	20.0	228	13	1.0	11.0	12.1	9	11
2005	21	848	1,098	1.4	14	52.3	1.3	74	3	2.0	17	22.0	318	14	0.0	7.7	13.8	4	6
2006	19	546	1,310	2.4	3	69.0	2.4	74	8	2.3	5	1.7	2,326	12	0.1	5.7	17.5	1	1
2007	11	409	573	1.4	9	52.0	1.4	70	10	2.2	14	1.0	422	19	0.2	5.7	12.9	6	13
2008	10	438	570	1.3	8	57.0	1.3	69	10	2.4	8	2.3	220	12	0.7	6.8	18.4	1	7
2009	14	624	936	1.5	13	66.9	1.5	74	14	2.2	11	3.0	132	7	0.2	6.2	18.7	3	7
Avg.	**19.3**	**722.6**	**776.4**	**1.1**	**12.1**	**42.5**	**1.2**	**66.2**	**9.4**	**2.3**	**9.1**	**25.6**	**541.4**	**10.2**	**2.5**	**8.7**	**13.4**	**4.8**	**9**

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Table 4. Total number (No.), catch per hour (C/f) and relative weights (W_r) by length groups of **largemouth bass** collected during spring electrofishing from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥ 90.

	Total (≥ 40)		**< 8 in. (15-45)**		**8 – 12 in. (15-30)**		**≥ 12 in. (≥ 15)**		**≥ 14 in. (≥ 10)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r
1987	257	57.1	34.7	90	14.7	93	7.8	95	4.7	96
1988	288	52.4	12.9	83	17.5	90	22.0	95	10.4	95
1989	289	55.1	20.2	74	12.9	80	21.9	89	7.8	95
1990*	259	26.6	6.5	96	6.2	91	13.9	86	4.0	87
1991	243	46.3	4.8	81	8.8	87	32.8	90	16.8	90
1992	272	54.4	12.6	92	9.4	90	32.4	92	21.0	93
1993*	208	23.8	11.1	96	7.3	92	13.8	89	7.9	88
1994	252	36.0	8.7	89	7.1	87	20.1	87	13.0	88
1998	191	44.9	14.1	91	8.9	89	21.9	87	12.9	90
1999	225	47.4	10.7	82	14.7	84	21.9	87	15.6	88
2000	252	72.0	20.9	86	24.9	86	26.3	87	14.3	91
2001	213	65.5	22.8	85	16.3	83	26.5	85	16.0	86
2004	243	40.5	13.5	87	9.2	88	17.8	86	11.5	86
2006	275	45.8	10.2	87	13.3	85	22.3	86	14.7	88
2008	221	36.8	8.6	84	13.3	84	15.3	85	6.7	89

*High water levels during sampling period.

Table 5. Gel electrophoresis (1999-2006) and mDNA by PCR analysis (2009) of **largemouth bass** collected during electrofishing from ***Sardis Lake***.

		Phenotype			
Year	Sample Size	NLMB%	FLMB%	F1%	Fx%
1999	40	10.0	40.0	20.0	30.0
2003	35	11.0	20.0	20.0	49.0
2004	40	24.3	37.8	13.5	24.3
2006	42	43.0	2.0	17.0	38.0
2009	92	8.7	10.9	21.7	58.7

Table 6. Total number (No.), catch per hour (C/f) and relative weights (W_r) by length groups of **spotted bass** collected during spring electrofishing from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥ 90.

	Total (≥ 40)		**< 8 in. (15-45)**		**8 – 12 in. (15-30)**		**≥ 12 in. (≥ 15)**		**≥ 14 in. (≥ 10)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r
2006	95	15.8	5.3	91	8.5	85	2.0	87	1.0	83
2008	83	13.8	1.2	84	9.5	85	3.2	84	1.0	90

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Table 7. **Black bass** age and growth collected by spring electrofishing from ***Sardis Lake*** in 2008.

Largemouth Bass			**Spotted Bass**		
Age	Average Length (in.)	Number Collected	Age	Average Length (in.)	Number Collected
1	7.3	77	1	7.1	10
2	11.5	72	2	10.0	39
3	14.4	19	3	12.4	6
4	15.8	11	4	14.3	4
5	18.9	5	5	16.3	3
6	18.4	3	6	-	0
7	21.9	3	7	-	0
8	21.6	3	8	-	0
9	-	0	9	-	0
10	22.8	1	10	-	0
11	23.4	2	11	-	0

Table 8. Total number (No.), catch per 24 hrs. (C/f) and relative weights (W_r) by length groups of **crappie** collected during fall gill netting from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are $\geq$ 90.

	Total (≥ 4.80)		**< 8 in. (1.20 – 7.20)**		**≥ 8 in. (≥ 1.92)**		**≥ 10 in. (≥ 0.96)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1987	98	8.2	2.2	90	5.9	92	3.7	91
1988	119	9.6	2.2	84	7.5	89	4.0	89
1989	80	6.0	1.8	96	4.1	97	3.3	96
1990	90	7.2	3.1	72	4.0	92	3.3	94
1991	27	1.9	0.6	85	1.4	93	0.9	93
1992	126	10.1	5.4	86	4.9	87	4.1	86
1993	414	17.3	12.1	90	5.3	89	2.2	86
1994	196	7.2	3.1	89	4.1	86	2.6	86
1995	147	11.3	7.0	92	4.3	86	1.9	82
1996	68	5.0	2.0	84	3.0	87	1.7	87
1997	205	16.1	10.5	87	5.7	84	3.0	83
1998	204	15.8	9.6	86	6.3	86	3.1	82
1999	108	8.2	3.6	88	4.7	86	1.6	82
2000	56	4.3	2.0	83	2.3	83	1.3	81
2001	141	10.3	5.8	87	4.4	80	3.5	78
2002	60	4.6	2.5	84	1.9	77	1.6	77
2004	350	25.0	23.4	104	1.7	81	1.4	81
2006	113	8.4	1.6	82	6.6	90	0.4	79
2009*	96	7.2	1.0	94	6.3	94	3.4	92

*New 80 ft. gill nets; C/f criteria does not apply.

Table 9. Average length at age of **crappie** collected during fall trap netting from ***Sardis Lake***. Numbers in parentheses represent values for acceptable growth rates.

Year	Age 1.5 (≥ 6.00 in.)	Age 2.5 (≥ 8.00 in.)	Age 3.5 (≥ 9.00 in.)	Age 4.5 (≥ 10.00 in.)
1992	5.8	7.5	11.4	-
1993	6.4	9.0	10.0	11.1
1994	5.6	7.5	10.6	9.8
1995	6.7	8.0	9.5	11.4
1996	5.8	8.4	10.0	11.1
1997	6.4	8.6	10.8	-
1998	6.5	8.8	10.2	10.5
1999	7.0	8.7	10.0	12.0

Table 10. Total number (No.), catch per 24 hrs. (C/f) and relative weights (W_r) by length groups of **white bass** collected during fall gill netting from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥ 90.

