Mina Lake

Site Description

Location
Water designation number (WDN)	26-0003-00
Legal description	T123N-R66W-Sec.12-14, 23-26
County (ies)	Brown; Edmunds
Location from nearest town	14.0 miles east of Ipswich, SD

Survey Dates and Sampling Information
Survey dates	August 4-6, 2015 (FN, GN)
	September 28, 2015 (EF-WAE)
Frame net sets (n)	18
Gill net sets (n)	6
Electrofishing-WAE (min)	60

Morphometry (Figure 1)
Watershed area (acres)	195,000
Surface area (acres)	806
Maximum depth (ft)	27
Mean depth (ft)	9

Ownership and Public Access
Mina Lake is an impoundment owned by the State of South Dakota and the fishery is managed by the SDGFP. Two public access sites are located on Mina Lake, one within the state park and the other along the southeastern shore near the outlet structure (Figure 1). The shoreline has mixed ownership including the State of South Dakota and private individuals.

Watershed and Land Use
Land use within the Mina Lake watershed is primarily agricultural and includes a mix of cropland (cultivated and non-cultivated) and range/pastureland. Housing and small shelterbelts/farmsteads comprise the remaining portions.

Water Level Observations
Water levels on Mina Lake are not monitored by SDDENR.

Fish Management Information
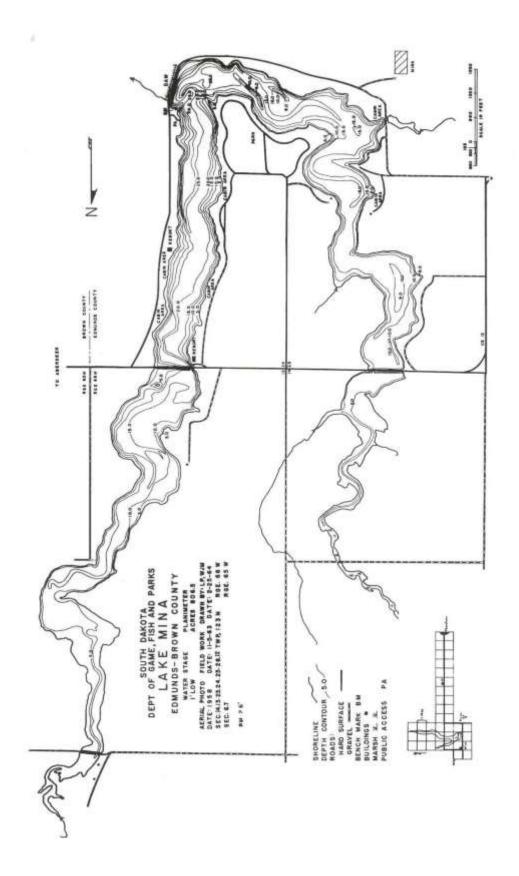|	
Primary species	black crappie, bluegill, channel catfish, walleye,
Other species	black bullhead, common carp, emerald shiner, freshwater drum, golden shiner, green sunfish, largemouth bass, northern pike, orangespotted sunfish, rock bass, rudd, shortnose gar, white bass, white sucker, yellow perch
Lake-specific regulations	none
Management classification	warm-water permanent
Fish consumption advisories	none

