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

Lake Placid

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July 31, 2017

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Placid were surveyed in fall 2016 using electrofishing and trap netting and in spring 2017 using gill netting, low frequency electrofishing, and baited tandem hoop nets. 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:** Lake Placid is a 214-acre reservoir located on the Guadalupe River in Guadalupe County one-half mile southwest of Seguin. This small impoundment, constructed in 1928, is fed by the Guadalupe River watershed and used for water supply, hydroelectric generation, and recreation. Habitat features consisted of boat docks, piers, bulkhead, riprap, and several native aquatic species including water willow, American lotus, and spatterdock.

- **Management History:** Important sport fish include Largemouth, Guadalupe, and Spotted Bass, Channel, Blue, and Flathead Catfishes, and Crappies. The management plan from the 2012 survey report included additional surveys (Electrofishing in 2010; Trap netting in 2011) to assess and monitor declines in prey abundance and poor body condition of important sport fish species. Historically, nuisance aquatic vegetation has caused access and recreational problems, however herbicide and grass carp introductions have been used to manage this. Florida Largemouth Bass were most recently stocked in 2017. Angler harvest of all sport fishes has been regulated per statewide size and bag limits.

- **Fish Community**

  - **Prey species:** Gizzard Shad, Bluegill, and Bullhead Minnows comprised the bulk of the forage base for the predator assemblage. Redbreast, Redear, and Longear sunfishes were also present. While relative abundance decreased for most prey species, population size structure for Bluegill was suitable to support sport fish populations.

  - **Catfishes:** Blue, Channel, and Flathead Catfishes were present in the reservoir. Relative abundance of Blue and Channel Catfishes decreased substantially over the study period. Several Flathead Catfish were collected and a high percentage of the sampled population consisted of legal-sized (≥18-in) fish.

  - **Largemouth Bass:** Largemouth Bass abundance was moderate and similar over the study period, and catch rates in 2016 remained above the historical average. Several legal-sized (≥14-in) fish were collected and size structure indices indicated a balanced population. Largemouth Bass growth slowed in 2016, and mean age at 14 inches was 3.1 years.

  - **Crappies:** Both White and Black Crappie were present in the reservoir; however White Crappie were more abundant. Relative abundance of White Crappie decreased in 2016 relative to 2014. Roughly half of crappie collected were legal-size (≥10-in) and available to anglers. Body condition for legal-sized fish was poor. Crappie growth at 10 inches averaged 1.8 years.

Management Strategies: Continue to manage sport fish populations with existing harvest regulations. Conduct additional electrofishing in 2018 to monitor Largemouth Bass population dynamics and prey abundance and additional gill netting and tandem hoop-netting in 2019 to assess apparent declines in abundance of catfish species. Monitor success of native vegetation plantings and replant as necessary. Monitor non-native exotic species as needed.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Placid in 2016-2017. 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. Management strategies are included to address existing problems and/or opportunities. Historical data are presented with the 2016-2017 data for comparison.

Reservoir Description

Lake Placid is a 214-acre impoundment constructed in 1928 on the Guadalupe River. It is located in Guadalupe County one-half mile southwest of Seguin and is operated and controlled by the Guadalupe-Blanco River Authority (GBRA). Primary water uses included municipal water supply, hydroelectric generation, and recreation. Although most of the shoreline is privately owned, public boat access is adequate. Handicap and bank fishing access is inadequate and restricted to one boat launch area. Substrate in the upper portion of the reservoir is primarily composed of rock and gravel. Clay, sand and silt are dominant substrate types in the middle and lower portions of the reservoir. Habitat features at time of sampling included boat docks, piers, bulkheads, riprap, native aquatic vegetation, submerged timber, and overhanging terrestrial vegetation. Native aquatic plants present in 2016 were American lotus and water willow (Appendix C). Introduced exotics, including water hyacinth, water lettuce, and hydrilla caused access problems for many years until aggressive chemical and biological controls were implemented. While water level data was not available, water levels at the reservoir remained relatively stable. Other descriptive characteristics for Lake Placid can be found in Table 1.

Angler Access

Lake Placid has one public boat ramp and several private boat ramps. The public boat ramp is located at the I-10 underpass just outside the city of Seguin. Shoreline and handicap access is limited to the public boat ramp area. Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Binion and Findeisen 2012) included:

1. Submerged native vegetation is relatively low or scarce throughout the reservoir.
   Action: In 2017, the Corpus Christi District crew planted two species of submerged vegetation (Wild celery and Illinois pondweed) and two emergent species (Pickerelweed and Spike rush) in habitat suitable for these native plants (Appendix E).

2. Historically, non-native plants such as water hyacinth and hydrilla have been a problem in the reservoir.
   Action: Water hyacinth was discovered in the 2016 vegetation survey and mechanically removed by district staff. Signage was distributed to GBRA and posted at the IH-10 boat ramp focusing on the Clean, Drain and Dry campaign and the awareness of transport of nuisance species.

3. Promote catfish fisheries and excellent catfish angling opportunities.
   Action: A press release was distributed to local and statewide media in 2013. However, recent surveys suggest catfish abundance is currently low and therefore, a press release was not distributed in 2017.

Harvest regulation history: Sport fish in Lake Placid are currently managed with statewide harvest regulations (Table 3).

Stocking history: Lake Placid has been stocked with numerous species including; Channel Catfish, Blue Catfish, Largemouth Bass, White Crappie, Coppernose Bluegill, and Triploid Grass Carp. The most recent stocking (Florida Largemouth Bass) occurred in 2017. A complete stocking history is presented in Table 4.

Vegetation/habitat management history: Historically, non-native vegetation such as water hyacinth, water lettuce, and hydrilla has caused boater and angler access problems. In 1996, aggressive chemical and biological controls (Triploid Grass Carp) were implemented. Over the current survey period, non-native invasive vegetation has not negatively impacted boat and angler access. In 2016, water hyacinth was detected for the first time since 2008. Coverage was limited and plants were physically removed by district staff.

Water Transfer: Lake Placid is primarily used for hydro-power generation and recreation. No significant transfer of water occurs at Lake Placid and no interbasin transfers exist.

METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Lake Placid (TPWD, unpublished). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected, excluding trap netting (biologist selected) and all surveys were conducted according to 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 (1 hour at 12, 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 12 randomly-selected fish (range 13.0 to 14.9 inches) in 2016.

Trap netting – Crappie were collected using trap nets (10 net nights at 10 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn). Ages for White Crappie were determined using otoliths from 11 randomly-selected fish (range 9.0 to 11.0 inches) in 2016.

Gill netting – Channel, Blue, and Flathead Catfish 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).

Low-frequency electrofishing – Blue and Flathead Catfish were collected by low-frequency electrofishing at 20 stations. The duration of electrofishing at each station was 3 minutes. CPUE for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Tandem hoop nets – Channel Catfish were collected using 6 tandem hoop-net series at 6 stations. Nets were baited with soap and deployed for 2-night soak durations. CPUE for tandem hoop netting was recorded as the number of fish caught per tandem hoop net series (fish/series).

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 (W_r)] were calculated for target fishes per 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 statistics. Mean age at length was calculated for Largemouth Bass between 13 – 15 inches total length in 2006 (N = 12), 2008 (N = 12), 2010 (N = 4), 2012 (N = 13), 2014 (N = 15), and 2016 (N = 12). Mean age at length was calculated for crappie between 9 – 11 inches total length in 2016 (N = 11).

Genetics − Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2008 – 2012.

RESULTS AND DISCUSSION

Habitat: Shoreline habitat consisted primarily of bulkheads, boat docks, and natural shoreline (Table 6). Native vegetation surface coverage decreased substantially in 2016 (1.6 acres; < 1.0%) from 2012 (22.7 acres; 9.1% Table 7). American lotus and water willow were the only native species present in 2016.

Prey species: Gizzard Shad abundance decreased substantially from 248/h in 2014 to 45/h in 2016 (82% decrease) (Figure 1). Gizzard Shad size composition was poor in 2016; IOV value was 58, and considerably lower than 2014 (IOV = 88). The 2016 electrofishing catch rate for Bluegill in 2016 (92.0/h) was consistent with the 2012 survey (109.0/h) but lower than 2014 (218.0/h) (Figure 2). Size structure for Bluegill was adequate and most individuals collected were <6 in total length and available as forage to most sport fish. Overall, decreased abundance of important prey species as well as decreased IOV in Gizzard Shad, sub-par relative weights for some important sport fishes and reduced growth in Largemouth Bass indicate prey could be limiting growth and condition of sport fish in the reservoir. Additional monitoring of prey species should be implemented.

