

Enemy Swim Lake

Site Description

Location

Water designation number (WDN)	22-0006-00
Legal description	T123N-R53W-Sec.10-16
County (ies)	Day
Location from nearest town	1.5 miles east and 6.5 miles north of Waubay

Survey Dates and Sampling Information

Dates of current survey	July 10-12; September 14, 2007
Date of most recent survey	June 12, July 11-13, September 6, 2006
Gill net sets (n)	6
Frame net sets (n)	24
Spring electrofishing (min)	0 (Boat malfunction)
Fall electrofishing (min)	62

Morphometry (Figure 1)

Watershed area (acres)	22,310
Surface area (acres)	2,146
Maximum depth (ft)	26
Mean depth (ft)	16

Ownership and Public Access

Enemy Swim Lake is a meandered lake managed by the SDGFP. Two public access sites are located on Enemy Swim Lake (southwest and south shore) and each are maintained by the SDGFP (Figure 1). Lands adjacent to Enemy Swim Lake are owned by the State of South Dakota, Bureau of Indian Affairs, and private individuals.

Watershed and Land Use

Land use within the Enemy Swim Lake watershed is primarily agricultural with much of the landscape being grassland (hay, pasture, CRP; Stueven and Bren 2000). However, many CRP contracts may have expired or will expire in upcoming years which will likely result in a higher percentage of cropland within the watershed.

Water Level Observations

The Water Management Board established Ordinary High Water Mark is 1854.4 fmsl (feet above mean sea level), and the outlet elevation of Enemy Swim Lake is 1853.6 fmsl. On May 9, 2007, the elevation of Enemy Swim Lake was 2.2 ft. higher than fall 2006 and near the Ordinary High Water Mark with an elevation of 1854.9 fmsl. By October 17, 2007 water levels on Enemy Swim Lake had declined to an elevation of 1853.6 fmsl. Enemy Swim Lake is classified as mesotrophic to eutrophic; however, Stueven and Bren (2000) reported that Enemy Swim Lake has become more eutrophic over time.



Aquatic Vegetation and Exotics

Cattail (*Typha spp.*) and bulrush (*Scirpus spp.*) is common along the much of the shoreline and occurs in large beds in Church Bay and East Lake. Submergent vegetation, primarily coontail (*Ceratophyllum demersum*) and pondweeds (*Potamogeton spp.*), is extensive in protected areas of East Lake and Church Bay; scattered areas also exist throughout much of the main lake. Common carp were the only exotic species encountered during the 2007 survey.

Fish Management Information

Primary species	black crappie, bluegill, largemouth bass, northern pike, smallmouth bass, walleye, yellow perch
Other species	black bullhead, fathead minnow, common carp, Johnny darter, logperch, orangespotted sunfish, pumpkinseed, rock bass, spottail shiner, white bass, white sucker
Management classification	warm-water permanent
Fish Consumption Advisories	none

South Dakota Game, Fish, and Parks
 SDSU Wildlife and Fisheries Sciences

Enemy Swim Lake - Day county
 Map Creation: November, 2002 Sonar Survey: August, 2002
 Shoreline: Landsat 7, August, 2000

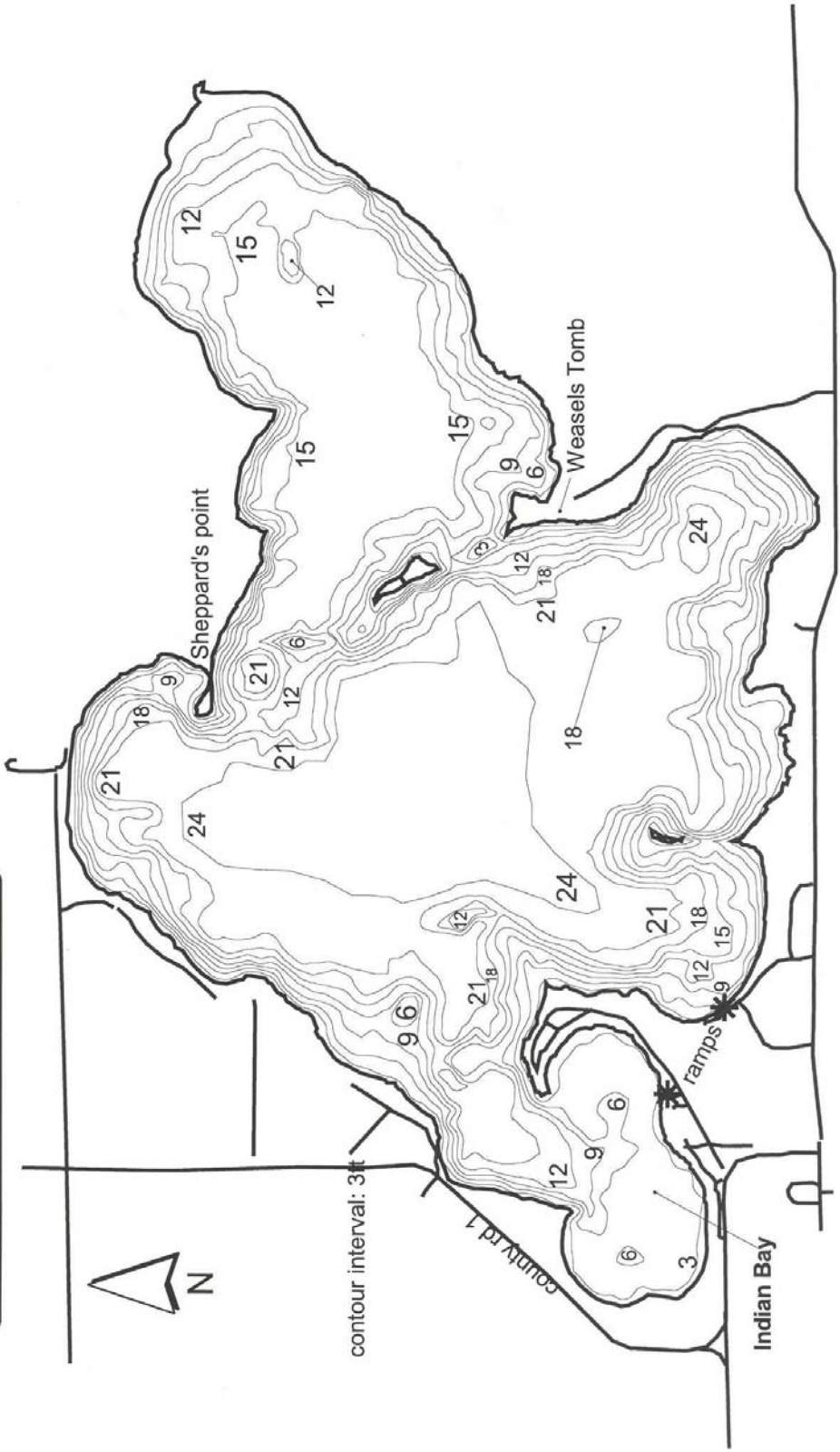


Figure 1. Enemy Swim Lake contour map.

Management Objectives

- 1) Maintain a mean gill net CPUE of stock-length walleye ≥ 10 , a PSD of 30-60, and an RSD-P of 5-10.
- 2) Maintain a mean frame net CPUE of stock-length black crappie ≥ 5 , a PSD of 30-60, and an RSD-P of 5-10.
- 3) Maintain a mean frame net CPUE of stock-length bluegill ≥ 25 , a PSD of 30-60, and an RSD-P of 5-10.
- 4) Maintain a mean gill net CPUE of stock-length yellow perch ≥ 25 , a PSD of 30-60, and an RSD-P of 5-10.
- 5) Maintain a mean fall night electrofishing CPUE of stock-length smallmouth bass ≥ 30 , a PSD of 40-70, and an RSD-P of 10-20.
- 6) Maintain a mean spring night electrofishing CPUE of stock-length largemouth bass ≥ 30 , a PSD of 40-70, and an RSD-P of 10-20.