Figure 1. Map depicting depth contours of Mina Lake, Edmunds County, South Dakota.
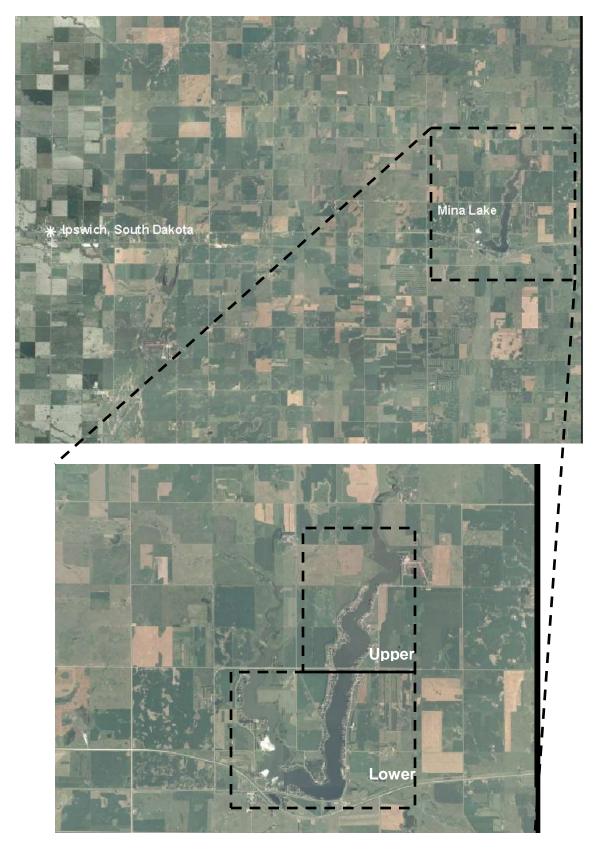
Figure 2. Map depicting geographic location of Mina Lake from Ipswich, Edmunds County, South Dakota (top). Also noted are upper and lower section designations (bottom).
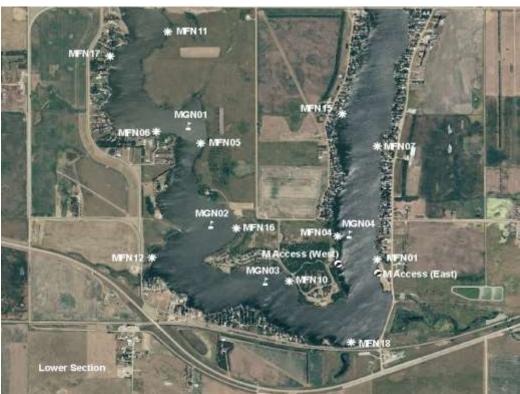
Figure 3. Map depicting access points and standardized net locations for upper and lower sections of Mina Lake, Edmunds County, South Dakota. MFN= frame nets, MGN= gill nets

Management Objectives

1) Maintain a mean frame net CPUE of stock-length black crappie ≥ 10, a PSD of 30-60, and a PSD-P of 5-10.

2) Maintain a mean frame net CPUE of stock-length bluegill ≥ 25, a PSD of 30-60, and a PSD-P of 5-10.

3) Maintain a channel catfish population to diversify sport fishing opportunity in Mina Lake.

4) Maintain a mean gill net CPUE of stock-length walleye ≥ 10, a PSD of 30-60, and a PSD-P of 5-10.

5) Maintain a mean frame net CPUE of stock-length black bullhead ≤ 100.

Results and Discussion

Mina Lake is an impoundment constructed in the 1930's on Snake Creek approximately 12 miles west of Aberdeen, South Dakota. Snake Creek drains portions of McPherson, Edmunds, and Brown counties in South Dakota. Mina Lake is primarily managed as a black crappie, bluegill, channel catfish and walleye fishery.

Primary Species

Black Crappie: In 2015, frame nets captured only one stock-length black crappie with a TL of 18 cm (7.1 in; Figure 4). The mean frame net CPUE of stock-length black crappie was 0.1 (Table 1) and below the minimum objective (≥10 stock-length black crappie/net night; Table 3). The 2013-2015 frame net CPUE's have represented a substantial decrease from the 2012 CPUE of 31.3 (Table 2) and indicated low relative abundance. The cause of the decrease in relative abundance is unknown.

Low sample size precludes analysis of condition, size and age structure of the black crappie population.

Bluegill: The mean frame net CPUE of stock-length bluegill was 5.7 (Table 1) and below the minimum objective (≥ 25 stock-length bluegill/net night; Table 3). Since 2006, the mean frame net CPUE of bluegill has fluctuated from a low of 0.6 (2009) to a high of 16.7 (2014; Table 2). Based on the 2015 frame net CPUE, relative abundance is considered low.

Frame net captured bluegill ranged in TL from 9 to 24 cm (3.5 to 9.4 in), with most being quality-preferred length (15-20 cm; 6-8 in; Figure 5). Both the PSD of 98 and PSD-P of 24 were above the management objective ranges (30-60 and 5-10, respectively; Table 3).

Otoliths were collected from a sub-sample of frame net captured bluegill in 2015. Five year classes (2008, 2011-2014) were represented with the 2012 and 2013 year classes being the most abundant comprising 26% and 55%, respectively, of bluegill captured (Table 4).

