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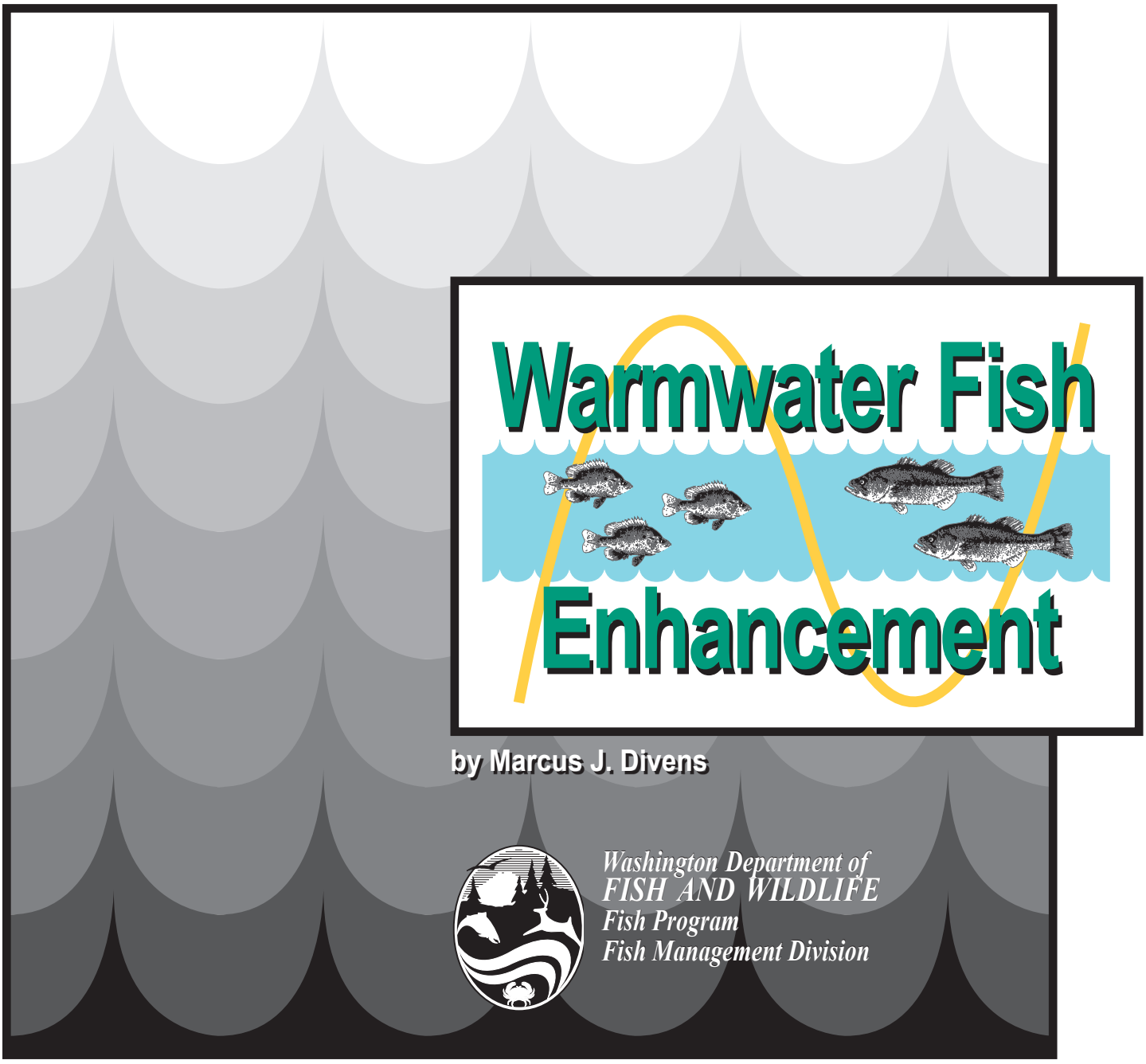
2012 Warmwater Fisheries Survey of Mesa Lake (Franklin County), Washington



by Marcus J. Divens

Washington Department of
FISH AND WILDLIFE
Fish Program
Fish Management Division

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2012 Warmwater Fisheries Survey of Mesa Lake (Franklin County), Washington

by

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Acknowledgements

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Abstract

Washington Department of Fish and Wildlife (WDFW) biologists surveyed Mesa Lake (Franklin County) October 14-16, 2012 by boat electrofishing, gill netting and fyke netting. Yellow Perch *Perca flavescens* (65%) and Largemouth Bass *Micropterus salmoides* (15%) were the most abundant species by number. Common Carp *Cyprinus carpio* (33%), Lake Whitefish *Coregonus clupeaformis* (27%), Walleye *Sander vitreus* (17%), and Yellow Perch (13%) comprised the highest proportion of the catch by weight. Other game fish species sampled included Bluegill *Lepomis macrochirus*, Black Crappie *Pomoxis nigromaculatus*, and Pumpkinseed Sunfish *Lepomis gibbosus*. Nongame species sampled included Longnose Sucker *Catostomus catostomus*, Largescale Sucker *Catostomus macrocheilus*, Goldfish *Carassius auratus*, and Sculpin *Cottus* spp. Recently, Mesa Lake has been managed for naturally reproducing warmwater fish, although the fish community is strongly influenced by fish moving through the Columbia Basin irrigation system, which Mesa Lake is part of, creating regular variability in the community makeup. At the time of this survey, Walleye and Yellow Perch offered anglers the best opportunities for quality sized fish.