Results and Discussion

Enemy Swim Lake is a large, permanent, natural lake situated in the Coteau des Prairie. Enemy Swim Lake has a moderately-sized watershed with excellent aquifer connections allowing the lake to sustain stable water levels. Major surface water inlets to Enemy Swim Lake include Lewandowski Creek at the northeast and Burns Slough at the southeast. Water exiting Enemy Swim Lake drains into Campbell Slough from there it flows into Blue Dog Lake and then into a series of connected lakes (Rush Lake, Minnewasta Lake, Waubay Lake and Bitter Lake).

Enemy Swim Lake is a popular recreational lake. Enemy Swim Lake is also highly developed with a large portion of the shoreline supporting residential housing and cabins. Currently, Enemy Swim Lake is primarily managed as a black bass, bluegill, and walleye fishery. Overall, Enemy Swim Lake supports one of the most diverse fish assemblages in northeast South Dakota with as many as 18 fish species contributing to the fishery.

Primary Species

Black crappie: Mean frame net CPUE of stock-length (130 mm) black crappie in 2007 was 0.8 (Table 1) and below the minimum objective (≥ 5 fish/net night) for black crappie in Enemy Swim Lake (Table 3). Since 2000, mean frame net CPUE values have fluctuated, likely related to year-class strength and sampling variability, from a high of 5.9 (2003) to a low of 0.8 (2007; Table 2). Abundance of black crappie in Enemy Swim Lake appears low, based on mean frame net CPUE values observed from 2000-2007 (Table 2; Table 3). However, sampling takes place in mid-July, likely affecting

catch rates in near-shore areas. Guy and Willis (1991) found that CPUE values for frame net captured black crappies peaked during spring (April) and fall (September) in Lake Madison.

Length-frequency analysis of the 2006 frame net catch indicated relatively consistent recruitment in recent years with what appeared to be several weak year-classes present; however, length-frequency analysis of the 2007 frame net catch suggests more variable recruitment (Figure 2). Guy and Willis (1995) found that black crappie populations in South Dakota natural lakes tend to exhibit unstable recruitment, fast growth rates, and high condition, but densities are often too low for the species to contribute to the sport fishery. During periods of increased relative abundance anglers target black crappies in Enemy Swim Lake. Blackwell (2005) reported an increase in the importance of the black crappie fishery in Enemy Swim Lake in creel surveys conducted from December 1997-August 2004 with the percent of anglers targeting black crappies being highest from 2001-2004, likely related to increased relative abundance of black crappies in Enemy Swim Lake (Table 2; Hubers 2002).

Black crappie captured in frame nets during 2007 ranged in total length from 130 to 330 mm (Figure 2). The PSD and RSD-P of black crappie captured in frame nets during 2007 was 56 and 39, respectively (Table 1; Table 3; Figure 2). The 2007 PSD was within the management objective of 30-60 while the RSD-P was above the management objective of 5-10 (Table 3).

No growth information was available for black crappie in Enemy Swim Lake in 2007. Mean W_r values for black crappie in the 2007 frame net catch exceeded 90 for all length categories sampled and no length-related trends in condition were apparent. The mean W_r of stock-length black crappie was 94 (Table 1).

Bluegill: The mean frame net CPUE of stock-length bluegill during 2007 was 43.0 (Table 1) and above the minimum objective (≥ 25) for bluegill in Enemy Swim Lake (Table 3). Since 2000, the mean frame net CPUE of stock-length bluegill in Enemy Swim Lake has remained relatively stable with CPUE values ranging from 39.7 (2004) to 85.7 (2002; Table 2). Based on the 2007 mean frame net CPUE, relative abundance of bluegill in Enemy Swim Lake appears to be moderate to moderate-high.

The bluegill population in Enemy Swim Lake has exhibited consistent recruitment of varying magnitude. Year-classes produced in 2002-2005 comprised the majority of bluegills captured in the 2007 frame net catch with the 2005 year-class being the most represented (Table 5).

The total length of bluegill captured in frame nets during 2007 ranged from 70 to 240 mm (Figure 3). Recruitment of what appears to be a relatively-strong 2005 year-class to our gear, coupled with few larger bluegills from the 1999-2001 year-classes being captured resulted in PSD and RSD-P values of 15 and 1 (Table 1; Table 5; Figure 3). Both PSD and RSD-P values were below management objectives of 30-60 and 5-10, respectively (Table 3). The number of preferred-length (200 mm) bluegill in frame net samples has declined each year from 2005-2007, likely the result of high mortality, either natural or by angling (Figure 3). From 2005-2007, an estimated 28,000 bluegill were harvested during the summer months (May-August) and an estimated 7,600 bluegill were harvested during the winter months (December-March) from Enemy Swim Lake (unpublished data, Blackwell 2007). The mean total length of bluegill harvested

from Enemy Swim Lake has ranged from 183 to 204 mm for both winter and summer periods from 2005-2007, despite decreased relative abundance of larger bluegill in the population. Coble (1988) found that, if angling mortality is sufficient to increase total annual mortality then a shift in length-frequency distribution of bluegill to smaller sizes may occur as anglers tend to select for larger individuals.

Based on weighted mean total length at capture data collected from 2003-2006 bluegill in Enemy Swim Lake typically attain quality-length (150 mm) at approximately age-5. Weighted mean total length at capture values for age-3 bluegills in Enemy Swim Lake have ranged from 87 to 125 mm since 2003 (Table 4). In 2007, weighted mean total length at capture values for age-3 and age-4 bluegills of 125 mm and 150 mm, respectively, were higher than in previous years while the weighted mean length at capture of age-2 bluegills of 96 mm was similar to past years (2003-2006; Table 4). Mean W_r values for bluegill in the 2007 frame net catch ranged from 95-108 for all length categories sampled and no length-related trends in condition were apparent. The mean W_r of stock-length bluegill was 100 (Table 1).

Largemouth bass: Largemouth bass are typically sampled using spring night electrofishing in northeast South Dakota lakes; however due to a boat malfunction spring night electrofishing was not conducted for largemouth bass in Enemy Swim Lake during 2007.

Smallmouth bass: Currently, fall night electrofishing is used to assess smallmouth bass populations in NE South Dakota. However, concerns regarding the effectiveness of fall night electrofishing at sampling larger bass have resulted in a Master of Science project being designed to evaluate the most effective approach to sample smallmouth bass. Preliminary results from Roy and Enemy Swim Lakes suggest that spring night electrofishing over suitable habitat (i.e., rocky substrate) may provide a better index to smallmouth bass populations in NE South Dakota glacial lakes (personal communication, Thomas Bacula). Research will be conducted on Clear and Pickerel Lakes in 2008 before a sampling recommendation is made.

The 2007 mean fall night electrofishing CPUE of smallmouth bass was 79.9, and above the minimum objective (≥ 30 fish/hour) for smallmouth bass in Enemy Swim Lake (Table 1; Table 3). Age structure information indicates consistent recruitment, as seven consecutive year-classes (2001-2007) were represented in the 2007 electrofishing catch (Table 6).