Growth of bluegill was good with weighted mean length at capture at age-2 and age-3 of 175mm and 201 mm, respectively (6.9 and 7.9 in, respectively; Table 5). Sampled bluegill had mean Wr values > 118 for all 10-mm length groups represented and the mean Wr was 119 (Table 1).

Channel Catfish: Since 2006, the relative abundance of channel catfish has remained low; mean frame net CPUE's have ranged from a low of 0.4 to a high of 5.7 (Table 2). In 2015, frame nets captured 19 individuals ranging in TL from 21 to 64 cm (8.3 to 25.2 in; Figure 6). The mean frame net CPUE of stock-length channel catfish was 0.7 (Table 1).

No growth information was available. Although sample size was low, frame net captured channel catfish appeared to be in good condition with mean Wr of stock-length channel catfish of 86.

Walleye: Recruitment of both naturally-produced and stocked walleye has been extremely poor in Mina Lake. In recent years, walleye of various sizes have been stocked annually with limited success (Table 4; Table 6). As a result mean gill net CPUE values for stock-length walleye have remained low (Table 2). In 2010, 43 walleye from the 2009 cohort, most of which were sub-stock, were captured in the gill net catch (Table 5; Figure 7). Recruitment of walleye from the 2009 year class, which coincided with a small fingerling stocking (Table 6; Table 8) represented the first substantial walleye recruitment in Mina Lake since 1998.

In 2015, gill nets captured 10 stock-length walleye that ranged in TL from 27 to 59 cm (10.6 to 23.2 in) representing five cohorts (2008-2009, 2011 and 2013-2014; Table 6; Figure 7). The mean gill net CPUE of stock-length walleye was 1.7 (Table 1). Few inferences can be made concerning size structure, growth, or condition due to the low sample size.

In 2015, fall night electrofishing indicated that a relatively strong age-0 year class, which coincided with a small fingerling stocking, was produced (mean CPUE = 69.0; Table 1, Table 8). The 2015 age-0 walleye fall electrofishing CPUE is the highest observed since 2006 and is higher than the 2009 CPUE of 54.9 (Table 2), which was the only recent year class to exhibit fair recruitment into the population. Recruitment of the 2015 cohort is currently unknown and will be assessed in future surveys.

Other Species

Black Bullhead: The mean frame net CPUE of stock-length black bullhead was 41.8 (Table 1) and within the objective range (≤100 stock-length black bullhead/net night; Table 3). Since 2006, mean frame net CPUE values have varied from a low 0.9 (2009) to a high of 85.5 (2012; Table 2). The 2015 mean frame net CPUE represented

an increase from the 2014 CPUE of 31.1 and relative abundance is still considered high.

Frame net captured black bullhead ranged in TL from 15 to 33 cm (5.9 to 13.0 in; Figure 8). The 2015 frame net PSD was 72 and the PSD-P was 30 (Table 1). Mean Wr values ranged from 71 to 95 for all 10-mm length groups sampled. The mean Wr of stock-length individuals was 84 (Table 1) and a decreased trend in Wr was observed as TL increased.

Freshwater Drum: The mean gill net CPUE of stock-length freshwater drum was 2.3 (Table 1). Since 2006, the mean gill net CPUE of freshwater drum has ranged from a low of 2.3 (2015) to a high of 30.2 (2007; Table 2).

Freshwater drum captured in the 2015 gill net catch ranged in TL from 34 to 40 cm (13.4 to 15.7 in), had a PSD of 100 and PSD-P of 29 (Table 1; Figure 9). No age or growth information was collected. The majority of freshwater drum captured were in the quality-preferred length category, which had a mean Wr of 94.

Yellow Perch: Mina Lake often contains a low to moderate density yellow perch population that is likely inhibited by habitat characteristics similar to other large impoundments in Region IV (i.e., Richmond and Elm lakes). In 2015, the mean gill net CPUE of stock-length yellow perch was 32.5 (Table 1) and the highest recorded since 2006 (Table 1; Table 2). Gill net CPUE has increased since 2014 (Table 2) indicating increased recruitment and the relative abundance is considered high in 2015.

