Five Year Hugo Lake Fisheries Management Plan – 2012

Oklahoma Department of Wildlife Conservation (ODWC)

Background

Hugo Lake is located approximately 7 miles east of Hugo in Choctaw County, 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 24 July 1946 for flood control, water supply, recreation and fish and wildlife. Storage for water quality was added in October 1969. Construction began in 1968 and was completed in October 1971 impounding the Kiamichi River. The conservation pool was filled to 404.5 ft. asl in March 1974. The reservoir contains 157,600 acre-feet of water with 13,250 surface acres. Elevation at the top of the flood control pool is 437.5 ft. asl with the capacity to store 943,679 acre-feet of water. The watershed consists of 1,709 square miles within Choctaw, Latimer, LeFlore, Pittsburg and Pushmataha Counties. Lake levels are controlled with a gate-controlled, concrete spillway with six gates and one 4 ft. low flow pipe and one 4 ft. water supply pipe. Water discharge is further controlled by slide gates for low flow and water supply. The Kiamichi River flows westward from the Ouachita National Forest to Clayton, OK where releases from Sardis Lake follow the pre-existing Jackfork Creek channel southward to the Kiamichi River confluence. The Kiamichi is impounded at Hugo Lake before flowing another 18 miles to the Red River. Physical and chemical characteristics of Hugo Lake are listed in Table 1. For more information, visit http://www.swt-wc.usace.army.mil/HUGO.lakepage.html.

A seasonal conservation pool was adopted in 1987 to benefit waterfowl and fisheries at Hugo Lake. By slowly raising water levels in the spring, shoreline vegetation is inundated for potential spawning areas and nursery habitat for fish. A late summer drawdown is then needed for natural or supplemental re-vegetation before water levels are slowly raised again to benefit migratory waterfowl during the fall and early winter. The lake elevation is lowered during late winter allowing vegetation to establish before bringing the water level up again through the spring and summer. Alternating years of higher water levels during the summer can benefit fisheries by allowing woody plants to establish around the shoreline before inundating the following summer. All water level plans are climate dependant. Oklahoma experienced a serious drought during 2011 and 2012 that interfered with planned water level manipulations. Concurrently, maintenance on one flood gate was scheduled for the summer of 2012 holding water levels below the planned target. The fish and wildlife beneficial water level plan is scheduled through 2015 and will resume when the climate cooperates and spillway is fully functional.

Hunting and fishing opportunities abound at Hugo Lake. The ODWC manages 19,566 acres for wildlife and waterfowl on the west and north sides of Hugo Lake. Five designated primitive camping areas and two boat ramps are offered on the area. Additional plots of land on Hugo Lake are managed by the USACE for restricted hunting. The USACE operates various recreation areas that offer general RV hookups, restrooms, showers, swim beaches, boat ramps and fishing areas. Hugo Lake State Park provides visitors with more options for lodging and a marina. Two ADA courtesy docks are located at Kiamichi Park and Virgil Point boat ramps. All camping area restrooms are also ADA compliant. For more information, contact the Hugo

Lake project office at 580-326-3345 or State Park at 580-326-0303. State Park website is www.HugoLakeStatePark.com.

Habitat

Fish habitat consists primarily of rock and flooded timber. Approximately 5,000 acres of dense trees were not cleared prior to impoundment. Boating lanes are provided through the upper half of the lake. These lanes are designated by a system of numbers for east-west lanes and letters for north-south lanes. The river channel is marked by an "RC" designation and accompanied with the appropriate lane designation where it crosses the river channel. Button Bush (*Cephalanthus occidentalis*) is a woody shrub that provides cover along the shoreline out to 4 ft. deep. Additional habitat includes man-made structures such as rip-rap along embankments and bridges. Marked brush pile fish attractors are present at 10 locations (Figure 2) and publicized on the ODWC's Interactive Digital Wildlife Atlas at http://fishlab.ou.edu/odwcims/. Brush piles were refurbished in January 2011. The average secchi depth is only 13.0 in., which is approximately 1/3 the depth of the photic zone. This means critical light will not reach below 3 ft. from the surface hindering growth of submerged aquatic vegetation. Artificial habitat called "spider blocks" is constructed with long lasting materials such as poly-pipe and concrete blocks. Antlers high school students made 300 spider blocks to use as fish attractors in Hugo Lake. The habitat was added in October 2010 around courtesy docks and brush pile locations.

Water Quality

Water quality data collected through the OWRB as part of the Beneficial Use Monitoring Program (BUMP) classifies Hugo Lake as fully supporting the outlined Fish and Wildlife Propagation (FWP) beneficial uses except for turbidity. 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/Hugo.pdf. The most recent sampling period was November 2007 – August 2008.

Thermal and Chemical Stratification

Hugo Lake stratifies during the summer between 23 and 30 ft. The lake is well mixed during all other seasons with dissolved oxygen (DO) values above the acceptable 4 mg/L. Lower lake's values fell to < 2 mg/L for up to 38% of the water column during August 2005 sampling. The DO levels during the sampling period were all sufficient to fully support FWP beneficial use.

Productivity

Carlson's trophic state index (TSI); (chlorophyll-a) was 54, classifying the lake as eutrophic (TSI = 51-60) which indicates high primary productivity and nutrient conditions. Compared to previous sampling results, this value does not indicate significant changes in productivity. Average turbidity is 37 Nephelometric Turbidity Units (NTU) with 80% of the lake-wide turbidity values exceeding the 25 NTU criteria. The FWP beneficial use is not supported. Nitrogen and phosphorus are important nutrients for plant growth. The nitrogen to phosphorus ratio (TN:TP) was 10:1 meaning the lake is potentially phosphorus limited. Input of phosphorus can be a major contributing factor for harmful algal blooms including toxic blue-green algae.

Conductivity
Total ion concentration is estimated by measuring the ability of water to conduct an electric current. Water conductivity can change with temperature so conductance is standardized to the conductivity water would have at 25˚ C. Specific conductance ranged from 55 – 78 microsiemens per centimeter (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 – 7.4 pH units. Hugo Lake's pH range is considered to fully support FWP beneficial use.

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 Hugo Lake is included in Table 2.

The major sportfish found in Hugo Lake include largemouth bass (*Micropterus salmoides*), spotted (kentucky) bass (*Micropterus punctulatus*), white crappie (*Pomoxis annularis*), black crappie (*P. nigromaculatus*), white (sand) bass (*Morone chrysops*), hybrid striped bass (*M. chrysops* X *M. saxatilis*), yellow bass (*M. mississippiensis*) 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/laws_regs/fishingguide.htm to review current license requirements and fishing regulations. Copies of "Oklahoma Fishing" are available where hunting and fishing licenses are sold.

Lake Records Program
Anglers can now share pictures and stories of their catch online. Big fish may be weighed in at the Hugo Lake Marina, 580-326-0303 or Jim Ray's Quick Stop in Antlers, 580-289-5521. Fish can be weighed in alive, on ice or frozen. Pictures of any fish caught that deserves attention (record or not) will be posted on the internet. Current and former Hugo Lake record fish and stories are available at http://lake-record.ou.edu/fishsite/public/fishlist.php?lake[]=92.

Black Bass

Some of Oklahoma's most sought after sportfish are the black bass. The ODWC evaluates bass abundance on a regular rotation using electrofishing catch rates. Spring surveys are scheduled to correspond with bass spawning activity to sample bass of all sizes. Fishing tournament information provides valuable information for the remainder of each year. The USACE issues permits for bass tournaments each year but many tournament reports are not received. A tournament report webpage is available at http://129.15.97.41/Bass/. Bass tournament results for Hugo Lake are summarized in Table 3.

Largemouth Bass

Electrofishing surveys in 2010 showed total abundance of largemouth bass (*Micropterus salmoides*) was moderate and abundance of quality size largemouth bass ($\geq$ 14 in.) was low compared to statewide averages. Body condition of quality bass was acceptable. Catch rates (C/f) and size structure are included in Table 4 and Figure 3, respectively. Otoliths were collected during 2010 electrofishing surveys to determine a baseline for average length at age. Average length at age-3 (14.2 in.) was above quality size (Table 5, Figure 4). Relative weights (W_r) consistently meet or fall below acceptable values for all length groups. Growth is slower than other regional lakes. Turbidity is possibly the limiting growth factor for sight feeding bass.

Florida Largemouth Bass (*Micropterus salmoides floridanus*; FLMB) are stocked regularly for their potential to reach trophy size. Liver samples were taken from 51 largemouth bass in 1993 for genetic analysis. Pure Florida (F) plus first generation hybrids (F1) only totaled 5.8% of the sample (Table 6); Lakes maintaining $\geq$ 30% F + F1 earn more points with stocking criteria so Hugo is often lower priority on the request list. However, points can also be earned by anglers participating in the lake records program and/or submitting bass tournament reports throughout the year.