Smallmouth bass captured during fall night electrofishing during 2007 ranged in total length from 100 to 450 mm. The PSD was 6 and the RSD-P was 4 (Table 1; Table 3; Figure 4). Low PSD and RSD-P values generally indicate a population comprised primarily of smallmouth bass less than quality-length (280 mm). However, the low PSD and RSD-P at Enemy Swim Lake is likely the result of larger bass not being effectively sampled during fall night electrofishing. Few smallmouth bass were sampled within the 300- to 458-mm (12- to 18-inch) protected-slot and no bass larger than 458 mm (18 inches) were captured (Figure 4).

Smallmouth bass in Enemy Swim Lake typically obtain quality-length (≥ 280 mm) between age-3 and age-4 (Table 6). Smallmouth bass growth in Enemy Swim Lake has been slightly slower than the regional and statewide average reported by Willis et al.

(2001). The mean back-calculated length at age-3 for smallmouth bass was 237 mm compared to the region IV and statewide means of 249 mm to 242 mm, respectively (Table 6). Smallmouth bass captured during fall electrofishing in 2007 had a decreasing trend in mean W_r values as total length increased. Mean W_r values ranged from 85-104, with sub-stock bass having the highest condition (104) and memorable-trophy smallmouth bass having the lowest (85). The mean W_r for stock-length smallmouth bass captured during fall electrofishing in Enemy Swim Lake was 101 (Table 1).

Walleye: The mean gill net CPUE of stock-length walleye during 2007 was 14.7 (Table 1) and above the minimum objective (≥ 10 stock length fish/net night) for walleye in Enemy Swim Lake (Table 3). Since 2000, walleye relative abundance in Enemy Swim Lake based on gill net CPUE has ranged from a low of 11.0 (2001, 2004) to a high of 19.8 (2000) stock-length walleye/net night with an average of 14.6 (Table 2). Walleye relative abundance, based on mean gill net CPUE in 2007 appeared to be moderate (9-14 stock-length walleye/net night) to moderate high (15-20 stock-length walleye/net night).

The walleye population in Enemy Swim Lake has exhibited relatively consistent recruitment of varying magnitude with 11 consecutive year-classes (1996-2006) contributing to the 2007 gill net catch (Table 8; Table 9). Year-classes produced in 2001, 2002 and 2005 were the most represented in the 2007 gill net catch (Table 9). The 2001 year-class was naturally produced; while the 2002 and 2005 year-classes coincided with large fingerling stockings (Table 8; Table 9). No fall electrofishing was conducted during 2002, but fall electrofishing in 2005 indicated that a weak naturally produced year-class was present before large fingerlings were stocked (Table 2). Fall electrofishing indicated that relatively strong year-classes (defined as > 20 age-0 walleye/hour; Ermer et al. 2005) were naturally produced in 2006 and 2007; however, recruitment is unknown (Table 2).

Walleye captured in gill nets during 2007 ranged in length from 180 to 640 mm (Figure 5). The PSD of walleye captured in gill nets during 2007 was 63 and the RSD-P was 14 (Table 1; Table 3; Figure 5). The 2007 PSD and RSD-P values were near the desired objective ranges of 30-60 and 5-10, respectively, indicating a relatively balanced population (defined as PSD of 30-60 and an RSD-P of 5-10). At the time of the 2007 survey, a high proportion, approximately 64%, of walleye in the gill net catch were above the 356 mm (14-inch) minimum length restriction and available for angler harvest in Enemy Swim Lake (Figure 5).

Walleye in Enemy Swim typically attain 356 mm (14 inches) between age-3 and age-4 (Table 7). The weighted mean total length at capture of age-3 walleye was similar in 2006 and 2007 with values of 336 and 329 mm, respectively (Table 7). Weighted mean total length at capture values for age-4 and age-5 walleye during 2007 were 407 and 430 mm, and approximately 25 mm (1 inch) longer than in 2006 (Table 7). Condition of walleye in Enemy Swim Lake is similar to other permanent lakes in NE South Dakota, with mean W_r values typically in the 80's. Mean W_r values ranged from 83-94 for length categories sampled and no length-related trends in condition were apparent. The mean W_r of stock-length walleye in the 2007 gill net catch was 89 (Table 1).

Yellow Perch: The mean gill net CPUE of stock-length (130 mm) yellow perch in 2007 was 14.3 and below the minimum objective (≥ 25 fish/net night) for yellow perch in Enemy Swim Lake (Tables 1 – 3). Since 2000, yellow perch relative abundance, as indexed by mean gill net CPUE, has declined from > 50 stock-length yellow perch/net night in surveys conducted in 2000 and 2001 to values of < 20 stock-length yellow perch/net night in surveys conducted from 2004-2007 (Table 2). In 2007, yellow perch relative abundance based on gill net CPUE appeared to be moderate to low. Length-frequency analysis of yellow perch captured in gill nets in 2007 indicates consistent recruitment as no missing 10-mm length groups are present from 130 to 220 mm; however, magnitude of year-class strength appears to be low (Figure 6).

During 2007, yellow perch captured in gill nets ranged in total length from 120 to 250 mm (Figure 6). Yellow perch in the 130- and 140-mm length groups comprised the majority of yellow perch captured in the 2007 gill net catch resulting in low PSD and RSD-P values of 8 and 1 (Table 1; Figure 6).

No growth information was available in 2007. The mean W_r of stock-length yellow perch in the 2007 gill net catch was 93, and indicative of good condition (Table 1). No length-related trends in condition were apparent in 2007.

Other Species

Black bullhead: The mean frame net CPUE of stock-length black bullhead during 2007 was 0.4 (Table 1) and within the objective (≤ 100) for black bullhead in Enemy Swim Lake (Table 3). Since 2000, black bullhead relative abundance in Enemy Swim Lake based on mean frame net CPUE has been low, as CPUE values have not exceeded 6.0 stock-length fish/net night (Table 2). The black bullhead population likely has minimal impact on sport fish in Enemy Swim Lake, due to their low abundance.

Recruitment of black bullheads in Enemy Swim Lake appears to be poor in recent years, as all black bullheads sampled exceeded 300 mm in total length (Figure 7). Relatively high predator abundance provided by several species of predatory fish (i.e., walleye, largemouth and smallmouth bass) likely aids in maintaining the low abundance of black bullhead in Enemy Swim Lake. Black bullheads sampled in frame nets during 2007 ranged in total length from 330 to 380 mm, had a PSD and RSD-P of 100 indicating a population dominated by larger individuals (Table 1; Figure 7).

No growth information was available in 2007. The mean W_r of stock-length black bullheads captured in frame nets during 2007 was 88, and no length related trends in mean W_r values was apparent as total length increased.

Northern Pike: The mean gill net CPUE of stock-length northern pike in Enemy Swim Lake during 2007 was 0.5 (Table 1). Northern pike typically are not sampled consistently using standard lake survey methods; however, northern pike abundance in Enemy Swim Lake has generally been considered moderate, with a 2000-2007 mean CPUE of stock-length fish of 1.8 for gill nets (Table 2). Three northern pike ranging in total length from 560 to 730 mm were captured in the 2007 gill net catch from Enemy Swim Lake. Mean W_r values of sampled northern pike ranged from 78-84 and were indicative of good condition.

Rock Bass: Rock bass were the second most abundant species in the 2007 frame net catch from Enemy Swim Lake with a mean frame net CPUE of 8.6 (Table 1). Mean frame net CPUE values have ranged from 8.6 (2007) to 17.6 (2002, 2003) in surveys conducted from 2000-2007. Rock bass in the 2007 frame net catch ranged from 80 to 270 mm with no missing 10-mm length groups indicating consistent recruitment (Figure 8). Frame net captured rock bass had a PSD of 36 and an RSD-P of 13 (Table 1). Despite relatively high abundance and quality size structure, angler interest in rock bass appears low. Blackwell et al. (2007) reported that rock bass were a minor component to the overall fishery in creel surveys conducted during winter and summer periods from December 2004 through August 2006.