Gill net captured yellow perch ranged in TL from 15 to 30 cm (5.9 to 11.8 in), had a PSD of 92 and a PSD-P of 15 (Table 1; Figure 10). Five consecutive year classes (2010-2014; Table 9) were represented. The 2013 cohort was the most abundant and comprised 79% of yellow perch in the gill net catch (Table 9).

In recent years, yellow perch in Mina Lake attained quality length (20 cm; 8 in) during their third growing season at age 2 (Table 8). In 2015, the weighted mean TL at capture of age-2 individuals was 220 mm (8.7 in; Table 10). Yellow perch in the gill net catch had mean Wr values > 93 for all length categories (e.g., stock to quality) sampled; stock-length individuals had a mean Wr of 98 (Table 1).

Northern Pike: The 2015 mean gill net CPUE for northern pike was 2.3 (Table 1). Since 2006, mean gill net CPUE values have ranged from 0.0 (2006, 2007) to 3.5 (2008; Table 2). Relative abundance is considered moderate.

Gill net captured northern pike ranged in TL from 32 to 73 cm (12.6 to 28.7 in). The PSD was 57 and PSD-P was 7 (Table 1). Condition was good with mean Wr values ranging from 82 to 88 for all length categories (e.g., stock to quality) sampled; stock-length individuals had a mean Wr of 84 (Table 1).

Other: Common carp, hybrid sunfish and white sucker were other fish species captured in low numbers during the 2015 survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys on an annual basis (next survey scheduled in summer 2016) to monitor fish relative abundance, fish population size structure, fish growth and stocking success.

2) Collect otoliths from black crappie, bluegill, and walleye to assess the age structure and growth rates of each population.

3) Stock channel catfish fingerlings (≈50 fingerlings/acre) every third year (when available) to bolster the channel catfish fishery in Mina Lake.

4) Consider re-introduction of saugeye into the population, as walleye recruitment has been poor. Stock saugeye (≈100 small fingerlings/acre) to establish additional year-classes if gill netting and/or fall night electrofishing CPUE of age-0 saugeye/walleye results warrant [i.e., low gill net CPUE of sub-stock (< 25 cm; 10 in) saugeye/walleye and/or fall night electrofishing CPUE of < 75 age-0 fish/hour].

5) Conduct fall night electrofishing on an annual basis to monitor age-0 saugeye/walleye relative abundance.

Table 1. Mean catch rate (CPUE; gill/frame nets= catch/net night, electrofishing= catch/hour) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) of stock-length fish for various fish species captured in gill nets, frame nets, and electrofishing in Mina Lake, 2015. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= black bullhead; BLC= black crappie; BLG= bluegill; CCF= channel catfish; COC= common carp; FRD= freshwater drum; HYB= hybrid sunfish; NOP= northern pike; WAE= walleye; WHS= white sucker; YEP= yellow perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
Frame nets								
BLB	41.8	22.3	72	3	30	3	84	1
BLC	0.1	0.1	0	---	0	---	117	---
BLG	5.7	2.6	98	2	24	7	119	0
CCF	0.7	0.3	69	24	8	14	86	7
COC	0.6	0.3	82	22	0	---	95	2
FRD	0.9	0.3	100	0	24	19	83	2
HYB[1]	0.1	0.1	100	---	0	---	---	---
NOP	0.4	0.2	75	31	50	36	70	14
WAE	0.1	0.1	0	---	0	---	---	---
WHS	0.3	0.3	100	0	83	34	89	6
YEP	1.6	0.6	97	6	0	---	92	1
Gill nets								
BLB	23.5	14.4	56	7	8	4	93	0
CCF	2.7	0.8	100	0	56	22	93	4
COC	1.2	0.9	14	28	0	---	99	4
FRD	2.3	1.3	100	0	29	22	91	3
NOP	2.3	1.0	57	24	7	13	84	3
WAE	1.7	1.0	60	30	20	24	96	3
WHS	0.2	0.2	100	---	100	---	97	---
YEP	32.5	15.5	92	3	15	4	98	0
Electrofishing								
WAE[2]	69.0	---	---	---	---	---	---	---

[1] All fish sizes
[2] Fall night electrofishing-WAE; catch rate (CPUE) represents age-0 walleye/hour