Blue Catfish: Relative abundance of Blue Catfish decreased. Gill net CPUE for Blue Catfish was 1.5/nn in 2017, lower than both in 2009 (2.6/nn) and in 2013 (7.8/nn; Figure 3). The majority (67%) of fish collected in 2017 were ≥ 12 in total length and available for angler harvest. Body condition for most inch groups were adequate (W_r values > 90; Figure 3). Limited Blue Catfish were collected (4.0/h) by low-frequency electroshocking.

Channel Catfish: Abundance of Channel Catfish has declined substantially over the study period. In 2017, the Channel Catfish gill net catch rate was 1.4/nn, greatly reduced from 15.6/nn in 2009 and 17.6/nn in 2013 (Figure 4). Relative weights of stock-size Channel Catfish varied (range: 83 – 109) and no discernible trends were evident based on size (Figure 4). No Channel Catfish were collected with baited tandem hoop nets.

Flathead Catfish: Relative abundance of Flathead Catfish remained low. Gill net CPUE for Flathead Catfish was 1.0/nn in 2017, consistent with values in 2013 (1.2/nn) and 2009 (3.0/nn) (Figure 5). Most fish collected in 2017 were ≥ the 18 inch MLL and available for angler harvest. Low-frequency electroshocking was conducted for the first-time in 2017 with some success; as catch rate was 18.0/h. A PSD of 20 indicates the population is dominated by smaller individuals. Relative weights of stock-size and greater Flathead Catfish varied (range: 83 – 91) and no discernible trends were evident based on size (Figure 6).

Largemouth Bass: Relative abundance of Largemouth Bass was similar over the survey period. The electrofishing catch rate of Largemouth Bass was 59.0/h in 2016, compared to 73.0/h in 2012 and 83.0/h in 2014 (Figure 7). Population size structure in 2016 was balanced as indicated by PSD (45; Figure 6) metric. Growth to legal length (14 in) has slowed over the study period; mean age at 14 inches in 2016 was 3.1 years (Table 8). Relative weights for fish ≥ 12" in 2016 were good, exceeded 93 (range: 93 – 103), and were improved relative to 2012 and 2014. Florida Largemouth Bass influence has remained relatively constant since 2008 as Florida alleles ranged from 56.7 to 64.6% (Table 9).

White Crappie: Trap net CPUE for White Crappie was 2.9/nn in 2016, consistent with 3.3/nn in 2012, but less than 6.2/nn in 2014 (Figure 8). Fish up to 12 in were collected and CPUE-10 was 1.7/nn, consistent with prior surveys in 2012 and 2014. Proportional size distribution in 2016 (81) was consistent with 2014 (90) and had improved from 2012 (52) indicating the population is primarily comprised of larger individuals. Growth to legal length (10 in) in 2016 was 1.8 years (Table 10). Relative weight values varied in 2016 (range: 72 – 101) and decreased with increased length (Figure 8).

Fisheries Management Plan for Lake Placid, Texas

Prepared - July 2017

ISSUE 1: Native aquatic vegetation abundance is relatively low with limited species diversity. Some emergent and floating-leaved species are present but submerged vegetation is scarce.

MANAGEMENT STRATEGY

1. Monitor planting success conducted in 2017 (Illinois Pondweed, Pickerelweed, Wild Celery, and Spike Rush) and replant as needed.

ISSUE 2: Presence of zebra mussels was verified in the river basin at upstream Canyon Lake in June 2017.

MANAGEMENT STRATEGIES

1. Deploy settlement samplers to monitor presence/absence of zebra mussels within the reservoir.
2. Distribute press releases to local media and promote the Clean, Drain, Dry program.

ISSUE 3: Relative abundance of several sport fish and prey species have decreased based on our 2016 – 2017 sampling.

MANAGEMENT STRATEGIES

1. Conduct additional electrofishing in 2018 to assess apparent declines in important prey species and to monitor Largemouth Bass population dynamics.
2. Conduct additional gill netting to monitor apparent declines in abundance of catfish species.
3. Continue to explore and assess utility of alternative sampling gears (LF electrofishing, baited tandem hoop nets) for assessing catfish populations.

ISSUE 4: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, 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. Historically, non-native plants such as water hyacinth and hydrilla have been a problem in the reservoir. These exotic plants restrict recreational use and can negatively impact the quality of fish and wildlife habitat restricting growth and colonization of native vegetation.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Discuss invasive species with local fishermen at the local boat ramp.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.
6. Monitor water hyacinth and other exotic nuisance vegetation through vegetation surveys as needed.
7. Continue to cooperate with GBRA on all vegetation control activities.

Objective-Based Sampling Plan and Schedule

Sport fish, forage fish, and other important fishes

Sport fish in Lake Placid include Blue, Channel, and Flathead Catfish, Largemouth Bass, and Black and White Crappie. Important forage species include Gizzard and Threadfin Shad, and Bluegill.

Low-density fisheries

Flathead Catfish: Flathead Catfish are present in the reservoir in low abundance. Since 1988, the mean gill net CPUE is 1.0/nn (range: 0.0 – 3.0/nn). An exploratory low-frequency electrofishing (LFE) survey (in concert with LFE Blue Catfish sampling) was conducted in late-spring 2017 to help further determine if this fishery is truly negligible, abundance averaged 18.0/h. An additional LFE survey will be conducted in late-spring 2020 to compare results collected in 2017. Presence/absence will be noted in standard gill net samples. Further, an online angler opinion survey will be conducted to determine angler species preference and relative importance or ranking of each sport fish in the reservoir.

Survey objectives, fisheries metrics, and sampling objectives

Blue Catfish: Blue Catfish are present, but historically, abundance has been relatively low compared to Channel Catfish. Since 1988, the mean gill net CPUE is 2.6/nn (N = 8, standard deviation = 2.6, range: 0.0 – 7.8/nn). Trend data on CPUE, size structure, and body condition have been collected at least every four years since 2001 with spring gill netting. Based on the last gill net survey conducted in 2017, the population appears to be highly variable. An exploratory low-frequency electrofishing (LFE) survey was conducted in late-spring 2017 to assess LFE for use as an alternative collection gear for this species, abundance was low 4.0/h. An additional LFE survey will be conducted in late-spring 2020 to compare results collected in 2017. In addition, basic population dynamics data (i.e., relative abundance, size structure indices, and body condition) will be collected per standard gill net sampling for Channel Catfish. No additional gill net effort will be expended beyond sampling effort conducted for Channel Catfish. Further, an online angler opinion survey will be conducted to determine angler species preference and relative importance or ranking of each sport fish in the reservoir.

Channel Catfish: Channel Catfish are the predominant catfish species however abundance is currently low. Since 1988, the mean gill net CPUE is 8.3/nn (N = 8, standard deviation = 6.6, range: 1.4 – 17.6/nn) and mean CPUE-stock = 5.5/nn (N = 8, standard deviation = 3.8, range: 1.3 – 11.0/nn). Trend data on CPUE, size structure, and body condition have been collected at least every four years since 2001 with spring gill netting. Based on the last gill net survey conducted, in 2017, the population is at its lowest in terms of relative abundance (1.4/nn) and size structure since 1988. Collection of trend data with spring gill netting every four years will allow for determination of large-scale changes in basic population dynamics (relative abundance, size frequency, and body condition) that may warrant further investigation and more intensive sampling. A minimum of 10 randomly selected gill net sites will be sampled in spring 2019 and 2021. Sampling will continue at additional random sites to collect basic population data. Due to high variability in catch data among sampling sites (mean RSE-T = 36.9 & RSE-S = 38.7), objectives of RSE for catch rates will not be set. An exploratory baited tandem hoop net survey was conducted in summer 2017 (2 night duration) to assess the utility of baited tandem hoop nets for use as an alternative collection gear for this species, unfortunately we were unsuccessful in collecting any Channel Catfish. An additional baited tandem hoop net survey will be conducted in the summer of 2020 to further assess as an alternative sampling gear. Further, an online angler opinion survey will be conducted to determine angler species preference and relative importance or ranking of each sport fish in the reservoir.

