

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2014 Fisheries Management Survey Report

Meredith Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish Populations in Meredith Reservoir were surveyed in 2014 using trap netting and in 2015 using gill netting. Historical data are also presented for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Meredith Reservoir is an impoundment on the Canadian River 35 miles northeast of Amarillo, Texas. It was built in 1965 to provide municipal and industrial water. It experiences substantial water level fluctuations and covered approximately 1,718 acres during 2014-2015, down from an average 3,264 acres in 2010-2011. A record low of 26.14 feet ft maximum water depth (2,839.14 MSL) was documented on 8 July 2013. The first documented golden alga kill occurred 20 December, 2010 into March, 2011. An additional golden alga kill occurred in spring 2012. Angler and boat access was adequate but only one boat ramp was usable in 2012 due to low water. There were two handicap accessible fishing piers. Habitat was primarily silt and rock, with some non-native macrophytes.
- **Management History:** Important sport fish have included Walleye, White Bass, Smallmouth Bass, Largemouth Bass, White Crappie, and catfish. Walleye were managed with a two fish under 16 inches regulation to improve angler catch rates and size of fish caught. Smallmouth Bass were placed under a 12-15 inch slot limit in 1992 in an effort to increase the number of larger fish. Largemouth Bass, crappie, and catfish have been managed under statewide regulations.
- **Fish Community:**
 - **Prey species:** No Gizzard Shad have been collected in surveys in the past five years. Only one Bluegill was collected in the trap net survey in 2014.
 - **Catfishes:** The only game species found in the reservoir in the past three surveys was Channel Catfish. The population appears to be recovering.
- **Management Strategies:** Continue monitoring of sport fish populations to determine impact of low water levels and increased chlorides due to drought conditions, and monitor golden alga blooms. Conduct gill net surveys in 2017 and 2019, a trap net survey in 2016 and electrofishing in 2016 and 2018. Conduct a habitat survey in 2018 and recommend stocking when conditions improve.

INTRODUCTION

This document is a summary of fisheries data collected from Meredith Reservoir in 2014-2015. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2014-2015 data for comparison.

Reservoir Description

Meredith Reservoir is a 16,505-acre impoundment constructed in 1965 on the Canadian River by the U.S. Bureau of Reclamation. It is located in Hutchinson, Moore, and Potter Counties approximately 35 miles northeast of Amarillo and is operated and controlled by the Canadian River Municipal Water Authority. The land surrounding Meredith Reservoir is owned and operated by the US Department of the Interior, National Park Service as the Lake Meredith National Recreation Area and the Alibates Flint Quarries National Monument. Primary water uses included municipal water supply and recreation. Meredith Reservoir was mesotrophic with a mean TSI chl-a of 44.44 (Texas Commission on Environmental Quality 2011) an increase of 1.78 since 2008. The first documented golden alga fish kill began in December, 2010 and continued through March, 2011. An additional golden alga kill occurred in spring 2012. Habitat at time of sampling consisted of silt, rocks, and non-native submerged vegetation. Water level declined from 2000 to summer 2013 with a record low of 2,839.14 feet MSL (26.14 ft maximum depth) documented on 8 July 2013. Since 2013 there has been an increase in water level to 19 feet above the record low (Figure 1). Boat access consisted of one open public boat ramp. Six ramps were closed due to low water level. Other descriptive characteristics for Meredith Reservoir are in Table 1.

Angler Access

Meredith Reservoir has seven public boat ramps and no private boat ramps. Two of the public ramps have been unusable due to low water levels for over 20 years. Declining water levels have reduced available ramps to a single ramp located at Sanford-Yake Marina. Five ramps were extended as water levels declined, but no further extensions are planned at four ramps due to reduced slope and available water. Continued declines in water level will likely reduce the feasibility of extending the remaining usable ramp. Additional boat ramp characteristics are in Table 2. Shoreline access is available throughout the basin but is limited due to the distance from parking and the slope of the basin. There is a handicap accessible fishing dock located at Sanford-Yake.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Munger and Clayton 2013) included:

1. Drought conditions have dramatically changed available habitat in the reservoir and have increased chlorides. Map habitat while water levels are low and monitor the Channel Catfish population. Evaluate restocking.
 - Action:** Continued mapping of the reservoir basin by satellite imagery. Standard sampling has been conducted except for electrofishing due to high conductivity above 3,000 $\mu\text{s}/\text{cm}$. Possibility of restocking is evaluated on an ongoing basis.
2. Meredith Reservoir experienced its first bloom of golden alga in 2010. High chlorides and low water levels may increase the incidence of golden alga blooms. Strategies were to monitor the reservoir for repeat golden alga blooms and evaluate the impact of the bloom on sport fishes.
 - Action:** Quarterly monitoring of golden alga cell density and sampling of sport fish has continued.
3. Boater access may be limited by low water levels. The National Park Service is working to maintain access.
 - Action:** Maintained contact with the National Park Service concerning management of the reservoir.

4. Analysis of zebra mussel risk to Meredith Reservoir indicated it is at high risk due to location between infested reservoirs, environmental conditions and angler traffic between infested reservoirs in adjacent states and Texas. Current low water conditions and high chlorides have reduced the risk of infestation, but inflows could return the reservoir to high risk. Strategies were to continue monitoring for infestations and maintain communication with controlling authorities and the public concerning the risk of infestations.

Action: Conditions for zebra mussels have improved with increased water levels. We are continuing contacts with the National Park Service about monitoring and refining responses. Signs have been posted.

Harvest regulation history: Sport fishes in Meredith Reservoir are currently managed with statewide regulations with the exception of Smallmouth Bass (Table 3). From 1988 to 1992, Smallmouth Bass were managed with a 14-inch minimum length limit; a 12- to 15-inch slot length limit was implemented in 1992 to improve population size structure.

Stocking history: Meredith Reservoir has not been stocked since 2000 (Largemouth Bass and Walleye). Largemouth Bass have been stocked to supplement natural reproduction when the Young:Adult Ratio was <1 and water levels were sufficient to provide nursery habitat. Yellow Perch were experimentally stocked between 1980 and 1995 to provide an alternate forage species for Walleye and an additional sport fish for anglers. The complete stocking history is in Table 4.

Vegetation/habitat management history: The reservoir had a history of non-problematic Eurasian watermilfoil which was the primary aquatic vegetation, but it has yet to cause access issues. None has been detected in the reservoir during the past two habitat surveys. The Canadian River Municipal Water Authority and the National Park Service both have active salt cedar treatment programs. Since about 2004 approximately 30,000 acres of salt cedar have been treated in the watershed. Structural habitat information is presented in Table 5.

Water transfer: Meredith Reservoir is primarily used for municipal water supply and recreation. The reservoir supplies water to 11 member cities via a 358-mile aqueduct system. When functioning, the water system transfers water from the Canadian River Basin to the Brazos River Basin.

METHODS

Fishes were collected by gill netting (10 net nights at 10 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for gill and trap nets was recorded as the number of fish per net night (fish/nn). Surveys were conducted to achieve survey and sampling objectives in accordance with objective-based sampling plan presented in Appendix C. Electrofishing was not conducted due to conductivities over 3,000 $\mu\text{s}/\text{cm}$ caused by drought conditions. Trap net survey sites were biologist-selected. Gill net surveys were randomly selected. All surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2014). A structural habitat survey was conducted in 2013. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2014).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition [relative weight (W_r)] indices were calculated for target fishes according to Anderson and Neumann (1996). Standard error (SE) was calculated for structural indices and relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics. Source for water level data was the United States Geological Survey (USGS 2015).

RESULTS AND DISCUSSION

Habitat: A habitat survey was conducted in 2013 (Table 5). Littoral zone habitat consisted of silt and rocks. No aquatic vegetation was found in the reservoir.

Prey species: No Gizzard Shad have been collected by surveys in the past five years. Only one Bluegill was collected in trap netting in 2014.

Channel Catfish: The gill net catch rate of Channel Catfish was 3.1/nn in 2015 which was similar to the last two gill net surveys. The difference in this survey and the previous two was that this survey indicated more natural reproduction, more fish over 19 inches, and an increase in fish condition (Figure 2).

Objective based sampling: Target sampling was completed as planned for gill net and trap net surveys but was not accomplished for electrofishing due to high conductivities over 3,000 $\mu\text{s}/\text{cm}$.