Table 2. Historic mean catch rate (CPUE; gill/frame nets= catch/net night, electrofishing= catch/hour) of stock-length fish for various fish species captured in frame nets, experimental gill nets, and by electrofishing from Mina Lake, 2006-2015. BLB= black bullhead; BLC= black crappie; BLG= bluegill; CCF= channel catfish; COC= common carp; FRD= freshwater drum; GSF= green sunfish; HYB= hybrid sunfish; LMB= largemouth bass; NOP= northern pike; OSF= orangespotted sunfish; ROB= rock bass; SHG= shortnose gar; WAE= walleye; WHB= white bass; WHS= white sucker; YEP= yellow perch

									CPUE	
Species	2006[3]	2007[3]	2008	2009	2010	2011	2012	2013	2014	2015
Frame nets										
BLB	6.0	16.2	5.8	0.9	8.9	8.1	85.5	35.2	31.1	41.8
BLC	25.9	9.0	2.5	3.2	1.1	16.7	31.3	0.2	0.1	0.1
BLG	5.9	10.8	1.8	0.6	1.8	3.9	5.6	6.7	16.5	5.7
CCF	0.6	4.8	2.4	3.6	4.2	5.7	1.2	0.6	1.4	0.7
COC	1.7	6.0	1.9	2.1	1.0	1.1	0.5	0.2	0.6	0.6
FRD	2.3	3.7	2.3	2.1	1.1	1.0	0.0	0.4	0.3	0.9
GSF	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HYB[1]	2.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1
NOP	0.3	0.2	3.2	2.2	2.4	1.1	2.0	0.9	0.8	0.4
OSF[1]	0.4	11.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
ROB	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SHG[1]	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WAE	0.5	0.2	0.3	0.3	0.3	0.5	0.7	0.1	0.3	0.1
WHB	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WHS	0.7	1.2	0.3	0.3	0.3	0.1	0.1	0.5	0.3	0.3
YEP	2.3	1.1	1.7	1.9	1.0	1.4	2.1	1.2	9.6	1.6
Gill nets										
BLB	6.0	10.3	8.2	12.2	10.7	7.5	44.7	17.0	24.5	23.5
BLC	0.7	0.0	0.0	0.0	0.5	1.5	1.0	0.0	0.0	0.0
BLG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0
CCF	0.7	1.0	1.7	1.8	0.8	1.7	1.0	3.2	1.0	2.7
COC	5.2	15.5	8.7	1.2	0.2	0.2	1.2	0.2	0.5	1.2
FRD	17.0	30.2	19.0	12.8	6.0	7.2	3.3	7.3	5.5	2.3
LMB	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
NOP	0.0	0.0	3.5	1.5	3.3	0.3	1.3	0.7	0.5	2.3
OSF[1]	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
WAE	0.5	0.3	1.0	0.2	0.7	1.8	1.2	3.5	0.7	1.7
WHS	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.2	0.2
YEP	9.2	4.2	1.7	4.3	6.0	8.3	14.8	8.7	27.2	32.5
Electrofishing										
WAE[2]	0.0	0.0	0.0	54.9	10.8	31.0	---	0.0	7.0	69.0

[1] All fish sizes
[2] Fall electrofishing-WAE; catch rate (CPUE) represents age-0 walleye/hour
[3] Monofilament gill net mesh size (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 3. Mean catch rate (CPUE; gill/frame nets= catch/net night), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) of stock-length fish for selected species captured by frame nets and gill nets in Mina Lake, 2006-2015. BLB= black bullhead; BLC= black crappie; BLG= bluegill; WAE= walleye