Other: Common carp, pumpkinseed, white bass and white sucker were other fish species captured during the 2007 survey (Table 1).

Management Recommendations

- 1) Conduct fish community assessment surveys on an annual basis (next survey scheduled in summer 2008) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Conduct spring night electrofishing annually to monitor the largemouth bass population.
- 3) Conduct fall night electrofishing on an annual basis to monitor walleye young-of-the-year abundance.
- 4) Collect otoliths from bluegill, walleye, and yellow perch; scales from largemouth and smallmouth bass to assess the age structure and growth rates of each population.
- 5) Stock large fingerling walleyes (≈ 25 walleye/acre) to establish additional year classes if the fall night electrofishing CPUE of young-of-the-year walleye and gill netting results warrant (i.e., low gill net CPUE of < 250 mm (10 inch) walleye and/or fall night electrofishing CPUE of age-0 walleye < 20 fish/hour).
- 6) Maintain special regulations on largemouth and smallmouth bass of 3 daily, fish must be less than 12" or longer than 18", but only one 18" or longer can be kept in the daily creel.
- 7) Maintain 356 mm (14-inch) minimum length restriction on walleyes in an effort to maintain predator densities and provide larger walleye to the angler.

Table 1. Mean catch rate (CPUE; frame/gill nets= catch/net night, electrofishing= catch/hour) of stock-length fish, mean relative weight (Wr) of stock-length fish, proportional stock density (PSD) and relative stock density of preferred-length fish (RSD-P) of various fish species captured in experimental gill nets, frame nets, and night electrofishing in Enemy Swim Lake, 2007. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= black bullhead; BLC= black crappie; BLG= bluegill; COC= common carp; LMB= largemouth bass; NOP= northern pike; PUS= pumpkinseed; ROB= rock bass; SMB= smallmouth bass; WAE= walleye; WHB= white bass; WHS= white sucker; YEP= yellow perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	RSD-P	CI-90	Wr	CI-90
<i>Frame nets</i>								
BLB	0.4	0.1	100	0	100	0	88	8
BLC	0.8	0.3	56	21	39	20	94	2
BLG	42.5	11.0	15	1	1	0	100	3
COC	< 0.1	0.1	100	---	0	---	101	---
LMB	< 0.1	0.1	---	---	---	---	---	---
NOP	0.3	0.1	100	0	29	35	85	5
PUS	< 0.1	0.1	100	---	0	---	---	---
ROB	8.6	2.7	36	6	13	4	102	1
SMB	1.3	0.4	19	0	16	0	95	1
WAE	0.3	0.2	63	34	38	34	86	3
WHB	0.5	0.3	92	8	83	17	95	2
WHS	0.3	0.1	100	0	100	0	93	5
YEP	3.5	2.4	1	2	0	---	78	1
<i>Gill nets</i>								
BLC	1.5	1.2	67	31	56	32	110	12
BLG	5.8	2.7	60	14	3	5	116	2
COC	1.8	0.8	100	0	82	18	92	5
NOP	0.5	0.3	100	0	33	67	82	6
ROB	14.0	20.1	92	5	20	8	105	< 1
SMB	1.8	1.1	45	29	9	17	100	2
WAE	14.7	3.0	63	8	14	6	89	1
WHB	1.5	1.0	89	11	67	31	95	2
WHS	1.7	0.7	100	0	100	0	96	5
YEP	14.3	8.3	8	5	1	2	93	1
<i>Electrofishing</i>								
SMB ²	79.9	37.4	6	4	4	3	101	1
WAE ² (age-0)	38.5	---	---	---	---	---	--	---

¹ spring night electrofishing.

² fall night electrofishing.

Table 2. Historic mean catch rate (CPUE; frame/gill nets= catch/net night, electrofishing= catch/hour) of stock-length fish for various fish species captured in experimental gill nets, frame nets, and electrofishing in Enemy Swim Lake, 2000-2007. BLB= black bullhead; BLC= black crappie; BLG= bluegill; COC= common carp; LMB= largemouth bass; NOP= northern pike; PUS= pumpkinseed; ROB= rock bass; SMB= smallmouth bass; WAE= walleye; WHB= white bass; WHS= white sucker; YEP= yellow perch

Species	CPUE								Mean
	2000	2001	2002	2003	2004	2005	2006 ⁴	2007 ⁴	
<i>Frame nets</i>									
BLB	2.9	5.4	3.5	4.4	2.8	2.6	1.0	0.4	2.9
BLC	2.2	3.4	3.4	5.9	1.5	1.0	2.3	0.8	2.6
BLG	44.9	54.0	85.7	63.1	39.7	51.3	56.0	42.5	54.7
COC	0.3	0.0	0.0	0.0	0.04	0.0	0.0	<0.1	0.0
LMB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
NOP	0.2	0.8	0.7	0.4	0.4	0.4	0.1	0.3	0.4
PUS	1.7	4.0	2.9	1.4	0.9	3.1	1.7	<0.1	2.2
ROB	10.6	15.2	17.6	17.6	11.0	9.6	14.0	8.6	13.0
SMB	0.8	3.7	4.2	4.1	1.9	2.1	6.3	1.3	3.1
WAE	0.1	0.4	0.6	0.2	0.4	0.2	0.3	0.3	0.3
WHB	0.1	0.2	0.1	0.1	0.1	0.1	0.3	0.5	0.2
WHS	0.1	0.0	0.2	0.04	0.1	0.1	0.0	0.3	0.1
YEP	1.5	3.0	3.1	1.4	0.5	2.3	4.4	3.5	2.5
<i>Gill nets</i>									
BLB	1.7	1.3	1.3	0.2	0.3	0.0	0.0	0.0	0.6
BLC	5.7	3.8	1.8	8.5	15.8	4.2	2.8	1.5	5.5
BLG	2.7	7.5	5.7	16.2	19.7	12.5	8.7	5.8	9.9
COC	0.2	0.0	0.7	0.2	0.3	0.0	1.2	1.8	0.6
NOP	2.3	1.8	2.2	2.0	2.8	1.2	1.2	0.5	1.8
PUS	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.1
ROB	8.5	1.5	2.8	23.8	4.5	1.8	2.3	14.0	7.4
SMB	7.2	4.2	2.2	6.0	3.5	5.0	1.2	1.8	3.9
SPS ¹	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
WAE	19.8	11.0	14.0	14.5	11.0	18.2	13.5	14.7	14.6
WHB	0.8	0.5	3.7	0.5	0.5	0.0	0.7	1.5	1.0
WHS	4.0	4.7	0.0	3.5	3.7	3.0	4.0	1.7	3.1
YEP	52.2	61.2	38.3	20.7	19.2	18.0	19.8	14.3	30.5
<i>Electrofishing</i>									
LMB ²	---	---	164.1	181.9	131.5	84.4	202.0	---	152.8
SMB ³	86.0	10.0	---	152.1	148.5	50.7	158.0	79.9	97.9
WAE ³ (age-0)	15.3	15.5	---	24.0	1.0	8.7	21.0	38.5	17.7

¹ all fish sizes.

² spring night electrofishing.

³ fall night electrofishing.

⁴ Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5"), previous years (.5", .75", 1", 1.25", 1.5" and 2").