Fisheries management plan for Meredith Reservoir, Texas

Prepared – July 2015.

ISSUE 1: Drought conditions have dramatically changed available habitat in the reservoir and have increased chlorides. A record low water level was set on 8 July 2013 at 26.14 ft maximum depth. Recent increases in water level have improved conditions at the reservoir that may allow for restocking. A management stocking of Gizzard Shad occurred during spring 2015.

MANAGEMENT STRATEGY

1. Continue monitoring of golden alga through fall 2015. If golden alga cell counts remain low consider stocking requests for 2016.

ISSUE 2: Meredith Reservoir experienced its first bloom of golden alga on 12/20/2010. The bloom continued through 3/23/2011 with a subsequent bloom in spring 2012. The blooms appear to have eliminated all major sport species except Channel Catfish. High chlorides and low water levels may increase the incidence of golden alga blooms.

MANAGEMENT STRATEGY

1. Conduct golden alga cell counts in fall, winter and spring to monitor for blooms.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state. Analysis of zebra mussel risk to Meredith Reservoir indicated it is at high risk due to location between infested reservoirs, environmental conditions, and angler traffic between infested reservoirs in adjacent states and Texas. Current low water conditions and high chlorides have reduced the risk of infestation, but inflows could return the reservoir to high risk.

MANAGEMENT STRATEGIES

1. Monitor reservoir water quality for conditions favorable to zebra mussels.
2. Continue work on the Meredith Zebra Mussel Response Plan with the National Park Service and the Canadian River Municipal Water Authority.
3. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
4. Educate the public about invasive species through the use of media and the internet.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes gill net surveys in 2017 and 2019 and trap net sampling in 2016. Electrofishing will be conducted in fall 2016 and 2018 if conductivity is below 3,000 $\mu\text{s}/\text{cm}$. Sampling with all gears is conducted in 2018/2019 (Table 6). Additional sampling information is presented in the objective based sampling plan below.

Objective-Based Sampling Plan for Meredith Reservoir **FY 2016-2019**

Reservoir Status/Disclaimer: Meredith Reservoir has been impacted by drought conditions since 2000 and annual golden alga blooms since 2010. At current water levels (5/5/15) the total area of Meredith

Reservoir is approximately 1,700 acres. The upper 1/3 of the basin has water levels too shallow to set gill nets or trap nets. The repeated golden alga kills have resulted in limited fisheries, but water levels are increasing and water quality is improving which could provide fisheries management opportunities.

Sport fish, forage fish, and other important fishes

Channel Catfish are the only known sport fish currently in Meredith Reservoir.

Negligible fisheries

Historically the reservoir had quality populations of **Walleye, Smallmouth Bass, White Bass, White Crappie, Flathead Catfish, and Largemouth Bass**. None of these species have been collected in surveys since 2011.

Survey objectives, fisheries metrics, and sampling objectives

Channel Catfish: Exploratory gill net sampling will be used to determine presence or absence of this species. Sampling effort for spring 2017 and 2019 will be 10 random gill net stations.

Walleye, Smallmouth Bass, White Bass, White Crappie, Largemouth Bass, and Bluegill: While these species do not have significant fisheries at this time, exploratory monitoring data will be collected while sampling for Channel Catfish with gill nets and should inform us of any large-scale changes to these populations that may require closer attention. Catch-per-unit-effort will be the measure of their presence, with no specific CPUE RSE required. Sampling effort will also include night electrofishing a minimum of 12 random 5-minute stations (2016 and 2018) if water quality improves enough to allow effective sampling (<3,000 $\mu\text{s}/\text{cm}$).

