PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-2

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2016 Fisheries Management Survey Report

Pat Mayse Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Pat Mayse Reservoir were surveyed in 2016 using electrofishing and in 2017 using gill netting. Access and aquatic vegetation surveys were conducted in July 2016. Historical data are presented with the 2016-2017 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Pat Mayse Reservoir is a 5,940-acre impoundment located in Lamar County, Texas, on Sanders Creek, a tributary of the Red River. It was constructed by the U.S. Army Corps of Engineers in 1967 for flood control, and as a municipal and industrial water supply. Aquatic vegetation coverage was less than 1% of reservoir surface area and was composed of native emergent species. Although hydrilla has been reported in the past, none was observed during the summer 2016 vegetation survey.

- **Management History:** Largemouth bass, Channel Catfish, and White Bass provide the most important sport fisheries. A creel survey was last conducted at the reservoir in spring 1998 to 2000, which resulted in terminating the stocking of Palmetto Bass because of low directed effort. The fisheries management plan from the 2012 survey report recommended monitoring the Largemouth Bass population every four years through fall electrofishing and collecting samples to monitor genetic influence of FLMB and growth rate to the minimum length limit. The management plan also recommended continuing to monitor the reservoir's hydrilla coverage.

- **Fish Community**
  - **Prey species:** Clupeid (Threadfin and Gizzard Shad) and sunfish populations provide the major prey species for sport fish populations. Body conditions of Largemouth Bass, Channel Catfish and White Bass indicate availability of adequate prey fish populations.

  - **Catfishes:** The Channel Catfish population shows consistent recruitment to legal size, with most fish in gill net samples being of legal size. This quality fishery has the potential to be further exploited.

  - **Temperate basses:** White Bass populations have been subject to periodic fish kills and subsequent reductions in abundance. Recent sampling indicates decreased availability of White Bass to anglers.

  - **Black basses:** Catch rate of Largemouth Bass in the most recent sample has increased and the population is dominated by abundant fish below the minimum length limit. This increase is apparently the result of increased recruitment resulting from improvements in aquatic habitat caused by higher lake elevations. Catch rates of legal sized fish have also gradually increased. Spotted Bass are much less abundant that Largemouth Bass and none were collected in 2016.

  - **Crappie:** Although White Crappie and Black Crappie are present in the reservoir, no sampling was conducted for these species in 2016 due to low and variable catch rates in previous surveys.

- **Management Strategies:** Stock FLMB in 2018 and 2019, plant American water willow in several trial sites, and inform the public about the threats from aquatic invasive species.

INTRODUCTION

This document is a summary of fisheries data collected from Pat Mayse Reservoir in 2016 and 2017. 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 2016 and 2017 data for comparison.

Reservoir Description

Pat Mayse Reservoir is a 5,940-acre impoundment located in Lamar County, Texas, on Sanders Creek in the Red River basin. The reservoir is located approximately 13 miles north-northwest of Paris, Texas, and is operated and controlled by the U. S. Army Corps of Engineers (USACE). Primary water uses included flood control, municipal and industrial water supply, and recreation. Total aquatic vegetation coverage was less than 5% of reservoir area. Water elevation has increased since it reached a minimum of 5 ft below conservation pool elevation (CPE) in late 2013 and for the past two years the USACE has maintained an average elevation of one foot above CPE (Figure 1). Other descriptive characteristics for Pat Mayse Reservoir are presented in Table 1.

Angler Access

Pat Mayse Reservoir has nine boat ramps maintained by the USACE. Shoreline access is adequate within USACE recreation areas surrounding the reservoir. Access to the reservoir is good. Additional boat ramp characteristics are presented in Table 2.

Management History

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

1. Monitor Largemouth Bass abundance, condition, population size structure, growth rate, and genetic composition.
   Action: Pat Mayse Reservoir was sampled using electrofishing in fall 2016. Genetic analyses and age and growth assessments were conducted on samples obtained from the sampling. A habitat improvement project involving the introduction of American waterwillow from Lake Holbrook was suspended because of concerns about potential transfer of aquatic invasive species (AIS).
2. Promote the Channel Catfish fishery
   Action: Opportunities to encourage anglers to exploit the Channel Catfish fishery are ongoing.
3. Monitor hydrilla coverage in Pat Mayse Reservoir and recommend treatment to USACE if applicable.
   Action: No hydrilla was observed in vegetation surveys conducted in 2012 and 2016 so management action was unnecessary.
4. Research funding options to improve boat ramp access at locations impacted by drought-induced closures
   Action: This issue was not considered a priority given that temporary ramp closures in 2011 impacted a limited number of ramps and alternate locations were accessible. The USACE has maintained an average elevation of one foot above CPE for the past two years so boat access has not been impaired.

Harvest regulation history: All sport fishes in Pat Mayse Reservoir are currently managed with statewide harvest regulations (Table 3).

Stocking history: Florida Largemouth Bass (FLMB) were introduced in 1981, and were stocked in 1983, 1991, 1994, 2003, 2004, and 2011. Channel Catfish were introduced in 1967, and have developed a quality self-sustaining fishery. Stocking of Palmetto Bass was conducted periodically from 1973 to 1986, and annually from 1991 to 2000. Stocking of Palmetto Bass was discontinued after 2000 due to low directed fishing pressure. A complete stocking history is found in Table 4.

Habitat/vegetation management history: Although hydrilla has been documented in Pat Mayse Reservoir, it has not been observed in vegetation surveys since 2000. It has never negatively impacted boat and angler access so it has never required treatment.

Water transfer: The City of Paris, Texas, currently owns all water rights to Pat Mayse Reservoir, and operates the only raw water intake facility on the reservoir. Water pumped from the reservoir is transferred to the City's water treatment facility and used to supply residents of the City of Paris as well as industrial customers including Lamar County Water Supply District, Campbell Soup Corporation, Lamar Power Partners, and Direct Energy. Pat Mayse Reservoir is located on Sanders Creek, a tributary of the Red River, approximately four miles upstream of its confluence with the Red River. The reservoir's proximity to the Red River and the State of Oklahoma may increase its risk of infestation by AIS such as zebra mussels and Asian carp. The development of future water transfers and reuse scenarios from Lake Crook or Pine Creek may increase these risks.

METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Pat Mayse Reservoir (TPWD unpublished). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected and all surveys were conducted per the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing in fall 2016 (1.5 h at 18, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 14 randomly-selected fish (range 13.4 to 14.7 inches).

