

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-45

Name: East Vermillion Lake

County: McCook

Legal Description: T102N-R53W-Sec. 14-15, 22-23, 26-27, 33-35

Location from nearest town: 5 miles east, 1 mile south of Canistota, SD

Dates of present survey: July 9-11, 2012 (netting); Sept.11, 2012 (electrofishing)

Dates of last survey: July 6-7, 2011 (netting); Sept.11, 2011 (electrofishing)

Game Species	Other Species
Walleye	Freshwater Drum
Black Crappie	Common Carp
Bluegill	White Sucker
Black Bullhead	
Channel Catfish	
Yellow Perch	
Largemouth Bass	
White Crappie	
Northern Pike	
White Bass	

PHYSICAL DATA

Surface area: 513 acres

Watershed area: 264,789 acres

Maximum depth: 23 feet

Mean depth: 12 feet

Volume: 6,600 acre feet

Shoreline length: 10.1 miles

Contour map available? Yes

Date prepared: 1974

Lake elevation observed during the survey: Full and running over the spillway

Beneficial use classification: (4) warmwater permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation and stock watering.

Introduction

East Vermillion Lake, commonly known as Lake Vermillion, is an impoundment formed by the construction of a dam across the East Vermillion River in 1958. Battle Creek is a secondary tributary that forms the west arm of the lake. A low-level outlet gate can be opened for flood control and dam maintenance purposes. In April and July 1993, the primary and secondary spillways suffered significant damage during flood events. In March 1994, the primary spillway was undermined and collapsed due to the previous year's damage. The primary spillway was repaired by spring 1995.

Ownership of Lake and Adjacent Lakeshore Properties

East Vermillion Lake is owned and managed by the Parks and Wildlife Divisions of the South Dakota Department of Game, Fish and Parks (GFP). Together, the two divisions own 1,826 acres which includes the surface area of the lake. Public use easements grant the public the right to access and use a strip of land 50 feet wide outside the high water contour of the lake.

Fishing Access

The West Recreation Area, a fee area managed by the Parks Division, has a double lane boat ramp, boat dock, public toilet, handicapped fishing dock, modern campground, fish cleaning station, swimming beach, and shore fishing access. There is vehicle access to shore-fishing areas in the western arm of the lake. The East Recreation Area, also a fee area managed by the Parks Division, has a double lane boat ramp, boat dock, public toilet, campground, and shore fishing access.

Field Observations of Water Quality and Aquatic Vegetation

Scattered beds of sago pondweed (*Potamogeton pectinatus*) were common throughout the lake. Cattails (*Typha spp.*) and duckweed (*Lemna spp.*) were also observed. The water was very clear with a Secchi depth measurement of 1.3 m (52 in).

BIOLOGICAL DATA

Methods:

East Vermillion Lake was sampled on July 9-11, 2012 with three overnight gill-net sets and ten overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh ($\frac{3}{4}$ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ($\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, and 2 in) monofilament netting. Two hours of nighttime electrofishing was done on Sept. 11, 2012 to evaluate walleye recruitment. Sampling locations are displayed in Figure 6.

Gill Net Catch

Black bullheads comprised the majority of the gill net catch this year (Table 1). Other species sampled included walleye, northern pike, common carp, white sucker, black crappie, channel catfish, freshwater drum and yellow perch. Except for one walleye, all sampled fish were stock length or larger (Table 2).

Table 1. Total catch from three overnight gill net sets at East Vermillion Lake, McCook County, July 9-11, 2012.

Species	No.	%	CPUE ¹	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	494	83.7	164.7	±6.4	131.0	0	0	95
Walleye	41	6.9	13.7	±8.7	10.2	43	8	82
Northern Pike	11	1.9	3.7	±1.1	1.1	45	9	78
Common Carp	10	1.7	3.3	±2.6	1.3	0	0	92
White Sucker	10	1.7	3.3	±2.4	8.2	100	100	88
Black Crappie	7	1.2	2.3	±2.4	0.9	--	--	--
Channel Catfish	7	1.2	2.3	±0.4	3.4	--	--	--
Freshwater Drum	5	0.8	1.7	±0.4	0.2	--	--	--
Yellow Perch	5	0.8	1.7	±0.4	14.6	--	--	--

* 10 years (2002-2011)

Table 2. Catch per unit effort by length category for various fish species captured with gill nets in East Vermillion Lake July 9-11, 2012.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black Bullhead	--	164.7	164.7	--	--	164.7	±6.4
Walleye	0.4	13.3	7.7	4.6	1.0	13.7	±8.7
Northern Pike	--	3.7	2.0	1.4	0.3	3.7	±1.1
Common Carp	--	3.3	3.3	--	--	3.3	±2.6
White Sucker	--	3.3	--	--	3.3	3.3	±2.4
Black Crappie	--	2.3	--	1.3	1.0	2.3	±2.4
Channel Catfish	--	2.3	--	1.3	1.0	2.3	±0.4
Freshwater Drum	--	1.7	1.0	0.7	--	1.7	±0.4
Yellow Perch	--	1.7	0.4	1.3	--	1.7	±0.4

Length categories can be found in Appendix A.