	Total (≥ 4.80)		< 8 in. (≥ 1.20)		8 – 12 in. (1.20 – 7.20)		≥ 12 in. (≥ 2.40)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1990	51	4.1	0.6	92	3.5	103	-	-
1991	35	2.4	0.2	96	0.5	94	1.8	100
1992	143	11.5	1.4	99	1.1	94	9.2	95
1993	211	8.9	5.5	93	2.5	93	0.9	83
1994	315	11.5	0.8	99	8.7	88	2.0	84
1995	191	14.6	5.0	95	5.7	93	4.0	86
1996	187	13.7	0.6	90	7.4	90	5.7	87
1997	188	14.6	6.1	87	4.2	92	4.4	86
1998	260	20.4	8.3	96	8.1	92	4.0	83
1999	98	7.4	3.8	92	2.5	88	1.2	80
2000	117	8.9	2.2	85	2.9	83	3.7	79
2001	118	6.2	0.7	83	3.1	91	4.8	89
2002	58	4.3	0.5	100	1.1	89	2.8	85
2004	89	6.2	1.7	87	0.9	89	3.8	87
2006	191	14.2	2.3	106	6.6	99	5.2	99
2009*	108	8.4	2.9	93	2.4	93	3.1	88

*New 80 ft. gill nets; C/f criteria does not apply.

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Table 11. Total number (No.), catch per 24 hrs. (C/f) and relative weights (W_r) by length groups of **walleye** collected during fall gill netting from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are $\geq$ 90.

	Total (≥ 2.40)		**< 12 in. (≥ 1.44)**		**12 – 16 in. (≥ 0.48)**		**≥ 16 in. (≥ 0.48)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1990	36	2.9	2.9	93	-	-	-	-
1991	12	1.0	-	-	0.5	93	0.4	95
1992	19	1.5	-	-	-	-	1.5	89
1993	18	0.7	0.1	84	-	-	0.7	86
1994	18	0.7	0.0	-	0.0	-	0.7	87
1995	0	0.0	-	-	-	-	-	-
1996	3	0.2	0.1	92	-	-	0.1	85
1997	11	0.9	-	-	0.4	81	0.5	82
1998	3	0.2	0.2	91	-	-	0.1	85
1999	2	0.1	0.0	-	-	-	0.1	74
2000	8	0.6	0.0	-	0.1	79	0.5	84
2001	2	0.1	0.0	-	0.0	-	0.1	79
2002	2	0.1	0.1	92	0.0	-	0.1	84
2004	5	0.4	0.1	97	0.0	-	0.3	85
2006	9	0.7	0.0	-	0.7	86	0.7	86
2009*	11	0.9	0.1	90	0.1	85	0.2	91

*New 80 ft. gill nets; C/f criteria does not apply.

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Table 12. Total number (No.), catch per 24 hrs. (C/f) and relative weights (W_r) by length groups of **channel catfish** collected during fall gill netting from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are $\geq$ 90.

	Total (≥ 4.80)		**< 12 in. (≥ 2.40)**		**≥ 12 in. (≥ 2.40)**		**≥ 16 in. (≥ 1.20)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1987	17	1.4	0.1	72	1.3	89	1.1	93
1988	19	1.4	0.2	80	1.3	92	0.7	101
1989	22	1.7	-	-	1.6	92	1.3	95
1990	19	1.4	0.6	82	0.9	94	0.9	94
1991	30	2.2	0.7	96	1.4	89	0.7	92
1992	38	3.1	0.9	82	2.2	81	1.6	81
1993	48	1.9	0.6	83	1.4	79	0.3	82
1994	54	1.9	0.6	92	1.3	80	0.5	82
1995	31	2.4	1.3	89	1.1	86	0.6	89
1996	34	2.4	1.8	83	0.7	88	0.5	91
1997	31	2.4	1.3	89	1.2	84	0.9	84
1998	32	2.4	1.2	89	1.3	82	0.5	86
1999	37	2.9	1.6	83	1.2	89	0.5	101
2000	101	7.7	6.0	87	1.6	88	0.6	94
2001	32	2.3	2.6	81	0.4	78	0.1	71
2002	49	3.7	2.0	89	1.1	80	0.1	99
2004	36	2.6	1.7	80	0.9	82	0.1	97
2006	64	4.8	3.3	88	1.5	88	0.2	76
2009*	58	4.5	1.3	91	3.2	85	1.0	89

*New 80 ft. gill nets; C/f criteria does not apply.

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Table 13. Total number (No.), catch per 24 hrs. (C/f) and relative weights (W_r) by length groups of **blue catfish** collected during fall gill netting from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥ 90.

	Total (≥ 2.40)		**< 12 in. (≥ 1.20)**		**≥ 12 in. (≥ 1.20)**		**≥ 16 in. (≥ 0.72)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1987	3	0.2	-	-	0.2	102	0.1	113
1988	2	0.2	-	-	0.2	98	0.2	98
1989	2	0.1	-	-	0.1	113	0.1	113
1990	4	0.3	-	-	0.3	105	0.3	105
1991	21	1.5	0.4	119	1.1	113	1.1	113
1992	1	0.1	-	-	0.1	111	0.1	111
1993	83	3.5	2.8	98	0.7	108	0.6	110
1994	83	3.1	2.7	95	0.3	107	0.3	107
1995	12	0.9	0.9	94	0.0	-	0.0	-
1996	22	1.6	1.3	87	0.4	96	0.1	112
1997	35	2.7	2.3	83	0.5	81	0.0	-
1998	7	0.6	0.2	91	0.3	96	0.1	114
1999	18	1.4	0.5	95	0.8	80	0.1	81
2000	28	2.1	1.2	83	0.9	81	0.0	-
2001	20	1.5	0.2	79	1.3	81	0.7	83
2002	38	2.9	1.2	81	1.7	82	0.5	88
2004	24	1.7	0.1	86	1.6	77	0.7	83
2006	22	1.6	0.2	77	1.4	88	0.4	117
2009*	16	1.3	0.1	86	1.1	91	1.1	91

*New 80 ft. gill nets; C/f criteria does not apply.

Table 14. Total number (No.), catch per hour (C/f) and relative weights (W_r) by length groups of **blue catfish** collected during summer electrofishing from ***Sardis Lake***. Acceptable W_r values are ≥ 90.

	Total		**< 12 in.**		**≥ 12 in.**		**≥ 20 in.**		**≥ 24 in.**		**≥ 28 in.**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r
1999	387	309.6	240.0	-	73.6	-	2.4	-	0.8	-	0.8	-
2000	339	271.2	123.0	-	147.2	-	0.8	-	0.8	-	0.0	-

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Table 15. Total number (No.), catch per 24 hrs. (C/f) and relative weights (W_r) by length groups of **flathead catfish** collected during fall gill netting from ***Sardis Lake***. Acceptable W_r values are $\geq$ 90.