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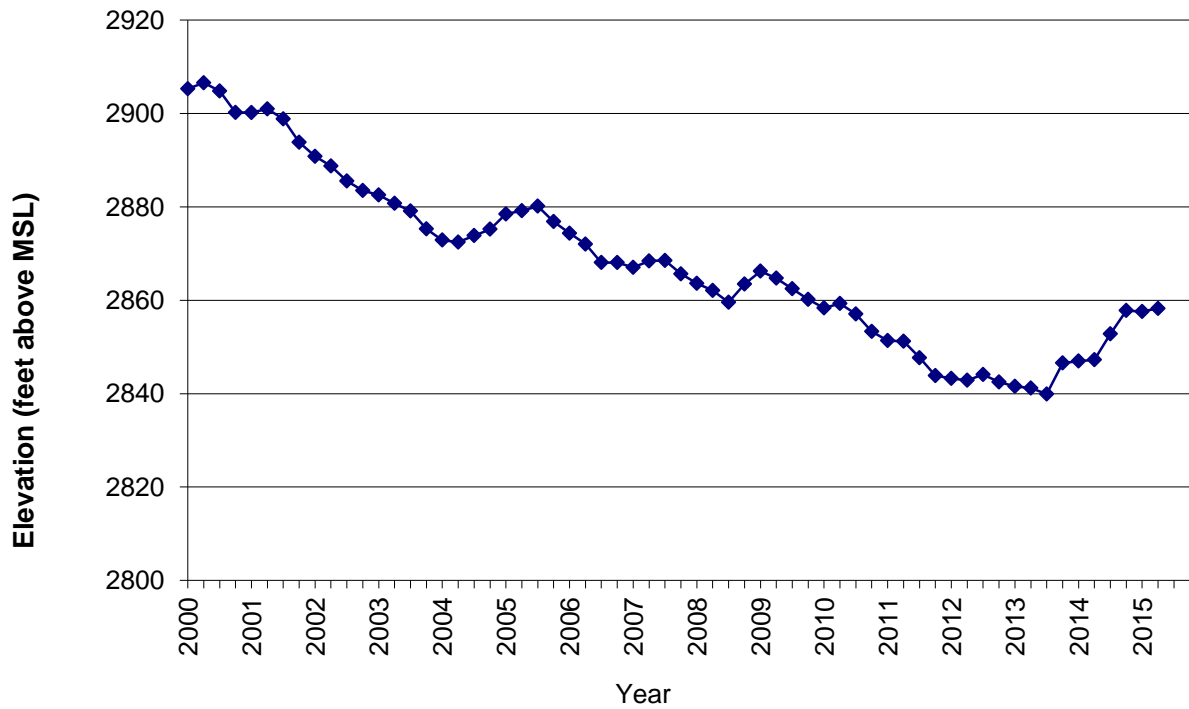


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Meredith Reservoir, Texas. Conservation pool is 2,936 ft MSL.

Table 1. Characteristics of Meredith Reservoir, Texas.

Characteristic	Description
Year constructed	1965
Controlling authority	Canadian River Municipal Water Authority
Counties	Hutchinson, Moore, Potter
Reservoir type	Mainstream
Shoreline Development Index (SDI)	1.72
Conductivity	6,540 μ hos/cm

Table 2. Boat ramp characteristics for Meredith Reservoir, Texas, August, 2014. Reservoir elevation at time of survey was 2,853 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Sanford-Yake	35.707534 -101.555136	Y	120	2,844	Usable with landing mat extension. Extension is feasible. 9 ft above water
Cedar Canyon	35.694990 -101.573509	Y	60	2,903	End of ramp (EOR) elevation is 50 ft above water. Extension is not feasible.
Fritch Fortress	35.688489 -101.592646	Y	80	2,863	EOR elevation is 10 ft above water. Extension is not feasible.
Harbor Bay	35.652362 -101.628718	Y	40	2,912	EOR elevation is 59 ft above water. Extension is not feasible
Blue West	35.68815 -101.63032	Y	50	2,895	EOR elevation is 42 ft above water. Extension is not feasible
Alibates	35.587616 -101.708155	Y	20	2,912	EOR elevation is 59 ft above water. Extension is not feasible
Plum Creek	35.597238 -101.713031	Y	20	2,915	EOR elevation is 62 ft above water. Extension is not feasible

Table 3. Harvest regulations for Meredith Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Smallmouth	5	12 – 15-inch slot limit
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum
Walleye	5	No more than 2 under 16

Table 4. Stocking history of Meredith Reservoir, Texas. Size Categories are: FRY = fry, FGL = fingerling, and ADL = adults.