¹ See Appendix A for definitions of CPUE, PSD, and mean Wr.

Trap Net Catch

Black bullheads were also the most abundant of 12 species sampled in the trap nets (Table 3). All sampled fish were stock length or larger except for minor numbers of northern pike, common carp and walleye (Table 4).

Table 3. Total catch from ten overnight trap net sets at East Vermillion Lake, McCook County, July 9-11, 2012.

Species	No.	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	1,524	91.0	152.4	±96.2	657.3	5	0	89
Northern Pike	34	2.0	3.4	±1.1	1.8	38	3	75
Common Carp	33	2.0	3.3	±2.0	3.7	42	26	82
Bluegill	21	1.3	2.1	±0.7	10.1	100	57	102
White Sucker	20	1.2	2.0	±1.2	2.8	100	90	81
White Crappie	11	0.7	1.1	±0.9	1.4	82	36	93
Channel Catfish	11	0.7	1.1	±0.9	3.0	82	27	79
Black Crappie	9	0.5	0.9	±0.5	6.7	--	--	--
Walleye	4	0.2	0.4	±0.3	1.7	--	--	--
Freshwater Drum	4	0.2	0.4	±0.4	0.0	--	--	--
Largemouth Bass	2	0.1	0.2	±0.3	0.2	--	--	--
White Bass	1	0.1	0.1	±0.1	0.0	--	--	--

* 10 years (2002-2011)

Table 4. Catch per unit effort by length category for various fish species captured with trap nets in East Vermillion Lake July 9-11, 2012.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black Bullhead	--	152.4	144.9	7.5	--	152.4	±96.2
Northern Pike	0.2	3.2	2.0	1.1	0.1	3.4	±1.1
Common Carp	0.2	3.1	1.8	0.5	0.8	3.3	±2.0
Bluegill	--	2.1	--	0.9	1.2	2.1	±0.7
White Sucker	--	2.0	--	0.2	1.8	2.0	±1.2
White Crappie	--	1.1	0.2	0.5	0.4	1.1	±0.9
Channel Catfish	--	1.1	0.2	0.6	0.3	1.1	±0.9
Black Crappie	--	0.9	0.1	0.7	0.1	0.9	±0.5
Walleye	0.1	0.3	0.2	--	0.1	0.4	±0.3
Freshwater Drum	--	0.4	0.4	--	--	0.4	±0.4
Largemouth Bass	--	0.2	--	0.1	0.1	0.2	±0.3
White Bass	--	0.1	--	--	0.1	0.1	±0.1

Length categories can be found in Appendix A.

Walleye

Management objective: Maintain a walleye population with a gill-net CPUE of at least 15.

Walleye gill-net CPUE increased in 2012 but remains below the management objective (Table 5). Two and three year old fish made up the majority of the sample (Table 6). Six consecutive age classes were present which indicates natural reproduction and recruitment is relatively consistent, but not always good enough to produce large year classes (Table 6). No age-0 and very few age-1 walleyes were sampled by fall electrofishing (Table 7). Overall, the population has a nice size structure (Figure 1), but the recent lack of natural reproduction and recruitment in 2011 and 2012 is a concern and stocking is needed to increase abundance.

Table 5. Walleye gill net CPUE, PSD, RSD-P and mean Wr in East Vermillion Lake, McCook County, 2003-2012.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Mean*
CPUE	8.3	4.8	9.8	17.8	8.8	10.0	7.3	10.5	7.5	13.7	10.2
PSD	78	89	50	60	59	0	21	40	33	43	48
RSD-P	25	28	15	4	15	0	4	0	11	8	11
Mean Wr	90	88	92	98	86	89	94	85	84	82	90

*10 years (2002-2011)