	Total		**< 12 in.**		**> 12 in.**		**> 20 in.**		**> 24 in.**		**> 28 in.**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r
1987	0	-	-	-	-	-	-	-	-	-	-	-
1988	3	0.2	-	-	0.2	99	0.2	99	0.2	102	0.2	102
1989	0	-	-	-	-	-	-	-	-	-	-	-
1990	3	0.2	-	-	0.2	93	0.2	93	-	-	-	-
1991	2	0.1	-	-	0.1	91	0.1	92	0.1	92	-	-
1992	2	0.2	-	-	0.2	72	0.1	69	-	-	-	-
1993	3	0.1	-	-	0.1	89	0.1	91	0.1	94	-	-
1994	4	0.1	0.1	-	0.1	92	0.1	92	0.1	92	-	-
1995	0	-	-	-	-	-	-	-	-	-	-	-
1996	3	0.2	-	-	0.2	109	0.1	83	0.1	83	0.1	83
1997	2	0.1	-	-	0.1	81	0.1	81	-	-	-	-
1998	2	0.2	-	-	0.2	90	0.2	90	0.1	97	0.1	97
1999	3	0.2	-	-	0.2	81	0.2	81	0.2	81	0.1	84
2000	1	0.1	-	-	0.1	95	0.0	-	0.0	-	0.0	-
2001	2	0.1	-	-	0.1	74	0.1	74	0.1	73	0.1	73
2002	2	0.1	-	-	-	-	-	-	-	-	-	-
2004	2	0.1	-	-	0.1	88	0.1	88	0.1	88	-	-
2006	0	-	-	-	-	-	-	-	-	-	-	-
2009*	2	0.1	-	-	0.1	102	0.1	102	-	-	-	-

*New 80 ft. gill nets.

Table 16. Total number (No.), catch per hour (C/f) and relative weights (W_r) by length groups of **flathead catfish** collected during summer electrofishing from ***Sardis Lake***. Acceptable W_r values are $\geq$ 90.

	Total		**< 12 in.**		**> 12 in.**		**> 20 in.**		**> 24 in.**		**> 28 in.**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r
1995	253	253	230	87	23	88	1	-	-	-	-	-
1996	296	296	257	85	39	89	5	95	4	97	2	100
1998	255	255	223	81	32	81	3	80	1	77	-	-
1999	240	218	184	97	35	82	4	64	4	64	2	47

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Table 17. Total number (No.), catch per hour (C/f) and relative weights (W_r) by length groups of **bluegill sunfish** collected during spring electrofishing from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥ 90.

	Total (≥ 45)		**< 3 in. (≥ 10)**		**3 – 6 in. (20 – 100)**		**≥ 6 in. (≥ 15)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1987	268	59.6	0.2	-	50.2	82	9.1	88
1988	385	70.0	4.4	-	54.2	75	11.5	80
1989	261	49.7	4.8	-	35.2	62	9.7	71
1990	211	21.6	1.0	-	17.3	92	3.3	88
1991	184	35.1	7.2	-	18.5	87	9.3	86
1992	167	33.4	5.8	-	25.2	88	2.4	79
1993*	170	56.7	28.3	-	25.7	90	2.7	95
1994	187	27.7	4.4	-	22.4	90	0.9	85
1998	132	58.7	31.6	-	26.7	91	0.4	99
1999	161	214.8	64.0	-	138.7	96	12.0	92
2008	42	12.9	2.2	-	8.3	95	3.4	87

*High water level during sampling period.

Table 18. Total number (No.), catch per hour (C/f) and relative weights (W_r) by length groups of **gizzard and threadfin shad** collected during spring electrofishing from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥ 90.

	Gizzard Shad				**Threadfin Shad**	
	Total (≥ 40)		< 8 in. (≥ 20)		Total	
Year	No.	C/f	C/f	W_r	No.	C/f
1987	9	2.0	1.8	103	1	0.2
1988	12	2.2	1.1	92	1	0.2
1989	2	0.4	0.0	-	21	4.0
1990	12	1.2	0.1	200	0	-
1991	114	21.7	10.3	90	4	0.8
1992	25	5.0	3.9	109	0	-
1993	72	24.0	17.3	85	51	17.0
1994	37	8.2	5.6	86	4	0.9
1995	-	-	-	-	-	-
1996	-	-	-	-	-	-
1997	-	-	-	-	-	-
1998	-	-	-	-	-	-
1999	23	30.7	17.3	85	56	74.7
2000	10	5.7	0.0	86	58	33.1
2001	0	-	-	-	0	0.0
2002	0	-	-	-	-	-
No longer collected by electrofishing.						

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Table 19. Total number (No.), catch per 24 hrs (C/f) and relative weights (W_r) by length groups of **gizzard shad** collected during fall gill netting and summer floating gill netting from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are $\geq$ 90.

	Sinking Gill Netting				Floating Gill Netting			
	Total (≥ 4.8)		< 8 in. (≥ 2.4)		Total		< 6 in.	
Year	No.	C/f	C/f	W_r	No.	C/f	C/f	W_r
1987	22	1.9	1.4	-	-	-	-	-
1988	49	4.1	2.2	-	-	-	-	-
1989	145	10.8	2.6	-	-	-	-	-
1990	97	7.7	0.2	-	-	-	-	-
1991	34	2.4	1.0	-	-	-	-	-
1992	94	7.7	3.6	87	-	-	-	-
1993	106	4.6	4.3	82	-	-	-	-
1994	62	2.4	-	-	-	-	-	-
1995	27	2.2	1.0	83	-	-	-	-
1996	25	1.9	0.5	102	-	-	-	-
1997	133	10.3	8.4	78	-	-	-	-
1998	76	6.0	5.5	82	-	-	-	-
1999	44	3.4	1.0	78	-	-	-	-
2000	93	7.0	2.6	90	-	-	-	-
2001	97	7.0	4.1	-	-	-	-	-
2002	76	5.8	1.9	-	-	-	-	-
2004	43	3.4	2.9	-	-	-	-	-
2006	117	6.0	1.2	-	-	-	-	-
2009*	83	6.5	6.5	91	-	-	-	-
2010	No longer collected.				46	0.1	0.1	-

*New 80 ft. gill nets; C/f criteria does not apply.

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Table 20. Total number (No.), catch per 24 hrs (C/f) and relative weights (W_r) by length groups of **threadfin shad** collected during fall gill netting and summer floating gill netting from ***Sardis Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are $\geq$ 90.

	Sinking Gill Netting		**Floating Gill Netting**	
	Total		Total	
Year	No.	C/f	No.	C/f
1987	1	0.1	-	-
1988	3	0.2	-	-
1989	0	-	-	-
1990	0	-	-	-
1991	0	-	-	-
1992	0	-	-	-
1993	7	0.3	-	-
1994	13	0.5	-	-
1995	1	0.1	-	-
1996	4	0.3	-	-
1997	11	0.9	-	-
1998	19	1.5	-	-
1999	34	2.6	-	-
2000	201	15.1	-	-
2001	0	0.0	-	-
2002	0	0.0	-	-
2004	1	0.1	-	-
2006	179	7.1	-	-
2009*	50	4.0	-	-
2010	No longer collected.		0	0.0

*New 80 ft. gill nets.