Species	Year	Number	Size	Species	Year	Number	Size
Rainbow Trout	1973	50,000	ADL	Florida Largemouth Bass	1986	631	ADL
	1989	3,000	ADL		1990	401,749	FGL
	Total	53,000			1993	100,000	FGL
Brown Trout	1973	30,000	ADL		1997	177,000	FGL
	Total				Total	679,380	
Blue Catfish	1965	2,500	FGL	Kemp's Largemouth Bass	1988	412,727	FGL
	1966	9,000	FGL		1990	189	ADL
	1971	12,000	FGL		2001	32,000	FGL
	1972	30,000	FGL		Total	444,916	
	1988	160,500	FRY				
	Total	214,000					
Channel Catfish	1965	421,500	FGL	Mixed Largemouth Bass	1989	197	ADL
	1966	360,000	FGL		1990	40	ADL
	1970	9,680	FGL		Total	237	
	1971	12,000	FGL	Crappie	1994	308	ADL
	1973	107,690	FGL				
	Total	910,870		White Crappie	1966	50,000	FGL
Flathead Catfish	1966	15,000	FGL	1993	161	ADL	
	1966	18	ADL	Total	50,161		
	Total	15,018					
White Bass	1965	15	ADL	Black Crappie	1966	150,000	FGL
Smallmouth Bass	1974	11,100	FGL	Yellow Perch	1980	2,500	ADL
	1975	28,000	FGL		1981	2,500	ADL
	1976	66,000	FGL		1983	2,212	ADL
	1977	322,700	FGL		1984	400	ADL
	Total	427,800			1992	165,116	FGL
Largemouth Bass	1965	480,000	FGL		1995	30,381	FGL
	1966	432,000	FGL		Total	203,109	
	1973	88,000	Mix	Walleye	1965	500,000	FRY
	1983	553	ADL		1966	2,000,000	FRY
	1993	10,200	FGL		1969	750,000	FRY
	1994	160,400	FGL		1998	5,096,000	FRY
	1995	586,663	FGL		2000	290,196	FGL
	2000	20,370	FGL		Total	8,636,196	
	Total	1,778,186					

Table 5. Survey of structural habitat types, Meredith Reservoir, Texas, 2013. Shoreline habitat type units are in miles.