Table 3. Mean catch rate (CPUE; frame/gill nets= catch/net night, electrofishing= catch/hour), proportional stock density (PSD), relative stock density of preferred-length fish (RSD-P), and relative weight (Wr) for selected species captured in experimental gill nets, frame nets, and electrofishing in Enemy Swim Lake, 2000-2007. BLB= black bullhead; BLC= black crappie; BLG= bluegill; LMB= largemouth bass; SMB= smallmouth bass; WAE= walleye; YEP= yellow perch

Species	2000	2001	2002	2003	2004	2005	2006 ³	2007 ³	Average	Objective
<i>Frame nets</i>										
BLB										
CPUE	3	5	4	4	3	3	1	<1	3	≤ 100
PSD	100	99	99	79	98	98	100	100	97	---
RSD-P	89	88	96	77	97	95	96	100	92	---
Wr	93	91	89	103	91	88	81	88	91	---
BLC										
CPUE	2	3	3	6	2	1	2	1	3	≥ 5
PSD	96	99	89	87	97	84	64	56	84	30-60
RSD-P	89	50	65	24	31	84	53	39	54	5-10
Wr	101	107	99	100	107	110	99	94	102	---
BLG										
CPUE	45	54	86	63	40	51	56	43	55	≥ 25
PSD	88	58	35	72	47	18	34	15	46	30-60
RSD-P	61	26	2	13	16	14	7	1	18	5-10
Wr	110	109	101	104	130	116	109	100	110	---
<i>Gill nets</i>										
WAE										
CPUE	20	11	14	15	11	18	14	15	15	≥ 10
PSD	13	30	36	52	27	12	57	63	36	30-60
RSD-P	2	5	2	6	3	6	7	14	6	5-10
Wr	87	85	84	82	84	85	87	89	85	---
YEP										
CPUE	52	61	38	21	19	18	20	14	30	≥ 25
PSD	39	69	68	48	57	35	24	8	44	30-60
RSD-P	0	1	3	3	12	12	5	1	5	5-10
Wr	93	97	95	89	96	94	96	93	94	---
<i>Electrofishing</i>										
LMB ¹										
CPUE	---	---	164	182	131	84	202	---	153	≥ 30
PSD	---	---	50	37	63	80	59	---	58	40-70
RSD-P	---	---	7	3	9	5	6	---	6	10-20
Wr	---	---	110	110	105	106	108	---	108	---
SMB ²										
CPUE	86	10	---	152	149	51	158	80	98	≥ 30
PSD	20	36	---	34	34	33	19	6	26	40-70
RSD-P	4	18	---	9	13	14	6	4	10	10-20
Wr	93	94	---	91	97	100	108	101	98	---
WAE ²										
CPUE (age-0)	15	16	---	24	1	9	21	39	18	---

¹ spring night electrofishing.

² fall night electrofishing.

³ Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5"), previous years (.5", .75", 1", 1.25", 1.5" and 2").

Table 4. Weighted mean length at capture (mm) for bluegill captured in frame nets in Enemy Swim Lake, 2002-2007. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	N	Age									
		1	2	3	4	5	6	7	8	9	10
2007	1,055	---	96	125	150	171	---	---	240	---	---
2006	1,342	---	94	112	110	145	176	220	227	242	---
2005	1,173	---	76	87	104	141	193	219	---	237	---
2004	951	---	---	106	115	170	199	170	261	---	---
2002 ¹	2,056	---	92	141	145	212	229	---	---	---	---

¹Age assignments made using scales; otoliths used other years.

Table 5. Numbers of bluegill sampled using frame nets (n) by year class in Enemy Swim Lake 2003-2007.

Survey Year	Year Class													
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994
2007			533	257	203	56			6					
2006				58	232	246	565	161	17	60	3			2
2005					5	122	843	71	51	76		5		
2004							202	269	238	228	13			1
2003								108	368	935	3	3	21	13

Table 6. Mean back-calculated length (mm) at age and standard error (SE) for smallmouth bass captured during fall night electrofishing in Enemy Swim Lake, 2007.

Year	Age	N	Age					
			1	2	3	4	5	6
2007	0	88	---	---	---	---	---	---
2006	1	290	84	---	---	---	---	---
2005	2	48	85	145	---	---	---	---
2004	3	9	81	146	203	---	---	---
2003	4	2	109	181	285	343	---	---
2002	5	1	88	146	204	286	323	---
2001	6	1	159	208	256	311	373	428
Mean	---	439	101	165	237	313	348	428
SE	---		12	13	20	17	25	0
<i>Mean Comparison ¹</i>								
			98	180	241	291	---	---
			92	169	237	304	335	---
			96	179	249	316	339	---
			91	171	242	300	333	---

¹ Willis et al. 2001.

Table 7. Weighted mean length at capture (mm) for walleye captured in experimental gill nets in Enemy Swim Lake, 2000-2007. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	N	1	2	3	4	5	6	7	8	9	10	11	12	13
2007 ¹	87	180	273	329	407	430	447	500	525	504	560	438	---	647
2006 ¹	90	198	255	336	378	411	420	466	432	482	502	674	---	---
2005 ¹	114	190	261	313	341	379	452	---	576	564	460	---	---	---
2004	76	154	256	315	359	392	429	506	440	---	---	---	---	---
2003	97	202	271	330	387	413	464	464	---	657	680	---	---	---
2002	91	196	270	337	373	400	416	---	665	---	---	---	---	---
2001	78	192	260	333	364	411	634	644	---	---	---	---	---	---
2000	131	195	284	320	358	382	550	585	---	---	---	---	---	---

¹Age assignments made using otoliths; scales used other years.

Table 8. Stocking history (10-year) including size and number for fishes stocked into Enemy Swim Lake, 1996 - 2007.

Year	Species	Size	Number
1996	WAE	small fingerling	246,520
1999	WAE	small fingerling	158,300
2000	WAE	small fingerling	439,450
2002	WAE	juvenile	2,971
		large fingerling	9,388
2005	WAE	large fingerling	57,791
2006	LMB	fingerling	116,460

Table 9. Numbers of walleye sampled (n) by year class and associated stocking history (Number stocked x 1,000) for walleye captured in Enemy Swim Lake, 2000-2007.

Survey Year	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994
2007 ^{1,2}		1	26	6	7	16	11	5	7	3	2	2		1
2006 ^{1,2}	---		10	6	12	28	16	2	6	1	1	8		
2005 ¹	---	---		2	9	48	39	7	3		3	2		
2004	---	---	---		1	20	17	19	8	6	4	1		
2003	---	---	---	---		10	11	21	31	9	5	8		
2002	---	---	---	---	---		8	10	33	6	17	16		
2001	---	---	---	---	---	---		9	16	8	24	18		
2000	---	---	---	---	---	---	---		12	1	39	73		
# stocked														
fry														
sm. fingerling								439	158			247	411	
lg. fingerling			58			12								114

¹ Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5"), previous years (.5", .75", 1", 1.25", 1.5" and 2").

²Age assignments made using otoliths; scales used other years.