Hugo would have ranked among one of the best Oklahoma bass tournament destinations in the early 2000s but an insufficient number of reports received excluded the lake from ranking. In 2003, 11 reports were submitted and several years of good bass fishing was finally highlighted with a number one overall rank for the state. Hugo topped the 2003 tournament list with the highest *Average Winning Weight*, the highest *Percent Success* and the second highest *Average Number of Bass Caught per Day*. Another overall first place ranking in 2004 followed with the highest *Average Winning Weight* and fewest hours to catch a 5 lbs. or better bass. Success tapered off through 2005 to the all time low in 2006. Fortunately, another boom period could be recreated by well-timed environmental manipulation. A water level manipulation research project was conducted at Hugo Lake from 1995-1999 that produced a strong 1998 year class during a planned high-water summer. Anglers reaped the benefits of earlier recruitment during the early 2000s giving the local economy a boost when 1,866 tournament anglers traveled to Hugo Lake between 2000 and 2005. Electrofishing and tournament results in 2006 were both poor but 2010 electrofishing results have biologists optimistic for the future. The < 8 in. group had the highest catch rate ever recorded with 18.3/hr.

Hugo Lake does not currently have a lake record largemouth bass. A minimum weight of 6 lbs. is required to qualify.

Spotted Bass

Total abundance and quality abundance is consistently low. The species is intolerant to high turbidity. Catch rates and size structure are included in Table 7. Misidentification can easily happen trying to distinguish between largemouth and spotted bass. A rough tooth patch is often found on the tongues of largemouth bass at Hugo Lake in particular. Always check the jaw hinge and the notch between the dorsal spines and rays. A spotted bass jaw hinge does not extend beyond the back of the eye and dorsal fins are not separated by a deep notch. Hugo Lake does not currently have a lake record spotted bass. A minimum weight of 2 lbs. is required to qualify.

Crappie

Another very popular sport fish is the crappie. Few lakes have crappie fisheries producing the size and numbers that are attractive to tournament sponsors. Mr. Wally Marshall (aka "Mr. Crappie") hosts annual crappie tournaments at Hugo Lake turning out big crowds and big crappie. Several factors contribute to favorable conditions for good recruitment and fast growth. Quality abundance is high despite heavy pressure each spring. The ODWC samples crappie with gill nets and trap nets during the fall.

White Crappie

Total abundance of white crappie (*Pomoxis annularis*) is high and W_r are acceptable for all length groups except the < 8 in. group. Quality sized ($\geq$ 8 in.) abundance is very high. A 15 in., 1.9 lbs. white crappie was the largest of the 2011 sample. Gill-net catch rates and size structure are included in Table 8 and Figure 5, respectively. Trap netting is also conducted to collect all year classes of crappie. Total abundance is extremely high and quality sized abundance is considered moderate to high with this gear. Catch rates and size structure are included in Table 9. Age and growth was evaluated during the early 1990s and again in 2010. Crappie growth is more than acceptable with an average length of 10 in. at 2.5 years of age (Table 10 and Figure 6). Growth can be attributed to balanced population dynamics and forage abundance.

Hugo Lake's current lake record crappie weighed 3.3 lbs. caught by Chad Moore of Hugo, OK on May 7, 2009.

Black Crappie

Being less tolerant to turbidity, black crappie (*P. nigromaculatus*) contributes to only 7 - 18% of the overall catch (2008 and 2011 gill netting). A 12.5 in., 0.9 lb. black crappie was the largest of the 2011 sample.

Temperate Bass

Three members of the Moronidae family provide more sport for anglers. The ODWC samples these fish with gill nets arranged with different sized meshes to capture all length groups. Samples are collected in the fall.

White Bass

Spring time congregates spawning white bass (*Morone chrysops*) on shallow rocky shoals up the Kiamichi River. Adult fish return to deeper water following spawning. Abundance is low but W_r are acceptable for all length groups. Catch rates and size structure are included in Table 11 and Figure 7, respectively.

Hugo Lake does not currently have a lake record white bass. A minimum weight of 3 lbs. is required to qualify.

Hybrid Striped Bass

Reciprocal crossing female white bass with male striped bass produces hybrid striped bass (*M. chrysops* X *M. saxatilis*). The tooth patch on a hybrid will typically be two separate parallel lines while white bass have one heart shaped patch. Hybrids were stocked in 2005, 2008 and 2010 for their potential to reach larger sizes than white bass. Total abundance was low to moderate during 2008 gill netting. No quality sized hybrids ($\geq$ 20 in.) were collected in the 2008 sample because the initial stocking was only three years earlier. Size structure is included in Figure 7.

Hugo Lake does not currently have a lake record hybrid striped bass. A minimum weight of 8 lbs. is required to qualify.

Yellow Bass

Also called barred fish and commonly confused with striped bass, yellow bass (*M. Mississippiensis*) shimmer a golden hue, lack a rough tooth patch and stripes are broken above the anal fin. Yellow bass contribute to mostly the < 12 in. groups. Size structure is included in Figure 7.

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. Overall catfish abundance in 2008 was similar to 2011 but size distribution changed as the strong 2008 year class of blue catfish was 6 in. longer on average in 2011.

Channel Catfish

Total abundance was below the minimum acceptable value for a quality fishery. Quality sized ($\geq$ 16 in.) abundance was low to moderate. All size groups except the < 12 in. group had less than desirable W_r values. Catch rates and size structure are included in Table 11 and Figure 8, respectively.

Hugo 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 mid 1980s and again in 1991. Total abundance is high. Quality sized ($\geq$ 16 in.) abundance is high with low W_r for all length groups. Gill-net C/f and electrofishing C/f are included in Tables 13 and 14, respectively. Length frequency distributions from 2008 and 2011 gill netting are shown in Figures 8 and 9, respectively. Active vs. passive capture techniques are often used for blue catfish and C/f can differ greatly between the two. For example, 2005 fall gill netting captured 7.0 blue catfish per 24 hours compared to 2005 summer electrofishing results of 633.5 per hour. Age and growth was evaluated in 2005 determining Hugo Lake has a slow growing blue catfish population. Annual mortality was estimated using catch curves to be 30% (statewide ranged 20-30%). Actual annual mortality is likely lower because the largest catfish are difficult to sample therefore not represented on the catch curve. Average length at age 7 was quality size at 16.2 in. and a 36.5 in. individual was 19 years old (Table 15). A 39.4 in. blue catfish netted in 2008 weighed 32.2 lbs. and approximately 22 years old using the growth curve in Figure 10. Electrofishing catch rate for preferred size ($\geq$ 30 in.) was only 0.5/hr. However a 13 lake state-wide creel survey found anglers prefer catfish 30 in. or better. Length limit regulations for blue catfish were changed in 2010 such that anglers may now keep 15 per day but only one fish over 30 in. to maintain acceptable numbers of trophy individuals.

Hugo Lake does not currently have a lake record blue catfish. A minimum weight of 40 lbs. is required to qualify.

Flathead Catfish

Noodling is a legal method of take and is becoming popular on television. The recent attention is attracting more angling pressure during the catfish spawning period from May through August. Six flathead catfish were collected during 2011 fall gill netting (Table 16). Three of the six were $\geq$ 20 in. with W_r of 91, above acceptable values ($\geq$ 90). The largest flathead catfish caught in 2011 gillnetting was 22.2 in. and weighed 4.4 lbs. Length frequency distributions from 2008 and 2011 gillnetting are shown in Figures 8 and 9, respectively. Very few flatheads are sampled using gill nets. Summer electrofishing surveys provide better information regarding flathead catfish population structure.

Hugo Lake does not currently have a lake record flathead catfish. A minimum weight of 40 lbs. is required to qualify.

Sunfish

Some common species of sunfish in Hugo Lake include: longear (*L. megalotis*), bluegill (*Lepomis macrochirus*), green (*L. cyanellus*), orangespotted (*L. humilis*), and warmouth (*L. gulosus*). Longear sunfish are present in greatest numbers.

Longear

Sunfish are occasionally collected along with bass while electrofishing. A survey in 2001 collected 64.8 longear per hour. This colorful fish is most often found close to shore in rocky areas or rip-rap.

Bluegill

Bluegill sunfish are present in low total abundance and low quality sized (> 6 in.) abundance. Thirteen of the 67 bluegill collected in 2001 were stock sized (3 – 6 in.) and one was quality sized (> 6 in.).

Hugo Lake does not currently have a lake record sunfish. A minimum weight of 1 lb. is required to qualify.

Shad

Sampling forage fish has proven to be inconsistent between electrofishing (Table 16) and gill nets (Tables 18 and 19). Sinking gill nets were used prior to 2010. Floating gill nets were used for the first time in September 2011 to target shad. The new gear is used between August and October.