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Figures

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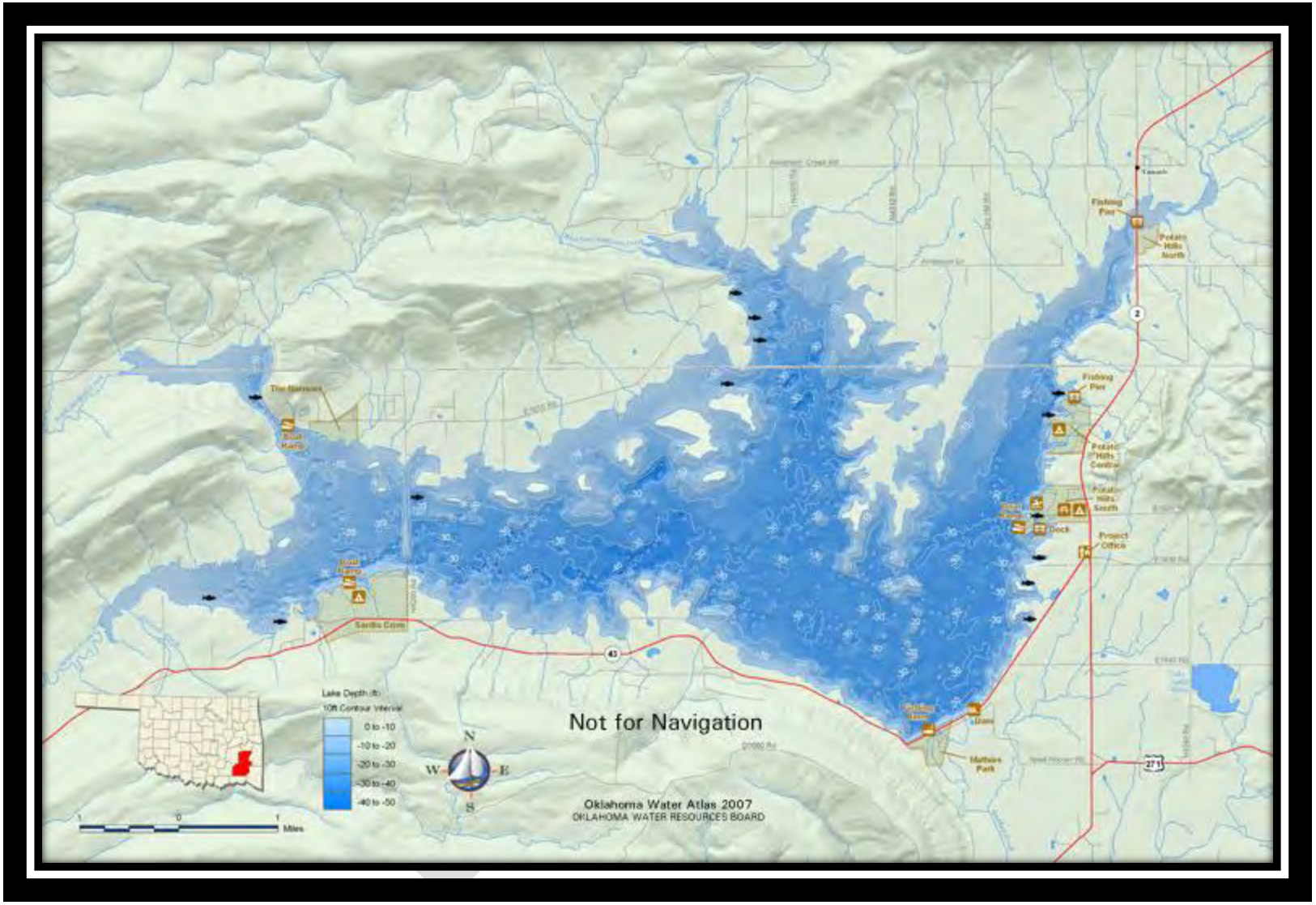

Figure 1. Map of ***Sardis Lake*** vicinity.

Figure 2. Fish attractor locations in Jackfork Creek and Anderson Creek Arms of ***Sardis Lake***.

Figure 3. Fish attractor locations in Buffalo Creek Arm of ***Sardis Lake***.

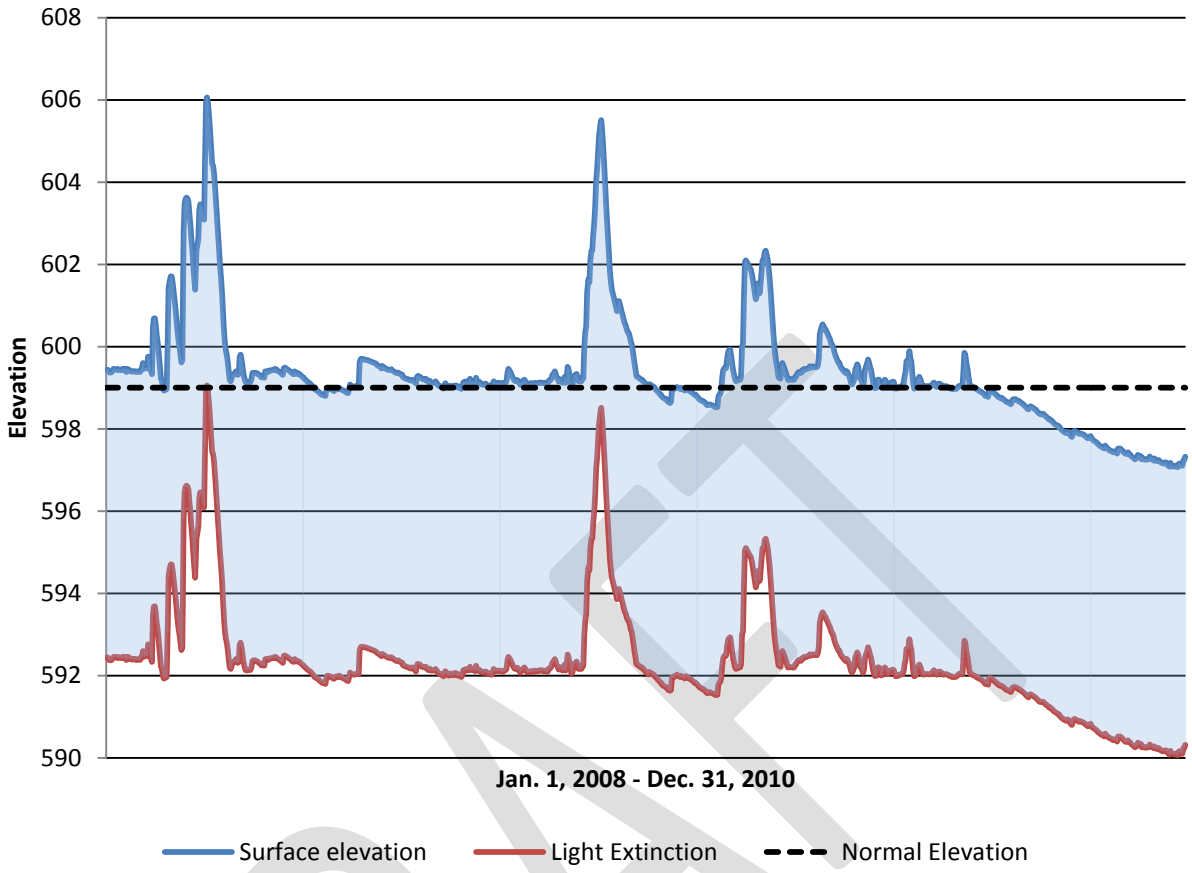

Figure 4. Average surface elevation for ***Sardis Lake*** in 2008 – 2010 and 7 ft. photic zone, according to average secchi disk readings.

