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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2016 Fisheries Management Survey Report

Colorado City Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Colorado City Reservoir were surveyed in 2017 using electrofishing and gill netting. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Colorado City Reservoir is a 1,618-acre reservoir located on Morgan Creek, a tributary of the Colorado River, west of Colorado City in Mitchell County, Texas. Habitat consisted primarily of flooded terrestrial vegetation, boulders, and boat docks. The Morgan Creek Power Plant, that used Colorado City as a cooling reservoir, ceased operating in 2008. Since then, the reservoir water level was not maintained at a near-constant level, as it had been in the past. Colorado City Reservoir has been severely impacted by toxic golden algae (*Prymnesium parvum*) blooms nearly every year since 2001 with fish kills occurring regularly. Shoreline access was good, including at the Lake Colorado City State Park, but boat access was not possible from 2011-2016 due to low water level. Boater access became available at the state park ramp after heavy rains in November 2016 increased water level.

- **Management History:** Historically, important sport fish included Largemouth Bass, White Bass, Channel Catfish, Blue Catfish, and Red Drum. Following golden algae-induced fish kills, fish stockings were conducted to reestablish populations. Florida Largemouth Bass (603,683) and Bluegill (863,965) were stocked during 2004-2008 and Channel Catfish (1,054,326) during 2003-2008. Re-occurrence of golden alga-related toxic conditions rendered these stocking efforts unsuccessful at re-building populations. As a result, all fish stocking in this reservoir has been suspended pending sustained improvements in water quality.

- **Fish Community**
  - **Prey species:** Gizzard Shad and Bluegill were not collected during sampling. Green Sunfish and killifish spp. were present in the reservoir.
  - **Catfishes:** No Channel Catfish were collected during sampling.
  - **White Bass:** No White Bass were collected during sampling.
  - **Largemouth Bass:** Largemouth Bass were present, but only one fish was collected.
  - **White Crappie:** No White Crappie were collected during sampling.

Management Strategies: Continue to monitor for golden algae during fall, winter, and spring quarters. Stock prey species if non-toxic conditions persist for two consecutive years and stock sportfish if non-toxic conditions persist for three consecutive years. Conduct electrofishing in 2020 and gill netting in 2021.

INTRODUCTION

This document is a summary of fisheries data collected from Colorado City Reservoir in 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 fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2017 data for comparison.

Reservoir Description

Colorado City Reservoir is a 1,618-acre impoundment that was constructed in 1949 and is located on Morgan Creek, a tributary of the Colorado River, west of Colorado City in Mitchell County, Texas. The reservoir is operated and controlled by the City of Colorado City. It is a former power-plant reservoir with habitat consisting primarily of flooded terrestrial vegetation, native emergent vegetation, boulders, and boat docks. There is currently no substantial coverage of submerged aquatic vegetation. With the closing of the Morgan Creek Power Plant in 2008, pumping no longer occurs to keep the water level at a near-constant level (Figure 1). The Reservoir has experienced frequent and severe impacts from toxic golden algae (*Prymnesium parvum*) blooms since 2001 (Appendix C).Fish kills routinely occurred. In 2008, Colorado City Reservoir was classified as hypereutrophic based on Carlson's Trophic State Index for Chlorophyll-*a* (TSI Chl-*a*) with a mean TSI chl-*a* of 66.08 (Texas Commission on Environmental Quality 2011). Other descriptive characteristics for Colorado City Reservoir are shown in Table 1.

Angler Access

There is one public boat ramp (Colorado City State Park), and a privately-owned boat ramp at Cooper's Cove resort (Table 2). Shoreline-angler access was adequate at Lake Colorado City State Park. The state park boat ramp was not usable due to low water level until fall 2016 when an 8ft water level rise made the ramp usable.

Management History

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

1. Continue monitoring golden algae cell density and toxicity levels to determine water quality. If significant improvements in water quality (e.g., no toxic conditions for a minimum of two years) are documented, then stock with Bluegill, Largemouth Bass, Channel Catfish and White Crappie (via management stocking) to help rebuild these populations and re-establish the fishery.
   Action: Golden Algae cell density and toxicity were monitored. Colorado City Reservoir was non-toxic during winter 2016-2017. No stockings have been requested.
2. Cooperate with controlling authorities to post signage, educate the public about invasive species, and track existing and future inter-basin water transfers to facilitate potential invasive species responses.
   Action: Continued to work with controlling authorities to post signage and to educate the public on invasive species threats through media outlets.

Harvest regulation history: Sport fish in Colorado City Reservoir are currently managed with statewide regulations (Table 3).