Habitat type	Estimate	% of total
Natural	6.1 miles	61.0
Rocky	3.9 miles	39.0

Channel Catfish

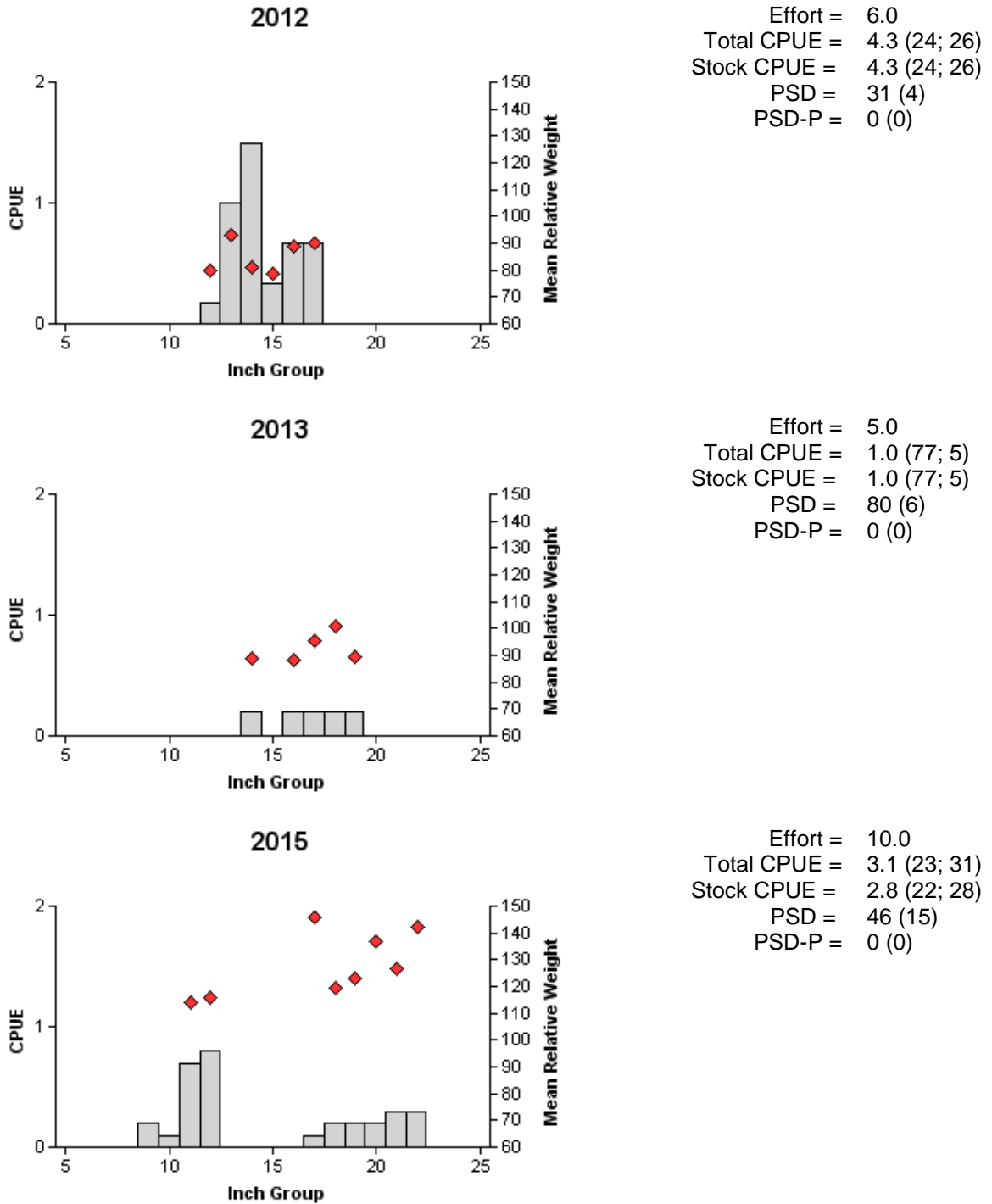


Figure 2. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Meredith Reservoir, Texas, 2012, 2013, and 2015.

Table 6. Proposed sampling schedule for Meredith Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard surveys are denoted by an S and additional surveys are denoted by an A. Electrofishing will only be conducted if conductivity decreases below 3,000 $\mu\text{s}/\text{cm}$. A full objective based sampling plan is presented in Appendix C.

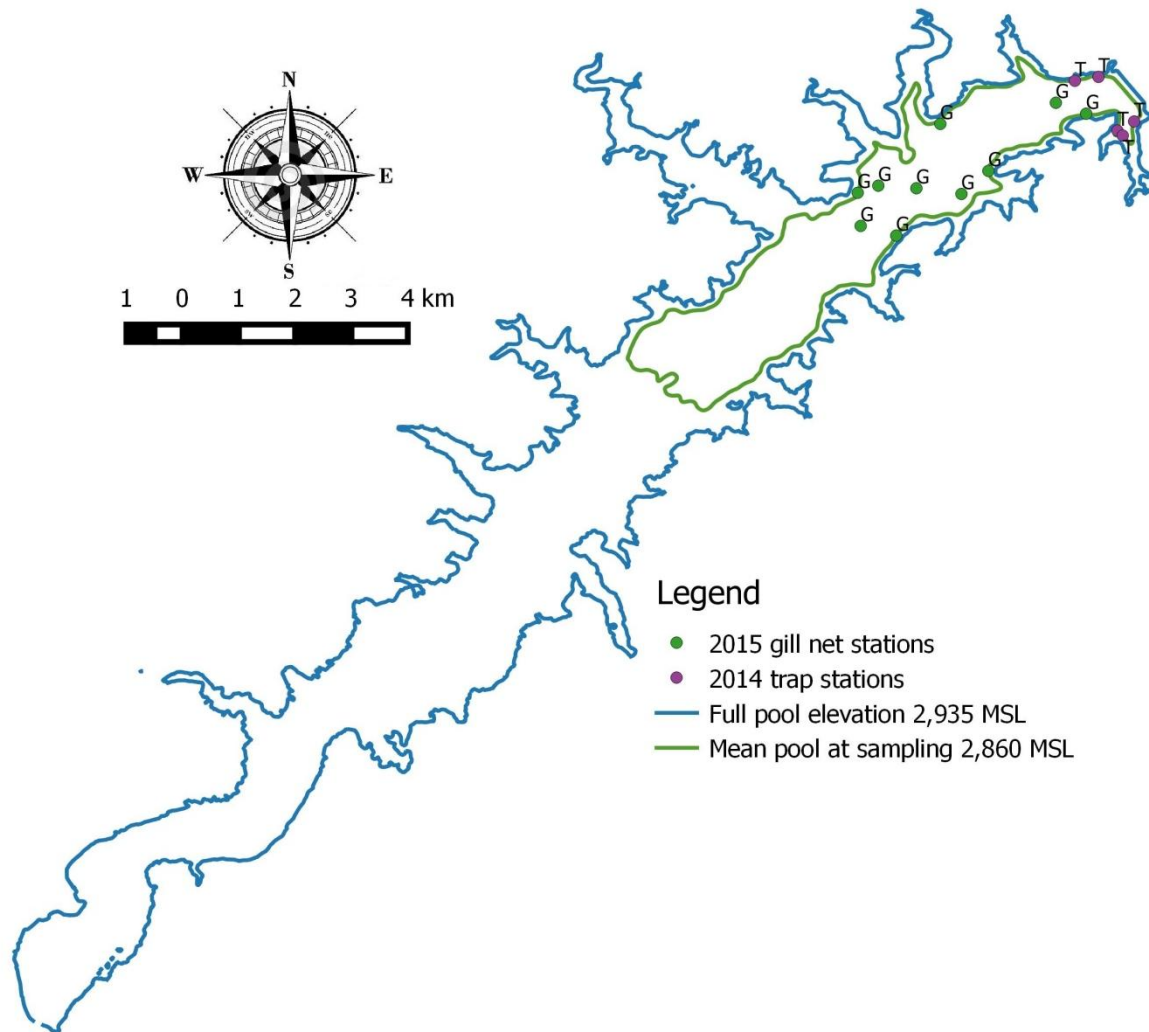
Survey year	Electrofishing	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2015- 2016								
2016- 2017	A	A	A					
2017- 2018								
2018- 2019	S		S	S	S	S		S