Gizzard Shad

Floating gill nets captured 618 gizzard shad (*Dorosoma cepedianum*) over 15 net nights. Total abundance was good with the < 6 in. length group C/f = 46.4 per net night. Gizzard shad grow larger than 6 in. and adults are captured in various mesh sizes of sinking nets. Over 200 adult gizzard shad were captured during the 2011 sinking gill net sample. Forage abundance is much better than other lakes in the region.

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. Gill netting in the fall of 2008 collected 552 and floating gill nets set in 2011 collected zero. A mild winter in 2011-2012 was welcomed following the recent winters with record low temperatures.

Other Species

The bowfin (*Amia calva*) has a long cylindrical body, long dorsal fin and a mouth full of teeth. Preferred habitat is near vegetation in pools and backwaters of the Kiamichi River and Hugo Lake. Over 11.4 million walleye (*Stizostedion vitreum*) were introduced in Sardis Lake during 1990-1991. Now walleye are caught below Sardis Lake and occasionally downstream in Hugo Lake.

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. Hugo Lake bass had mercury levels which exceeded U.S. Environmental Protection Agency (EPA) guidelines. Tissue from 15 largemouth bass was collected in July 2008. The average concentration was 0.52 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. Additional predator fish species typically harvested by anglers were collected in 2009. The following species-specific advisories again caution the sensitive population to limit their consumption to 2 meals per month: largemouth bass > 15 in., black crappie > 10 in., white bass > 12 in., blue catfish > 23 in. and flathead catfish >19 in. There are no advisories on any species from Hugo Lake for males age 15 and older and women past childbearing age. There are no consumption advisories for white crappie, channel catfish, green sunfish, common carp or smallmouth buffalo.

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. Hugo Lake does not have a documented population of zebra mussels, however, these invaders can be 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. Report all suspicious sightings to ODWC or USACE personnel.

Asian Carp
The ODWC and Dr. Tim Patton with Southeastern Oklahoma State University (SEOSU) sampled the lower Kiamichi River and connected systems downstream from Hugo Lake during June 2012. Data collected was length, weight, egg mass of females and age using pectoral spines (Table 20). Each of the next three following species was present:

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 Hugo Lake but below Hugo dam 10-15 were documented in Clear and Garland Creeks in June 2012. Documenting sightings will be critical to monitoring their expansion.

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 Hugo Lake, but eight were found below Hugo Lake in June 2012.

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 Hugo Lake, but five were found below Hugo Lake in June 2012.

Among the 13 *Hypophthalmichthys* captured, ten were females and three wee males. Mean length was 38.3 in. (range = 32.0 – 46.0 in.) and mean weight was 23.8 lbs. (range = 13.5 – 50.5 lbs.). Age estimates (N = 12) based on pectoral spine annuli were 2 – 12 years. Egg mass compromised an average of 20% of total body weight of females (range = 14 – 27%). Eggs were enumerated from a single female with 390 eggs/g of egg tissue, equating to 2.37 million eggs. Anglers should not catch and transport bait from one area to another. Asian carp could spread upstream to Hugo 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 kill, retain (do not release) and report any bighead or silver carp to the ODWC.

Snakehead Fish

Oklahoma does not have snakeheads. 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. The bowfin (*Amia calva*) inhabits the Kiamichi River drainage and closely resembles the long, cylindrical body of the snakehead. Please kill, retain (do not release) and report any snakeheads to the ODWC.

Aquatic Plants

Brazilian elodea (*Egeria densa*) and Hydrilla (*Hydrilla verticillata*) are non-native aquatic plant species invading lakes, ponds and streams in Oklahoma and Texas. These submursed plants form thick mats that can make fishing difficult. 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 http://www.wildlifedepartment.com/fishing/ans.htm.

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.

A bathymetric study in 1999 was conducted by the OWRB to address concerns that fluctuating lake levels could potentially impact fish and wildlife, recreation, tourism and economic development in the surrounding area. Additionally, positive relationships occur with age-0 threadfin shad abundance and number of days winter elevations are above 406 ft. asl and holding water in the flood pool during the summer was also positively related to largemouth bass recruitment (Boxrucker, J.C., G.L. Summers, and E.R. Gilliland. 2005. Effects and Duration of Seasonal Pool Inundation on Recruitment of Threadfin Shad, White Crappies and Largemouth Bass in Hugo Reservoir, Oklahoma, North American Journal of Fisheries Management, 25:2, 709-716.).

Management Objectives

Goals

- Use sampling procedures to monitor major sportfish and forage species.
- 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 2013 and 2016 electrofishing surveys 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.
- Conduct SSP fall 2014 and 2017 gill netting for crappie to evaluate their abundance and body condition. There is no apparent need at this time to propose daily and/or length limit regulations on crappie. Abundance is high. Growth rates remain acceptable. Trap netting for age/growth is not needed during the next 5 years.
- Conduct SSP fall 2014 and 2017 gill netting surveys for Morone species to evaluate their abundance and body condition. Stocking hybrid striped bass will not be requested during the next 5 years.
- Conduct SSP fall 2014 and 2017 gill netting surveys for catfish species to evaluate their abundance and body condition.
- Conduct SSP summer 2013 electrofishing surveys for flathead catfish to evaluate their abundance and body condition.
- Forage abundance appears to be sufficient with C/f high but sportfish W_r vary above and below acceptable values. It is not believed threadfin shad are completely missing but rather, their numbers decline from extremely cold winters. Threadfin will rebound under normal circumstances to provide additional forage for sportfish. Floating shad net sampling is not needed again during the next 5 years.
- Use the Fishery Analyses and Simulation Tools (FAST) computer program to model known population dynamics with simulated management scenarios.

2) Habitat

- Maintain fish attractors utilizing eastern red cedars (*Juniperus virginiana*) from surrounding WMA and USACE property in 2014. Replace fish attractor buoys as needed.
- Ask to resume the seasonal pool plan when conditions improve.
- Perform a fisheries habitat evaluation of the entire shoreline with GPS equipment and side-scan sonar to 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. Results from each year will be summarized and provided to appropriate resource agencies.
- Nutrient loading is non-point source pollution responsible for high productivity that can drive a productive fishery but causes taste and odor issues for water suppliers and harmful algae blooms. Riparian zones along tributaries and the Kiamichi River can buffer many nutrients running off the watershed.

4) Boating and Fishing Access

- Find an organization to partner with ODWC to improve boating and fishing access.

5) Public Outreach

- Form cooperative agreements with local groups to help fund, construct and maintain boating and fishing access points for public use.
- 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 public meetings as needed to discuss the progress of the fisheries management plans.
- Landowners within the Hugo Lake watershed can learn that good land management practices will slow sedimentation and nutrient loading in the river basin.
- Increase conservation awareness for the Kiamichi River ecosystem with educational programs.

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.

Tables

Table 1. Physical and chemical characteristics of ***Hugo Lake***.

Operating Agency	USACE
Impoundment Date	**1974**
Surface Area	**13,250 acres**
Shoreline	**110 miles**
Shoreline Development Ratio	**6.8**
Average Depth	**11.8 ft.**
Maximum Depth	**53.5 ft.**
Water Exchange Rate	**9.4**
Watershed	**1,709 square miles**
Secchi Disk	**13.0 inches**
Conductivity	**55 – 78 µS/cm**
pH	**6.6 – 7.4; Neutral**
Carlson's TSI (chlorophyll - a)	**54; Eutrophic**
Average annual precipitation	**49 inches**

Table 2. Species, number and fish stocked in ***Hugo Lake***, 1982 – 2012.