Gill netting – Channel Catfish and White Bass were collected by gill netting (10 net nights at 10 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

Genetics – Genetic analysis of Largemouth Bass was conducted per the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Micro-satellite DNA analysis was used to determine genetic composition of 30 individual fish collected in electrofishing in fall 2016.

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Habitat – An aquatic vegetation survey was performed per the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Shoreline distances and areas of vegetation were estimated using ESRI ArcGIS software.

Access survey – An access survey was conducted in July 2016 to characterize angler access.

Water level – Source for water elevation data was the USACE Tulsa District Water Control Home Page website.

RESULTS AND DISCUSSION

Habitat: An aquatic vegetation survey was conducted in August 2016. Water elevation at the time of the survey was 0.5 feet below CPE and total vegetation coverage was less than 1% of reservoir surface area. Aquatic vegetation consisted of the following native emergent species; giant cutgrass, buttonbush, giant bulrush and American waterwillow (Table 6). Although hydrilla has been documented in previous surveys (Storey and Jubar 2009), none was observed in the 2016 survey. Structural habitat in 2012 consisted primarily of natural shoreline (97%) and rock shore (3%) with standing timber being found adjacent to 28% of total shoreline distance (Bennett and Storey 2013).

Prey species: Primary prey species included Gizzard Shad, Threadfin Shad, and Bluegill. Electrofishing CPUE of Gizzard Shad in 2016 (216.7/h) was higher than in previous years and their availability as prey (IOV=89%) was also improved (Figure 2). The catch rate of Threadfin Shad in 2016 (60/7/h) was also higher than in 2012 (36.0/h) (Bennett and Storey 2013). Bluegill were the most abundant sunfish species (Appendix A) although electrofishing CPUE in 2016 (195.3/h) was lower than in previous years (Figure 3). Average relative weights of most size classes of game fishes exceeded 90 indicating an ample supply of prey fish populations in Pat Mayse Reservoir.

Channel Catfish: The abundance of Channel Catfish in Pat Mayse Reservoir remains consistent. Gill net CPUEs (7.2/nn, 8.4nn, and 7.3/nn in 2009, 2013, and 2017, respectively) and population characteristics remained stable between survey years (Figure 4). The Channel Catfish population continues to be dominated by legal-sized fish.

White Bass: White Bass CPUE in gill netting in 2017 (1.8/nn) was lower than in 2013 (10.7/nn) or 2009 (3.3/nn) but similar to the abundance observed in 2007 (1.6/nn), two years after an extensive White Bass fish kill (Storey and Jubar 2009). Although the White Bass population has a history of periodic species-specific fish kills (Storey and Jubar 2009), there have been no documented events in recent history to explain the depressed population level. Neither sampling objectives nor an age and growth sample were obtained because of low catches of White Bass in gill netting.

Black basses: Electrofishing CPUE of Largemouth Bass in 2016 (107.3/h) was higher than in 2008 (71.3/h) and 2012 (66.0/h). The 2016 survey was dominated by fish less than 10 inches in length, the result of strong cohorts from 2015 and 2016. As lake elevations have increased following the prolonged drought (Figure 1), this has encouraged the growth of terrestrial and aquatic plants. This improvement in littoral habitat has increased recruitment and survival leading to increased abundance of these year classes. The abundance of fish of legal length, CPUE-14, has increased gradually over the review period. Largemouth Bass grew rapidly in Pat Mayse Reservoir reaching an average length of 14.2 inches (13.4 to 14.7 inches) by fall of their second year of life (Average age class 1.1, N = 14; range = 1 – 2 years). Although the FLMB allele frequency (38%) has increased since 2012 (30%), the population sample was dominated by hybrids between FLMB and NLMB with more than half their alleles derived from the NLMB lineage, an indication the population could benefit from additional stockings of FLMB. Two fish in the 30-fish sample were pure NLMB.

No Spotted Bass were observed in 2016, although they have been collected in previous surveys at low abundances (Bennett and Storey 2013).

Crappie: White and Black Crappie are present in Pat Mayse Reservoir, and anecdotal accounts verify the existence of a fishery (personal communication Lamar County Game Warden, Bryan Callihan). Trap net sampling was not conducted in 2012 or 2016 due to low catch rates in previous surveys.

Fisheries management plan for Pat Mayse Reservoir, Texas

Prepared – July 2017

ISSUE 1: The lake record Largemouth Bass in Pat Mayse Reservoir, 14.1 lbs, was set in 1994. This fishery is popular and is a venue for numerous fishing tournaments where fish over 7 lbs are weighed in. The largest fish weighed in during the Brannan's Bass Shop Customer Appreciation Tournament included three fish over 7 lbs in 2017 (7.03, 7.06 and 7.33 lbs) and three fish over 7 lbs in 2016 (7.02, 7.11 and 7.13 lbs). Other fish over 7 lbs caught in 2017 spring tournaments included 8.30, and 7.32 lb entries in March and 7.27, 7.31, 7.33, and 7.47 lb fish in April. In addition, the following fish were caught in March by general anglers; 7.21, 8.34, 8.5 and 9.18 lb. At the Uncle Jesse's Memorial Big Bass Classic two fish over 8 lbs were weighed in 2012 (8.51 and 8.42 lbs) and a 9.85 lb fish in 2010. The lake was stocked with FLMB in 2011, the first time since 2004. The FLMB allele frequency increased from 30% to 38% between 2012 and 2016. Pat Mayse Reservoir has documented big-fish potential but needs higher FLMB alleles to enhance big-fish opportunities.

MANAGEMENT STRATEGIES

1. Request stockings of FLMB (1,000/km) in 2018 and 2019.

ISSUE 2 Aquatic vegetation in Pat Mayse Reservoir is limited (<1% reservoir surface area) and confined to native emergent species (dominated by giant cutgrass). Vegetation is confined to narrow shoreline bands which tend to become exposed with minor declines in reservoir elevation. Introduction of native emergent species in deeper water as a long-term strategy has the potential to improve recruitment of sport fishes, as well as increase angling success. Efforts on other reservoirs within Tyler North District to establish native vegetation have proven successful, and these techniques should be applied in Pat Mayse Reservoir.

MANAGEMENT STRATEGIES

1. Initial efforts will involve the use of American waterwillow which will be transplanted from other District reservoirs. This species is present in limited distribution in Pat Mayse Reservoir but it colonizes readily, can be planted in water 3 to 4 feet deep, and is resistant to herbivory. Conduct trials in 3 or 4 sites sheltered from exposure. If efforts to establish colonies are successful, additional sites will be selected in subsequent years.