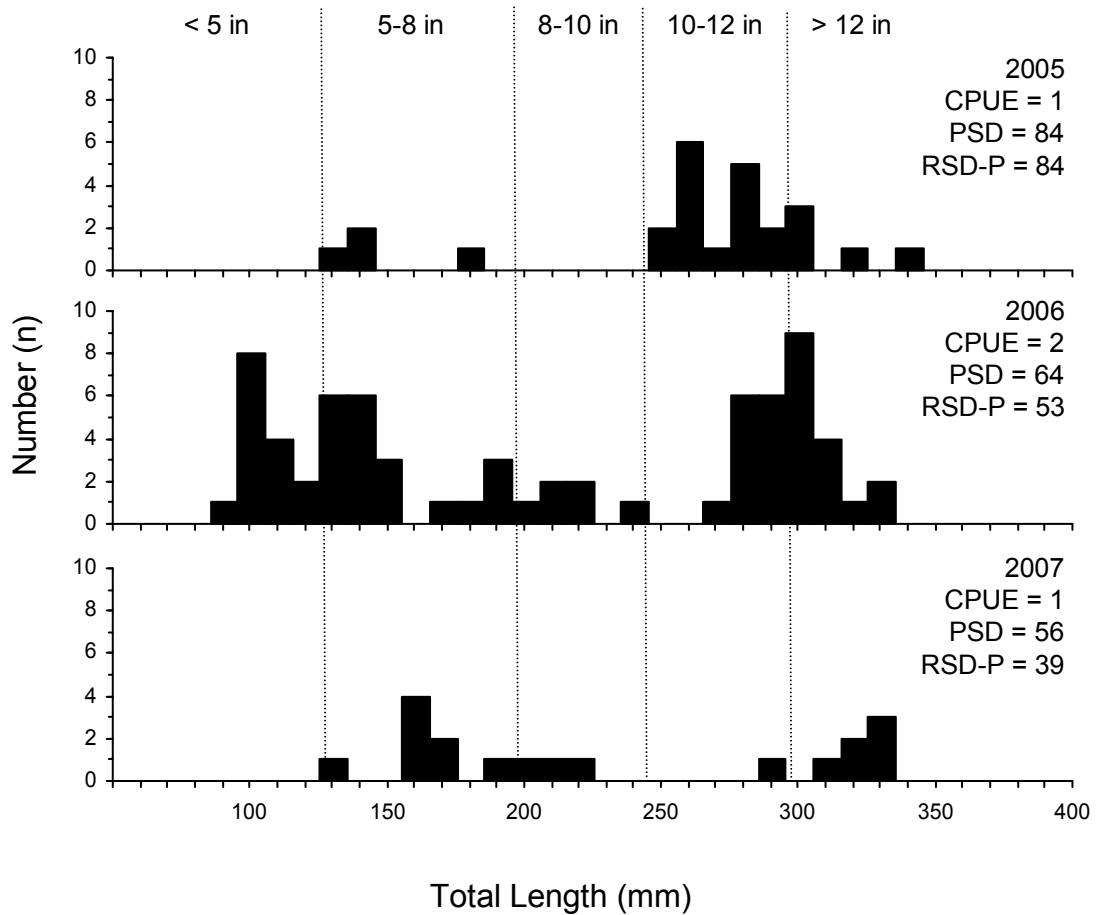


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for black crappie captured in frame nets in Enemy Swim Lake, 2005-2007.

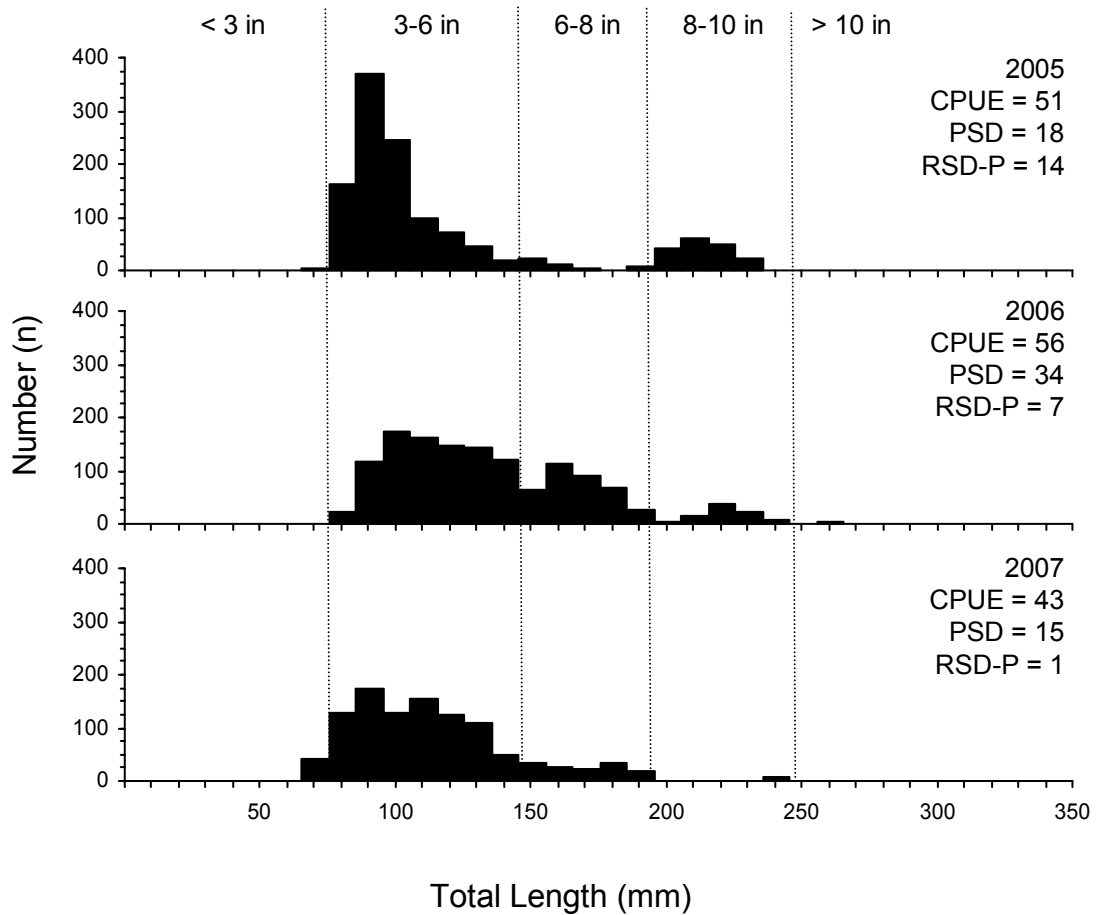


Figure 3 Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for bluegill captured in frame nets in Enemy Swim Lake, 2005-2007.