Date	Species	Number	Size
1982 – 1984	Threadfin Shad	48,566	Adults
1982	FLMB	17,500	Fingerlings
1984	FLMB	132,500	Fingerlings
1984 – 1985	Blue Catfish	174,847	Fingerlings
1986 – 1987	FLMB	200,217	Fingerlings
1988*	FLMB	3,740	Fingerlings
1989*	FLMB	5,000	Fingerlings
1990 – 1991	FLMB	110,092	Fingerlings
1991	Blue Catfish	215	Adults
1991*	FLMB	4,850	Fingerlings
1992 – 1993	FLMB	280,344	Fingerlings
1994*	FLMB	75,000	Fingerlings
2005	FLMB	119,210	Fingerlings
2005	Reciprocal HSB	21,090	Fingerlings
2008	Reciprocal HSB	162,093	Fry
2010	Reciprocal HSB	30,000	Fry
2011	FLMB	20,007	Fry

***Stocked into nursery pond and released into reservoir at a later date.**

Table 3. ***Hugo Lake*** Tournament Results from 1994 – 2011. 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	15	386	434	1.0	.	24.1	1.1	68	.	2.4	.	18.0	.	.	1.0	9.1	16.0	.	.
1995	12	438	433	1.2	.	36.0	1.0	60	.	2.2	.	13.0	.	.	0.0	7.6	13.6	.	.
1996	14	459	493	1.3	.	35.2	1.1	50	.	2.0	.	8.0	.	.	1.0	8.9	10.5	.	.
1997	7	254	155	0.8	.	22.1	0.6	54	.	2.4	.	2.0	.	.	0.0	6.2	13.2	.	.
1998	5	157	166	0.9	.	33.2	1.1	70	.	2.2	.	1.0	.	.	0.0	4.8	11.6	.	.
1999	6	159	166	1.3	.	27.7	1.0	75	.	2.1	.	1.0	.	.	0.0	5.2	14.8	.	.
2000	5	149	125	0.9	.	25.0	0.8	57	.	2.5	.	3.0	.	.	0.0	6.6	14.0	.	.
2001	3	64	85	1.2	.	28.3	1.3	78	.	2.3	.	1.0	.	.	0.0	5.7	13.2	.	.
2002	6	202	346	1.7	.	57.7	1.7	85	.	2.1	.	4.0	.	.	0.0	5.7	16.3	.	.
2003	11	264	514	1.9	2	46.7	1.9	88	1	2.1	13	2.0	257	16	0.0	5.6	14.6	1	1
2004	13	610	975	1.3	5	75.0	1.6	79	3	2.1	12	3.0	34	1	0.0	5.5	15.4	1	1
2005	11	577	619	1.5	12	56.3	1.1	73	5	2.1	16	5.0	515	18	0.0	6.5	12.4	9	12
2006	1	78	31	.	.	31.2	0.4	80	.	2.0	.	0.0	.	.	0.0	4.0	8.8	.	.
2007	5	97	146	.	.	29.0	1.5	65	.	2.5	.	1.2	.	.	0.2	6.2	15.8	.	.
2008	5	115	345	.	.	69.0	3.0	86	.	2.2	.	0.8	164	.	0.0	4.7	19.9	.	.
2009	9	368	810	2.2	1	90.0	2.2	83	6	2.4	6	0.7	316	19	0.0	4.8	19.1	1	2
2010*	3	70	262	.	.	87.3	3.7	89	.	2.2	.	2.0	13	.	0.0	5.8	18.0	.	.
2011	4	177	212	1.2	.	53.0	1.2	62	.	2.4	.	0.5	.	.	0.0	4.8	16.6	.	.
Avg.	**7.5**	**256.9**	**350.9**	**1.3**	**5**	**45.9**	**1.5**	**72.3**	**3.8**	**2.2**	**11.8**	**3.7**	**216.5**	**13.5**	**0.1**	**6.0**	**14.7**	**3**	**4**

*2010 data for only June – December.

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 ***Hugo Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are $\geq$ 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
1986	326	25.6	13.8	98	3.9	93	7.8	92	3.4	92
1988	257	22.8	8.8	80	8.3	88	5.8	99	3.6	101
1991	133	19.2	4.2	107	5.5	89	9.5	97	5.6	93
1993	276	28.3	11.0	86	8.2	91	9.1	93	5.6	95
1994	250	27.8	10.0	99	7.6	90	10.2	92	4.8	96
2001	186	31.0	17.7	93	7.2	90	6.2	88	4.0	89
2003	196	31.4	14.9	90	7.0	94	9.4	90	4.3	90
2006	149	24.8	8.3	85	13.2	85	4.5	85	0.8	90
2010	343	57.2	18.3	84	.	.	.	.	9.0	101

Table 5. **Largemouth bass** age and growth collected by spring electrofishing from ***Hugo Lake*** in 2010.

	Largemouth Bass	
Age	Average Length (in.)	Number Collected
1	8.0	41
2	11.7	31
3	14.2	25
4	16.9	18
5	17.9	6
6	19.2	2
7	.	0
8	18.4	1

Table 6. Gel electrophoresis of **largemouth bass** collected during electrofishing from ***Hugo Lake***.

			Phenotype		
Year	Sample Size	NLMB%	FLMB%	F1%	Fx%
1993	51	66.7	1.9	3.9	27.5

Table 7. Total number (No.), catch per hour (C/f) and relative weights (W_r) by length groups of **spotted bass** collected during spring electrofishing from ***Hugo Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are $\geq$ 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
2001	7	1.2	0.5	88	0.5	77	0.2	79	0.0	.
2003	31	5.0	2.9	96	1.8	92	0.3	101	0.3	101
2006	2	0.3	0.0	.	0.2	108	0.2	81	0.2	81
2010	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 ***Hugo 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 – 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
1986	210	14.6	9.4	74	5.3	94	2.4	94
1988	180	14.9	4.6	74	10.1	91	7.4	92
1990	243	17.5	7.7	86	9.8	99	4.8	101
1991	252	21.1	14.2	90	6.7	99	4.8	100
1994	313	25.0	11.5	92	13.4	99	9.8	99
2003	328	24.2	16.3	94	7.9	88	28.6	87
2005	130	9.6	0.5	91	9.1	96	6.0	95
2007	219	16.8	11.8	106	5.0	102	4.6	104
2008	265	19.9	4.3	95	15.6	102	4.6	104
2011*	150	11.5	3.8	87	7.7	94	5.9	96

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

Table 9. Total number (No.), catch per 24 hrs. (C/f) and relative weights (W_r) by length groups of **crappie** collected during fall trap netting from ***Hugo Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥ 90.

	Total (≥ 25)		**< 5 in. (≥ 5)**		**≥ 5 in. (10-40)**		**≥ 8 in. (≥ 10)**		**≥ 10 in. (≥ 4)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r
1993	1222	111.1	98.5	44	12.7	95	8.6	98	4.6	99
1994	1412	131.4	89.8	81	41.6	90	16.5	95	6.5	99
2010	1255	84.6	67.4	98	17.1	95	12.2	97	9.9	99

Table 10. Average length at age of **crappie** collected during fall trap netting from ***Hugo Lake***. Numbers in parentheses represent values for acceptable growth rates.

Year	**Age 1.5 (≥ 6 in.)**	**Age 2.5 (≥ 8 in.)**	**Age 3.5 (≥ 9 in.)**	**Age 4.5 (≥ 10 in.)**
1993	7.2	10.3	11.2	13.0
1994	6.9	10.3	11.1	12.1
2010	6.2	10.0	12.0	11.8

Table 11. 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 ***Hugo 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
1986	119	8.4	3.6	89	1.4	96	3.1	102
1988	21	1.7	0.2	81	0.2	88	1.2	95
1990	45	3.1	1.2	95	0.7	98	1.2	94
1991	39	3.4	1.7	99	1.2	94	0.5	90
1994	107	8.4	3.6	98	3.1	97	1.7	93
2003	64	4.8	2.2	91	1.0	91	1.7	90
2005	107	8.2	2.2	94	6.0	99	0.2	107
2007	81	6.2	1.7	90	4.3	105	0.2	118
2008	39	2.9	0.7	93	1.4	94	0.7	111
2011*	6	0.5	0.0	.	0.3	93	0.2	91

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

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 ***Hugo Lake***. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥ 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
1986	121	7.4	4.1	82	4.3	87	2.4	89
1988	170	13.9	11.8	77	2.4	87	1.4	92
1990	92	6.7	4.1	87	2.4	87	1.0	90
1991	61	5.0	3.1	87	1.9	92	1.0	98
1994	114	9.1	7.0	98	2.2	82	0.7	88
2003	64	4.8	3.4	91	1.2	76	0.2	81
2005	48	3.6	2.2	81	1.4	78	0.5	85
2007	63	4.8	2.2	91	2.6	83	0.7	82
2008	37	2.6	1.4	84	1.2	82	0.5	83
2011*	50	3.9	2.4	92	1.5	84	1.1	86

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

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 ***Hugo 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. (≥ 1.20)**		**≥ 12 in. (≥ 1.20)**		**≥ 16 in. (≥ 0.72)**	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1986	10	0.7	0.2	95	0.5	98	0.5	98
1988	12	1.0	0.0	.	1.0	95	0.7	96
1990	5	0.5	0.1	96	0.2	110	0.2	110
1991	3	0.2	0.2	93	0.0	.	0.0	.
1994	109	8.6	8.4	101	0.2	110	0.1	99
2003	82	6.0	3.8	84	0.2	82	1.2	84
2005	102	7.4	5.1	88	2.2	82	1.7	83
2007	90	7.0	0.2	75	6.7	84	4.1	85
2008	102	7.7	3.5	137	4.1	101	2.5	92
2011*	92	7.2	3.1	88	4.1	86	3.0	87

*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 ***Hugo Lake***. Acceptable W_r values are $\geq$ 90.