Stocking history: Red Drum were originally stocked in 1981. In an effort to maintain the population, stocking took place nearly every year from 1991 to 2003. Stocking was terminated in 2004 when it was determined that the power station that produced the warm water winter refuge necessary for the survival of red drum was scheduled for closure. The reservoir has been impacted by fish kills since 2001 due to golden algae blooms. When water quality conditions permitted, sport fish and forage fish were stocked to rebuild the populations. Florida Largemouth Bass (FLMB) were first stocked in 1986. Additional FLMB stocking occurred from 2004 to 2008. Bluegill were stocked as forage during the period 2004-2008. Channel Catfish were stocked from 2003 to 2008. Hybrid crappie were stocked between 1994 and 1997. The complete stocking history is shown in Table 4.

Vegetation/habitat management history: Colorado City Reservoir has no significant vegetation management history. The last survey was conducted in 2000 (Dennis and Farquhar 2001) and aquatic vegetation coverage has historically been <1%.

Water transfer: Colorado City was used as a power plant cooling reservoir up until 2008 when the plant closed. Now the reservoir is primarily used for municipal water supply and recreation. Water transfers have been conducted in the past by the Colorado River Municipal Water District, moving water from Champion Creek, E. V. Spence, and Moss Creek Reservoirs into Colorado City Reservoir.

METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Colorado City Reservoir (TPWD unpublished). Primary components of the OBS plan are listed in Table 5. All gill net sites were randomly selected and surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015) unless otherwise indicated. Electrofishing was conducted during daytime at biologist-selected stations.

Electrofishing – Largemouth Bass, Sunfishes, and Gizzard Shad were collected by electrofishing (0.67 hours at 4, 10-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Gill netting – Channel Catfish and White Bass were targeted by gill netting (5 net nights at 5 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

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 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.

Water level – Source for water level data was the United States Geological Survey (USGS 2017).

RESULTS AND DISCUSSION

Habitat: A habitat survey was last conducted in 2000 (Dennis and Farquhar 2001). No habitat/vegetation survey was conducted in 2016. A very limited amount of flooded terrestrial vegetation was observed in the reservoir during fish population sampling.

Prey species: No Gizzard Shad or Bluegill were observed during gill netting or electrofishing in 2017. Green Sunfish were present in the reservoir. Killifish (*Fundulus spp.*) were present and were abundant in shallow rocky shoreline areas.

Channel Catfish: No Channel Catfish were collected during gill netting or electrofishing in 2017.

White Bass: No White Bass were collected during gill netting or electrofishing in 2017.

Largemouth Bass: Largemouth Bass were present in the reservoir, but total CPUE was only 1.5 fish/hr. Only one 12 inch Largemouth Bass with a relative weight (W_r) of 99 was collected.

White Crappie: No specific sampling for crappie was conducted and no crappie were observed during gill netting or electrofishing.

Fisheries management plan for Colorado City Reservoir, Texas

Prepared – July 2017.

ISSUE 1: Colorado City Reservoir has been severely impacted by golden algae for more than 15 years, however slight improvements were observed in 2016-2017. Water levels increased in late fall 2016 and the reservoir remained non-toxic. Continued monitoring is needed to determine if and when forage and sport fish can begin to be re-stocked.

MANAGEMENT STRATEGY

1. Continue to monitor golden algae levels with quarterly monitoring in fall, winter, and spring.
2. If adequate water levels persists and the reservoir remains non-toxic through winter/spring 2017-2018 (two consecutive years), request stockings of Bluegill and conduct management stockings of Gizzard Shad to re-establish the prey base. Additionally, request stocking Channel Catfish.
3. If the Reservoir remains non-toxic through 2018-2019 (three consecutive years), request stockings of Largemouth Bass and conduct management stocking of White Crappie to begin rebuilding the sportfish population.
4. Monitor fish populations with electrofishing in 2020

ISSUE 2: 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. Giant salvinia (*Salvinia molesta*) 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 access points around the reservoir.
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 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.

Objective-Based Sampling Plan and Schedule

Colorado City Reservoir FY 2017-2020

Sport fish, forage fish, and other important fishes

All fish species in Colorado City Reservoir have been negatively impacted by toxic golden algae blooms. Historically, Largemouth Bass, White Crappie, and Catfish species were important sport fish. Gizzard Shad and Bluegill were important forage species.

Low-density fisheries

Currently, all fish populations are low-density fisheries due to toxic golden algae blooms.