Species	2006[1]	2007[1]	2008	2009	2010	2011	2012	2013	2014	2015	Objective
Frame nets											
BLB											
CPUE	6	16	6	1	9	8	86	35	31	42	≤ 100
PSD	90	23	45	56	74	69	93	96	75	72	---
PSD-P	47	6	1	0	0	1	6	25	41	30	---
Wr	87	87	89	88	87	83	94	90	86	84	---
BLC											
CPUE	26	9	3	3	1	17	31	<1	<1	<1	≥ 10
PSD	6	100	58	100	20	58	90	100	100	0	30-60
PSD-P	5	21	44	26	15	4	15	100	100	0	5-10
Wr	122	113	118	117	118	113	112	---	116	117	---
BLG											
CPUE	6	11	2	1	2	4	6	7	17	6	≥ 25
PSD	72	41	94	40	66	94	55	31	92	98	30-60
PSD-P	7	9	3	30	19	13	21	13	2	24	5-10
Wr	124	122	124	124	122	116	123	112	126	119	---
Gill nets											
WAE											
CPUE	1	<1	1	<1	1	2	1	4	1	2	≥ 10
PSD	67	100	83	100	0	0	29	62	100	60	30-60
PSD-P	67	50	33	0	0	0	0	5	25	20	5-10
Wr	105	100	107	115	82	89	84	91	104	96	---

[1] Monofilament gill net mesh size (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 4. Year class distribution based on the expanded age/length summary for bluegill sampled in frame nets from Mina Lake, 2015.

	Year Class								
Survey Year	2015	2014	2013	2012	2011	2010	2009	2008	2007
2015		6	56	27	12			1	

Table 5. Weighted mean TL (mm) at capture for bluegill age-1 through age-10 sampled in frame nets (expanded sample size) from Mina Lake 2015.

	Age							
Year	1	2	3	4	5	6	7	8
2015	137(6)	175(56)	201(27)	209(12)	---	---	240(1)	---

Table 6. Year class distribution based on the expanded age/length summary for walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from Mina Lake, 2011-2015.

Survey Year	Year Class										
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
2015		4	2		2		1	1			
2014	---					1	3				
2013	---	---			5	4	11		1		
2012	---	---	---				7				
2011	---	---	---	---			11				
Fry										800	
sm. fingerling	80	80	49	81	80	80	80	80	81		
lg. fingerling				7						23	33

[1] Monofilament gill net mesh size (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50").

Table 7. Weighted mean TL at capture (mm) for walleye sampled in experimental gill nets (expanded sample size) from Mina Lake, 2006-2015. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	Age								
	0	1	2	3	4	5	6	7	8
2015	---	290(4)	386(2)	---	470(2)	---	562(1)	599(1)	---
2014	---	---	---	---	431(1)	472(3)	---	---	---
2013	---	---	317(5)	390(4)	411(11)	---	513(1)	---	---
2012	---	---	---	357(7)	---	---	---	---	---
2011	---	---	303(11)	---	---	---	---	---	---
2010	---	224(43)	---	---	---	---	---	---	---
2009	122(1)	---	---	---	489(1)	---	---	---	---
2008	---	---	364(1)	---	---	---	501(2)	493(2)	551(1)
2007	---	---	---	429(1)	---	---	514(1)	---	---
2006	---	330(1)	---	---	---	520(1)	520(1)	---	---

Table 8. Stocking history including size and number for fishes stocked into Mina Lake, 2006-2015. CCF= channel catfish; WAE= walleye

Year	Species	Size	Number
2006	WAE	fry	800,000
	WAE	large fingerling	23,110
	CCF	fingerling	42,350
2007	WAE	small fingerling	80,780
2008	WAE	small fingerling	80,000
2009	WAE	small fingerling	80,115
2010	WAE	small fingerling	80,300
2011	WAE	small fingerling	79,980
2012	CCF	fingerling	17,075
	WAE	small fingerling	80,850
	WAE	large fingerling	7,485
2013	WAE	small fingerling	48,900
2014	WAE	small fingerling	79,906
2015	WAE	small fingerling	80,060

Table 9. Year class distribution based on the expanded age/length summary for yellow perch sampled in gill nets from Mina Lake, 2012-2015.

Survey Year	Year Class								
	2015	2014	2013	2012	2011	2010	2009	2008	2007
2015		2	154	19	19	1			
2014	---		91	19	37	5	12		
2013	---	---		5	30	7	10		
2012	---	---	---		8	17	55	2	7

Table 10. Weighted mean TL (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from Mina Lake, 2012-2015.