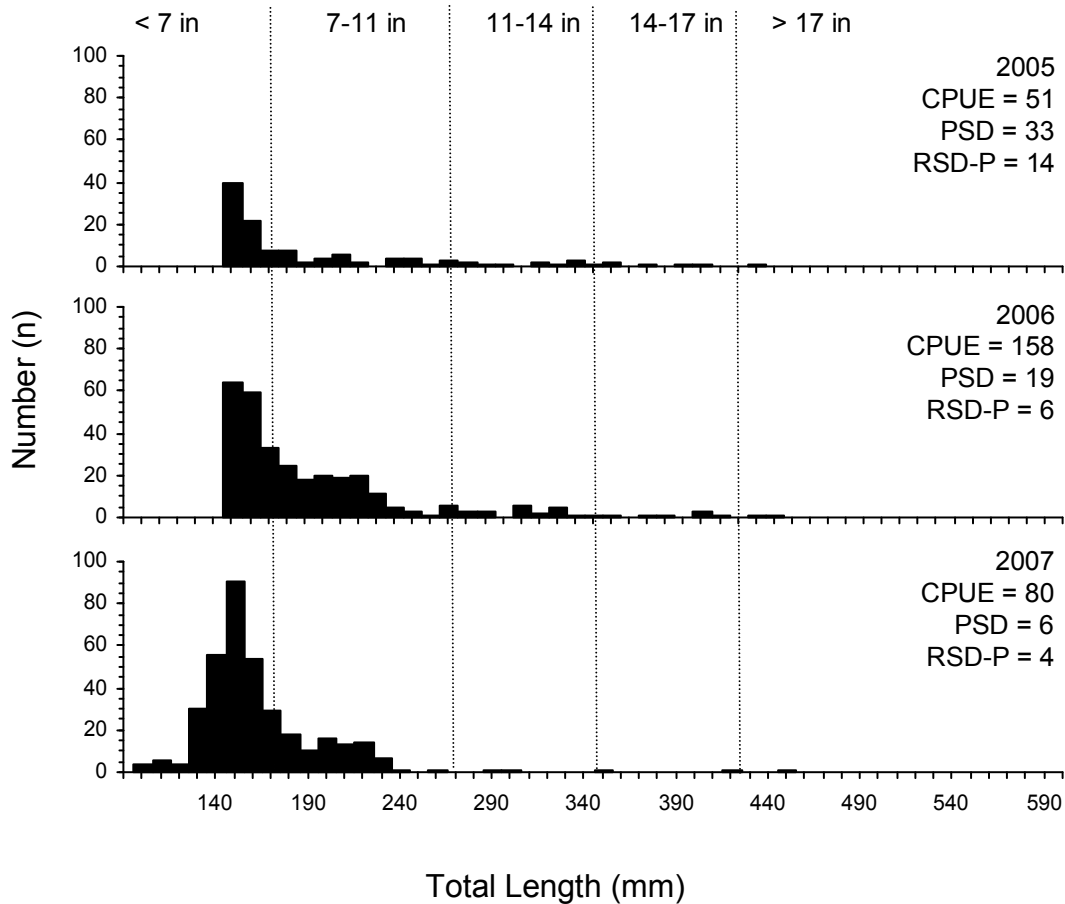


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for smallmouth bass captured during fall night electrofishing in Enemy Swim Lake, 2005-2007.

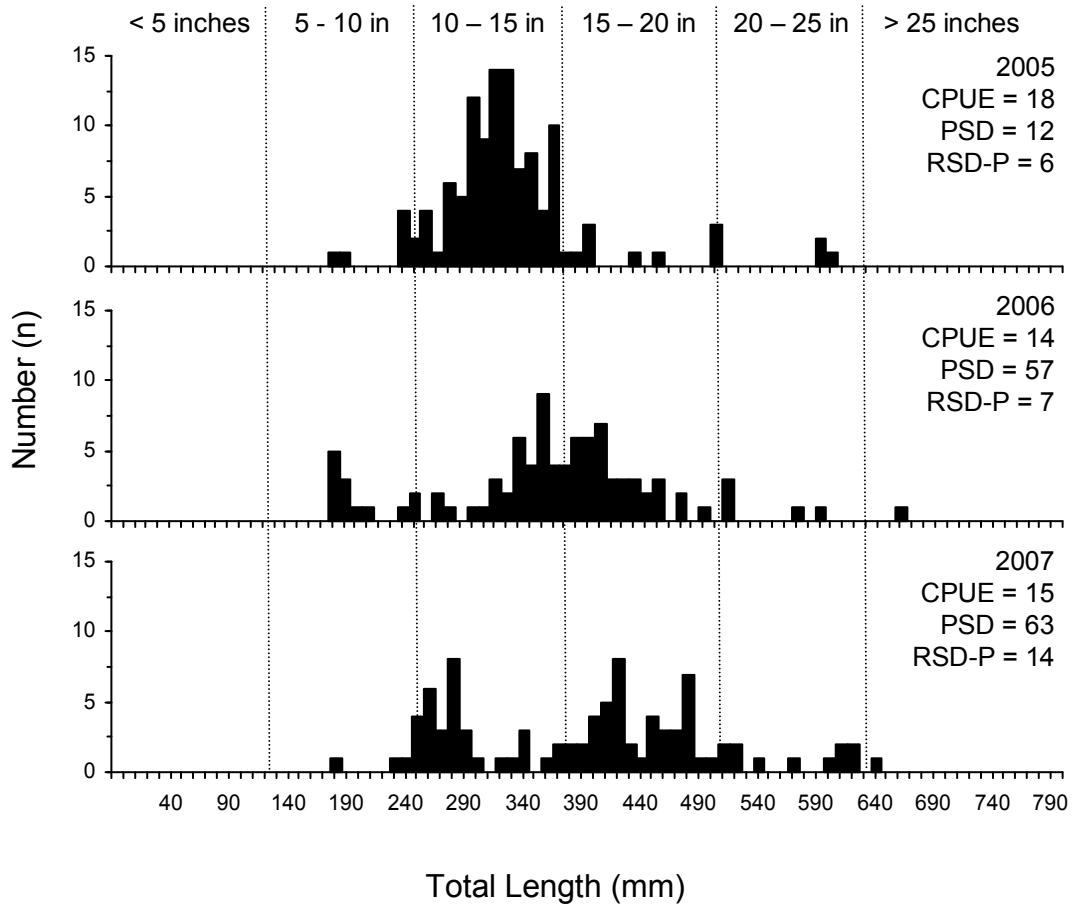


Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for walleye captured in gill nets in Enemy Swim Lake, 2005-2007.

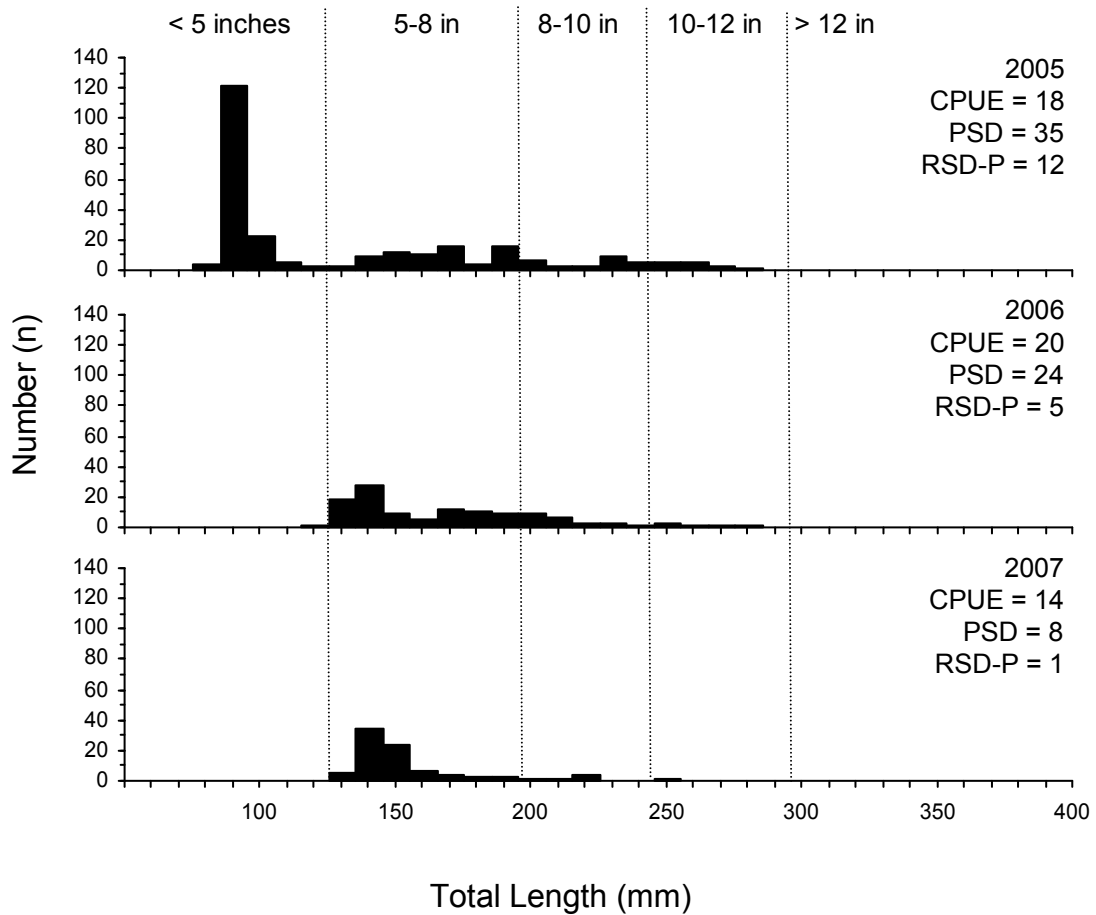


Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for yellow perch captured in gill nets in Enemy Swim Lake, 2005-2007.