Survey objectives, fisheries metrics, and sampling objectives

Our survey objectives are to determine species composition and monitor for increases in abundance. Fisheries metrics to be collected include CPUE, length frequency, PSD, and condition of all sportfish species encountered. For prey species, we will collect CPUE, length frequency and IOV for Shad and CPUE, PSD and Length frequency for Bluegill. However, due to the exploratory nature of the surveys, no defined sampling objectives will be made for the number of stock size fish to be collected or for the precision of abundance estimates. We will conduct 1 hour of daytime electrofishing in fall 2020, contingent on golden algae monitoring results (Table 6).

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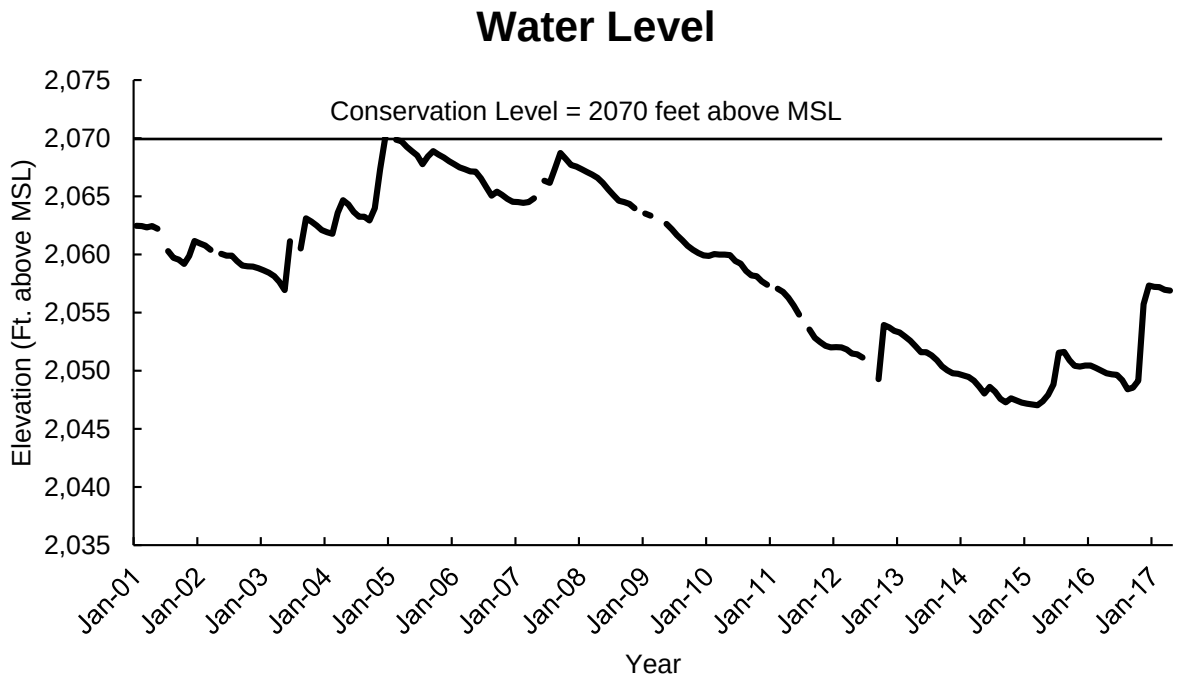


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Colorado City Reservoir, Texas.

Table 1. Characteristics of Colorado City Reservoir, Texas.

Characteristic	Description
Year constructed	1949
Controlling authority	City of Colorado City
County	Mitchell
Reservoir type	Tributary
Shoreline Development Index (SDI)	4.09
Conductivity	4,950 μmhos/cm

Table 2. Boat ramp characteristics for Colorado City Reservoir, Texas, April, 2017. Reservoir elevation at time of survey was 13 feet below mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Lake Colorado City State Park	32.339583 -100.92872	Y	15	2053	Excellent. No Issues.
Cooper's Cove	32.356565 -100.93366	N	10	2057	Out of Water. Extension is feasible.

Table 3. Harvest regulations for Colorado City 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, Largemouth	5	14-inch minimum
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Colorado City Reservoir, Texas. FGL = fingerling; FRY = fry; ADL = adults; UNK = unknown.