Largemouth Bass: Historically, Largemouth Bass have been present in the reservoir in moderate numbers. The mean historical total CPUE for Largemouth Bass is 48.4/h (N = 11; standard deviation = 22.5; range: 16.0 –83.0/h) and mean stock-size CPUE is 33.5/h (N = 11; standard deviation = 16.8; range: 13.0 – 61.0/h). Relative abundance of LMB has remained high in recent years (2012 = 73.0/h, 2014 = 83.0/h and 2016 = 59.0/h) compared to previous years (2006 = 39.0/h, 2008 = 52.0, 2010 = 20.0/h). Trend data on CPUE, size structure, and body condition has been collected biennially since 2006 with fall electrofishing to monitor large-scale changes in the population that may spur further investigation. Twelve sites will be sampled once every two years to collect basic population dynamics data (abundance, size structure indices, body condition). Further, category 2 age and growth analysis [mean age at legal length (14 in), N = minimum of 13 fish between 13.0 – 14.9 in] will be conducted every four years to assess any changes in growth to the minimum length limit. No additional sampling above the 12 stations will be conducted at this time. Further, an online angler opinion survey will be conducted to determine angler species preference and relative importance or ranking of each sport fish in the reservoir.

White Crappie: White Crappie are present in the reservoir but trap net samples have yielded mixed results and low catches (historical mean CPUE = 3.1/nn; N = 9; standard deviation = 2.1; range: 0.2 – 6.2/nn). Trend data on important population metrics (CPUE, size structure, body condition, age and growth) have been collected biennially since 2003 with fall trap netting. Both random and fixed sampling stations have been utilized. Biologist selected fixed sites have tended to yield higher quality data (increased CPUE and precision); however, data quality is still relatively poor (mean RSE-T = 49.2) at current level of sampling effort (N = 10 sets). An online angler opinion survey will be conducted to determine angler species preference and relative importance or ranking of each sport fish in the reservoir. If crappies are deemed important to anglers at Lake Placid, trap net sampling will be conducted every four years at biologist selected fixed stations to assess large-scale changes in basic population dynamics (abundance, size structure indices, body condition, age-at-length).

Gizzard Shad and Bluegill: Gizzard Shad and Bluegill are the primary forage at Lake Placid. Like Largemouth Bass, trend data on CPUE and size structure of Gizzard Shad and Bluegill have been collected biennially since 2006 with fall electrofishing. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Gizzard Shad and Bluegill relative abundance and size structure. Sampling effort based on achieving sampling objectives for Largemouth Bass will result in sufficient numbers for size structure estimation (Gizzard Shad IOV; 50 fish minimum, Bluegill PSD; 50 fish minimum at 12 randomly selected stations with 90% confidence) and relative abundance estimates (Bluegill CPUE-Total; RSE $\leq$ 25). No additional effort will be conducted beyond sampling effort conducted for Largemouth Bass data collection.

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Table 1. Characteristics of Lake Placid, Texas.

Characteristic	Description
Year constructed	1928
Controlling authority	Guadalupe-Blanco River Authority
County	Guadalupe
Reservoir type	Mainstream: Guadalupe River
Shoreline Development Index	5.27
Conductivity (umhos/cm)	395 – 414
Access: Boat	Adequate – 1 ramp
Bank	Inadequate
Handicapped	Inadequate

Table 2. Boat ramp characteristics for Lake Placid, Texas, March, 2017. Reservoir elevation at time of survey was 497.5 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
IH-10 underpass	29.566847 -98.023132	Y	12+	UNK	Excellent, no access issues

Table 3. Harvest regulations for Lake Placid, 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, Largemouth	5[a]	14-inch minimum
Bass: Spotted and Guadalupe	5[a]	None
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

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

Table 4. Stocking history of Lake Placid, Texas. FGL = fingerling; ADL = adults.

Species	Year	Number	Size
Channel Catfish	1966	4,200	FGL
	1973	9,000	FGL
	1995	6,261	FGL
	1997	5,990	FGL
	2005	20,806	FGL
	Total	46,257	
Largemouth Bass	1978	410	FGL
	1985	9,500	FGL
	1993	1,461	FGL
	1994	40,413	FGL
	1994	141	ADL
	2003	119,487	FRY
	2003	20,136	FGL
	2005	20,396	FGL
	2017	308,083	FRY
	Total	520,027	
White Crappie	1994	24,808	FGL
Coppernose Bluegill	1983	10,000	FGL
Blue Catfish	1995	40,541	FGL
	1998	40,000	FGL
	Total	80,541	
Triploid Grass Carp	1995	*25	ADL
	1998	*11	ADL
	Total	36	

*Radio tagged.

Table 5. Objective-based sampling plan components for Lake Placid, Texas 2016 – 2017.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	N ≥ 50 stock
	Age-and-growth	Age at 14 inches	N = 13, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
Bluegill [a]	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	N ≥ 50
Gizzard Shad [a]	Abundance	CPUE – Total	
	Size structure	PSD, length frequency	N ≥ 50
	Prey availability	IOV	N ≥ 50
Gill netting			
Channel Catfish	Abundance	CPUE – stock	
	Size Structure	PSD, length frequency	N ≥ 50 stock
Low-frequency electrofishing			
Flathead Catfish	Abundance	CPUE – stock	
	Size structure	Length frequency	N ≥ 50 stock
Blue Catfish	Abundance	CPUE – stock	
	Size structure	Length frequency	N ≥ 50 stock
Trap netting			
Crappie	Abundance	CPUE – stock	
	Size structure	PSD, length frequency	N = 50
Tandem hoop netting			
Channel Catfish	Abundance	CPUE– stock	
	Size structure	PSD, length frequency	N ≥ 50 stock

[a] No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition will provide information on forage abundance, vulnerability, or both relative to predator density.

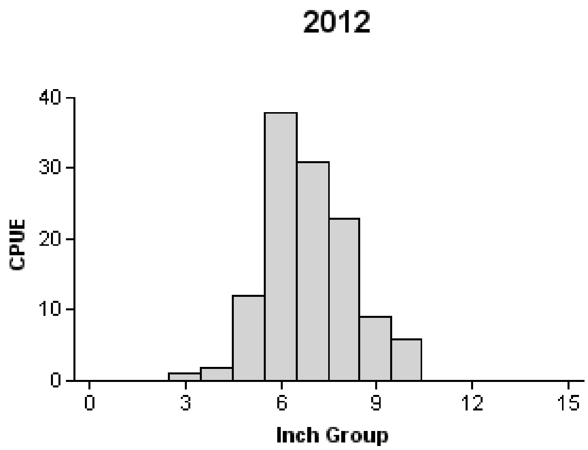
Table 6. Survey of structural habitat types, Lake Placid, Texas, 2008. Shoreline habitat type units are measured in miles.

Habitat type	Estimate	% containing
Bulkhead	7.8	45.9
Boat docks	8.5	49.9
Natural	9.2	54.2
Rocks	0.1	0.7

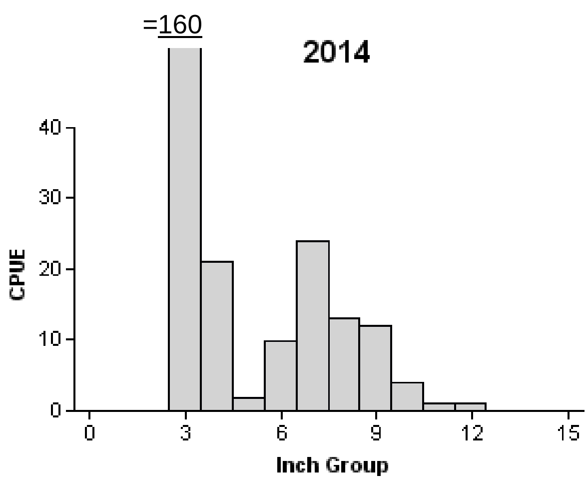
Table 7. Survey of aquatic vegetation, Lake Placid, Texas, 2012 and 2016. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2012	2016
Native emergent		
Water willow	4.8 (1.9)	0.6 (0.3)
Native floating-leaved		
American lotus	<0.1 (<0.1)	1.0 (0.5)
Spatterdock	17.8 (7.2)	
Non-native		
Water hyacinth		0.1 (<0.1)