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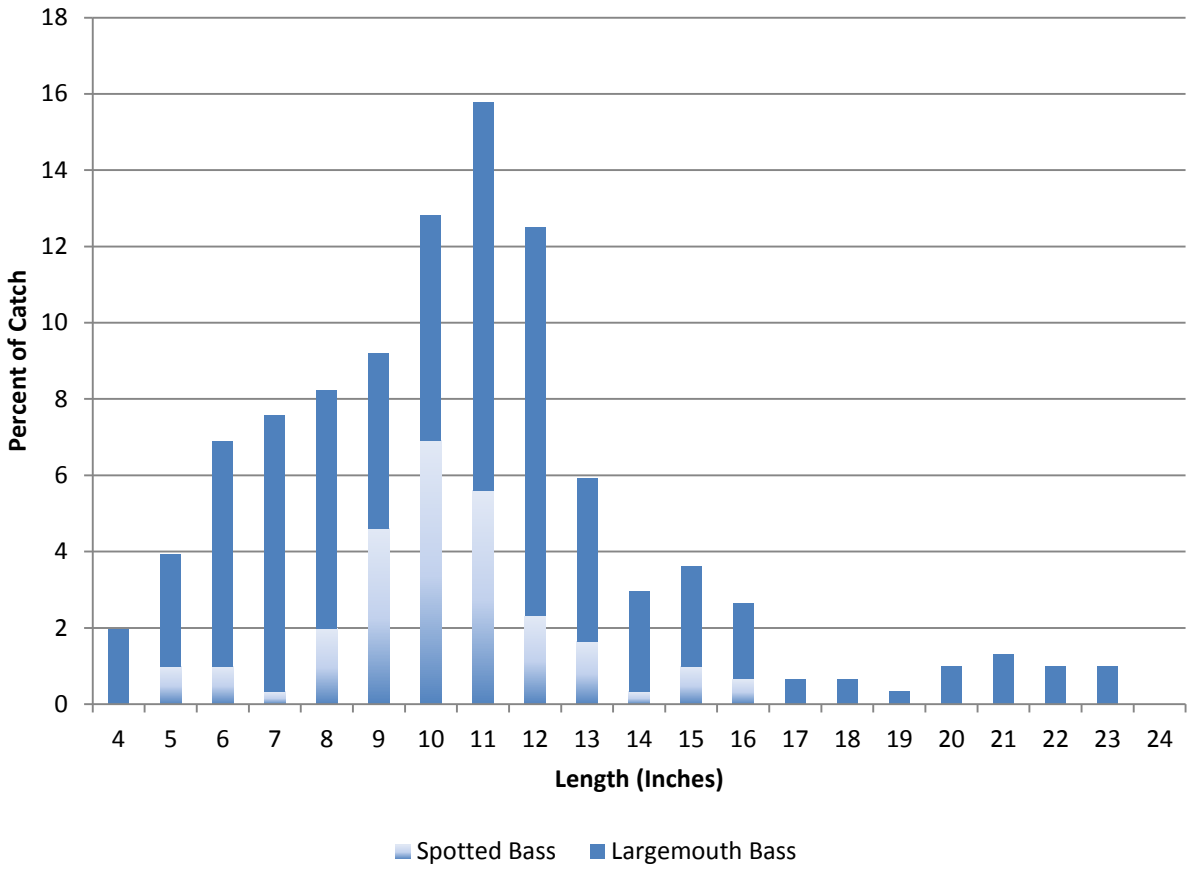

Figure 5. Length frequency distribution of **largemouth bass and spotted bass,** N = 304. Spring 2008 electrofishing samples from ***Sardis Lake***.

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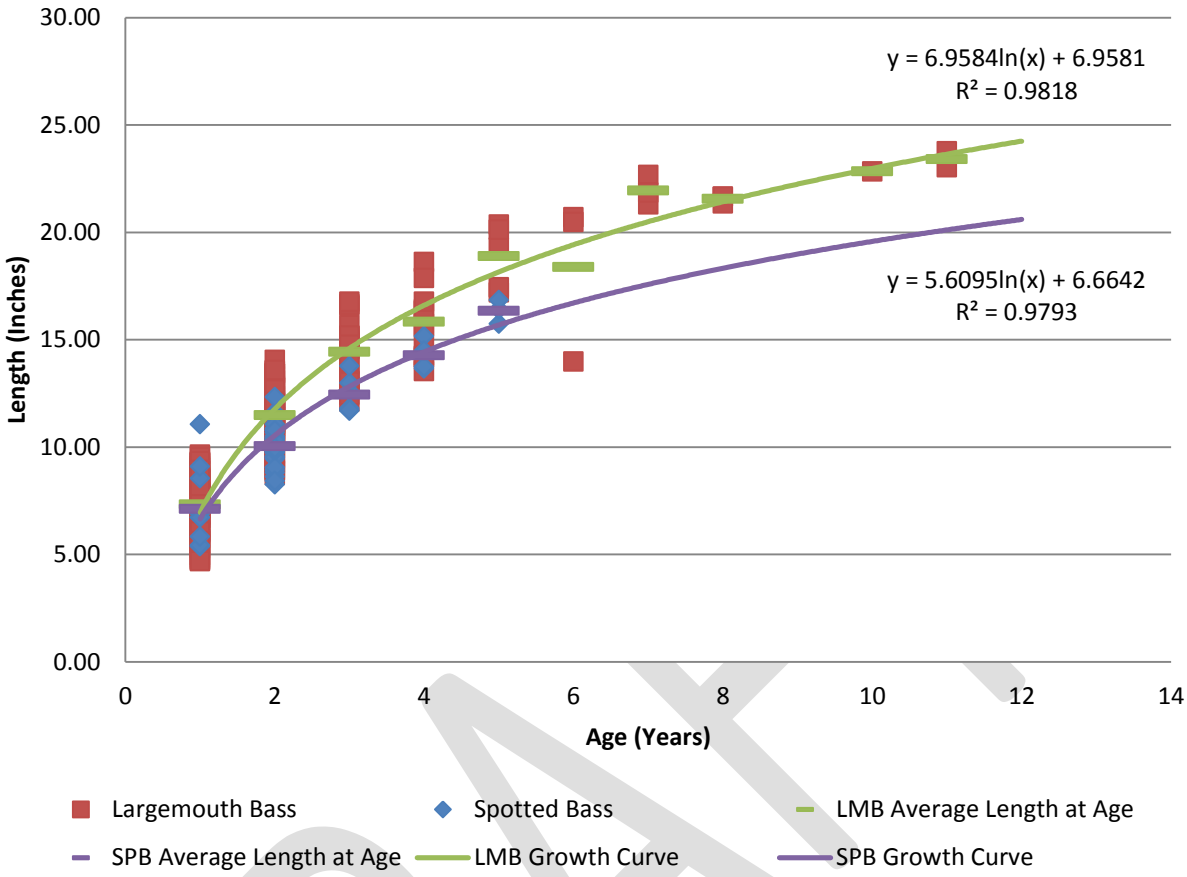

Figure 6. Age and growth for **largemouth bass and spotted bass**. Spring 2008 electrofishing samples from ***Sardis Lake***.