Table of Contents

List of Tables

List of Figures

Introduction

Mesa Lake (surface area = 50 acres; mean depth = 2 m; maximum depth = 3 m) (Figure 1) is located in Franklin County, one mile southwest of the town of Mesa. It is fed primarily by a Columbia Basin irrigation canal located at the southern end of the lake, as well as three smaller canals. Land ownership around the lake is shared by the U. S. Bureau of Reclamation (≈ 40%) and the Washington Department of Fish and Wildlife (≈ 60%), which provides developed public access. In 2010, the Washington Department of Fish and Wildlife purchased 558 acres of lakeshore property on Mesa Lake, which significantly increased shoreline access around the lake. WDFW manages the site as part of the Sunnyside/Snake River Wildlife Area Complex. The property is managed under a Register to Hunt program limiting access during the hunting season. Under this program, visitors sign in at the access point on a first-come basis up to a maximum of five vehicles per lot. A rough boat launch, managed by WDFW, is located at the southwest end of the lake. The lake is open to fishing year-round and is managed under statewide general regulations.

Historically, Mesa Lake has provided angling opportunities for Cutthroat Trout (*Oncorhynchus clarki*) and Rainbow Trout (*O. mykiss*), as well as several warmwater fish species. The lake was rehabilitated with rotenone in 1961 to reduce the abundance of Common Carp (*Cyprinus carpio*). Following the rotenone treatment, the lake was restocked with Smallmouth Bass (*Micropterus dolomieui*) and Cutthroat Trout, which provided a fair fishery for two years. Common Carp reappeared in 1964 and the lake was treated with toxaphene to eliminate them. The lake was then restocked with Rainbow Trout, which provided good angling for about two years. Today, there is no fish stocking at Mesa Lake and it is now managed primarily as a warmwater fishery, relying on naturally reproducing species such as Largemouth Bass (*M. salmoides*), Bluegill (*Lepomis macrochirus*), and Yellow Perch (*Perca flavescens*). Additionally, species such as Walleye (*Sander vitreus*) and Lake Whitefish (*Coregonus clupeaformis*) are found in the lake as they move in via the irrigation canals.

A previous standardized fish survey was conducted on Mesa Lake in August 1998 (Divens and Phillips 2000). At that time the fish community was described as unbalanced with a variety of both game fish and nongame fish, and likely to offer only marginal angling opportunity. A large proportion of the biomass at the time was in Common Carp and Sucker (*Catostomus* spp.). Largemouth Bass, Walleye, Black Crappie (*Pomoxis nigromaculatus*), and Yellow Perch were present, with some to quality size. Management options were described as limited due to the lakes connectivity to the large Columbia Basin irrigation system, which allowed movement of fish both into and out of the lake regardless of their value as a sport fish. However, it was recommended that the lake be included under the state's 12-17 inch slot-limit for Largemouth Bass, which was adopted as the statewide regulation for Largemouth Bass in 2003.

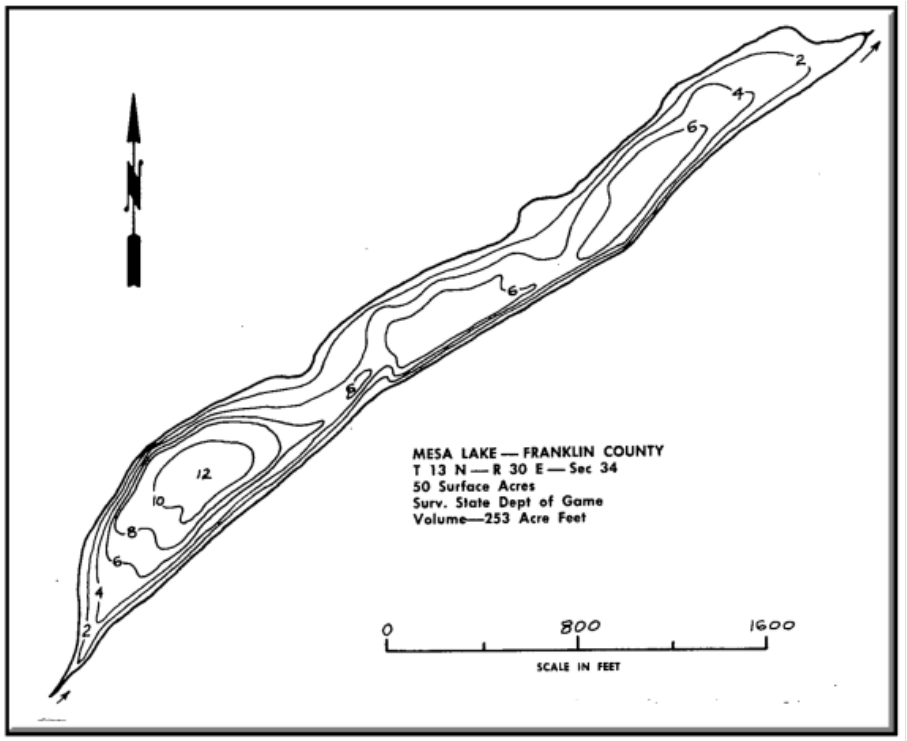

Figure 1. Bathymetic map of Mesa Lake (Franklin County)

Methods

Sampling

A standardized survey of Mesa Lake (Franklin County) was conducted October 14-16, 2012 following the procedures outlined in Standard Fish Sampling Guidelines for Washington State Ponds and Lakes (Bonar et al. 2000). Fish were captured using boat electrofishing, gill netting, and fyke netting. The electrofishing unit consisted of a 5.5 m Smith-Root 5.0 GPP "shock boat" using a DC current of 120 cycles / sec $^{-1}$ at 3 to 5 amps power. Experimental gill nets (45.7 m long x 2.4 m deep) were constructed of four sinking panels (two each at 7.6 m and 15.2 m long) of variable size (1.3, 1.9, 2.5, and 5.1 cm stretched mesh) monofilament. Fyke nets were constructed of a main trap (4.7 m long and 1.2 m in diameter), a lead net (30.5 m long x 1.2 m), and two wings (7.6 m long x 1.2 m deep).