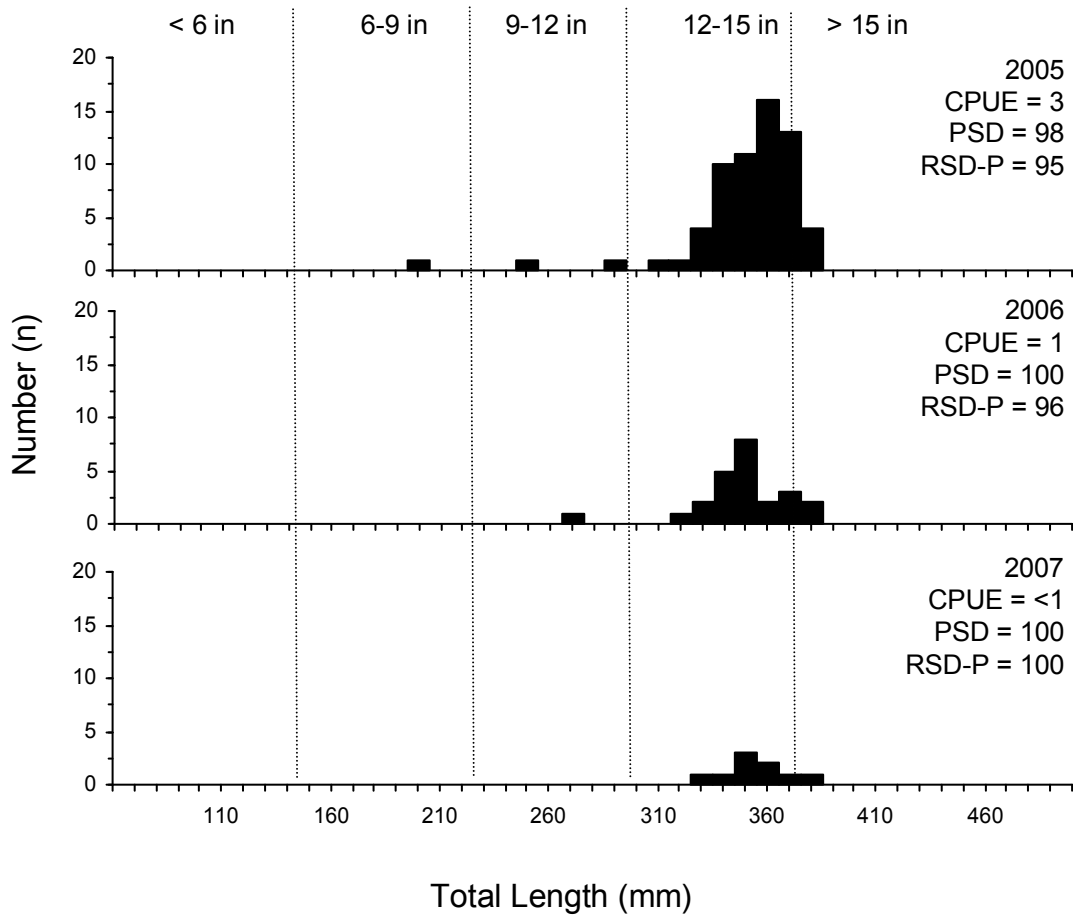


Figure 7. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for black bullhead captured in frame nets in Enemy Swim Lake, 2005-2007.

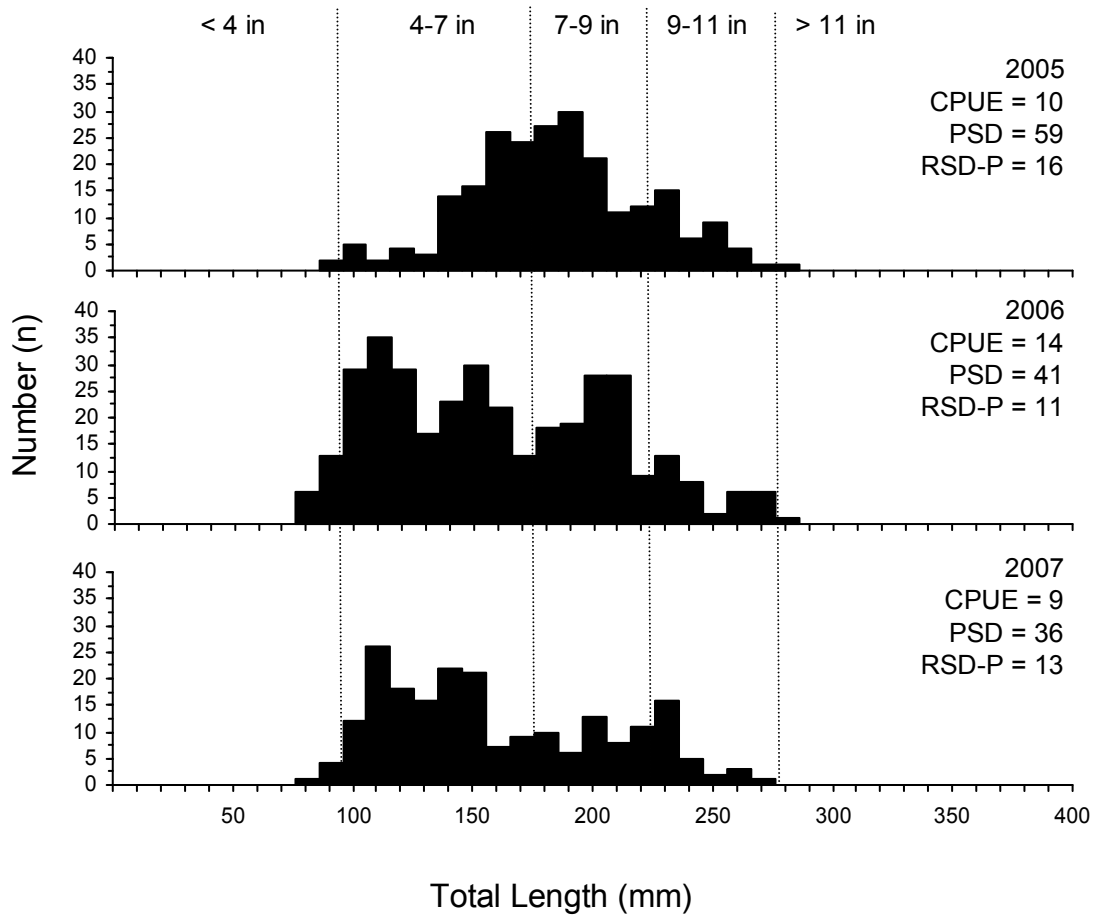


Figure 8. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for rock bass captured in frame nets in Enemy Swim Lake, 2005-2007.