	Total		**CV**	**≥ 30 in.**	**CV ≥ 30 in.**	**Annual Mortality**
Year	No.	C/f		C/f		
2005	1265	633.5	0.1	0.5	1.0	0.3

Table 15. Average length at age of **blue catfish** collected during summer electrofishing from ***Hugo Lake***.

Age	**N**	**Average Length (in.)**
1	721	6.6
2	212	8.8
3	167	10.7
4	20	12.6
5	45	13.0
6	44	14.6
7	46	16.2
8	4	17.7
9	2	18.7
10	3	19.2
11 - 18	0	.
19	1	36.5

Table 16. 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 ***Hugo 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
1986	3	0.2	0.0	.	0.2	100	0.1	118	0.1	118	0.1	118
1988	2	0.2	0.0	.	0.2	114	0.2	114	0.1	118	0.1	118
1990	4	0.2	0.0	.	0.2	95	0.2	99	0.0	.	0.0	.
1991	6	0.5	0.1	.	0.5	100	0.5	100	0.2	99	0.2	99
1994	2	0.2	0.0	.	0.2	103	0.2	103	0.2	103	0.2	103
2003	3	0.2	0.0	.	0.2	76	0.1	.	0.1	.	0.1	.
2005	1	0.1	0.0	.	0.1	85	0.1	85	0.0	.	0.0	.
2007	2	0.2	0.0	.	0.2	98	0.2	98	0.1	95	0.1	95
2008	4	0.3	0.1	101	0.2	92	0.1	94	0.1	103	0.1	103
2011*	6	0.5	0.0	.	0.5	93	0.3	91	0.0	.	0.0	.

*New 80 ft. gill nets.

Table 17. 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 ***Hugo 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
1988	180	23.2	12.9	84	1	0.1
1991	159	35.9	23.9	103	1	0.2
1993	276	64.9	8.5	83	28	6.6
1994	82	18.2	4.9	93	0	0.0
2001	4	1.6	0.4	81	.	.
No longer collected by electrofishing.						

Table 18. 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 ***Hugo 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 ($\geq$ 4.8)		< 8 in. ($\geq$ 2.4)		Total		< 6 in.	
Year	No.	C/f	C/f	W_r	No.	C/f	C/f	W_r
1988	.	28.3	19.0	82	.	.	.	.
1990	.	20.6	14.4	86	.	.	.	.
1991	.	42.2	29.3	88	.	.	.	.
1994	.	16.3	3.6	91	.	.	.	.
2003	.	72.0	71.0	.	.	.	.	.
Analysis changed from < 8 in. to <6 in.					.	.	.	.
2005	225	16.9	11.8	.	.	.	.	.
2007	652	48.5	44.9	.	.	.	.	.
2008	436	31.7	18.0	.	.	.	.	.
2011	No longer collected.				618	47.1	46.4	.

Table 19. 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 ***Hugo 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
1988	19	1.6	.	.
1990	10	0.7	.	.
1991	1	0.1	.	.
2003	784	58.6	.	.
2005	175	7.3	.	.
2007	589	44.3	.	.
2008	552	40.0	.	.
2011	No longer collected.		0	0.0

Table 20. Characteristics of 13 bighead and silver carp captured from two streams below ***Hugo Lake*** in Choctaw and McCurtain Counties, Oklahoma, June 2012.

Species	Water Body	Gender	Age	Length (in.)	Weight (lbs.)
Bighead Carp	Garland Creek	F	3	36.0	21.4
Bighead Carp	Garland Creek	F	2	37.0	22.0
Bighead Carp	Garland Creek	F	3	38.0	25.1
Bighead Carp	Garland Creek	M	4	43.0	27.3
Bighead Carp	Kiamichi River	M	4	37.0	23.8
Bighead Carp	Kiamichi River	F	4	37.0	23.8
Bighead Carp	Kiamichi River	F	12	43.0	50.5
Bighead Carp	Kiamichi River	F	7	46.0	36.8
Silver Carp	Garland Creek	F	2	31.0	15.0
Silver Carp	Kiamichi River	F	-	32.0	17.0
Silver Carp	Kiamichi River	F	3	32.0	14.1
Silver Carp	Kiamichi River	M	4	32.0	13.4
Silver Carp	Kiamichi River	F	4	35.0	19.0

Figures

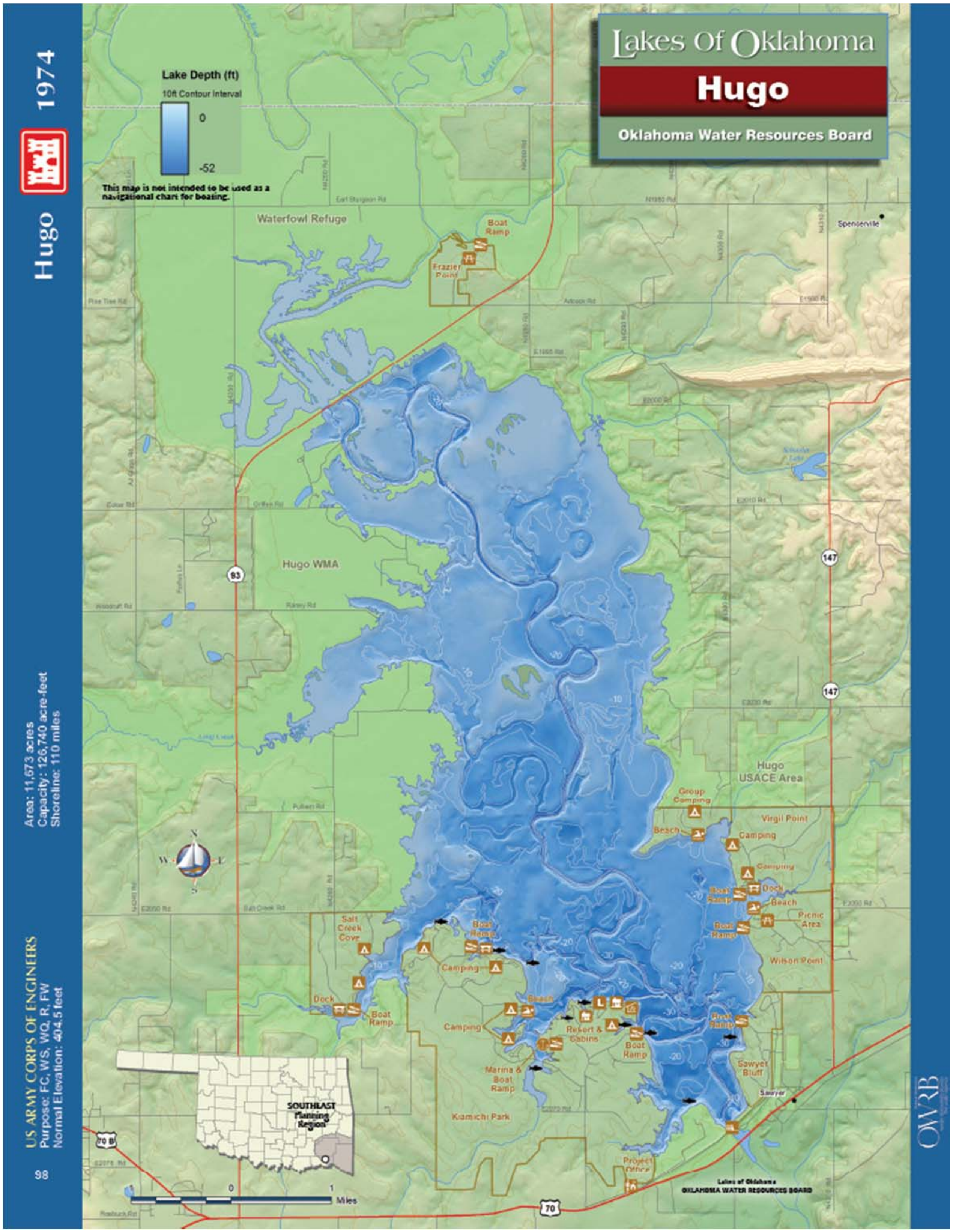

Figure 1. Map of ***Hugo Lake*** vicinity.

Figure 2. Fish attractor locations in ***Hugo Lake***.