Sampling locations were selected by dividing the shoreline into 8 sections approximated 400 m in length. Three sampling sections for boat electrofishing, two for gill netting, and two for fyke netting were randomly selected for sampling. While electrofishing, the boat was maneuvered through the shallows (depth range = 0.2 - 2 m), adjacent to the shoreline. This sampling was conducted during evening hours to maximize the size and number of fish captured. The total electrofishing time was 1,800 seconds ("pedal-down" time). Gill nets were set perpendicular to the shoreline with the small mesh end attached onshore and the large mesh end anchored offshore. Fyke nets were set perpendicular to the shore with the lead net anchored onshore and the wing nets set at 45 degree angles to the trap. Fyke nets were set so that the trap was no deeper than three meters.

Each fish captured was identified to species, measured to total length (mm), and weighed to the nearest gram (g). Scales were collected for age and growth analysis from Largemouth Bass, Bluegill, Black Crappie, Yellow Perch, and Pumpkinseed Sunfish. Scale samples (up to five per 10 mm length-class for each species) were mounted on adhesive scale cards, pressed onto acetate slides, and aged according to Jearld (1983) and Fletcher et al. (1993).

Data Analysis

Species composition by weight (kg) and number was calculated using all fish sampled during the survey and also using all fish sampled excluding young-of-the-year YOY. Species composition by number was calculated from fish collected by dividing the number of individuals of each species captured by the total number of individuals of all species captured, and multiplying by 100.

Catch-per-unit-of-effort (CPUE), by gear type, was determined for each fish species collected (number of fish/hour electrofishing, number of fish/gill net-night, and number of fish/fyke net-night). Eighty percent confidence intervals (CI) were calculated for each mean CPUE by species and gear type. Each CI was calculated as the mean ±t(N-1)×SE, where *t*=Student's *t* for confidence level with N-1 degrees of freedom (two tailed) and SE=standard error of the mean.

Length frequency histograms (percent frequency captured by each gear type) were created to evaluate the size structure of populations, for which sample size was greater than 25 individual fish.

Proportional size distribution (PSD), formally referred to as Proportional Stock Density and Relative Stock Density, was calculated by gear type for each warmwater fish species that have established stock lengths (Anderson and Neuman 1996; Guy et al. 2007) (Table 2). Eighty percent confidence intervals were calculated, assuming a normal distribution, as an indication of precision (Conover 1980; Gustafson 1988).

Table 1. PSD standard length categories (mm; TL) for fish species sampled from Mesa Lake (Franklin County) in October 2012. Numbers in parentheses represent percentages of world record lengths (Gablehouse 1984).

Species	Standard Length Categories				
	Stock (20-26%)	Quality (36-41%)	Preferred (45-55%)	Memorable (59-64%)	Trophy (74-80%)
Largemouth Bass	200	300	380	510	630
Black Crappie	130	200	250	300	380
Pumpkinseed Sunfish	80	150	200	250	300
Bluegill	80	150	200	250	300
Walleye	250	380	510	630	760
Yellow Perch	130	200	250	300	380
Common Carp	280	410	530	660	840

Age and growth of warmwater fishes sampled were evaluated using the Lee's modification of the direct proportional method (Carlander 1982). Using Lee's modification, L_n was back–calculated as $L_n=a+A\times(TL-a)/S$, where a is the species-specific standard intercept from a scale radius-fish length regression. Mean back–calculated lengths at age n for bluegill, black crappie, and yellow perch are presented.

The relative weight (W_r) index was calculated for all species to evaluate condition (Anderson and Neuman 1996) . The index was calculated as,

$$W_r = \frac{W}{W_s} x100$$

where W is the weight (g) of an individual fish and W_s is the standard weight of a fish of the same length calculated with the standard weight (W_s) equation . The W_s equations were obtained from Andersen and Neuman (1996). Relative weights are useful for comparing the condition of different size groups within a single population to determine if all sizes are getting adequate nutrition. A W_r value of 100 generally indicates that a fish is in average condition when compared to the national average for that species (Anderson and Gutreuter 1983). Fish collected with relative weights below 85 are underweight and may be an indication of too many fish for their food supply (Flickinger and Bulow 1993). Anderson and Neumann (1996) list the parameters for the W_r equations of many warmwater fish species, including the minimum length recommendations for their application. W_r values from this survey were compared to the national average (W_r=100) for each species.

Results

Species Composition

Twelve species were collected at Mesa Lake in October, 2012 (Table 2). Common Carp and Lake Whitefish made up the majority of the catch by weight. Of game fish, Walleye and Yellow Perch made up the bulk of the catch by weight. Yellow Perch, Largemouth Bass, and Bluegill were the most numerous species.

Table 2. Species composition by weight (kg) and number for all fish sampled at Mesa Lake (Franklin County) in October 2012.

	Species Composition					
	by Weight		by Number		Size Range (mm TL)	
Species	(kg)	(%)	(#)	(%)	Min	Max
Common Carp	40.95	33.11	23	2.32	132	628
Lake Whitefish	33.27	26.90	49	4.95	168	512
Walleye	20.90	16.89	30	3.03	80	683
Yellow Perch	16.16	13.06	642	64.85	66	385
Longnose Sucker	3.66	2.96	4	0.40	332	491
Largemouth Bass	3.24	2.62	151	15.25	63	268
Goldfish	2.12	1.71	20	2.02	98	372
Largescale Sucker	1.41	1.14	1	0.10	483	483
Bluegill	1.27	1.03	52	5.25	37	170
Black Crappie	0.39	0.32	2	0.20	153	279
Pumpkinseed Sunfish	0.26	0.21	11	1.11	98	113
Sculpin, General	0.07	0.05	5	0.51	78	113

Table 3. Species composition by weight (kg) and number for all fish, excluding young-of-the-year YOY, sampled at Mesa Lake (Franklin County) in October 2012.