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 can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant salvinia and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. 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.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at reservoir's access points.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc. so that they can in turn educate their customers.
3. Educate the public about invasive species using media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

Pat Mayse Reservoir Objective-Based Sampling Plan and Schedule for 2017-2021

Sport fish, forage fish, and other important fishes

Sport fishes in Pat Mayse Reservoir include Largemouth Bass, White Bass, Channel Catfish, crappie, and sunfish. Shad and sunfish are the primary prey species for sport fishes.

Low-density fisheries

Crappie: Both White and Black Crappie are present in Pat Mayse Reservoir, although White Crappie are usually more abundant. CPUE of the combined species from single-cod, shoreline trap netting surveys in 1997, 2000, 2002, 2004, and 2008 were 3.7/nn, 0.6/nn, 17.4/nn, 3.7/nn, and 1.3/nn respectively. This sampling method was discontinued after 2008 because catches were generally insufficient to assess the fishery. As an alternative, tandem hoop nets will be deployed to assess this gear as an alternative to collect data on crappie populations in spring 2021. A minimum sampling effort of 10 hoop net series will be employed to assess abundance, size structure, and condition of crappie populations. This is exploratory sampling and no specific sampling objective are yet necessary.

Spotted Bass: Spotted Bass are present in low abundance in Pat Mayse Reservoir. CPUE from electrofishing surveys in 2000, and 2012 were 2.0/h, and 4.7/h respectively. No fish were collected in surveys in 2002, 2004, 2008, and 2016. Anecdotal information suggests this species is caught primarily in the lower section of the reservoir and they are periodically included in tournament weigh-ins. This species does not provide a significant fishery and any fish observed in future standard electrofishing surveys will be measured and recorded.

Survey objectives, fisheries metrics, and sampling objectives

Channel Catfish: Gill net CPUE of Channel Catfish from surveys conducted in 2003, 2005, 2007, 2009, 2013, and 2017 were 4.8/nn, 3.1/nn, 8.3/nn, 7.2/nn, 8.4/nn, and 7.3/nn respectively. Analysis of the data from the three most recent gill net surveys predicts a sample of 50 stock-sized Channel Catfish can be obtained at the 80th percentile by sampling 10 stations, yielding an RSE $\leq$ 25 at the 80th percentile. A minimum effort of 10 gill nets set at randomly-selected sites in spring will be conducted and an additional five random stations will also be generated in the event additional sampling is required to meet OBS plan objectives for Channel Catfish in spring 2021. Otoliths from 13 fish between 11.0 and 12.9 inches will be collected in 2021 to determine mean age at 12 inches to monitor large-scale changes in growth that may indicate the need for further investigation.

White Bass: Gill net CPUE of White Bass from surveys conducted in 2003, 2005, 2007, 2009, 2013 and 2017 were 7.6/nn, 10.5/nn, 1.6/nn, 3.3/nn, 10.7/nn and 1.8/nn respectively. This population has a documented history of periodic fish kills, explaining some of the variability in catch rates. Analysis of the data from the surveys in 2005, 2009, and 2013 predicted sampling between 10 – 20 gill net stations would be sufficient to obtain a sample of 50 stock-sized White Bass at the 80th percentile and an RSE $\leq$ 25 at the 80th percentile could be obtained by sampling 15 stations. However, the most recent survey collected few White Bass and data analysis predicts collecting a sample of 50 stock-sized fish would require an effort of 35 net nights at the 80th percentile and this would also yield an RSE $\leq$ 25 at the 80th percentile. This sampling effort is considered excessive so no sampling objectives will be set nor will any additional sampling effort beyond that needed to obtain sampling objectives for Channel Catfish be expended. However, the survey objective is to monitor for large-scale changes in relative abundance (CPUE) and size structure (PSD).

Largemouth Bass: Pat Mayse Reservoir supports a low to moderately abundant Largemouth Bass population managed using a 14-inch minimum-length limit. The population sample is dominated by second or higher generation hybrids between FLMB and NLMB with most of those fish having higher percentages of NLMB alleles as compared with FLMB alleles.

Sampling on the Pat Mayse Reservoir's Largemouth Bass fishery will be to monitor general trend data (every four years) on relative abundance, size structure, body condition, and growth. These data will allow for determination of any large-scale changes in the Largemouth Bass population that may initiate further investigation. Analysis of the data from the most recent electrofishing survey, 2016, predicts a sample of 50 stock-sized Largemouth Bass can be obtained at the 80th percentile by sampling 17 stations yielding an RSE $\leq$25. However, data analysis of the two previous surveys, 2008 and 2012, indicated a much higher effort of between 24 and 30 stations to collect a sample of 50 stock-sized fish with an RSE $\leq$ 30 at the 80th percentile. A minimum effort of 18 randomly-selected nighttime electrofishing stations will be sampled and an additional six random stations will also be generated in the event additional sampling is required to meet sampling objectives (CPUE RSE<25 and 50 stock-length fish for PSD) for Largemouth Bass in fall 2020. To document long-term changes in growth of Largemouth Bass a sample of 13 fish (13. 0 to 14. 9 inches) will be processed to calculate average age at minimum length limit in fall 2020.

Sunfish and other prey species: Gizzard Shad, Bluegill, and Threadfin Shad are the primary prey species in Pat Mayse Reservoir. Long-term monitoring trend data is desired for these populations to evaluate their relative abundance (CPUE) and size structure (PSD; IOV). Relative weights of the Largemouth Bass population, along with relative abundance (CPUE) of other sunfish and Threadfin Shad, will also be used to gauge prey fish availability for sport fishes. No additional sampling effort beyond that needed to obtain sampling objectives for Largemouth Bass will be expended for prey species.