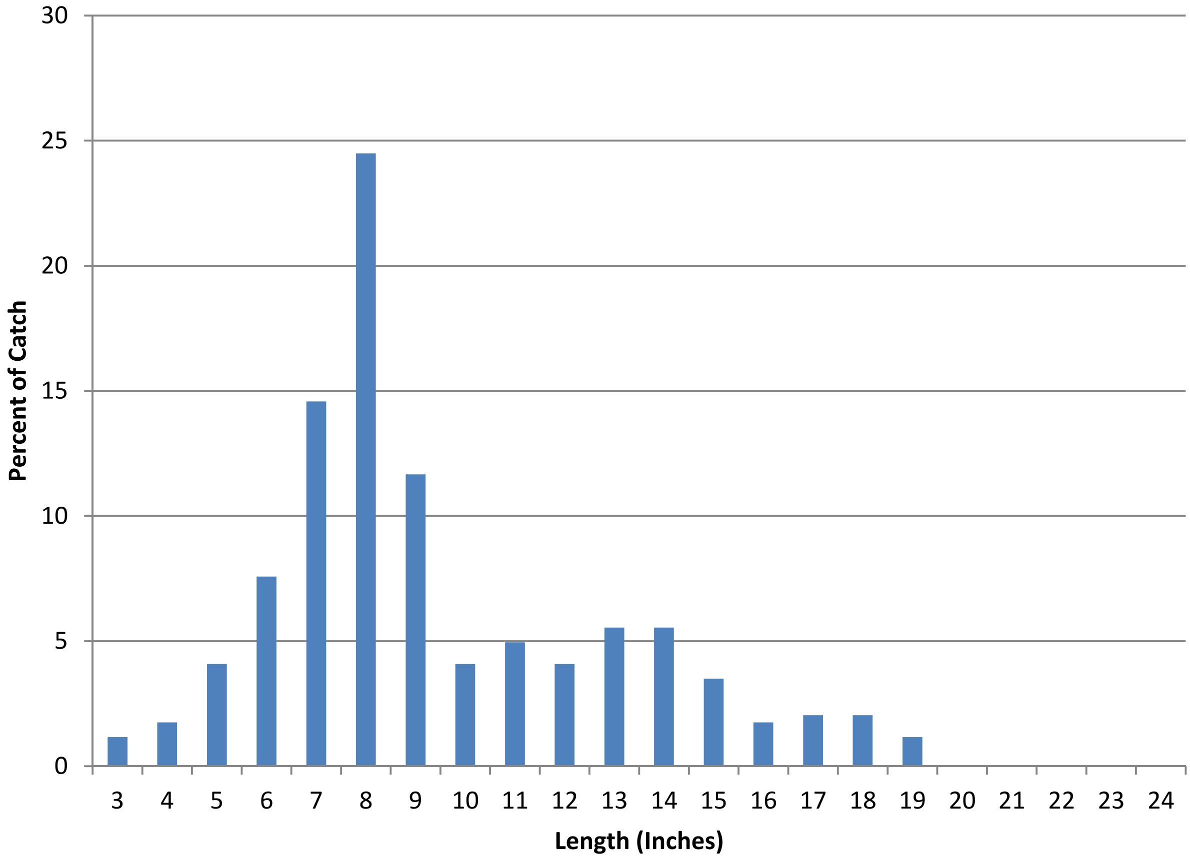

Figure 3. Length frequency distribution of **largemouth bass,** N = 343. Spring 2010 electrofishing samples from ***Hugo Lake***.

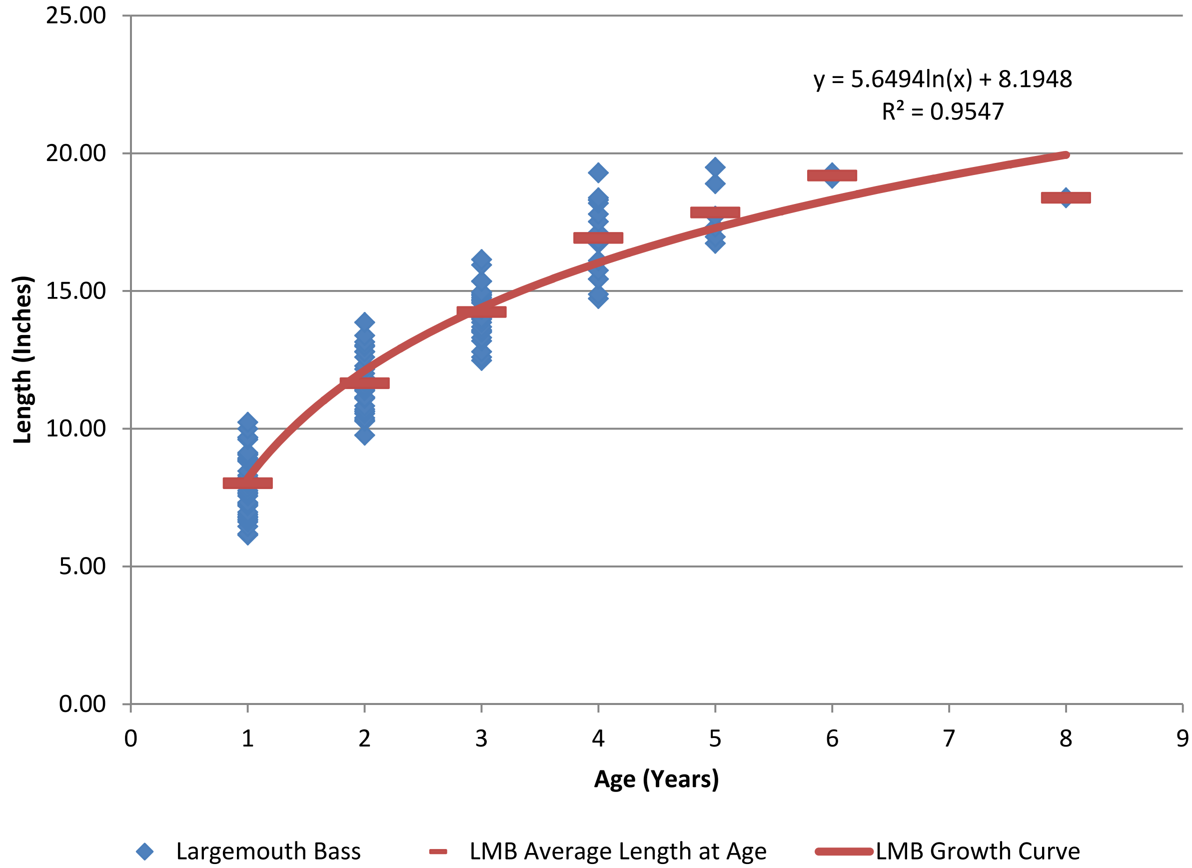

Figure 4. Age and growth for **largemouth bass**. Spring 2010 electrofishing samples from ***Hugo Lake***.

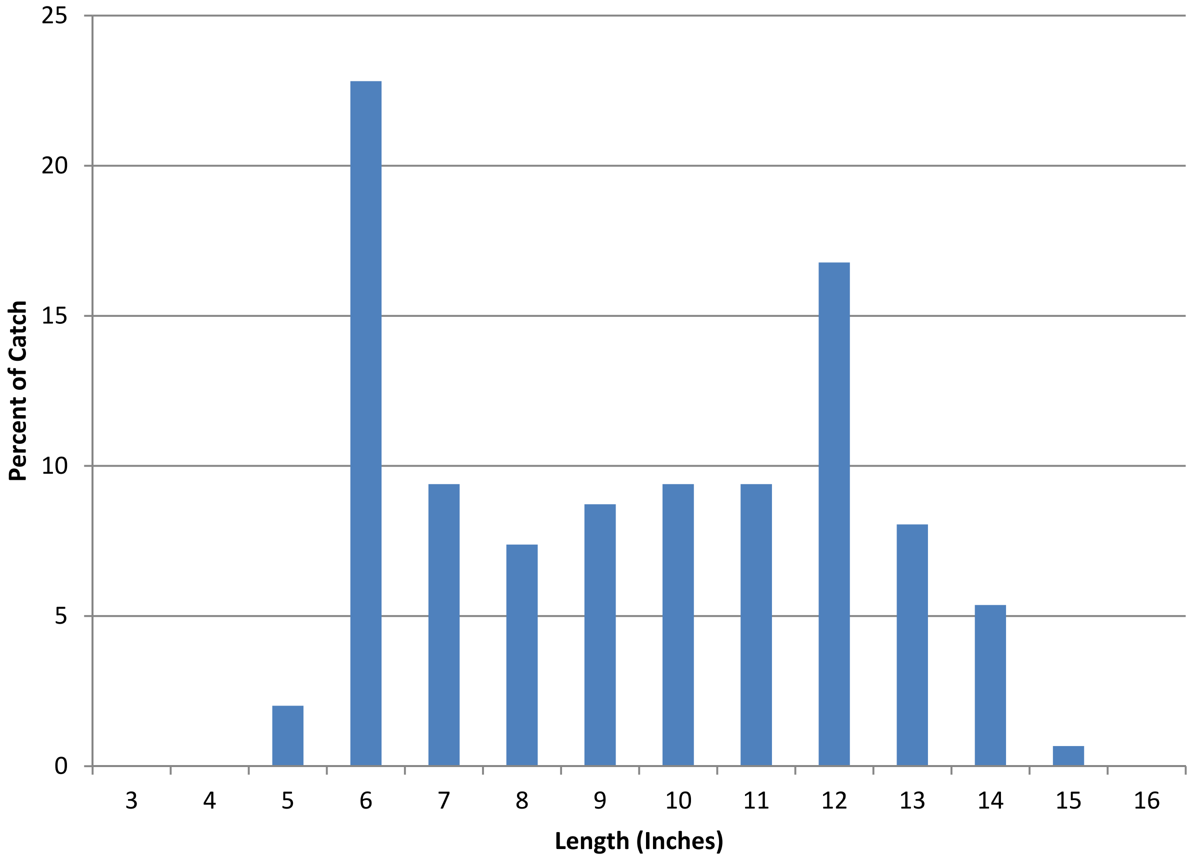

Figure 5. Length frequency distribution of **all crappie combined**, N = 149. Fall 2011 gill netting samples from ***Hugo Lake***.