	Species Composition					
	by Weight		by Number		Size Range (mm TL)	
Species	(kg)	(%)	(#)	(%)	Min	Max
Common Carp	40.95	34.06	23	3.35	132	628
Lake Whitefish	33.27	27.68	49	7.13	168	512
Walleye	20.56	17.10	10	1.46	241	683
Yellow Perch	13.83	11.50	453	65.94	118	385
Longnose Sucker	3.66	3.04	4	0.58	332	491
Largemouth Bass	2.45	2.04	63	9.17	100	268
Goldfish	2.12	1.76	20	2.91	98	372
Largescale Sucker	1.41	1.17	1	0.15	483	483
Bluegill	1.27	1.05	47	6.84	78	170
Black Crappie	0.39	0.33	2	0.29	153	279
Pumpkinseed Sunfish	0.26	0.21	11	1.60	98	113
Sculpin, General	0.06	0.05	4	0.58	103	113

Catch-per-Unit-Effort (CPUE)

Stock-length Yellow Perch were the game fish caught at the highest rate by boat electrofising, followed by Bluegill and Largemouth Bass (Table 4). Goldfish and Common Carp were also caught frequently by electrofishing. Lake Whitefish and Yellow Perch were caught at the highest rate by gill netting. Yellow Perch and Bluegill were caught at the highest rate by fyke netting. Several other species were caught at lower rates.

Table 4. Mean catch-per-unit-effort by sampling method, including 80% confidence intervals, for stock length fish sampled at Mesa Lake (Franklin County) in October 2012.

	Gear Type					
	Electrofishing		Gill Netting		Fyke Netting	
Species	(#/hour)	Sites	#/Net Night	Net Nights	#/Net Night	Net Nights
Yellow Perch	226 ± 68	3	10 ± 5	2	10 ± 12	2
Bluegill	48 ± 19	3	0	2	11 ± 3	2
Goldfish	40 ± 47	3	0	2	0	2
Common Carp	24 ± 12	3	2 ± 2	2	1 ± 1	2
Largemouth Bass	16 ± 17	3	0	2	0	2
Pumpkinseed Sunfish	10 ± 5	3	0	2	3 ± 1	2
Sculpin, General	6 ± 8	3	0	2	1 ± 1	2
Walleye	2 ± 3	3	4 ± 3	2	0	2
Longnose Sucker	2 ± 3	3	2 ± 1	2	0	2
Black Crappie	2 ± 3	3	0	2	1 ± 1	2
Lake Whitefish	0	3	25 ± 3	2	0	2
Largescale Sucker	0	3	1 ± 1	2	0	2

Proportional Size Distribution

Proportional Size Distribution indices were calculated and presented for species of which twenty or more stock length fish were captured (Table 5). Except for Yellow Perch sampled by boat electrofishing, sample sizes of stock length fish were low allowing for only limited interpretation. The values for Yellow Perch sampled by electrofishing were low compared to the higher values for perch sampled by gill netting, which is most likely an artifact of gear bias. The larger perch sampled by gill netting, which tend to be further offshore than can be effectively sampled by boat electrofishing are indicative of a population offering anglers an opportunity for quality Yellow Perch angling at the lake. The relatively low PSD values for Bluegill suggest few quality sized fish within the population.

Table 5. Proportional Size Distribution indices by sampling method, including 80% confidence intervals, for fish sampled from Mesa Lake (Franklin County) in October 2012.

Species	# Stock Length	PSD	PSD-P	PSD-M	PSD-T
		Electrofishing			
Bluegill	24	0	0	0	0
Yellow Perch	113	4 ± 2	1 ± 1	1 ± 1	1 ± 1
		Gill Netting			
Yellow Perch	20	85 ± 10	15 ± 10	5 ± 6	5 ± 6
		Fyke Netting			
Bluegill	22	5 ± 6	0	0	0

Largemouth Bass

Mesa Lake Largemouth Bass sampled ranged in length from 63 to 268 mm TL (Table 2; Figure 2). No bass of quality length (≥ 300 mm) or larger were sampled resulting in a PSD of 0 (Table 5). The Largemouth Bass sampled were aged at 0 and 1 year, with a resulting back-calculated length at age 1 of 99 mm TL. Largemouth Bass condition varied about the national 75th percentile (Figure 3).

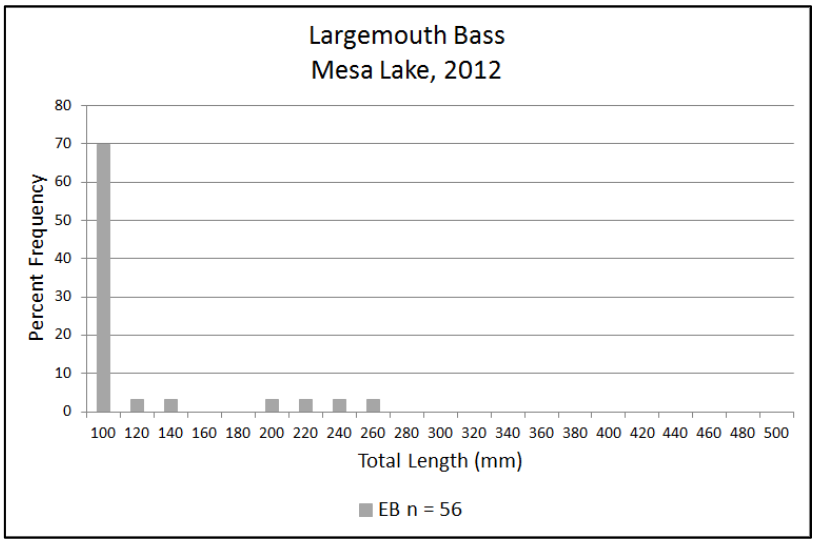

Figure 2. Length frequency distribution of Largemouth Bass sampled at Mesa Lake (Franklin County) in October 2012 by boat electrofishing (EB).