Year	Age				
	1	2	3	4	5
2015	159(2)	220(154)	250(19)	271(19)	302(1)
2014	164(91)	225(19)	247(37)	259(5)	267(12)
2013	159 (5)	213 (30)	219 (7)	248 (10)	---
2012	152 (8)	203 (17)	227 (55)	264 (2)	244 (7)

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black crappie captured using frame nets in Mina Lake, 2011-2015.
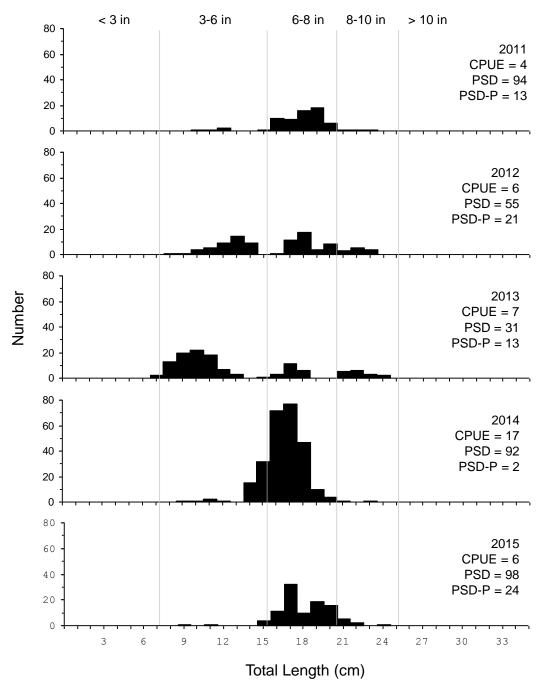
Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE),
proportional size distribution of quality- (PSD) and preferred-length (PSD-P)
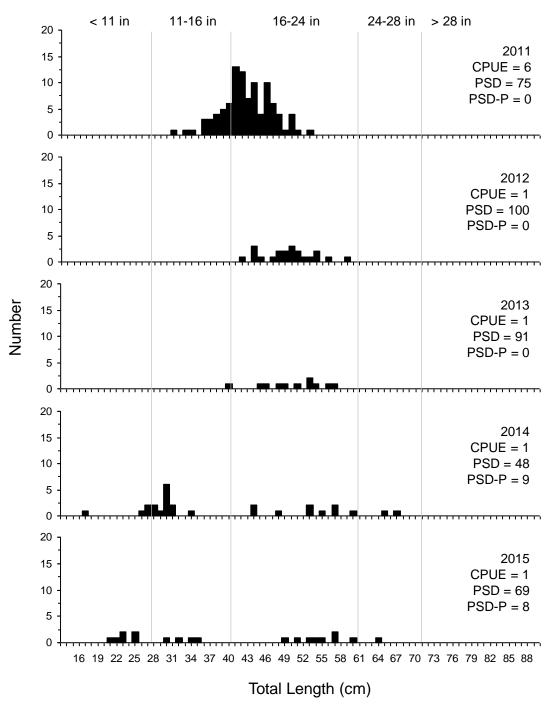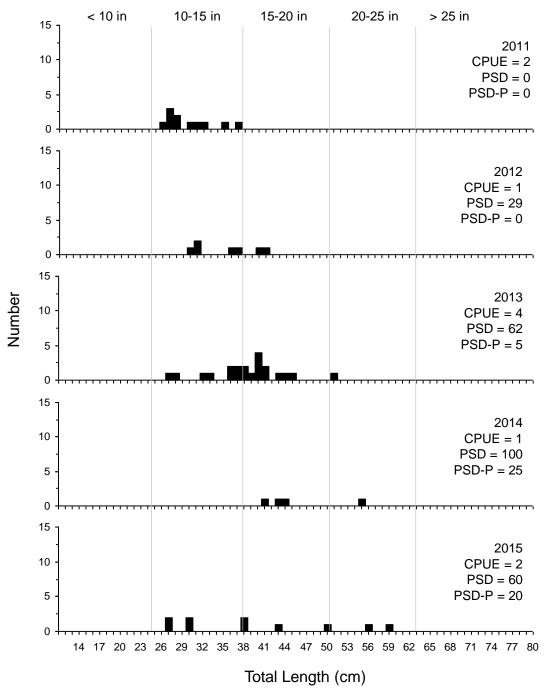fish for bluegill captured using frame nets in Mina Lake, 2011-2015.

Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE),
proportional size distribution of quality- (PSD) and preferred-length (PSD-P)
fish for channel catfish captured using frame nets in Mina Lake, 2011-2015.