Table 6. Weighted mean length at capture (mm) for walleye captured in gill nets in East Vermillion Lake, McCook County, 2003-2012. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2012 (41)	269 (1)	320 (17)	391 (15)	449 (3)	496 (3)	587 (2)	--	--	--	--	--	--
2011 (30)	196 (12)	334 (13)	397 (2)	--	466 (2)	--	--	--	--	550 (1)	--	--
2010 (39)	255 (28)	--	408 (3)	438 (8)	--	--	--	--	--	--	--	--
2009 (28)	--	291 (4)	351 (23)	555 (1)	--	--	--	--	--	--	--	--
2008 (40)	216 (2)	290 (37)	372 (1)	--	--	--	--	--	--	--	--	--
2007 (35)	270 (6)	323 (5)	387 (5)	392 (5)	461 (2)	446 (2)	468 (3)	518 (3)	552 (1)	629 (2)	478 (1)	--
2006 (71)	229 (18)	325 (19)	418 (20)	--	448 (5)	457 (5)	510 (3)	--	531 (1)	--	--	--
2005 (34)	288 (10)	369 (9)	--	440 (8)	467 (2)	522 (3)	596 (1)	641 (1)	--	--	--	--
2004 (19)	249 (3)	--	391 (2)	461 (6)	505 (4)	557 (1)	505 (1)	613 (2)	--	--	--	--
2003 (32)	--	299 (4)	400 (10)	446 (7)	486 (4)	535 (3)	587 (2)	626 (2)	--	--	--	--

Table 7. Age-0 and age-1 walleyes sampled during two hours of nighttime electrofishing on East Vermillion Lake, McCook County, 2000-2012.

Year	Stocking	Age-0 CPH	80% C.I.	% stocked	Mean length (range; mm)	Wr	Age-1 CPH	80% C.I.	Mean length (range; mm)	Wr
2012	none	0					4	3-5	272 (189-282)	85
2011	none	52	29-75		133 (112-164)	90	60	40-80	215 (185-256)	78
2010	none	102	74-130		172 (138-220)	81	24	18-30	¹ (238-343)	
2009	none	164	83-245		174 (135-190)	97	7	2-12	206 (205-211)	98
2008	none	35	13-57		188 (170-215)	98	2	0-5	226 (226-226)	83
2007	none	23	8-38		151 (131-151)	75	156	78-234	221 (171-262)	81
2006	fingerling	326	213-439	8	144 (116-205)	85	2	0-6	254 (212-268)	92
2005	none	39	27-51		201 (152-230)	98	3	1-5	228 (220-230)	93
2004	none	44	34-54		193 (154-215)	86	1	0-2	303 (290-315)	86
2003	none	84	60-108		178 (134-209)	97	1	0-2	272 (255-286)	87
2002	none	7	2-12		169 (161-185)	96	196	138-254	271 (224-315)	89
2001	none	371	259-483		169 (129-216)	94	43	28-57	296 (245-330)	91
2000	none	231	117-345		200 (150-228)	103				

¹ Only the smallest and largest age-1 individuals were measured to provide a range of lengths.

Yellow Perch

Management objective: Maintain a yellow perch population with a gill-net CPUE of at least 25.

Yellow perch gill-net CPUE declined in 2012 and the management objective has only been met once in the last 10 years (Table 8). The stocking of 737 adult perch in fall 2011 (Table 14) did not increase gill-net CPUE in 2012.

Table 8. Yellow perch gill-net CPUE, PSD, RSD-P, and mean Wr for East Vermillion Lake, McCook County, 2003-2012.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Mean*
CPUE	28.8	21.3	8.8	6.3	7.3	11.5	2.8	4.3	12.0	1.7	14.6
PSD	97	94	26	60	24	89	45	47	40	--	61
RSD-P	41	36	11	16	0	7	0	35	0	--	15
Mean Wr	101	99	98	104	112	108	119	106	89	--	105

*10 years (2002-2011)

Table 9. Weighted mean length at capture (mm) for yellow perch captured in gill nets in East Vermillion Lake, McCook County, 2011-2012. Sample size is in parentheses.

Year	1	2	3	4	5	6	7	8
2012 (5)	--	187 (2)	222 (3)	--	--	--	--	--
2011 (48)	145 (4)	199 (43)	245 (1)	--	--	--	--	--

Black Crappie

Management objective: Maintain a black crappie population with a trap net CPUE of at least 20.

Black crappie trap-net CPUE declined dramatically in 2012 (Table 10). It is interesting to note that only in 2010 and 2011 has crappie CPUE exceeded 10 fish per net in the last ten years. This coincides with adult crappie stockings in fall 2009 and spring 2010 (Table 14). Natural reproduction and recruitment have not been sustaining crappie abundance. A shortage of suitable spawning and rearing habitat is the likely cause.

Table 10. Black crappie trap-net CPUE, PSD, and mean Wr in East Vermillion Lake, McCook County, 2003-2012.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Mean*
CPUE	2.2	0.5	0.3	1.1	0.9	0.3	0.5	11.3	35.5	0.9	6.7
PSD	95	--	--	--	--	--	--	47	41	--	69
RSD-P	15	--	--	--	--	--	--	3	5	--	6
Mean Wr	107	--	--	--	--	--	--	110	108	--	111

*10 years (2002-2011)

Bluegill

Management objective: Maintain a bluegill population with a trap net CPUE of at least 20.