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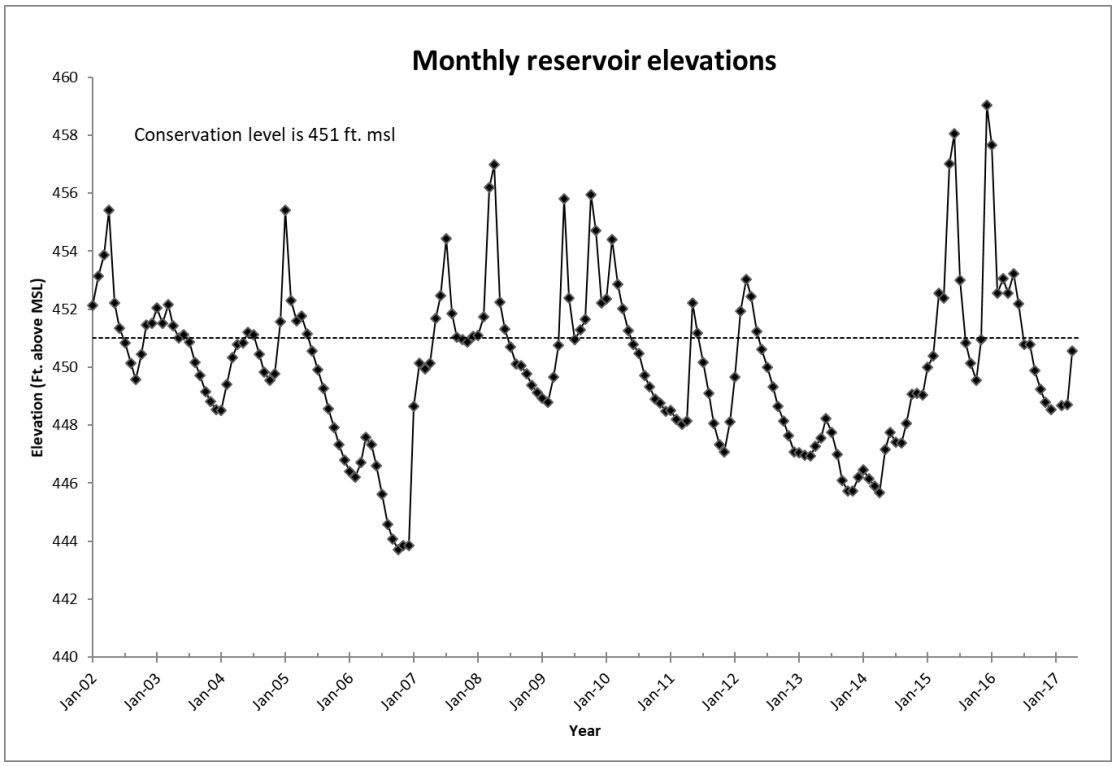


Figure 1. Average monthly reservoir elevations in feet above mean sea level (ft. msl) recorded for Pat Mayse Reservoir, Texas.

Table 1. Characteristics of Pat Mayse Reservoir, Texas.

Characteristic	Description
Year constructed	1967
Controlling authority	U. S. Army Corps of Engineers
County	Lamar
Reservoir type	Water Supply
Shoreline Development Index (SDI)	1.9
Conductivity	280 uS/cm

Table 2. Boat ramp characteristics for Pat Mayse Reservoir, Texas, July 2016. Reservoir elevation at time of survey was at conservation pool elevation.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft. msl)	Condition
CR 34950	33.836445 -95.545683	Y	Campers only	446. 5	No public parking area
Lamar Point	33.827800 -95.628676	Y	24	447.0	No access issues
PM East Recreation Area Loop B-A	33.840081 -95.592307	Y	10	446.5	No access issues
PM East Recreation Area East Park Rd.	33.838110 -95.583670	Y	17	444.5	No access issues
PM West Recreation Loop A	33.841614 -95.609577	Y	15	444.0	Access to camping area, Fishing pier close to ramp
PM West Recreation Loop Calle	33.840855 -95.600375	Y	Campers only	446.5	No public parking area
Red Bluff	33.817027 -95.650853	Y	12	444.5	Unpaved surface on access road and parking area
Sanders Cove A	33.844271 -95.542731	Y	38	445.5	Courtesy docks on either side of ramp. No access issues
Sanders Cove B	33.841093 -95.542240	Y	14	445.5	Courtesy dock next to ramp. No access issues No access issues

Table 3. Harvest regulations for Pat Mayse Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Palmetto	5	18-inch minimum
Bass, Largemouth	5[a]	14-inch minimum
Bass, Spotted	5[a]	None
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

[a]Daily bag limit for Largemouth Bass and Spotted Bass = 5 fish in any combination

Table 4. Stocking history of Pat Mayse Reservoir, Texas. FGL = fingerling; ADL = adults.

Year	Number	Size
	Threadfin Shad	
1986	1,000	ADL
Species total	1,000	
	Channel Catfish	
1967	162,400	FGL
Species total	162,400	
	Palmetto Bass	
1973	46,303	FGL
1974	60,000	FGL
1975	59,773	FGL
1976	60,000	FGL
1979	30,000	FGL
1982	63,000	FGL
1986	89,495	FGL
1991	95,000	FGL
1992	98,700	FGL
1993	49,284	FGL
1994	89,758	FGL
1995	121,525	FGL
1996	42,801	FGL
1997	42,175	FGL
1998	42,200	FGL
1999	21,084	FGL
2000	42,027	FGL
Species total	1,053,125	
	Largemouth Bass	
1967	505,000	FGL
1968	901,000	FGL
Species total	1,406,000	
	Florida Largemouth Bass	
1981	7,980	FGL
1983	289,375	FGL
1991	289,390	FGL
1994	301,790	FGL
2003	298,658	FGL
2004	147,910	FGL
2011	298,130	FGL
Species total	1,633,233	

Table 5. Objective-based sampling plan components for Pat Mayse Reservoir, Texas for 2016 – 2017.

Gear/ target species	Survey objective	Metrics	Sampling objective
Electrofishing – Fall 2016			
(Effort =12 – 18 stations)	*Monitor trend in:*		
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 30
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	N = 30, any age
	Age-and-growth	Age at 14 inches	N = 13, 13. 0 – 14. 9 inches
Bluegill [a]	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	N ≥ 150 total
Gizzard Shad	Size structure	PSD, length frequency	
	Prey availability	IOV	
Gill netting 2017			
(Minimum effort = 10nn)	*Monitor trend in:*		
Channel Catfish	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N = 50
	Age-and-growth	Age at 12 inches	N = 13, 11.0 – 12.9 in
	Monitor trend in:		
White Bass	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N = 50
	Age-and-growth	Age at 12 inches	N = 13, 9.0 – 10.9 in

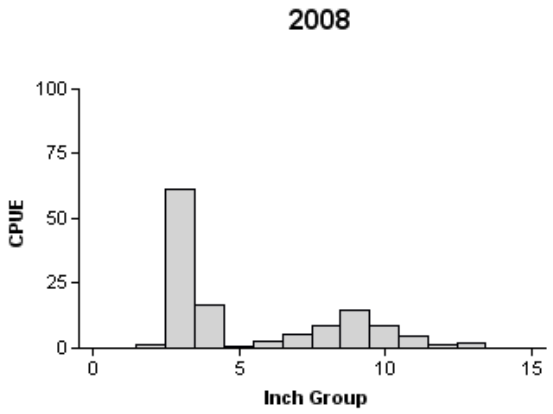
[a] No sampling objectives have been set for prey species so no additional sampling effort beyond that designated for Largemouth Bass will be conducted. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

Table 6. Survey of aquatic vegetation, Pat Mayse Reservoir, Texas, 2012, and 2016. Surface area (acres) is listed with percent of total reservoir surface area in parentheses. Water elevation at the time of the survey in August 2016 was 0. 53 feet below cpe. Individual native species observed during surveys are listed in footnotes.