Species	Year	Number	Size
Threadfin Shad	1980	2,000	UNK
Bluegill	2003	162,739	FGL
	2004	83,251	FGL
	2005	168,338	FGL
	2006	140,191	FGL
	2007	135,618	FGL
	2008	173,828	FGL
	Total	863,965	
Channel Catfish	1972	7,000	UNK
	2003	79,983	FGL
	2003	151	ADL
	2004	149,628	FGL
	2005	359,478	FRY
	2005	165,719	FGL
	2006	142,404	FGL
	2008	156,963	FGL
	Total	1,061,326	
Largemouth Bass	1966	40,000	UNK
	1968	25,000	UNK
	1970	15,000	UNK
	1972	50,000	UNK
	1997	161,800	FGL
	Total	291,800	
Florida Largemouth Bass	1986	160,351	FGL
	2000	41,113	FGL
	2004	143,915	FGL
	2005	162,134	FGL
	2007	135,384	FGL
	2008	162,250	FGL
	Total	805,147	
Palmetto Bass	1978	10,000	UNK

Table 4. Stocking history continued.

Species	Year	Number	Size
Red Drum	1981	167,400	FGL
	1982	134,000	FGL
	1986	174,850	FGL
	1987	160,000	FGL
	1991	183,800	FGL
	1992	72,803	FGL
	1993	162,780	FRY
	1994	160,859	FGL
	1995	166,000	FGL
	1996	165,228	FGL
	1997	168,178	FGL
	1999	195,948	FGL
	2000	204,400	FGL
	2001	204,016	FGL
	2003	177,093	FGL
	Total	2,497,355	
Hybrid crappie	1994	162,548	FRY
	1995	161,830	FRY
	1996	162,423	FRY
	1997	143,697	FGL
	Total	630,498	
Walleye	1978	50,000	UNK

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

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Largemouth Bass	Exploratory	Presence/Absence	Practical Effort
Bluegill	Exploratory	Presence/Absence	Practical Effort
Gizzard Shad	Exploratory	Presence/Absence	Practical Effort
Gill netting			
Channel Catfish	Exploratory	Presence/Absence	Practical Effort
White Bass	Exploratory	Presence/Absence	Practical Effort

Table 6. Proposed sampling schedule for Colorado City 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 survey denoted by S.

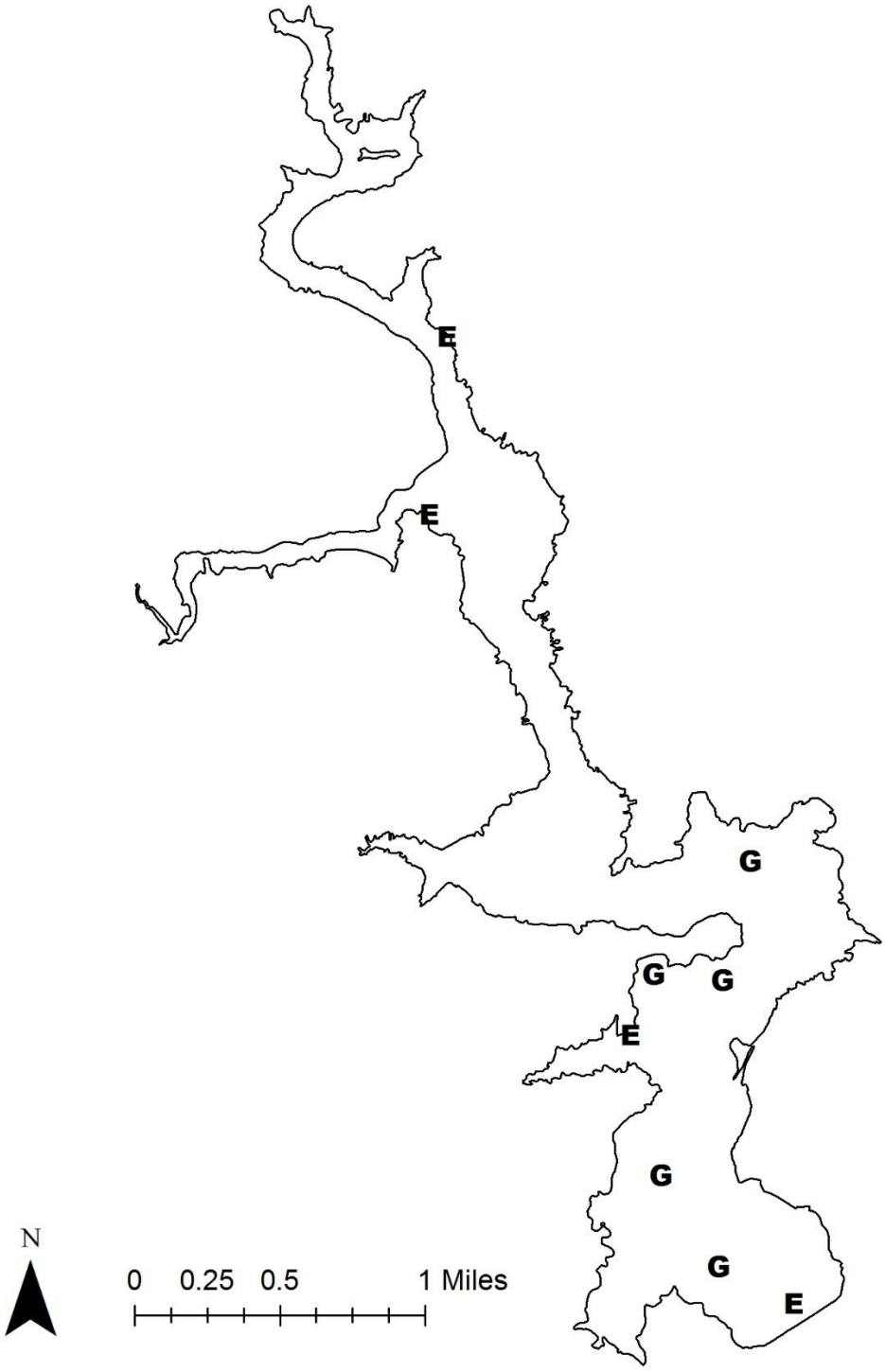
Survey year	Electrofish Fall(Spring)	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2017-2018								
2018-2019								
2019-2020								
2020-2021	S				S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Colorado City Reservoir, Texas, 2017. Sampling effort was 5 net nights for gill netting and 0.67 hour for electrofishing.