Bluegill trap-net CPUE declined and remains well below the management objective (Table 11). Unlike crappie, the stocking of adult bluegills in 2009 and 2010 did not produce significant increases in CPUE. Bluegill populations do best in clear water environments with an abundance of submerged aquatic vegetation. East Vermillion does not provide this type of environment so it is unlikely the management objective can be achieved.

Table 11. Bluegill trap-net CPUE, PSD, RSD-18, RSD-P, and mean Wr in East Vermillion Lake, McCook County, 2003-2012.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Mean*
CPUE	41.1	14.7	6.6	4.9	2.5	3.6	0.8	2.1	4.1	2.1	10.1
PSD	100	100	100	44	96	97	--	57	93	100	87
RSD-18	98	99	100	33	32	94	--	19	46	95	65
RSD-P	55	78	97	33	28	69	--	10	17	57	49
Mean Wr	112	110	115	131	122	114	--	115	109	102	117

*10 years (2002-2011)

Black Bullhead

Management objective: Maintain a black bullhead population with a trap-net CPUE of less than 100.

Black bullhead trap-net CPUE has declined but remains above the management objective (Table 12). Most of the population consists of a single year class that averages about 20 cm (8 in) in length (Figure 5).

Table 12. Black bullhead trap-net CPUE and PSD for East Vermillion Lake, McCook County, 2003-2012.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Mean*
CPUE	473.1	1,574.0	258.8	2,718.8	534.1	78.9	491.4	39.5	214.4	152.4	657.3
PSD	27	19	91	2	2	83	8	33	33	5	36
RSD-P	1	0	0	0	0	0	0	1	3	0	1
Mean Wr	98	93	93	89	90	94	88	90	83	89	92

*10 years (2002-2011)

Other Species

White bass were sampled for the first time in 2011, but abundance did not increase in 2012 (Table 13).

Table 13. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in East Vermillion Lake, McCook County, 2003-2012.

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
COC (GN)	0.3	0.3	0.8	3.0	3.8	2.0	0.8	0.5	1.0	3.3
COC (TN)	1.2	1.4	6.3	2.3	8.2	7.5	0.3	1.8	1.1	3.3
WHS (GN)	4.5	2.8	4.5	3.0	8.3	10.0	10.0	18.5	19.8	3.3
WHS (TN)	0.8	0.1	1.7	2.1	1.6	2.5	5.2	4.4	5.2	2.0
BLB (GN)	233.3	169.5	124.0	174.5	98.8	86.8	131.3	59.0	86.5	164.7
BLB (TN)	473.1	1574	258.8	2718.8	534.1	78.9	491.4	39.5	214.4	152.4
CCF (GN)	3.5	1.5	5.0	10.8	2.8	3.8	5.5	0.3	0.3	2.3
CCF (TN)	4.7	9.2	6.6	3.1	3.1	2.7	0.3	0.2	0.1	1.1
NOP (GN)	--	0.3	0.8	--	0.5	0.8	0.3	1.0	4.3	3.7
NOP (TN)	1.3	1.2	0.6	1.3	0.2	1.0	0.3	0.7	2.7	3.4
WHB (GN)	--	--	--	--	--	--	--	--	--	--
WHB (TN)	--	--	--	--	--	--	--	--	0.3	0.1
OSF (GN)	--	--	--	--	--	--	0.3	0.3	--	--
GSF (TN)	--	--	--	0.3	0.1	0.1	--	0.7	--	--
BLG (GN)	--	0.5	--	--	--	--	--	--	--	--
BLG (TN)	41.1	14.7	6.6	4.9	2.5	3.6	0.8	2.1	4.1	2.1
HYB (TN)	0.1	--	--	--	--	--	--	--	--	--
LMB (TN)	0.1	0.3	0.3	0.3	--	--	--	--	--	0.2
WHC (GN)	--	0.3	0.3	0.3	--	--	--	2.0	--	--
WHC (TN)	1.3	1.2	0.3	--	0.2	--	0.1	0.1	4.1	1.1
BLC (GN)	0.8	0.3	--	0.3	--	0.3	0.3	2.0	2.0	2.3
BLC (TN)	2.2	0.5	0.3	1.1	0.9	0.3	0.5	11.3	35.5	0.9
YEP (GN)	28.8	21.3	8.8	6.3	7.3	11.5	2.8	4.3	12.0	1.7
YEP (TN)	1.6	0.6	0.4	1.5	0.7	0.1	0.1	1.5	1.9	--
WAE (GN)	8.3	4.8	9.8	17.8	8.8	10.0	7.3	10.5	7.5	13.7
WAE (TN)	2.1	1.3	0.3	0.1	2.2	2.2	1.7	1.7	1.2	0.4
FRD (GN)	--	--	--	0.3	--	--	--	0.8	1.3	1.7
FRD (TN)	--	--	--	--	--	0.1	0.1	1.0	1.0	0.4