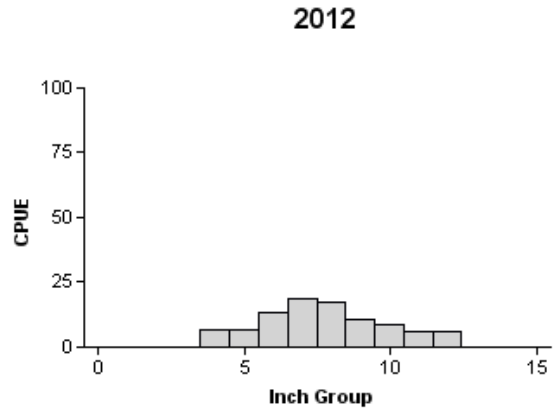
Vegetation	2012	2016
Native emergent	38. 0 (0.7)[1]	33.7 (0.6)[3]
Native submersed	187. 3 (3.5)[2]	
Total	225. 3 (4.2)	33.7 (0.6)

[1] *American lotus, giant bulrush, giant cutgrass*
[2] *Muskgrass*
[3] *Buttonbush, giant bulrush, giant cutgrass, waterwillow*

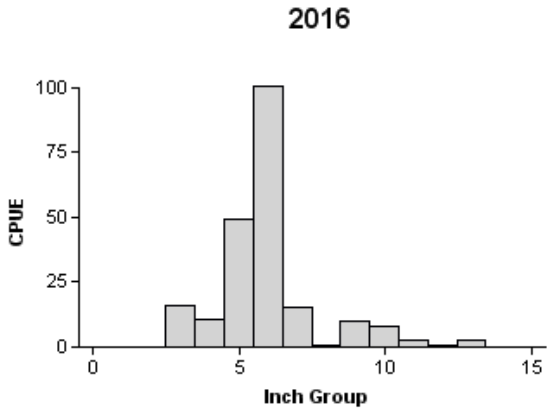
Gizzard Shad



Effort = 1.5
Total CPUE = 128.0 (27; 192)
Stock CPUE = 45.3 (34; 68)
IOV = 69 (8)



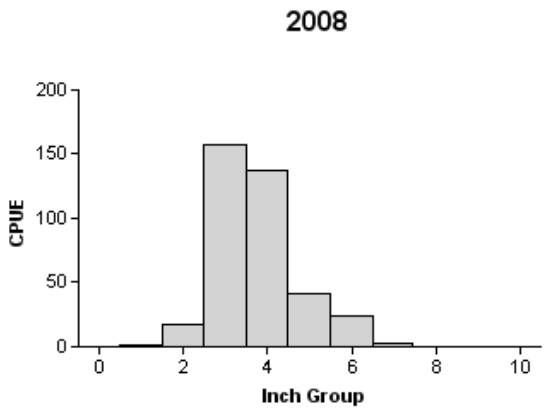
Effort = 1.5
Total CPUE = 94.0 (17; 141)
Stock CPUE = 67.3 (16; 101)
IOV = 48 (8)



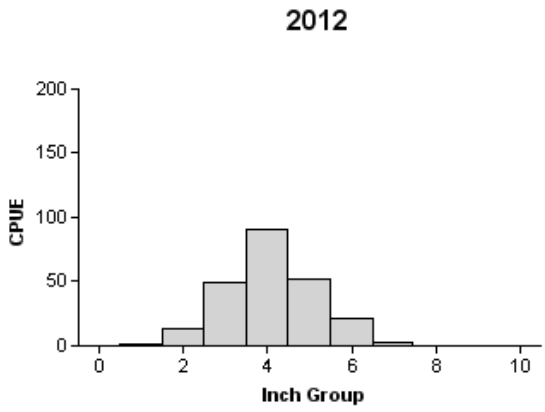
Effort = 1.5
Total CPUE = 216.7 (16; 325)
Stock CPUE = 40.0 (34; 60)
IOV = 89 (4)

Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Pat Mayse Reservoir, Texas, 2008, 2012, and 2016.

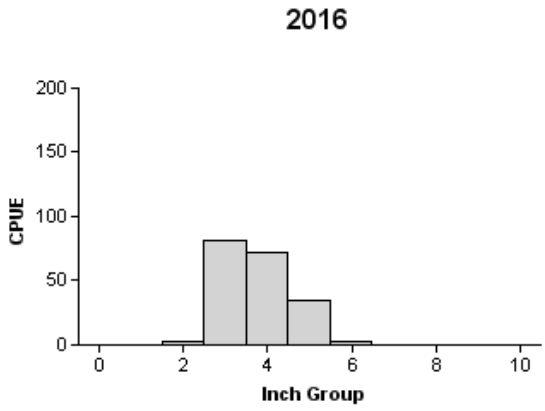
Bluegill



Effort = 1.5
Total CPUE = 383.3 (14; 575)
Stock CPUE = 363.3 (14; 545)
PSD = 8 (2)



Effort = 1.5
Total CPUE = 232.0 (19; 348)
Stock CPUE = 216.7 (20; 325)
PSD = 11 (2)



Effort = 1.5
Total CPUE = 195.3 (14; 293)
Stock CPUE = 192.0 (14; 288)
PSD = 2 (1)

Figure 3. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Pat Mayse Reservoir, Texas, 2008, 2012, and 2016.