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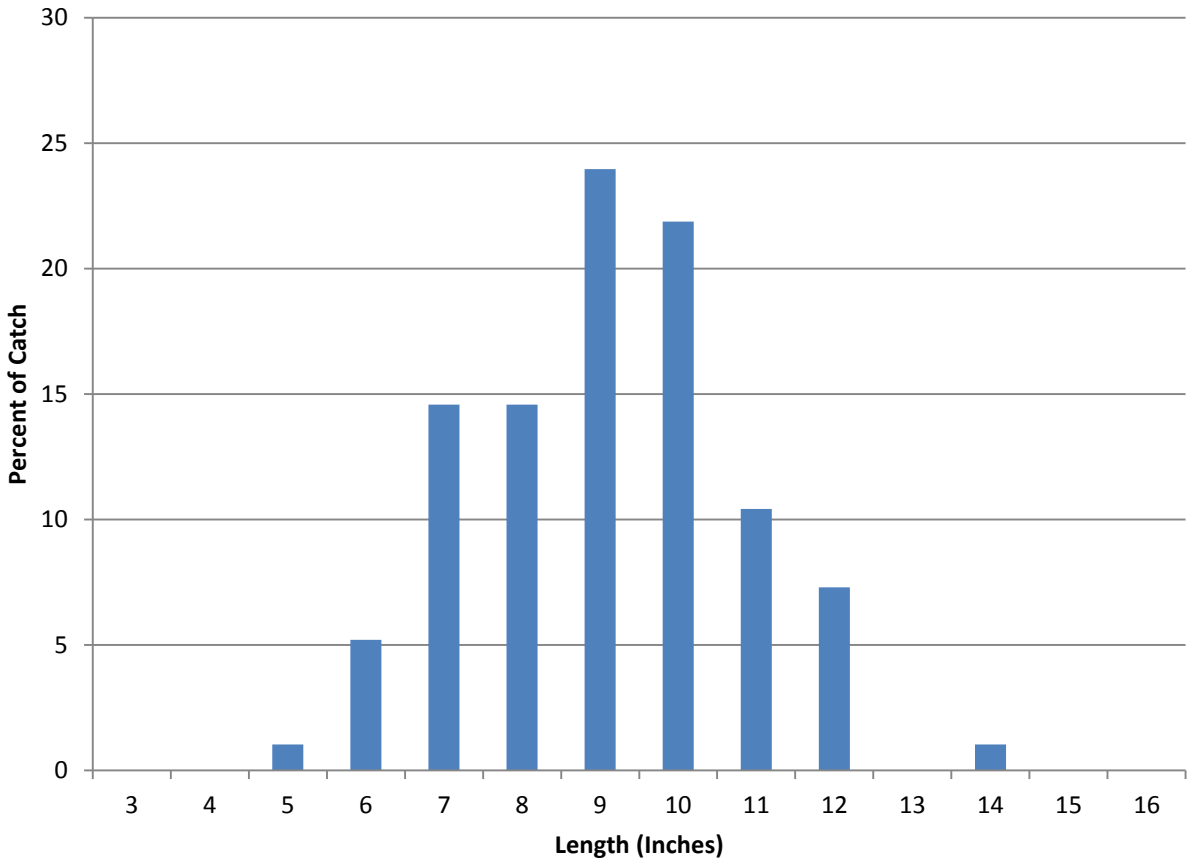

Figure 7. Length frequency distribution of **white crappie**, N = 96. Fall 2009 gill netting samples from ***Sardis Lake***.

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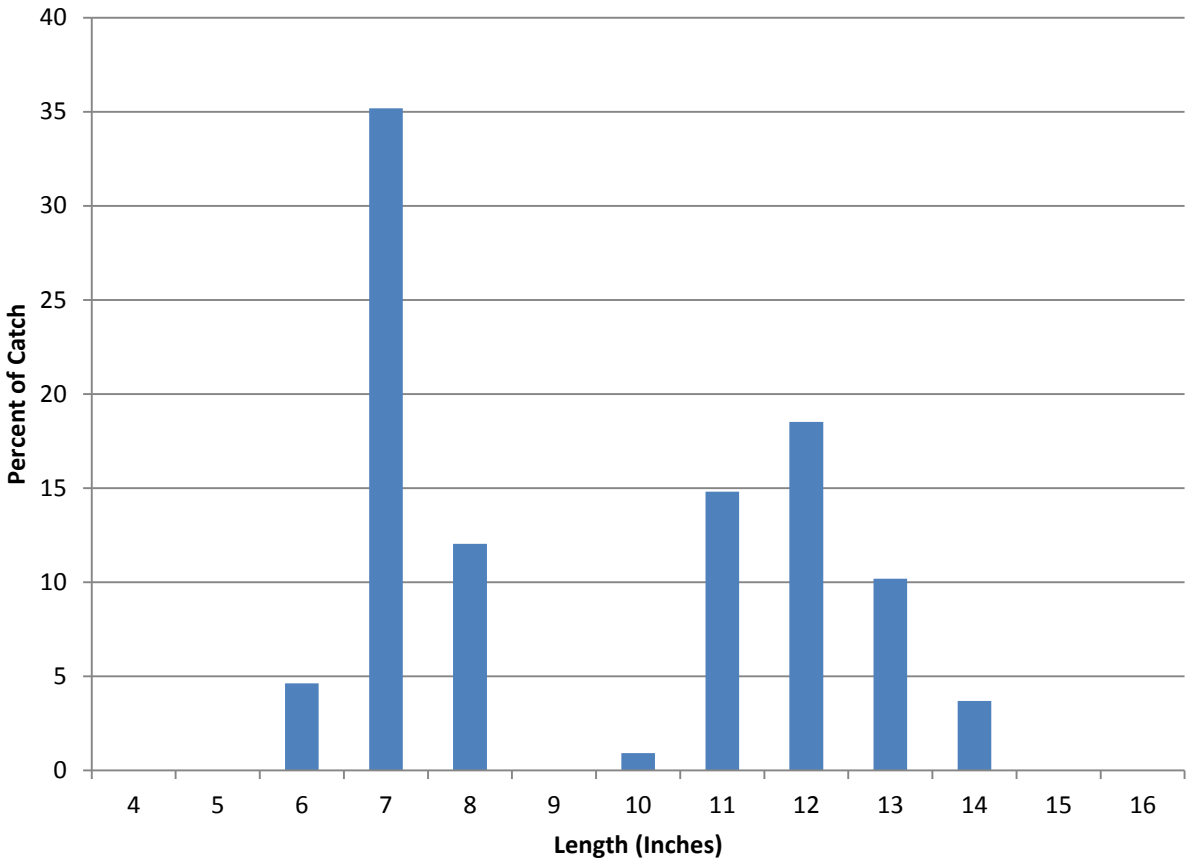

Figure 8. Length frequency distribution of **white bass**, N = 108. Fall 2009 gill netting samples from ***Sardis Lake***.