Figure 7. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using gill nets in Mina Lake, 2011-2015.
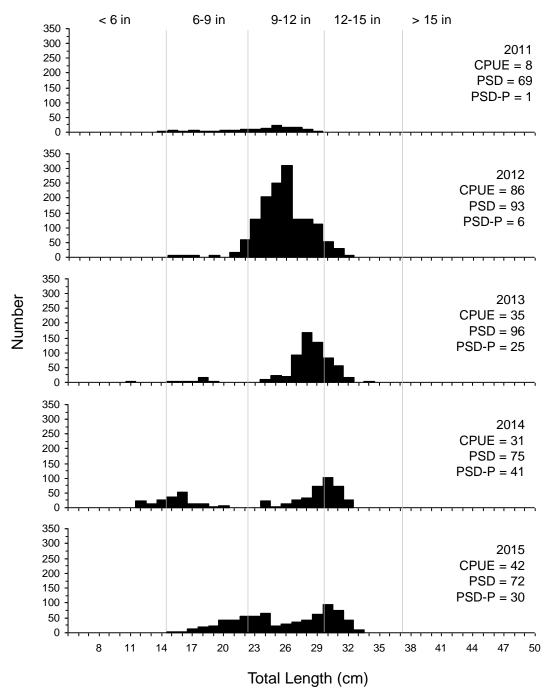
Figure 8. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black bullhead captured using frame nets in Mina Lake, 2011-2015.
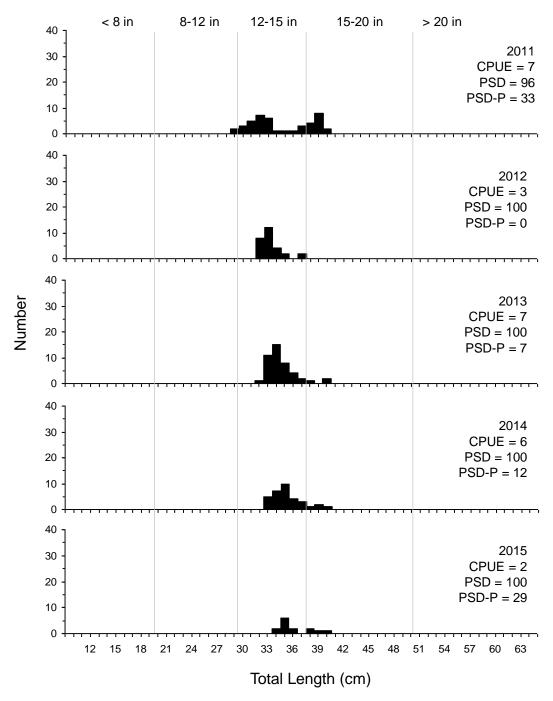
Figure 9. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for freshwater drum captured using gill nets in Mina Lake, 2011-2015.
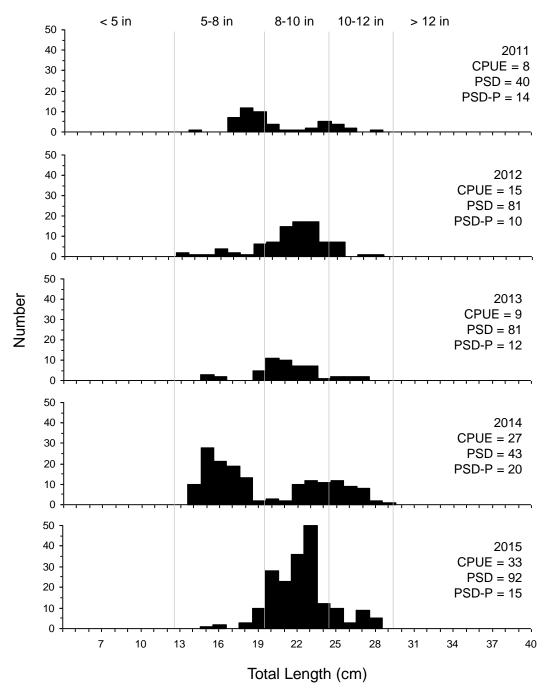
Figure 10. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Mina Lake, 2011-2015.