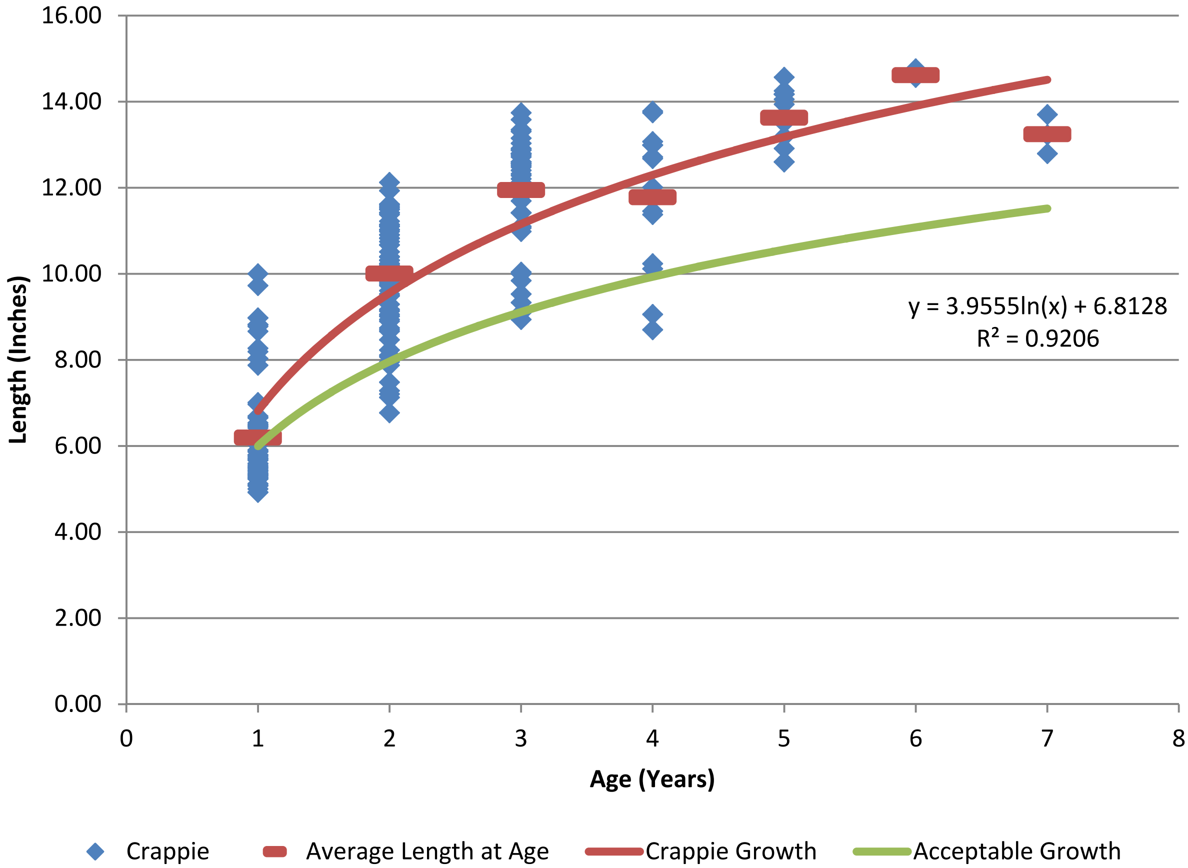

Figure 6. Age and growth for **crappie**. Fall 2010 trap netting samples from ***Hugo Lake***.

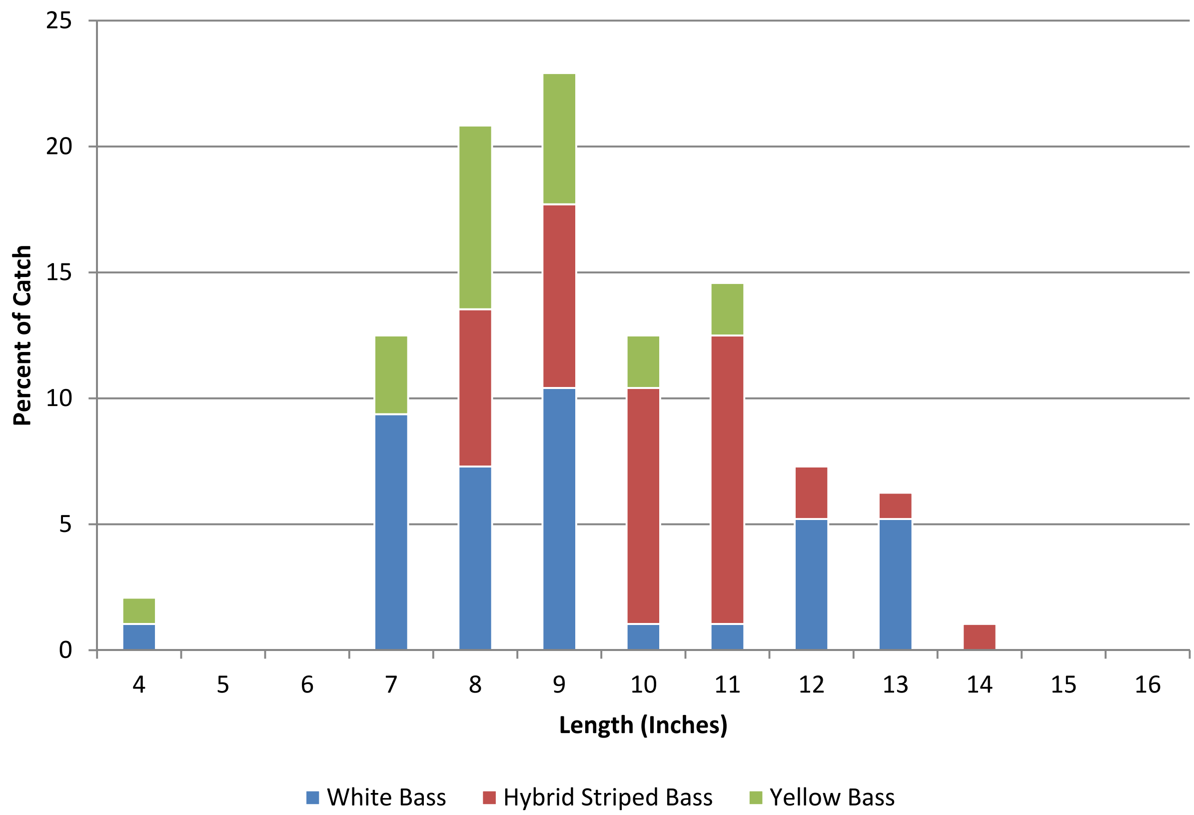

Figure 7. Length frequency distribution of **morone species,** N = 96. Fall 2008 gill netting samples from ***Hugo Lake***.