APPENDIX A

Catch rate (CPUE) and number (N) of all species collected from all gear types from Meredith Reservoir, Texas, 2014-2015. Effort was 10 net nights for gill nets, and 5 net nights for trap nets.

Species	Gillnet	N – Gillnet	Trap Net	N – Trap Net
Common Carp	15.30	153	0.20	1
River Carpsucker	3.10	31		
Black Bullhead	3.50	35		
Channel Catfish	3.10	31		
Fathead Minnow			1.00	5
Green Sunfish	3.50	35	0.60	3
Bluegill			0.20	1
Longear Sunfish			0.40	2

APPENDIX B



Location of sampling sites, Meredith Reservoir, Texas, 2014-2015. Trap net and gill net stations are indicated by T and G, respectively.

APPENDIX C

Objective-Based Sampling Plan for Meredith Reservoir

FY 2015

Reservoir Status/Disclaimer: Meredith Reservoir has been impacted by drought conditions since 2000 and annual golden alga blooms since 2010. At current water levels (8/25/14) the total area of Meredith Reservoir is approximately 3,700 acres. The upper 1/3 of the basin has water levels too shallow to set gill nets or trap nets. The repeated golden alga kills have resulted in limited fisheries, but water levels are increasing and water quality is improving which could provide fisheries management opportunities.

Sport fish, forage fish, and other important fishes

Channel catfish are the only known sport fish currently in Meredith Reservoir.

Negligible fisheries

Historically the reservoir had quality populations of **walleye, smallmouth bass, white bass, white crappie, flathead catfish, and largemouth bass**. None of these species have been sampled since 2011.

Survey objectives, fisheries metrics, and sampling objectives

Channel catfish: Exploratory gill net sampling will be used to determine presence or absence of this species. Sampling effort for spring 2015 will be 10 random gill net stations.

Walleye, smallmouth bass, white bass, white crappie, largemouth bass, and bluegill: While these species do not have significant fisheries at this time, exploratory monitoring data will be collected while sampling for channel catfish with gill nets and should inform us of any large-scale changes to these populations that may require closer attention. Catch-per-unit-effort will be the measure of their presence, with no specific CPUE RSE required. Sampling effort will also include electrofishing a minimum of 12 random 5-minute stations if conductivity drops below 3,000 $\mu\text{s}/\text{cm}$.