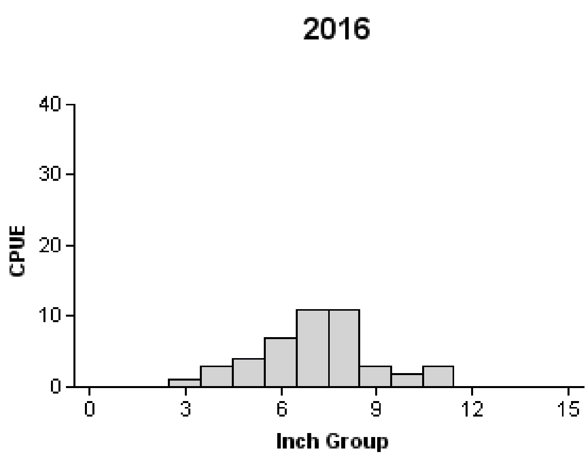
Gizzard Shad



Effort =	1.0
Total CPUE=	122.0 (27; 122)
IOV =	69 (5)



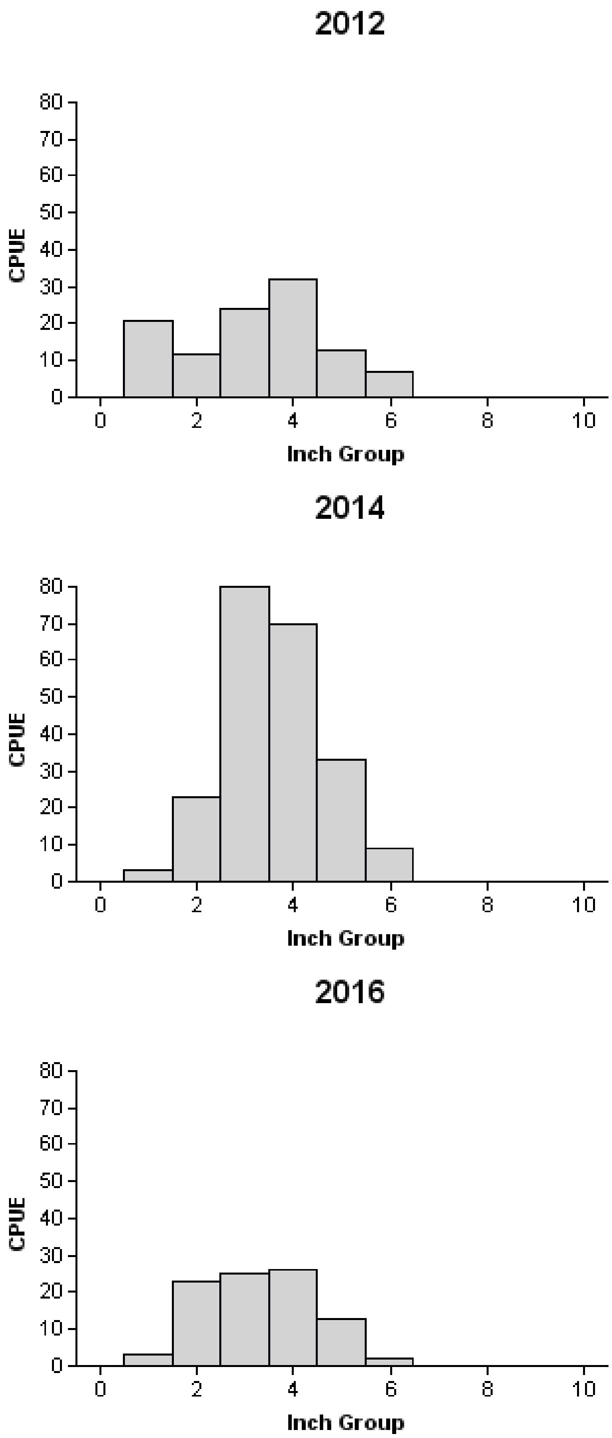
Effort =	1.0
Total CPUE=	248.0 (49; 248)
IOV =	88 (7)



Effort =	1.0
Total CPUE=	45.0 (34; 45)
IOV =	58 (15)

Figure 1. Comparison of the number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Placid, Texas, 2012, 2014, and 2016.

Bluegill



2012

Effort =	1.0
Total CPUE =	109.0 (16; 109)
Stock CPUE =	76.0 (18; 76)
CPUE-6 =	7.0 (45; 7)
PSD =	9 (4))

2014

Effort =	1.0
Total CPUE =	218.0 (24; 218)
Stock CPUE =	192.0 (25; 192)
CPUE-6 =	9.0 (55; 9)
PSD =	5 (2)

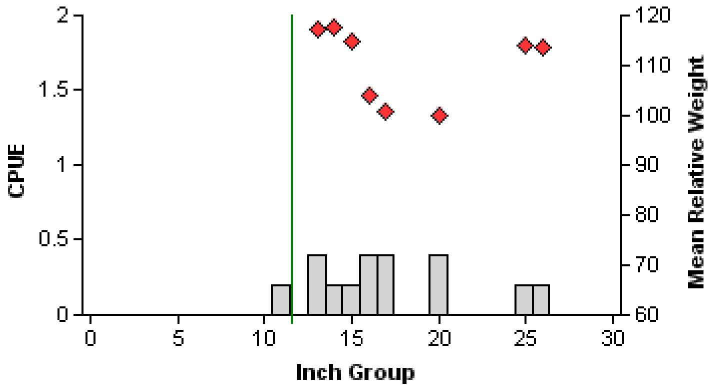
2016

Effort =	1.0
Total CPUE =	92.0 (25; 92)
Stock CPUE =	66.0 (25; 66)
CPUE-6 =	2.0 (100; 2)
PSD =	3 (3)

Figure 2. Comparison of the 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, Lake Placid, Texas, 2012, 2014, and 2016.

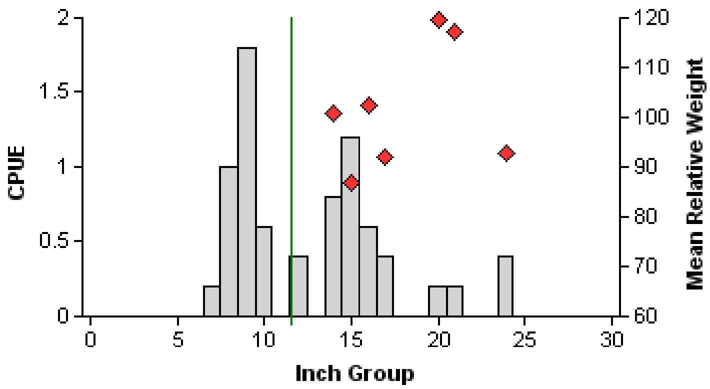
Blue Catfish

2009



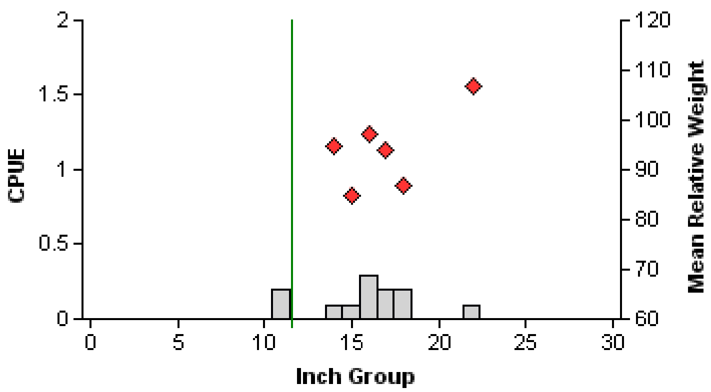
Effort =	5.0
Total CPUE =	2.6 (41; 13)
Stock CPUE =	2.4 (47; 12)
CPUE-20 =	0.8 (73; 4)
PSD =	33 (17)