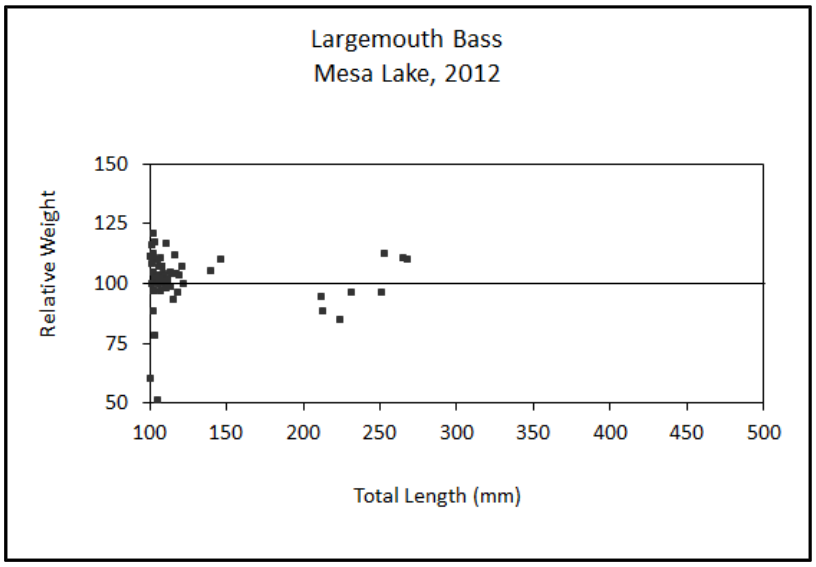

Figure 3. Relative weight (W_r) of Largemouth Bass sampled at Mesa Lake (Franklin County) in October 2012.

Bluegill

Mesa Lake Bluegill sampled ranged in length from 37 to 170 mm TL (Table 2; Figure 5). Bluegill PSD was below the preferred range (Table 5). The Bluegill sampled were aged from 0 to 2 years (Figure 4). Bluegill condition varied about the national 75th percentile (Figure 6).

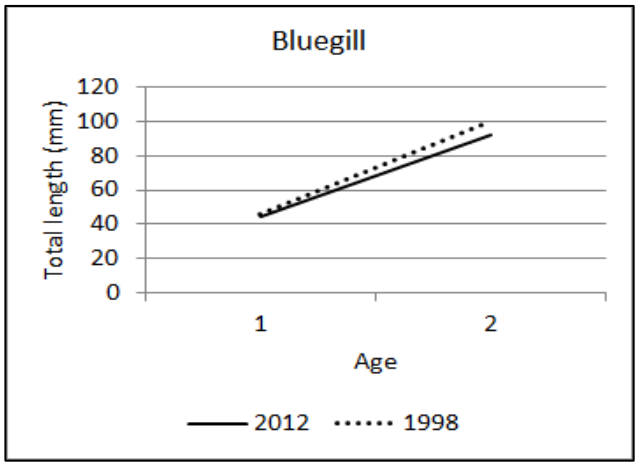

Figure 4. Lee's mean back-calculated length at age of Bluegill sampled at Mesa Lake (Franklin County) in October 2012.

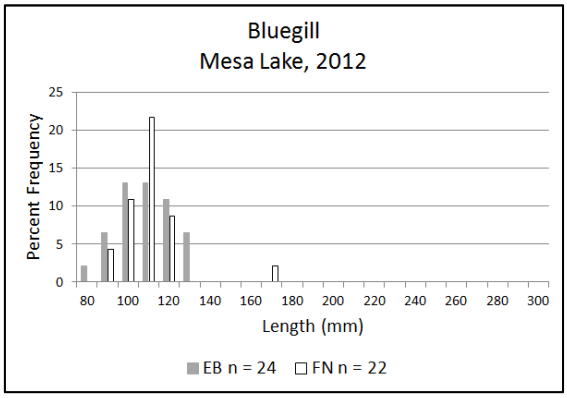

Figure 5. Length frequency distribution of Bluegill sampled at Mesa Lake (Franklin County) in October 2012 by boat electrofishing (EB) and fyke netting (FN).

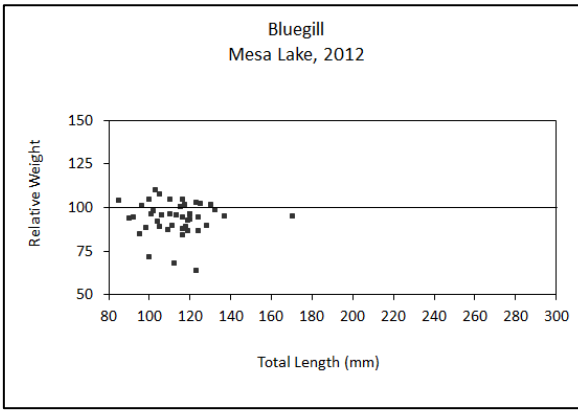

Figure 6. Relative weight (W_r) of Bluegill sampled at Mesa Lake (Franklin County) in October 2012.

Black Crappie

The two Black Crappie sampled at Mesa Lake in 2012 were 153 mm and 279 mm TL (Table 2). The larger of the two was aged at 4 years, with a Lee's back-calculated length at age of 235 mm TL (Figure 7). Black Crappie condition was slightly below the national 75th percentile (Figure 8).

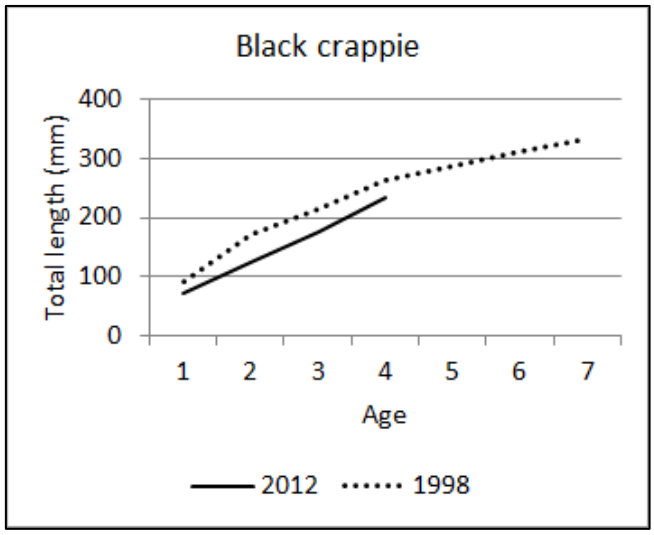

Figure 7. Lee's mean back-calculated length at age of Black Crappie sampled at Mesa Lake (Franklin County) in October 2012.