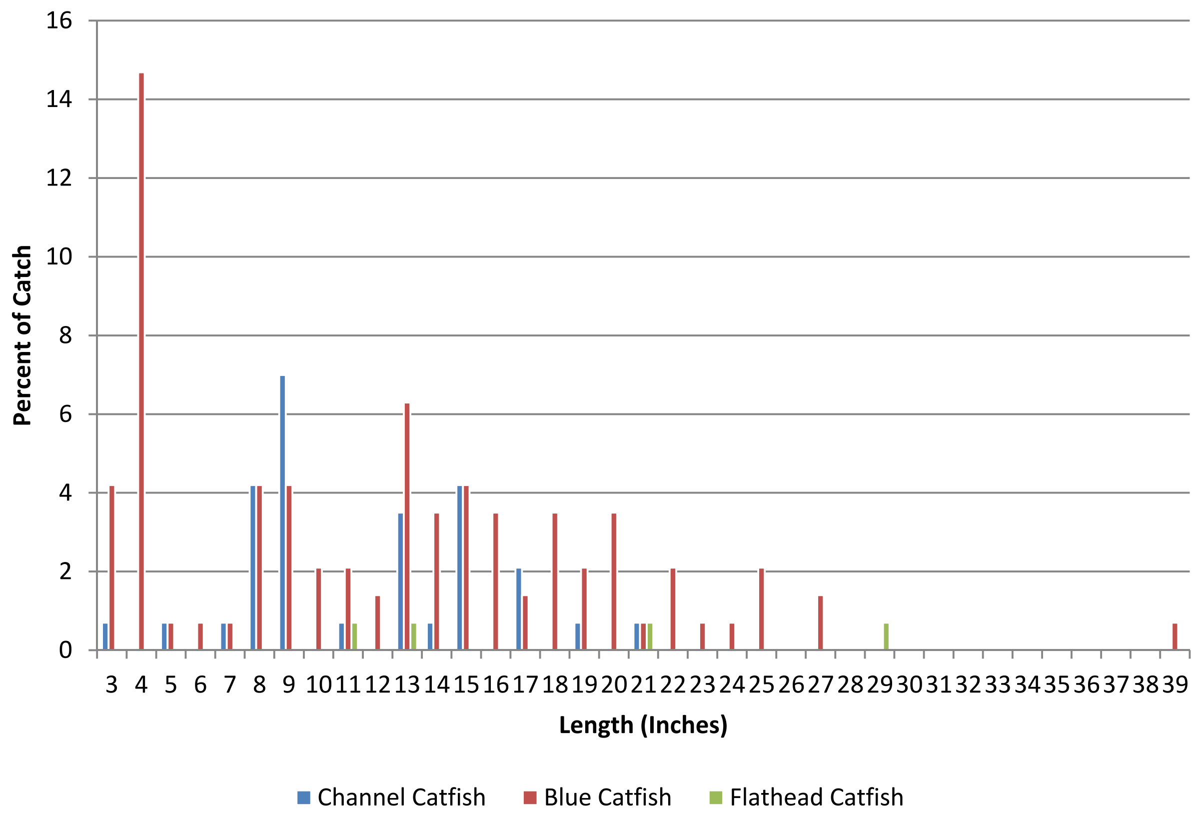

Figure 8. Length frequency distribution of **catfish species**, N = 143. Fall 2008 gill netting samples from ***Hugo Lake***.

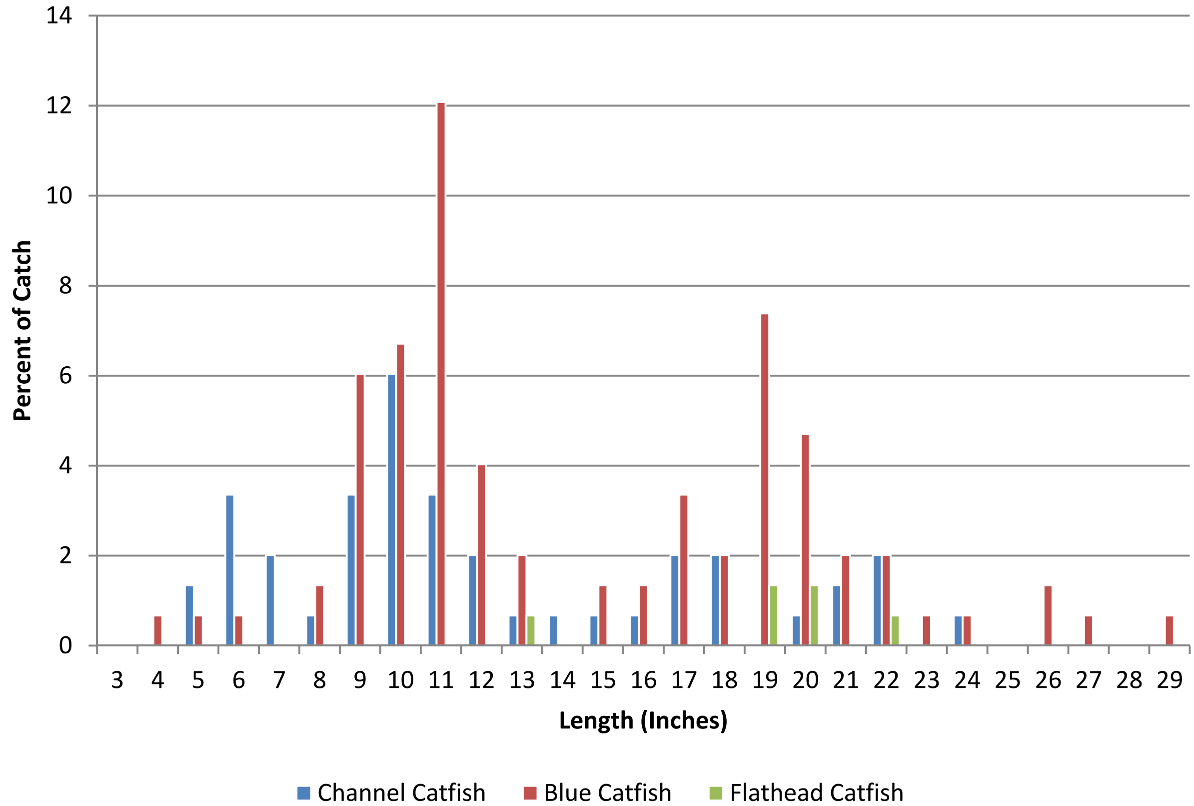

Figure 9. Length frequency distribution of **catfish species**, N = 149. Fall 2011 gill netting samples from ***Hugo Lake***.

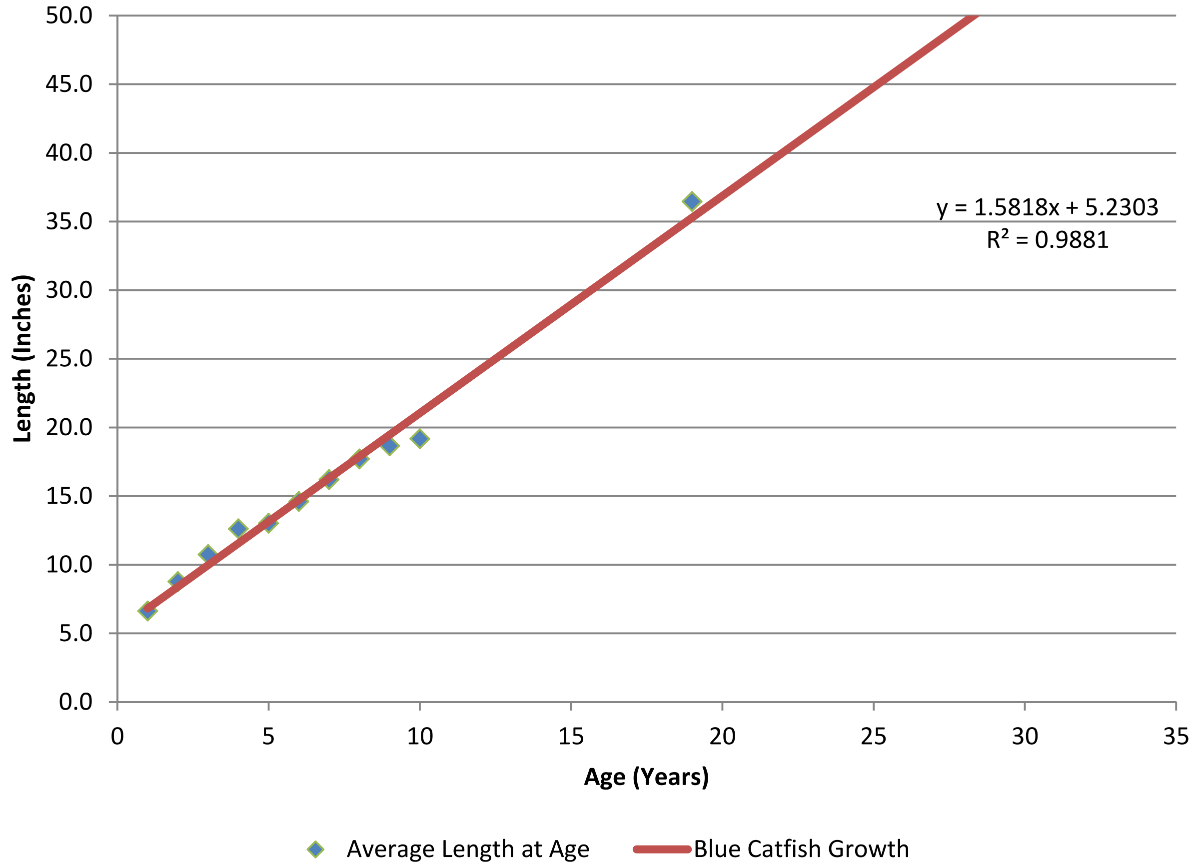

Figure 10. Age and growth for **blue catfish**. Summer 2005 electrofishing samples from ***Hugo Lake***.