2013



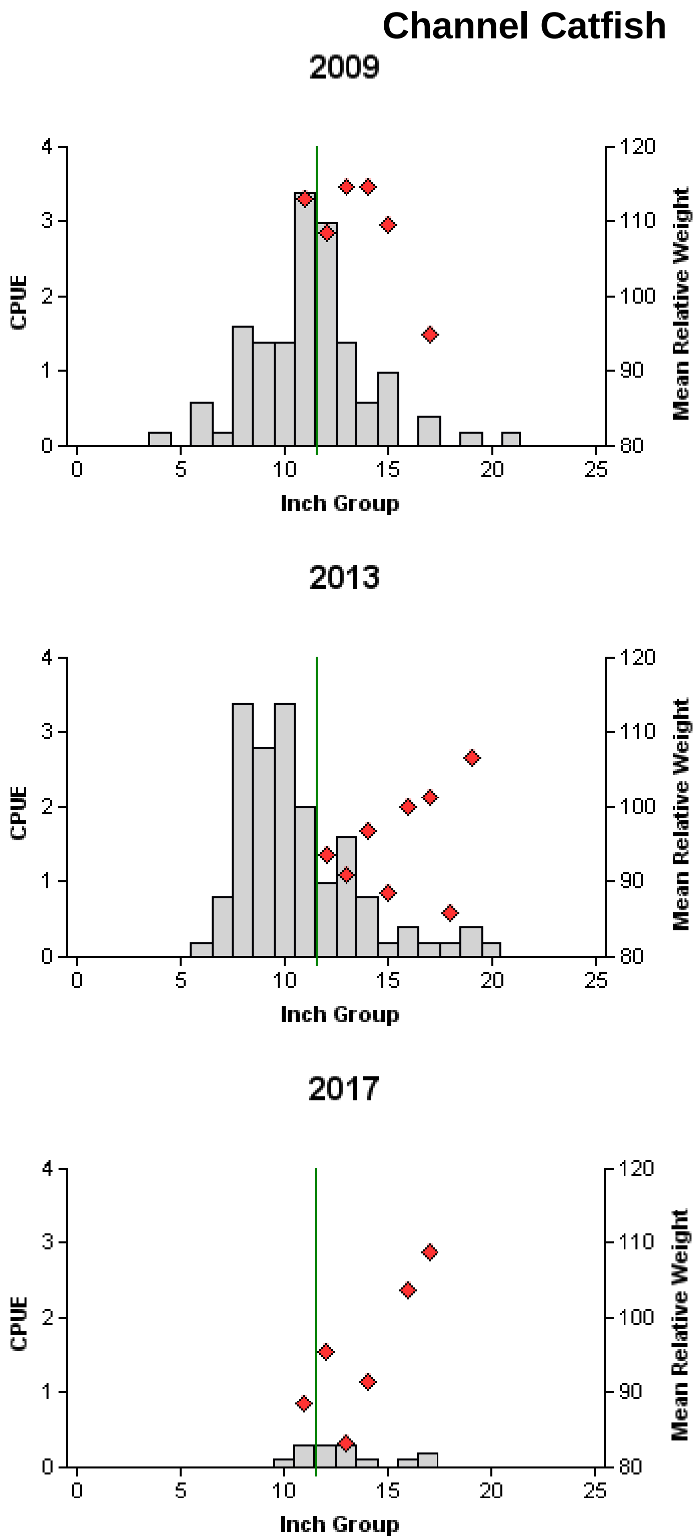
Effort =	5.0
Total CPUE =	7.8 (27; 39)
Stock CPUE =	4.2 (41; 21)
CPUE-20 =	0.8 (47; 4)
PSD =	19 (5)

2017



Effort =	10.0
Total CPUE =	1.5 (37; 15)
Stock CPUE =	1.0 (45; 10)
CPUE-20 =	0.1 (100; 1)
PSD =	10 (10)

Figure 3. Comparison of the number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and populations indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Placid, Texas, 2009, 2013, and 2017. Vertical line denotes 12-inch minimum length limit.



2009

Effort =	5.0
Total CPUE =	15.6 (43; 78)
Stock CPUE =	10.2 (45; 51)
CPUE-16 =	0.8 (25; 4)
PSD =	8 (3)

2013

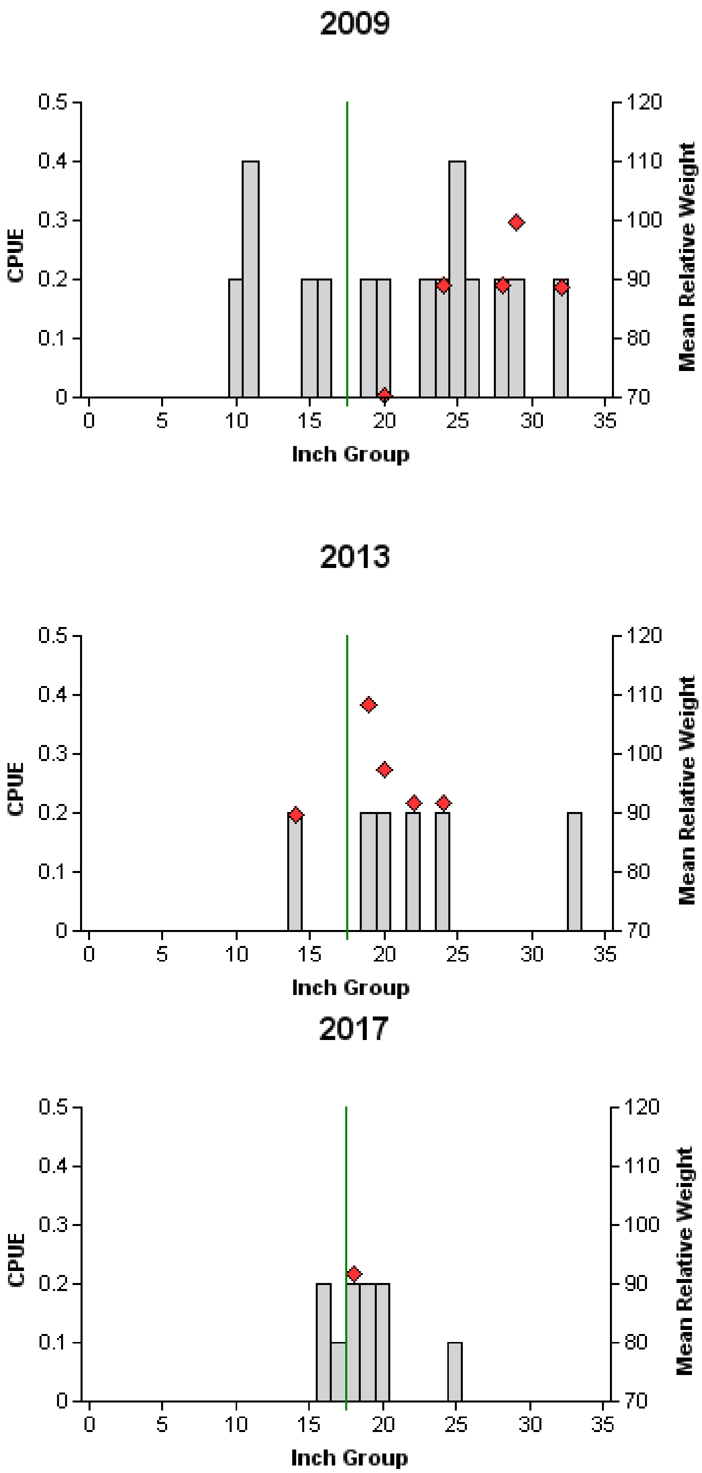
Effort =	5.0
Total CPUE =	17.6 (31; 88)
Stock CPUE =	7.0 (41; 35)
CPUE-16 =	1.4 (70; 7)
PSD =	20 (10)

2017

Effort =	10.0
Total CPUE =	1.4 (40; 14)
Stock CPUE =	1.3 (41; 13)
CPUE-16 =	0.3 (100; 3)
PSD =	23 (17)

Figure 4. Comparison of the number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and populations indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Placid, Texas, 2009, 2013, and 2017. Vertical line denotes 12-inch minimum length limit.