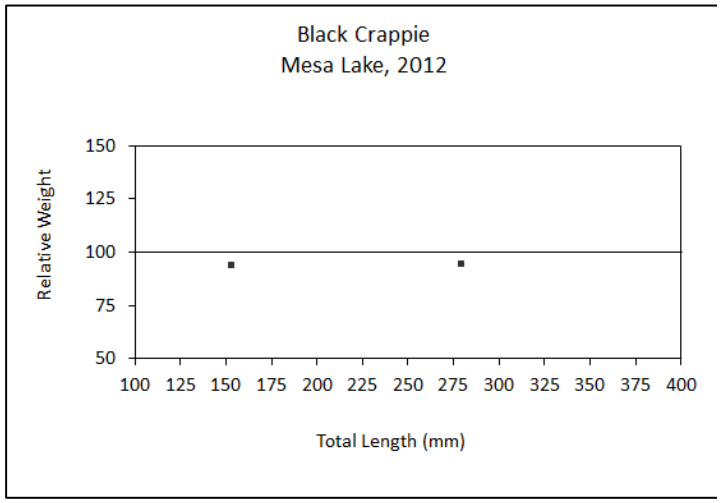

Figure 8. Relative weight (W_r) of Black Crappie sampled at Mesa Lake (Franklin County) in October 2012.

Pumpkinseed Sunfish

Mesa Lake Pumpkinseed Sunfish sampled ranged from 98 to 113 mm TL (Table 2). Pumpkinseed Sunfish sampled were aged at 1 year, with a Lee's mean back-calculated length at age 1 of 52 mm. Condition of Pumpkinseed Sunfish varied slightly around the national 75th percentile (Figure 9).

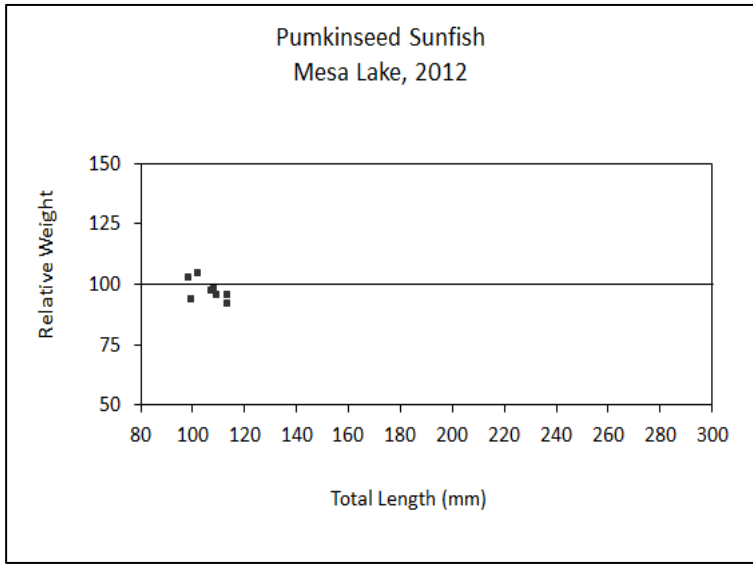

Figure 9. Relative weight (W_r) of Pumpkinseed Sunfish sampled at Mesa Lake (Franklin County) in October 2012.

Walleye

Mesa Lake Walleye sampled ranged in length from 80 to 683 mm TL (Table 2; Figure 10) and none were aged for this survey. Walleye condition varied about the national 75th percentile, with walleye greater than 500 mm TL exhibiting the highest condition (Figure 11).

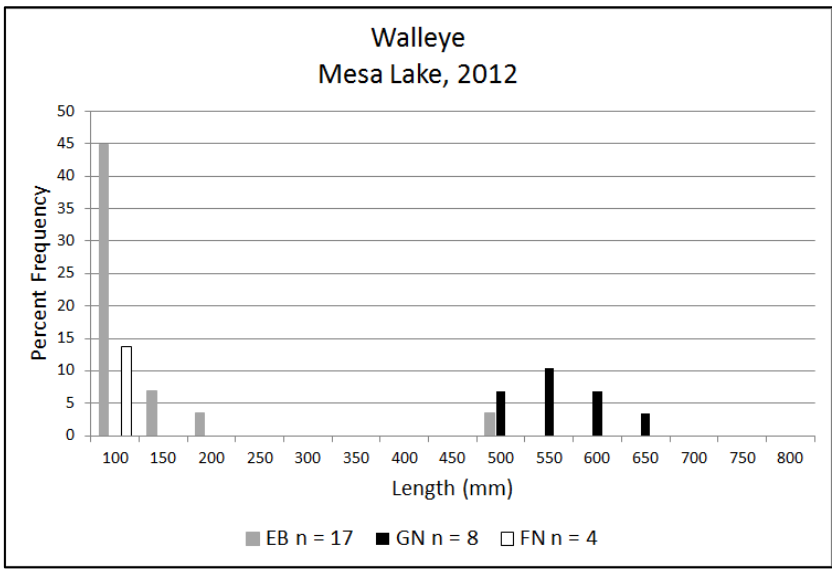

Figure 10. Length frequency distribution of Walleye sampled at Mesa Lake (Franklin County) in October 2012 by boat electrofishing (EB), gill netting (GN), and fyke netting (FN).