COC (Common Carp), WHS (White Sucker), BLB (Black Bullhead), CCF (Channel Catfish), NOP (Northern Pike), WHB (White Bass), GSF (Green Sunfish), BLG (Bluegill), HYB (Hybrid Sunfish), SMB (Smallmouth Bass), LMB (Largemouth Bass), WHC (White Crappie), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye), FRD (Freshwater Drum)

MANAGEMENT RECOMMENDATIONS

1. Continue to monitor East Vermillion Lake with annual summer netting surveys to sample adult fish populations and fall electrofishing surveys to monitor walleye recruitment.
2. Stock walleye as needed to achieve the management objective.
2. Develop a habitat improvement plan for East Vermillion Lake that may include periodic drawdowns, artificial structures, rock spawning reefs and fishing piers.
3. Investigate potential solutions to the poor crappie and bluegill recruitment in recent years.

Table 14. Stocking record for East Vermillion Lake, McCook County, 1991-2012.

Year	Number	Species	Size
1991	6,700	Walleye	Sml. Fingerling
	6,000	Walleye	Lrg. Fingerling
1992	15,000	Largemouth Bass	Sml. Fingerling
	40,690	Largemouth Bass	Med. Fingerling
	12,824	Walleye	Lrg. Fingerling
	902	Walleye	Juvenile
	109	Walleye	Adult
	38,930	Yellow Perch	Fingerling
1995	1,350	Black Crappie	Adult
	27,500	Channel Catfish	Fingerling
	35,700	Fathead Minnow	Adult
	55,000	Walleye	Sml. Fingerling
	3,789	Black Crappie	Adult
1996	51,300	Bluegill	Fingerling
	51,300	Channel Catfish	Fingerling
	5,227	Yellow Perch	Fingerling
	102,600	Walleye	Fingerling
1997	51,300	Walleye	Fingerling
1999	16,544	Walleye	Fingerling
2005	51,425	Walleye	Fingerling
2009	1,661	Black Crappie	Adult
	1,187	Bluegill	Adult
2010	6,125	Black Crappie	Adult
	405	Bluegill	Adult
2011	196	Walleye	Lrg. Fingerling
	737	Yellow Perch	Adult