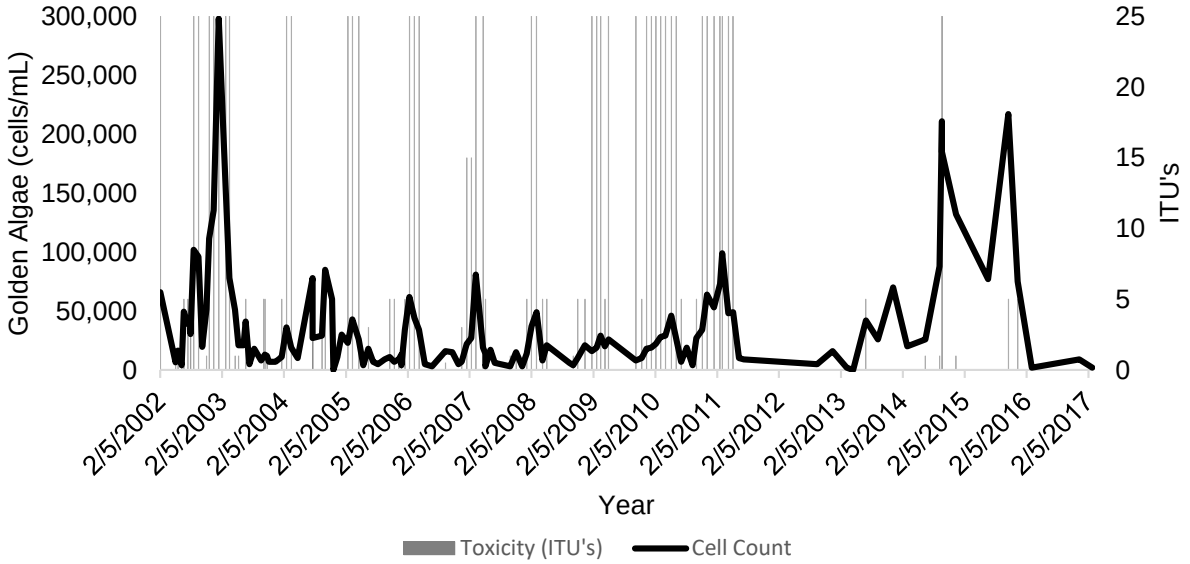
Species	Electrofishing		Gill Netting	
	N	CPUE	N	CPUE
Common Carp	64	96.0	25	5.0
Black Bullhead	1	1.5	1	0.2
Green Sunfish	2	3.0		
Largemouth Bass	1	1.5		
Killifish *spp*.	26	39.0		

APPENDIX B



Location of sampling sites, Colorado City Reservoir, Texas, 2017. Gill net and electrofishing stations are indicated by G and E, respectively. Water level was 13.1 ft. below full pool at time of sampling.

Appendix C



Golden alga monitoring results for Colorado City Reservoir, 2002 - 2017. Toxicity rankings based on laboratory bioassays conducted with fathead minnows. Toxicity rankings are: 0=non-toxic, 1.0=slight, 5.0=moderate, and 25.0=high. Cell count units are cells/mL of water.