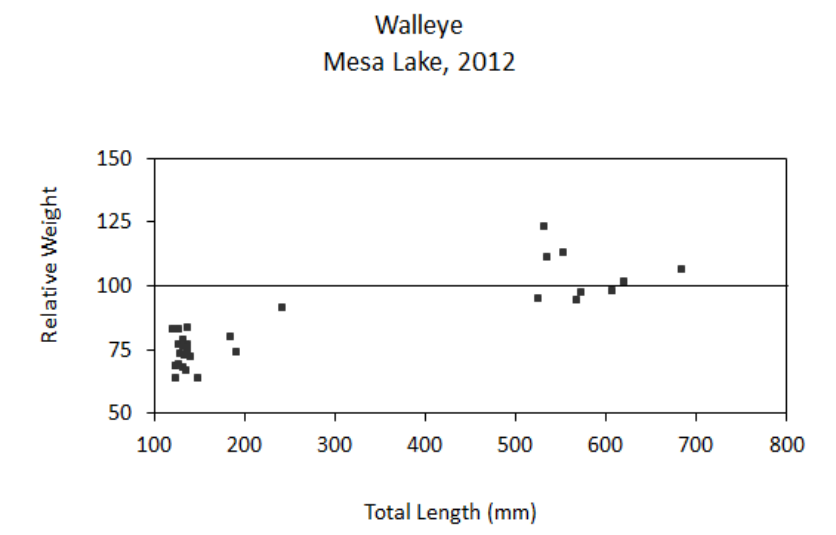

Figure 11. Relative weight (W_r) of Walleye sampled at Mesa Lake (Franklin County) in October 2012.

Yellow Perch

Mesa Lake Yellow Perch sampled ranged in length from 66 to 385 mm TL (Table 2; Figure 13). Yellow Perch PSD was below the preferred range (Table 5). Although the PSD of Yellow Perch sampled by boat electrofishing was low, that from gill netting was relatively high (Table 5). Additionally, a PSD-P value of 15, as well as PSD-M&T of 5, was observed in this survey. The Yellow Perch sampled were aged from 0 to 6 years, with a Lee's mean back-calculated length at age 6 of 374 mm TL (Figure 12). Yellow Perch condition was generally lower than the national 75th percentile (Figure 14).

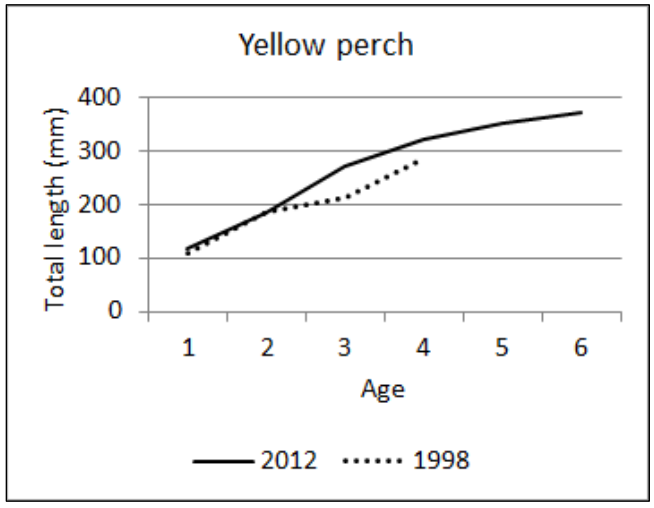

Figure 12. Lee's mean back-calculated length at age of Yellow Perch sampled at Mesa Lake (Franklin County) in October 2012.

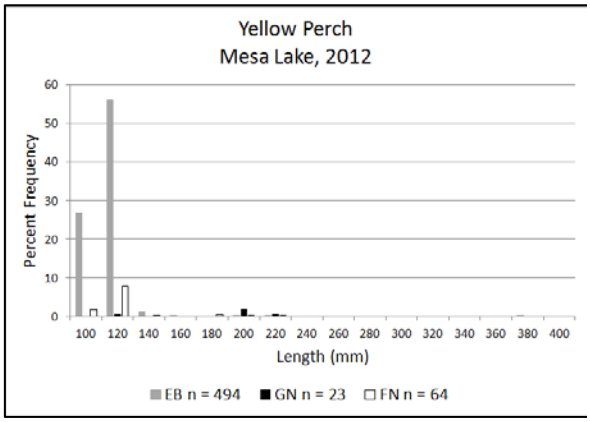

Figure 13. Length frequency distribution of Yellow Perch sampled at Mesa Lake (Franklin County) in October 2012 by boat electrofishing (EB), gill netting (GN), and fyke netting (FN).

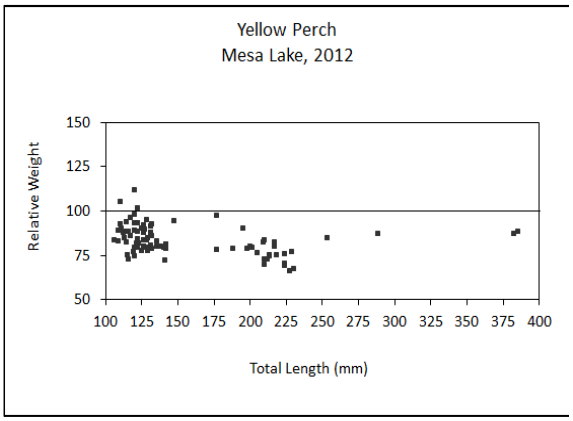

Figure 14. Relative weight (W_r) of Yellow Perch sampled at Mesa Lake (Franklin County) in October 2012.

Lake Whitefish

Mesa Lake Whitefish sampled ranged in length from 168 to 512 mm TL (Table 2; Figure 15) and none were aged for this survey.