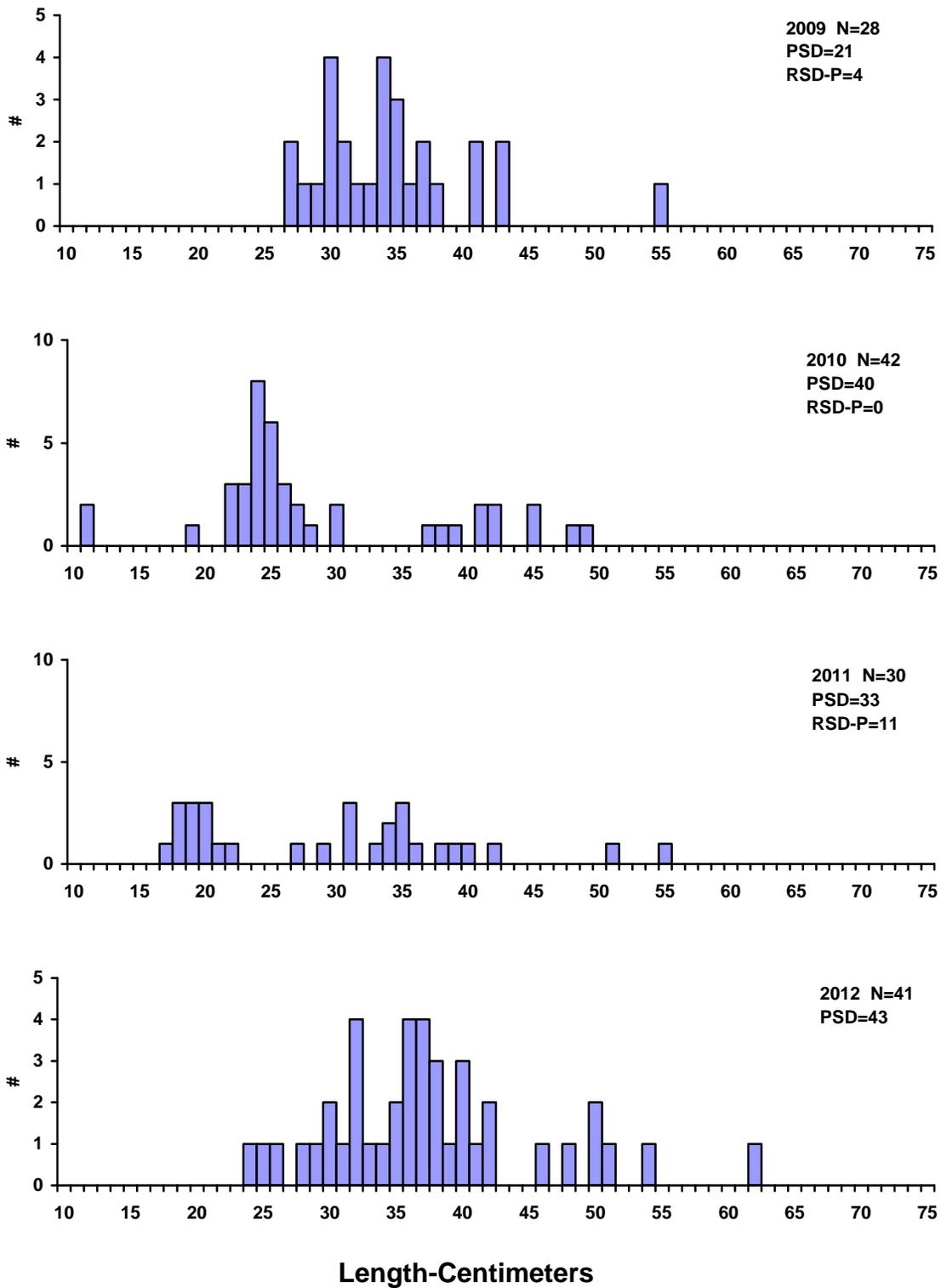


Figure 1. Length frequency histograms for walleye sampled with gill nets in East Vermillion Lake, McCook County, 2009-2012.