Flathead Catfish



2009

Effort =	5.0
Total CPUE =	3.0 (33; 15)
Stock CPUE =	2.4 (34; 12)
CPUE-20 =	1.8 (27; 9)
PSD =	75 (10)

2013

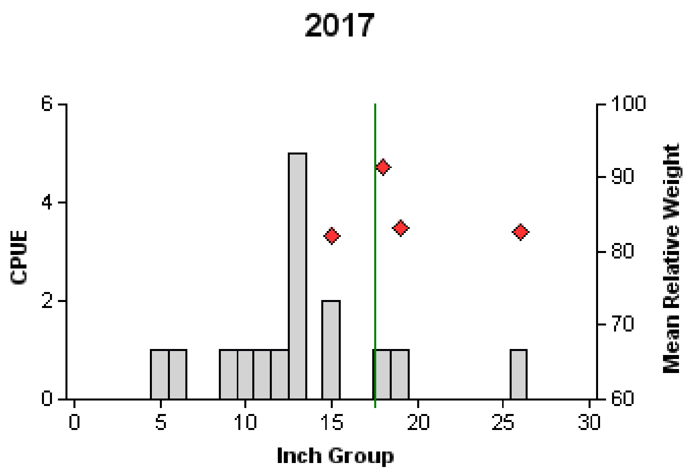
Effort =	5.0
Total CPUE =	1.2 (41; 6)
Stock CPUE =	1.2 (41; 6)
CPUE-20 =	0.8 (25; 4)
PSD =	67 (22)

2017

Effort =	10.0
Total CPUE =	1.0 (39; 10)
Stock CPUE =	1.0 (39; 10)
CPUE-20 =	0.3 (71; 3)
PSD =	30 (16)

Figure 5. Comparison of the number of Flathead Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and populations indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Placid, Texas, 2009, 2013, and 2017. Vertical line denotes 18-inch minimum length limit.

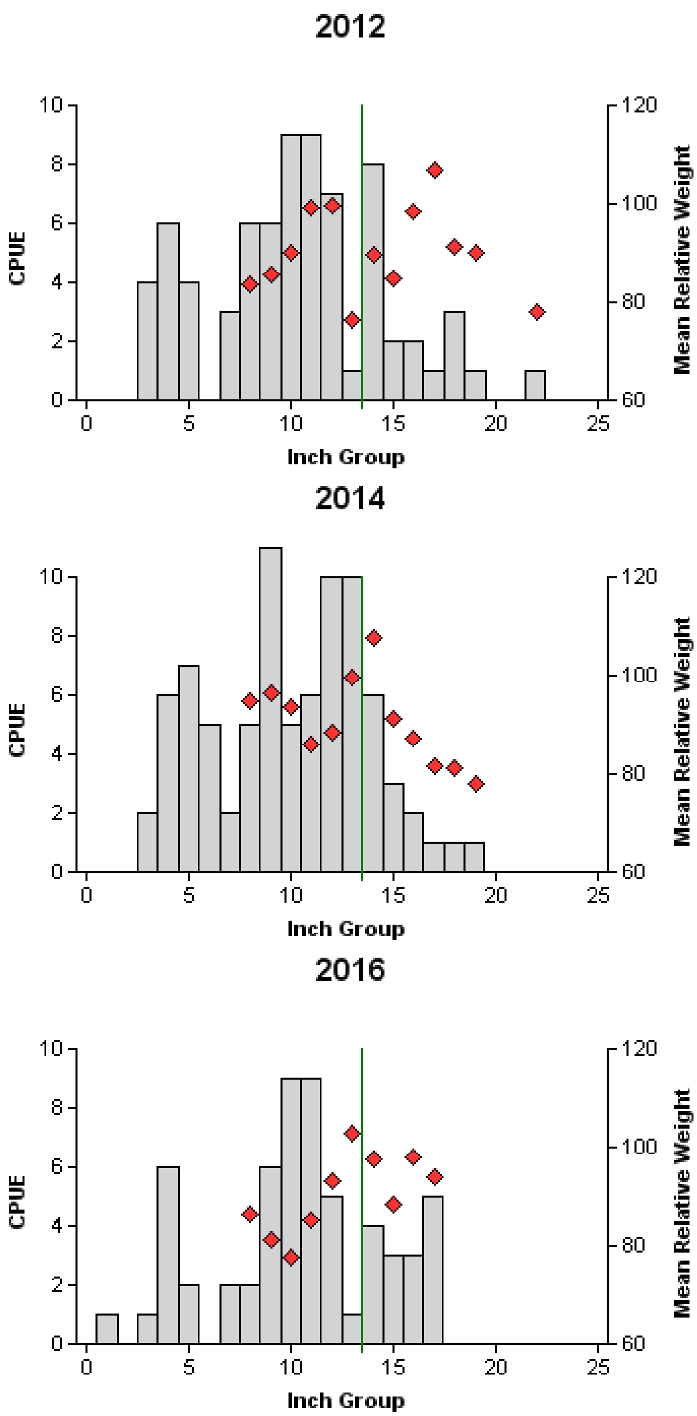
Flathead Catfish



Effort =	1.0
Total CPUE =	18.0 (43; 18)
Stock CPUE =	5.0 (64; 5)
PSD =	20 (10)

Figure 6. Number of Flathead Catfish caught per hour (CPUE, bars), mean relative weight (diamonds), and populations indices (RSE and N for CPUE and SE for size structure are in parentheses) for a spring low-frequency electroshocking survey, Lake Placid, Texas, 2017. Vertical line denotes 18-inch minimum length limit.

Largemouth Bass



2012

Effort =	1.0
Total CPUE =	73.0 (26; 73)
Stock CPUE =	56.0 (35; 56)
CPUE-14 =	18.0 (42; 18)
PSD =	38 (7)

2014

Effort =	1.0
Total CPUE =	83.0 (12; 83)
Stock CPUE =	61.0 (13; 61)
CPUE-14 =	14.0 (35; 14)
PSD =	56 (10)

2016

Effort =	1.0
Total CPUE =	59.0 (24; 59)
Stock CPUE =	47.0 (31; 47)
CPUE-14 =	15.0 (51; 15)
PSD =	45 (12)

Figure 7. Comparison of the number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Placid, Texas, 2012, 2014, and 2016. Vertical line denotes 14-inch minimum length limit.

Largemouth Bass

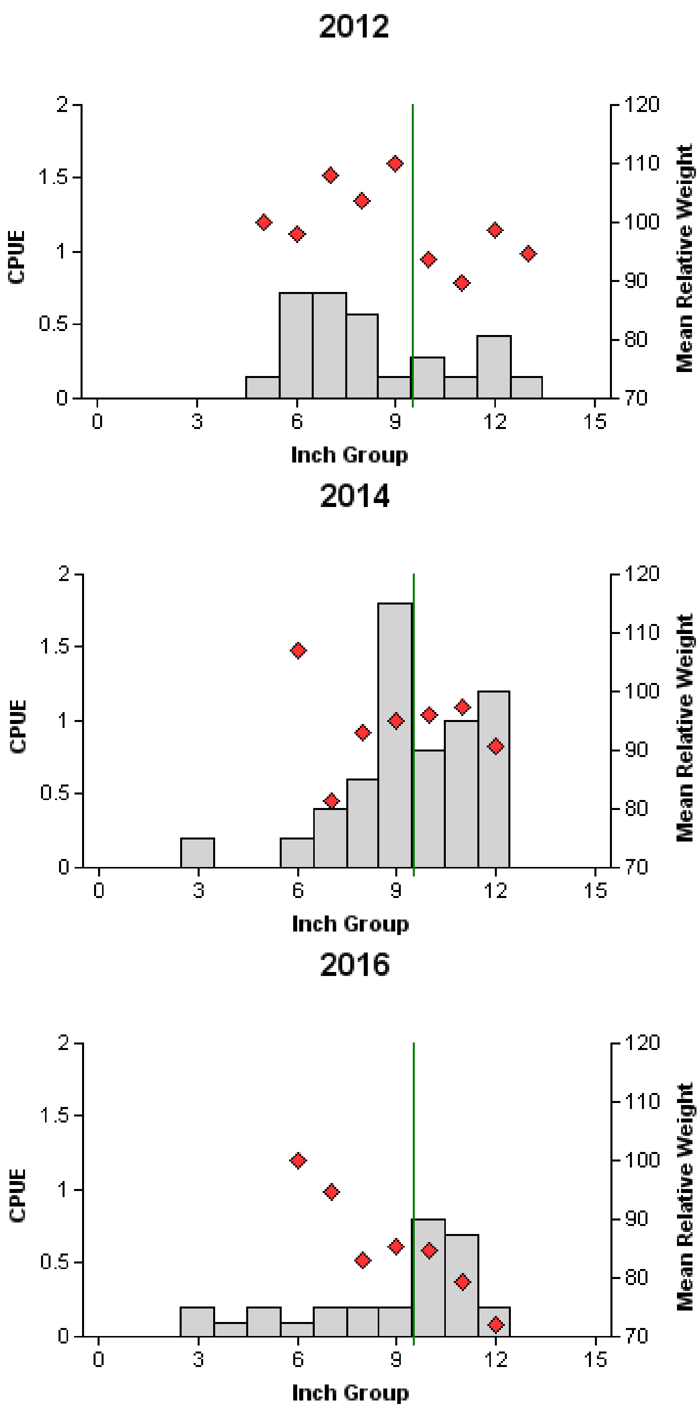
Table 8. Mean age at legal length (14 in) for Largemouth Bass collected by fall electrofishing, Lake Placid, Texas. Standard deviations are in parentheses.