Channel Catfish

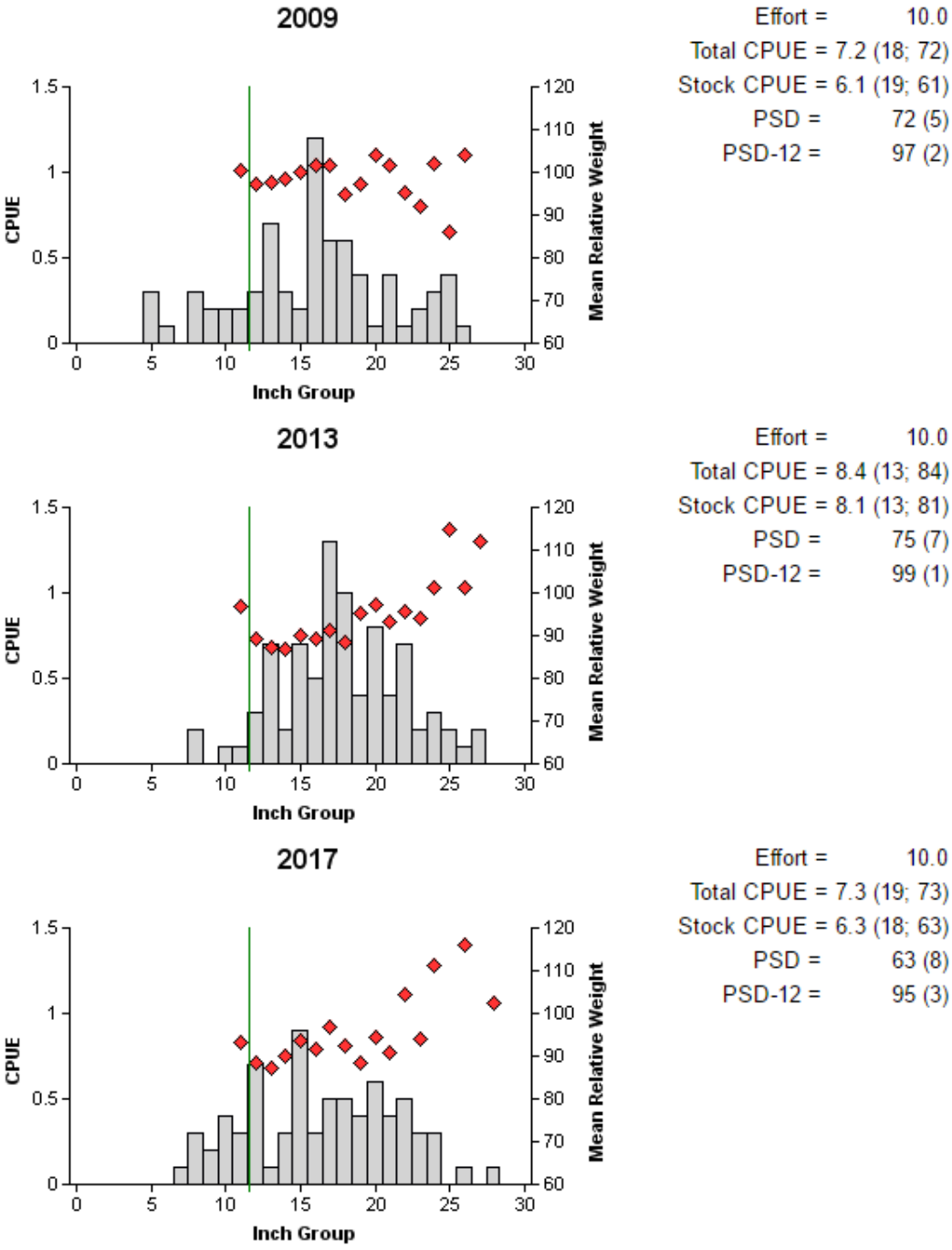


Figure 4. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Pat Mayse Reservoir, Texas, 2009, 2013, and 2017. Vertical lines indicate minimum length limit at time of survey.

White Bass

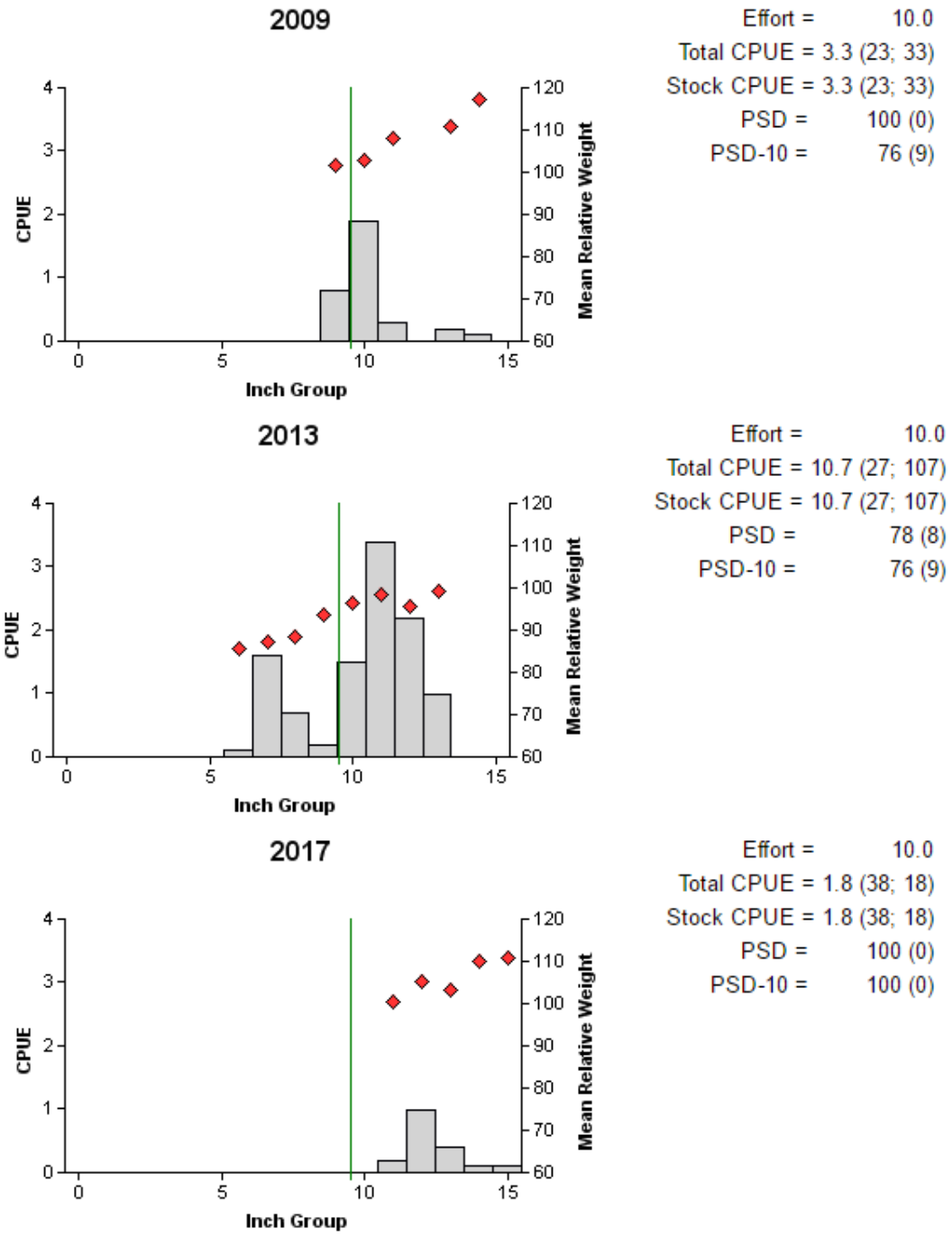


Figure 5. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Pat Mayse Reservoir, Texas, 2009, 2013, and 2017. Vertical lines indicate minimum length limit at time of survey.