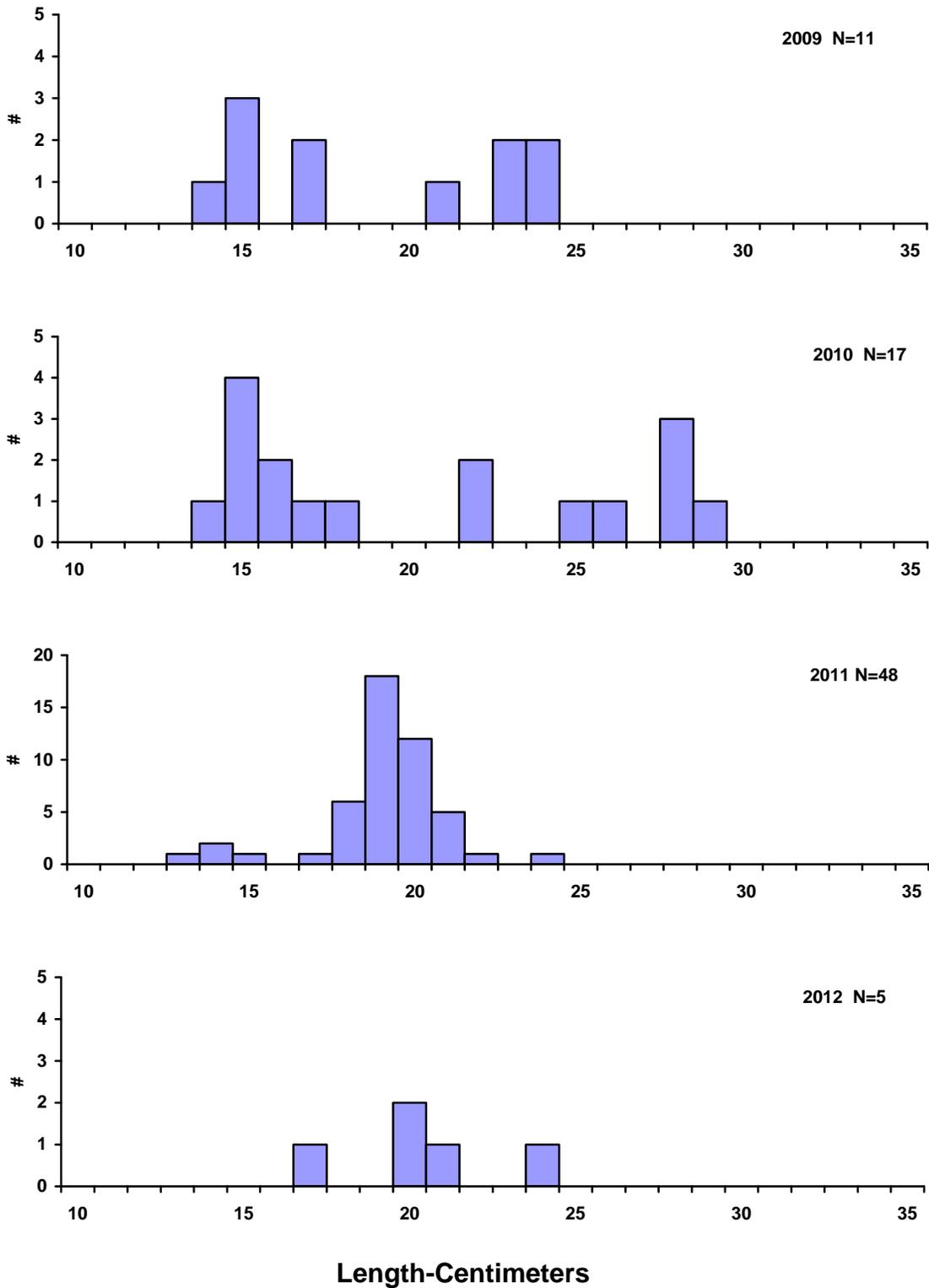


Figure 2. Length frequency histograms for yellow perch sampled with gill nets in East Vermillion Lake, McCook County, 2009-2012.

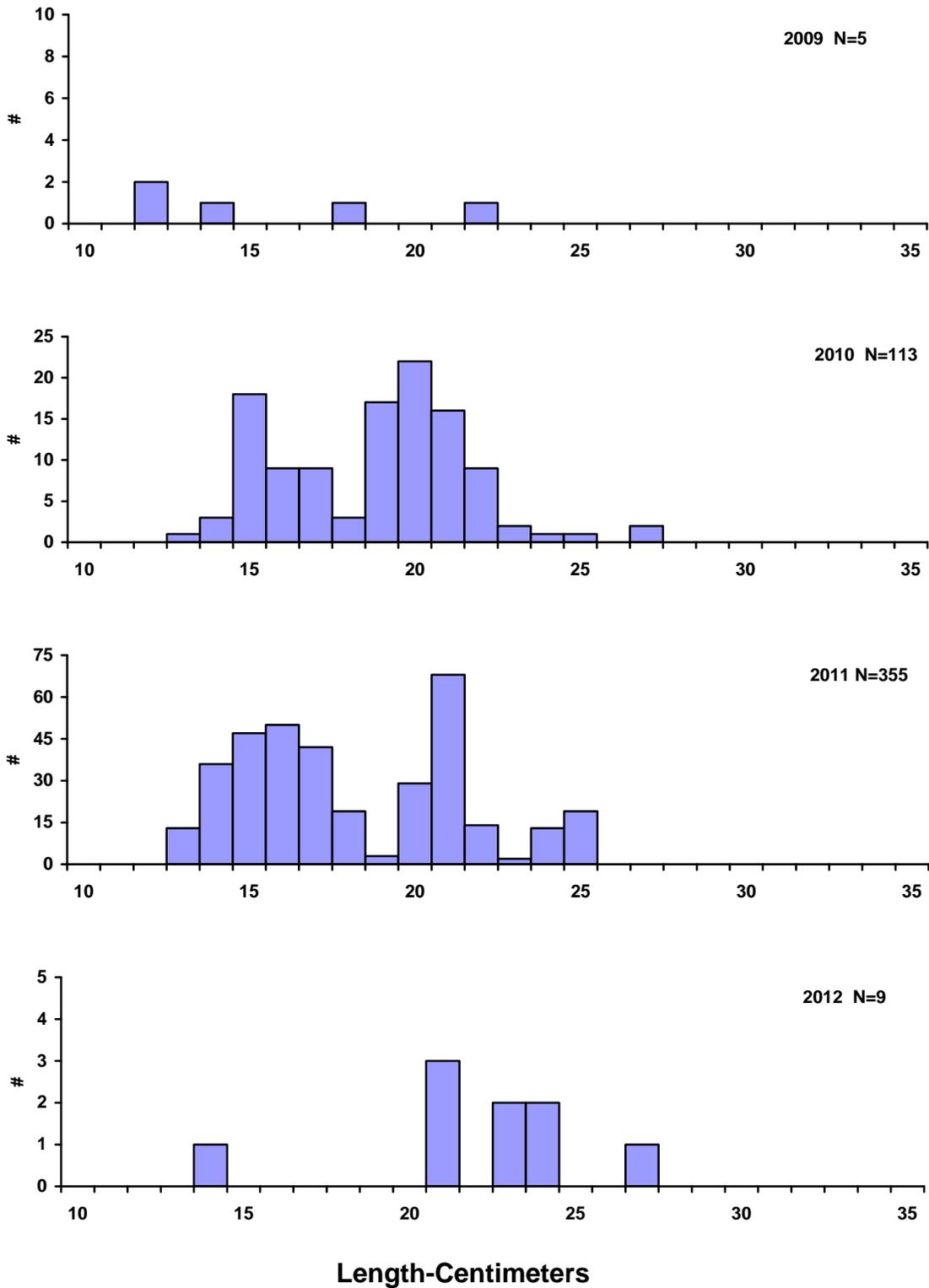


Figure 3. Length frequency histograms for black crappies sampled with trap nets in East Vermillion Lake, McCook County, 2009-2012.