Year	N	Age Range	Age at Length
2008	12	2 – 3	2.3 (0.45)
2010	4	2 – 4	3.0 (0.81)
2012	13	1 – 4	2.7 (0.83)
2014	15	2 – 3	2.5 (0.52)
2016	12	2 – 5	3.1 (0.99)

Table 9. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Lake Placid, Texas, 2008, 2010, and 2012. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by with micro-satellite DNA analysis.

		Number of fish				
Year	Sample Size	FLMB	Intergrade	NLMB	% FLMB alleles	%FLMB
2008	14	0	14	0	64.6	0.0
2010	30	1	28	1	57.4	3.3
2012	30	0	30	0	56.7	0.0

White Crappie



2012

Effort = 7.0
Total CPUE = 3.3 (41; 23)
Stock CPUE = 3.3 (41; 23)
CPUE-10 = 1.0 (38; 7)
PSD = 52 (8)

2014

Effort = 5.0
Total CPUE = 6.2 (26; 31)
Stock CPUE = 6.0 (27; 30)
CPUE-10 = 3.0 (51; 15)
PSD = 90 (3)

2016

Effort = 10.0
Total CPUE = 2.9 (37; 29)
Stock CPUE = 2.6 (39; 26)
CPUE-10 = 1.7 (46; 17)
PSD = 81 (9)

Figure 8. Comparison of the number of White Crappie 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 fall trap netting surveys, Lake Placid, Texas, 2012, 2014, and 2016. Vertical line denotes 10-inch minimum length limit.

White Crappie

Table 10. Mean age at legal length (10 in) for White Crappie collected by fall trap netting, Lake Placid, Texas. Standard deviation is in parentheses.

Year	N	Age Range	Age at Length
2016	11	1-2	1.8 (0.40)

Table 11. Proposed sampling schedule for Lake Placid, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, low frequency electrofishing and tandem hoop net surveys are conducted in the summer, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

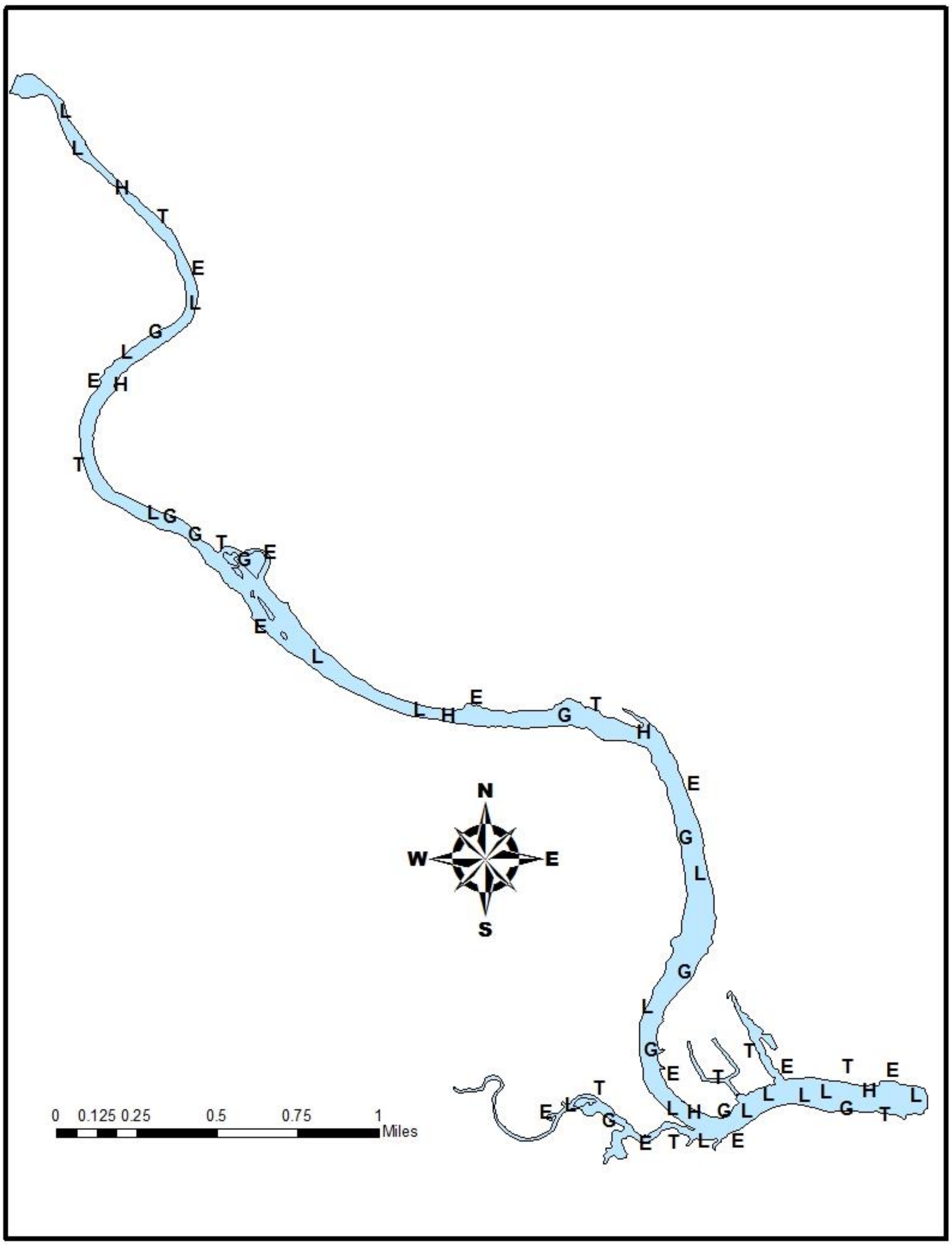
						Habitat			
Survey year	Electrofish	Trap net	Gill net	LFE	THN	Structural	Vegetation	Access	Report
2017-2018									
2018-2019	A		A						
2019-2020				A	A				
2020-2021	S	S	S				S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Lake Placid, Texas, 2016 – 2017. Sampling effort was 10 net nights for gill netting, 10 net nights for trap netting, and 1 hour for electrofishing.