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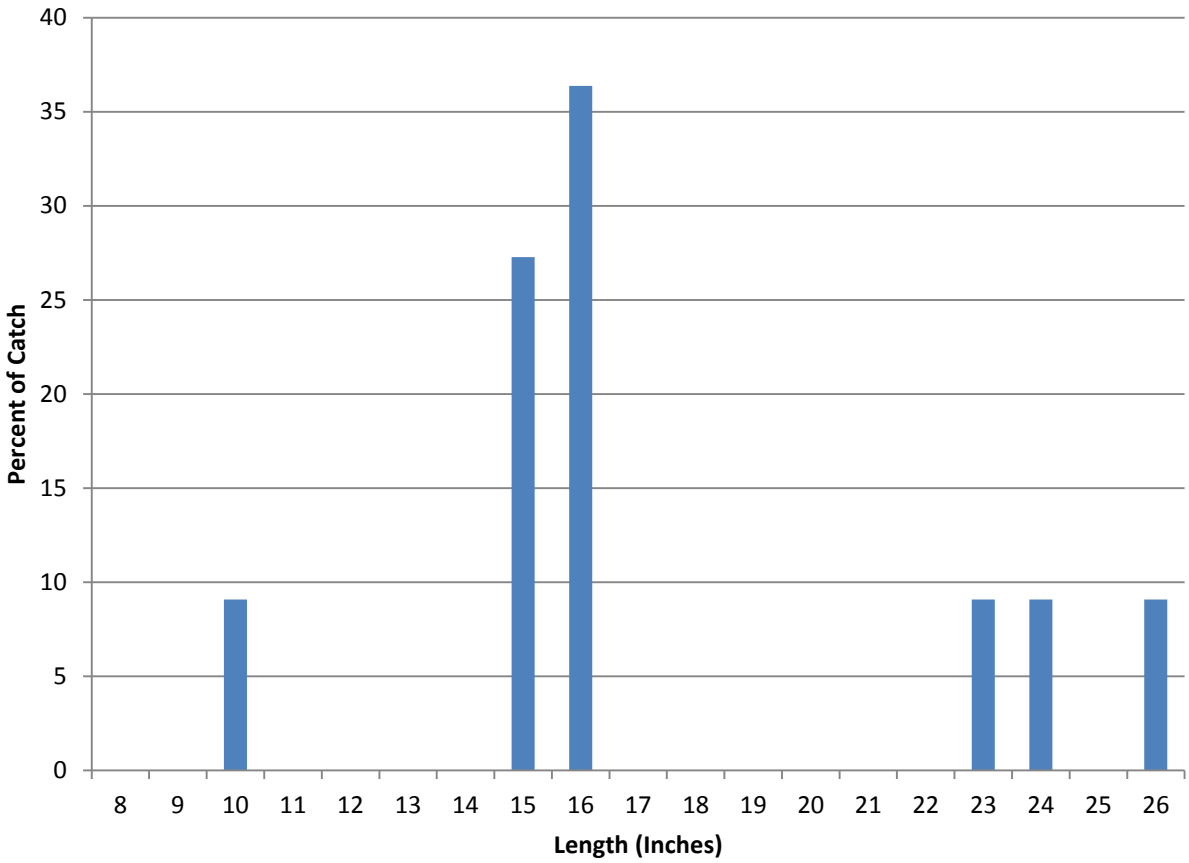

Figure 9. Length frequency distribution of **walleye**, N = 11. Fall 2009 gill netting samples from ***Sardis Lake***.

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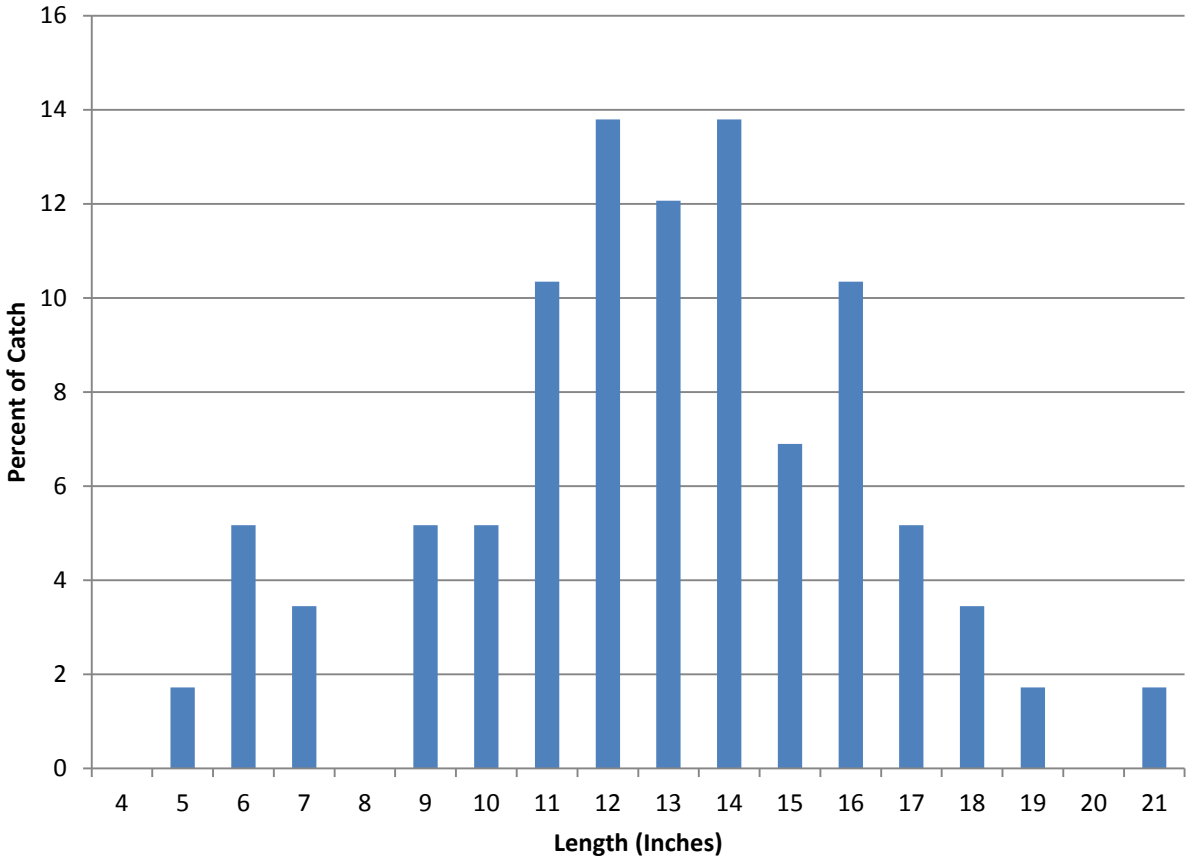

Figure 10. Length frequency distribution of **channel catfish**, N = 58. Fall 2009 gill netting samples from ***Sardis Lake***.