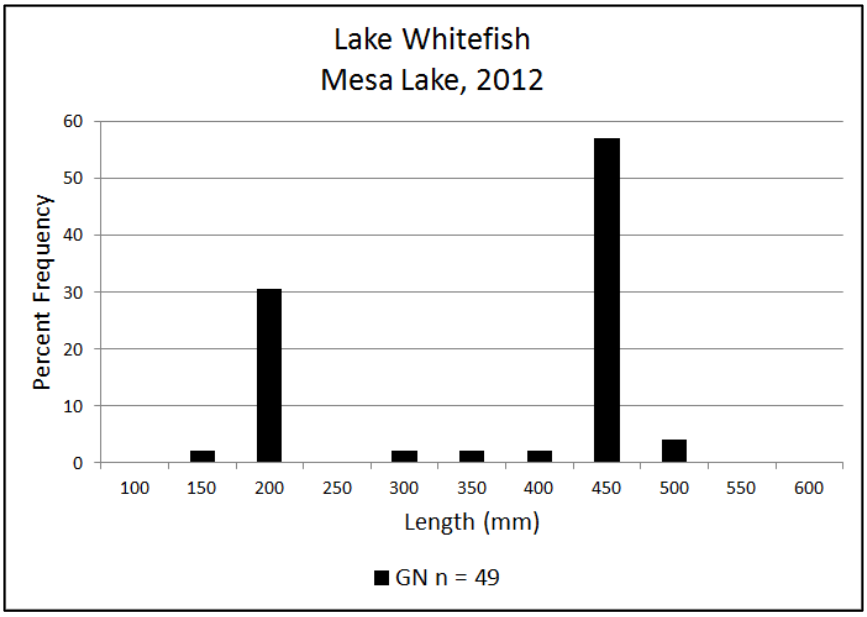

Figure 15. Length frequency distribution of Lake Whitefish sampled at Mesa Lake (Franklin County) in October 2012 by gill netting (GN).

Common Carp

Mesa Lake Common Carp sampled ranged in length from 132 to 628 mm TL (Table 2; Figure 16) and none were aged for this survey.

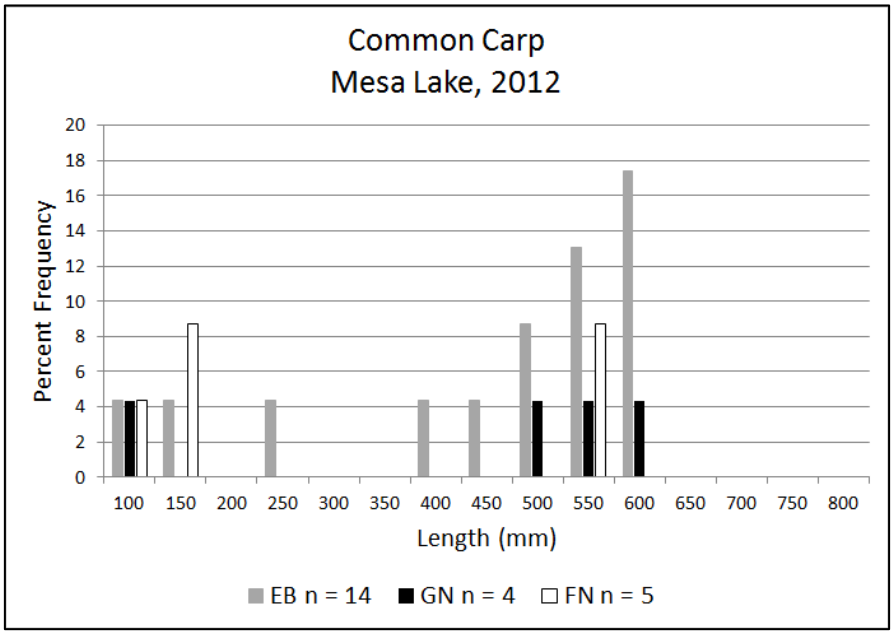

Figure 16. Length frequency distribution of Common Carp sampled at Mesa Lake (Franklin County) in October 2012 by boat electrofishing (EB), gill netting (GN), and fyke netting (FN).

Other Species

Other species sampled during this survey included Goldfish and Sculpin, as well as Longnose and Largescale Sucker.

Discussion

The fish community of Mesa Lake has changed little since it was last surveyed in August 1998. It's connectivity with the irrigation canal system continues to have a strong influence on the species present. A large proportion of the biomass in Mesa Lake is still comprised of Common Carp. Suckers, which made up the highest proportion of the biomass in 1998, were found to be less abundant in 2012. Similar to 1998, Walleye, Lake Whitefish and Yellow Perch were the most abundant game fish species by weight. Yellow Perch and Largemouth Bass were again the most numerous species. Although sampled at low rates in both surveys, Bluegill were more numerous in 2012, whereas Black Crappie were fewer.

Although sample sizes of stock length fish were generally low in 2012, Yellow Perch PSD and PSD-P calculated from both electrofishing and gill netting increased, indicating a higher quality population, which should improve angler chances of catching larger perch. Sample sizes of stock length fish of other species were too low for a meaningful comparison.

Largemouth Bass sampled were less than 12 inches in length and were small on average. No largemouth bass within the 12 to 17 inch protective slot were sampled in either the 1998 or 2012 survey, indicating little if any positive result from the implementation of the 2003 regulation change, which protects bass in the 12-inch to 17-inch range. In addition, the condition of the stock length bass sampled was lower in 2012. In general, Largemouth Bass offer only marginal opportunity for anglers at Mesa Lake.

Similar to Largemouth Bass, opportunities for quality Bluegill or Black Crappie at Mesa Lake continue to be minimal. Black Crappie of nice size were sampled, however, their numbers are likely low.

Walleye and Yellow Perch are two species in Mesa Lake that offer anglers an opportunity for quality sized fish. Several Walleye ranging in size from 500 mm (20 inches) to 683 mm (26 inches) were sampled from the lake. These adult fish exhibited good condition, which was at or above average. Yellow Perch were sampled up to 385 mm (15 inches), with many in the 200 mm (8 inch) to 229 mm (9 inch) range. For Yellow Perch, this size range is perfect for catching, filleting, and eating and we encourage the harvest of them.

Lake Whitefish also are available to anglers at Mesa Lake, with fish up to 500 mm (20 inches). Although these fish are large and known for their excellent table quality, particularly when smoked, they are often overlooked by anglers.

Fisheries management options at Mesa Lake are limited due to the openness of the lake to the irrigation system, which allows fish to move freely into and out of the lake. The management focus should be on the naturally reproducing warmwater fish species that occur in the system. At the present time, anglers should be encouraged to take advantage of the quality sized warmwater fish that inhabit this small lake, especially Walleye and Yellow Perch.

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