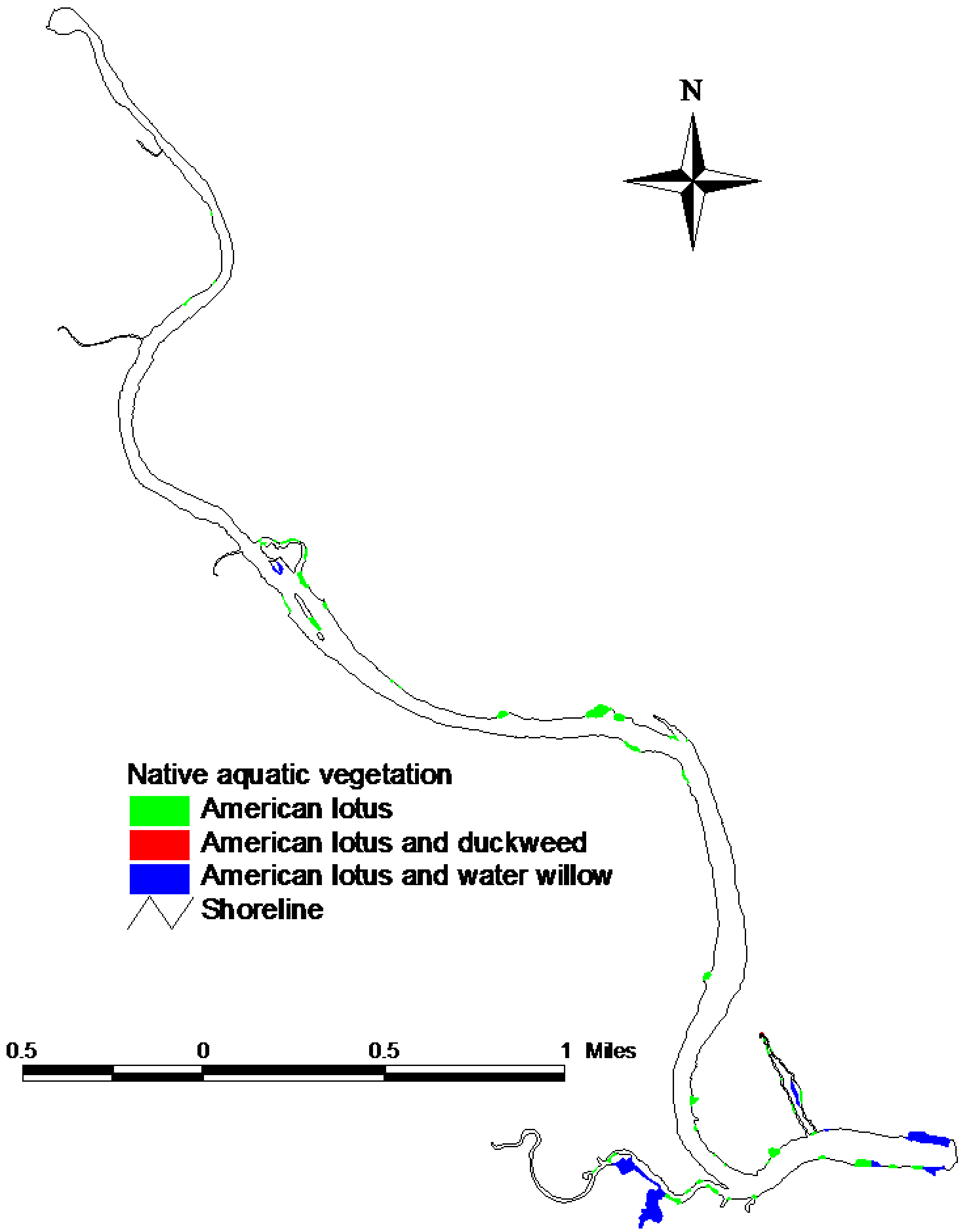
Species	Electrofishing		Gill Netting		Trap netting	
	N	CPUE	N	CPUE	N	CPUE
Spotted Gar			2	0.2		
Longnose Gar			8	0.8		
Gizzard Shad	45	45.0	46	4.6		
Threadfin Shad	7	7.0			17	1.7
Golden Shiner	2	2.0				
Bullhead Minnow	28	28.0				
Inland Silverside	6	6.0				
Grey Redhorse			10	1.0		
Blue Catfish			15	1.5		
Channel Catfish			14	1.4	1	0.1
Flathead Catfish			10	1.0	1	0.1
Redbreast Sunfish	6	6.0	2	0.2	1	0.1
Green Sunfish	1	1.0				
Warmouth	4	4.0				
Bluegill	92	92.0	5	0.5	113	11.3
Longear Sunfish	6	6.0			24	2.4
Redear Sunfish	7	7.0			17	1.7
Spotted Bass	8	8.0	1	0.1		
Largemouth Bass	59	59.0	5	0.5		
White Crappie	1	1.0	2	0.2	29	2.9
Black Crappie			1	0.1	9	0.9
Rio Grande Cichlid	8	8.0			1	0.1
Blue Tilapia	2	2.0	2	0.2		

APPENDIX B



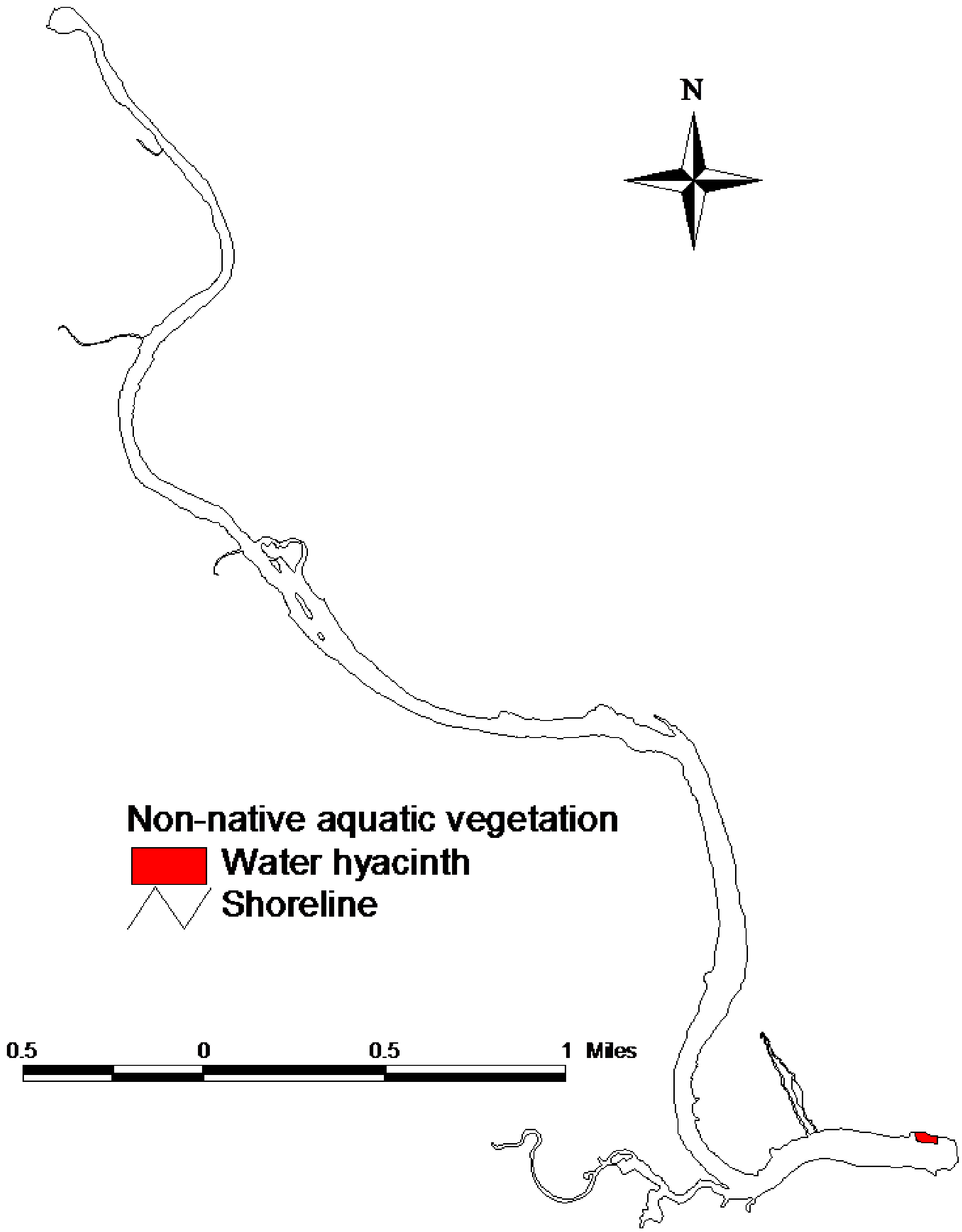
Location of sampling sites, Lake Placid, Texas, 2016-2017. Trap net, gill net, tandem-hoop net, low frequency electrofishing, and fall electrofishing stations are indicated by T, G, H, L, and E, respectively. Water level was near full pool at time of sampling.

APPENDIX C



Map of native aquatic vegetation, Lake Placid, Texas, 2016.

APPENDIX D



Map of non-native aquatic vegetation, Lake Placid, Texas, 2016.

APPENDIX E

Images of native vegetation planting project, Lake Placid, Texas, 2017.