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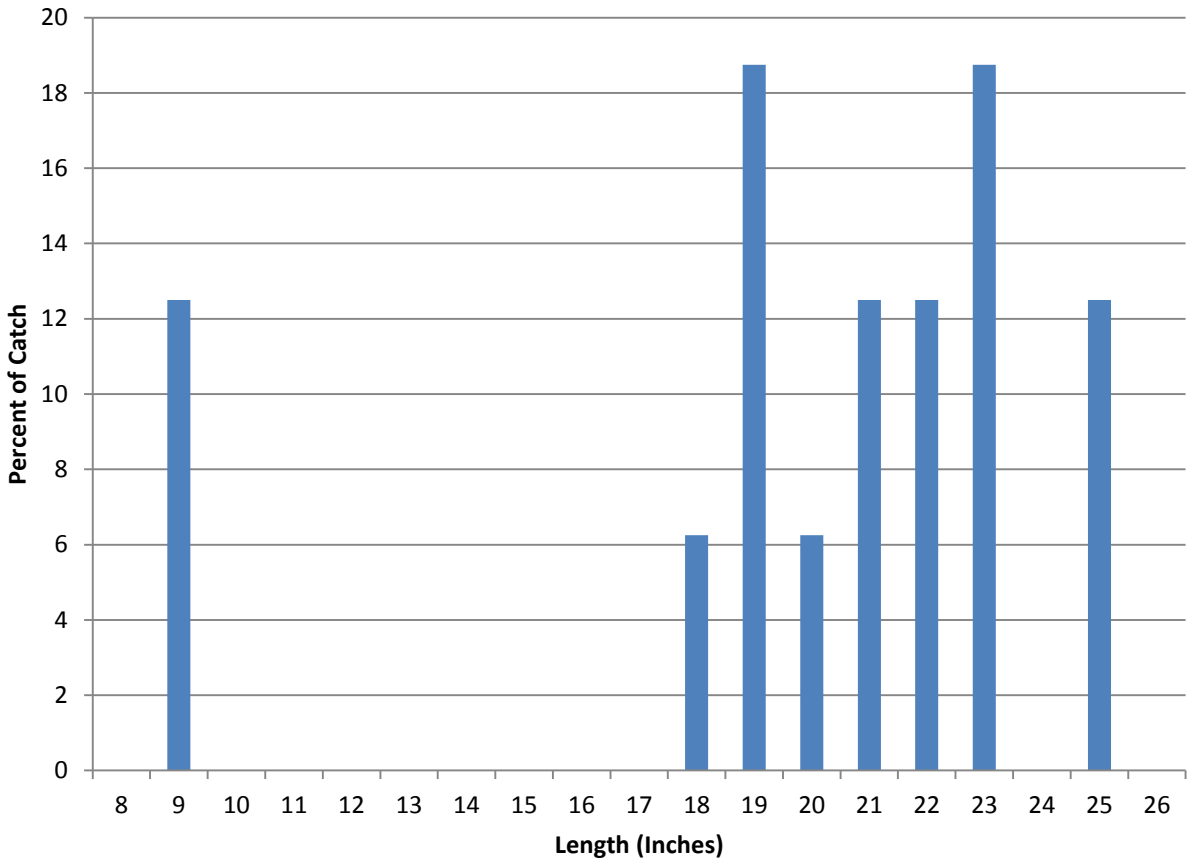

Figure 11. Length frequency distribution of **blue catfish**, N = 16. Fall 2009 gill netting samples from ***Sardis Lake***.

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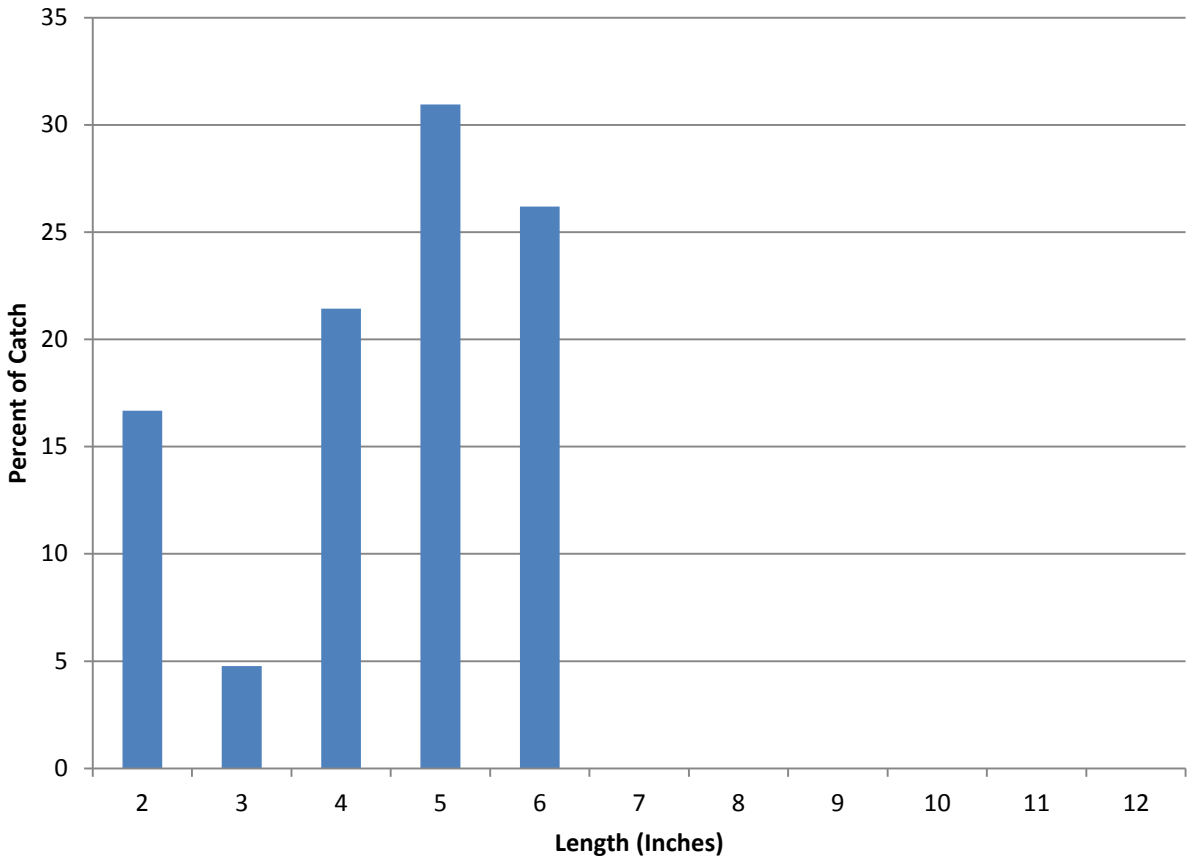

Figure 12. Length frequency distribution of **bluegill sunfish**, N = 48. Spring 2008 electrofishing samples from ***Sardis Lake***.

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