Largemouth Bass

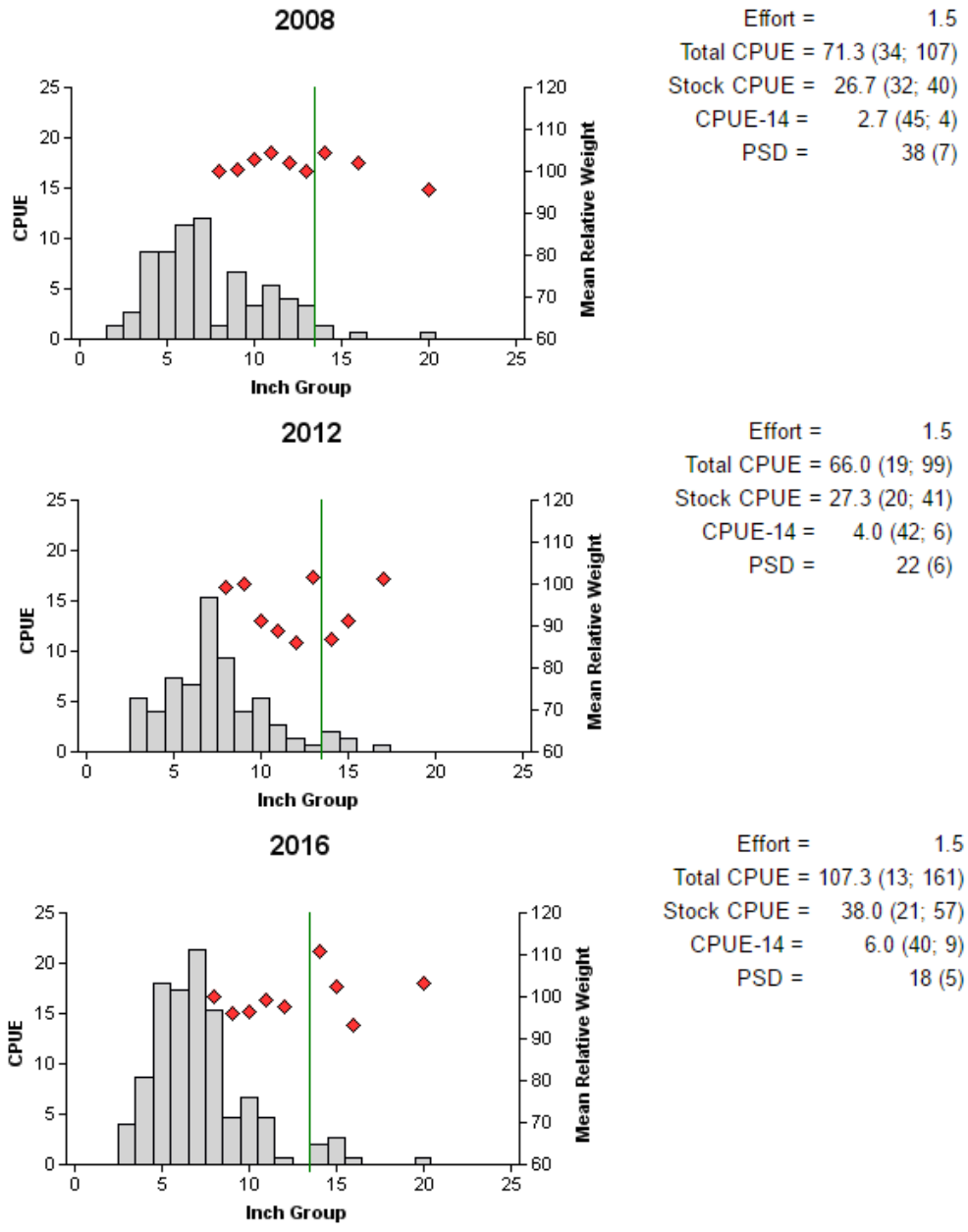


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Pat Mayse Reservoir, Texas, 2008, 2012, and 2016. Vertical lines indicate minimum length limit at time of survey.

Largemouth Bass

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Pat Mayse Reservoir, Texas, 2008, 2012 and 2016. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = hybrids with half of their alleles derived from each lineage, Fx-F/Fx-N=hybrids with more than half their alleles derived from the FLMB/ NLMB lineage. Genetic composition was determined with micro-satellite DNA analysis.

Year	Sample size	Genotype						% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	Fx-F	Fx-N	NLMB		
2008	30	0	0	27	-	-	3	30	0
2012	29	0	0	28	-	-	1	30	0
2016	30	0	0	0	8	20	2	38	0

Largemouth Bass

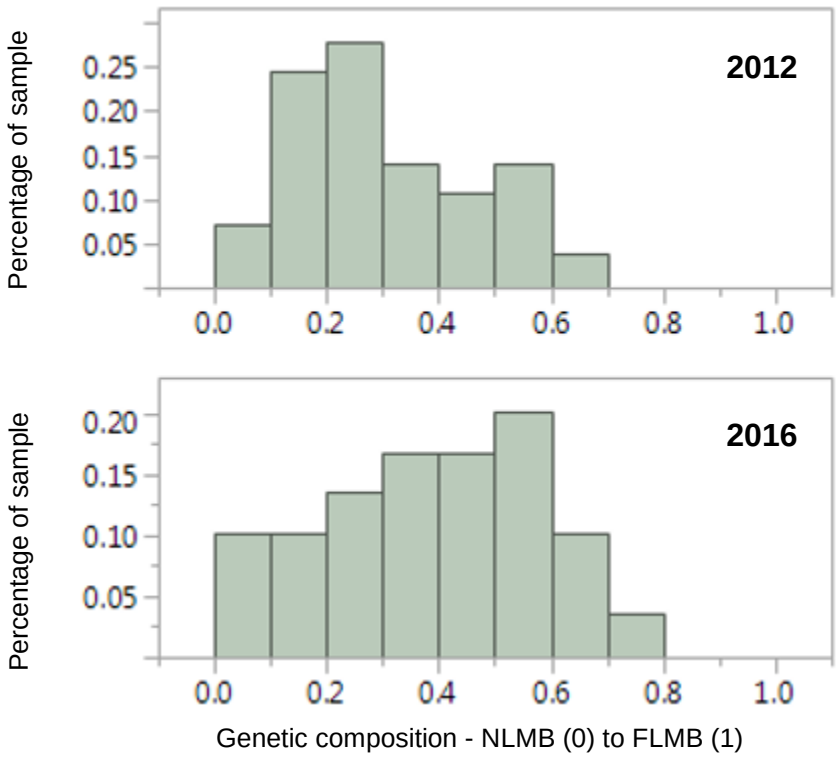


Figure 7. Distribution of genetic composition of Largemouth Bass in Pat Mayse Reservoir in 2012 and 2016.

Table 8. Proposed sampling schedule for Pat Mayse Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

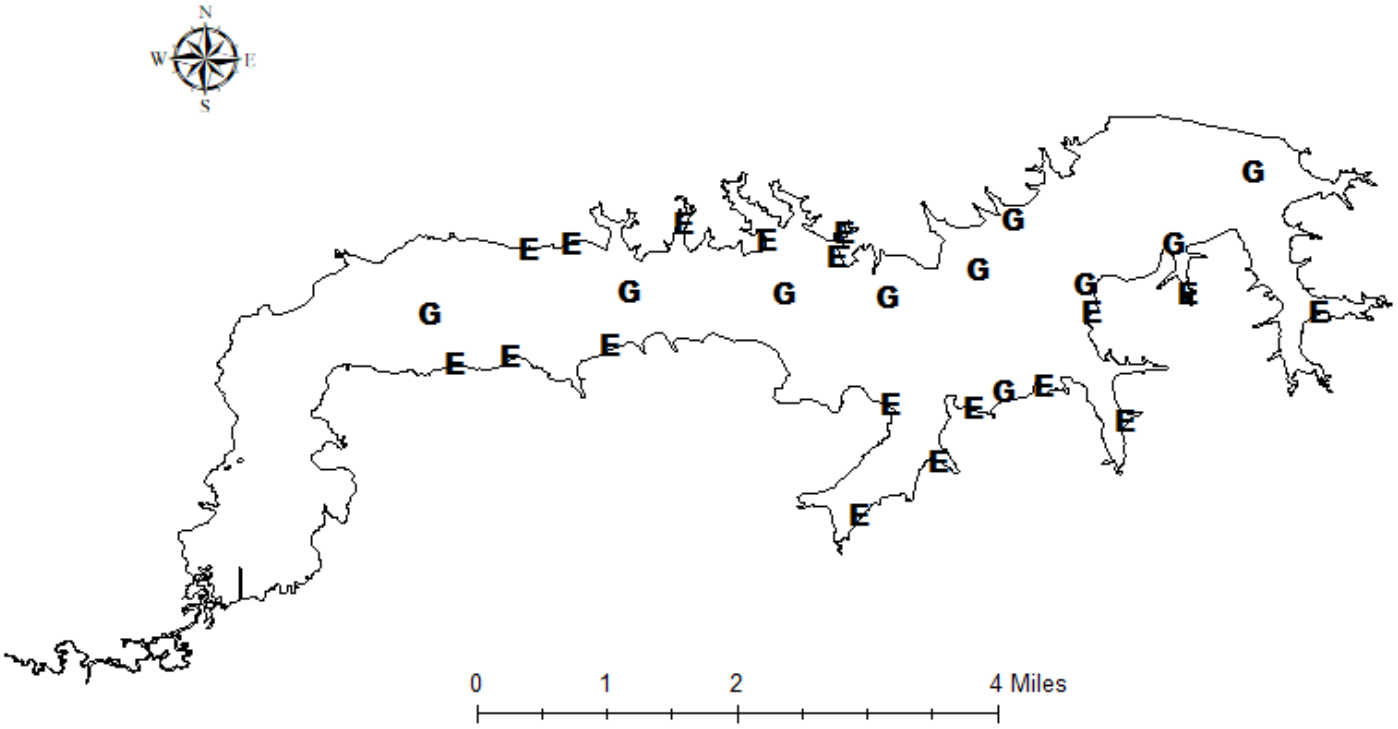
Survey year	Electrofish Fall	Gill net	Hoop net	Vegetation/ Habitat	Access	Report
2017-2018						
2018-2019						
2019-2020						
2020-2021	S	S	A	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected by fall electrofishing, and spring gill netting from Pat Mayse Reservoir, Texas, 2016-2017. Sampling effort was 1.5 hours for electrofishing and 10 net nights for gill netting.

	Electrofishing		Gill Netting	
Species	N	CPUE	N	CPUE
Gizzard Shad	325	216.7		
Threadfin Shad	91	60.7		
Channel Catfish			73	7.3
Flathead Catfish			2	0.2
White Bass			18	1.8
Redear sunfish	19	12.7		
Warmouth	5	3.3		
Bluegill	293	195.3		
Longear Sunfish	57	38.0		
Largemouth Bass	161	107.3		

APPENDIX B



Location of electrofishing (E) and gill netting (G) sites, Pat Mayse Reservoir, Texas, 2016-2017. Water level was near full pool at time of sampling.

APPENDIX C

Objective-based sampling plan components for Pat Mayse Reservoir, Texas for 2017 – 2021.

Gear/ target species	Survey objective	Metrics	Sampling objective
Electrofishing – Fall 2020			
(Minimum effort = 1.5h)	*Monitor trend in:*		
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 30
	Size structure	PSD, length frequency	N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	N = 30, any age
	Age-and-growth	Age at 14 inches	N = 13, 13. 0 – 14. 9 inches
Bluegill [a]	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	
Gizzard Shad [a]	Size structure	PSD, length frequency	
	Prey availability	IOV	
Gill netting – Spring 2021			
(Minimum effort = 10nn)	*Monitor trend in:*		
Channel Catfish	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N = 50
	Age-and-growth	Age at 12 inches	N = 13, 11. 0 – 12. 9 in
	Monitor trend in:		
White Bass	Abundance	CPUE	
	Size structure	PSD, length frequency	
Tandem hoop netting – March/ April 2021			
(Minimum effort = 10 net series)	*Monitor trend in:*		
Crappies	Abundance	CPUE– stock	
	Size structure	PSD, length frequency	
	Condition	W_r	

[a] No sampling objectives have been set for prey species so no additional sampling effort beyond that designated for Largemouth Bass will be conducted. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.