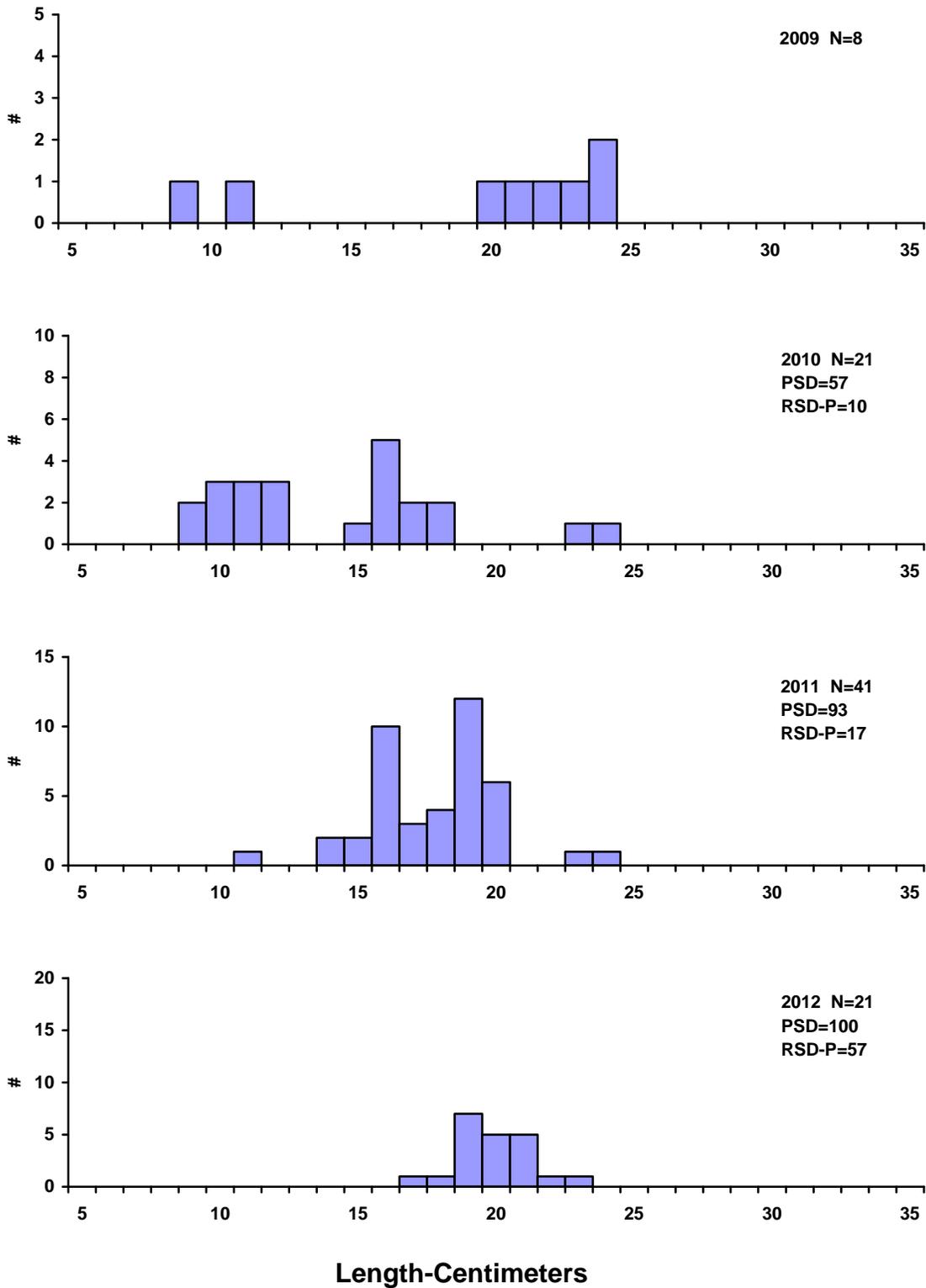


Figure 4. Length frequency histograms for bluegills sampled with trap nets in East Vermillion Lake, McCook County, 2009-2012.

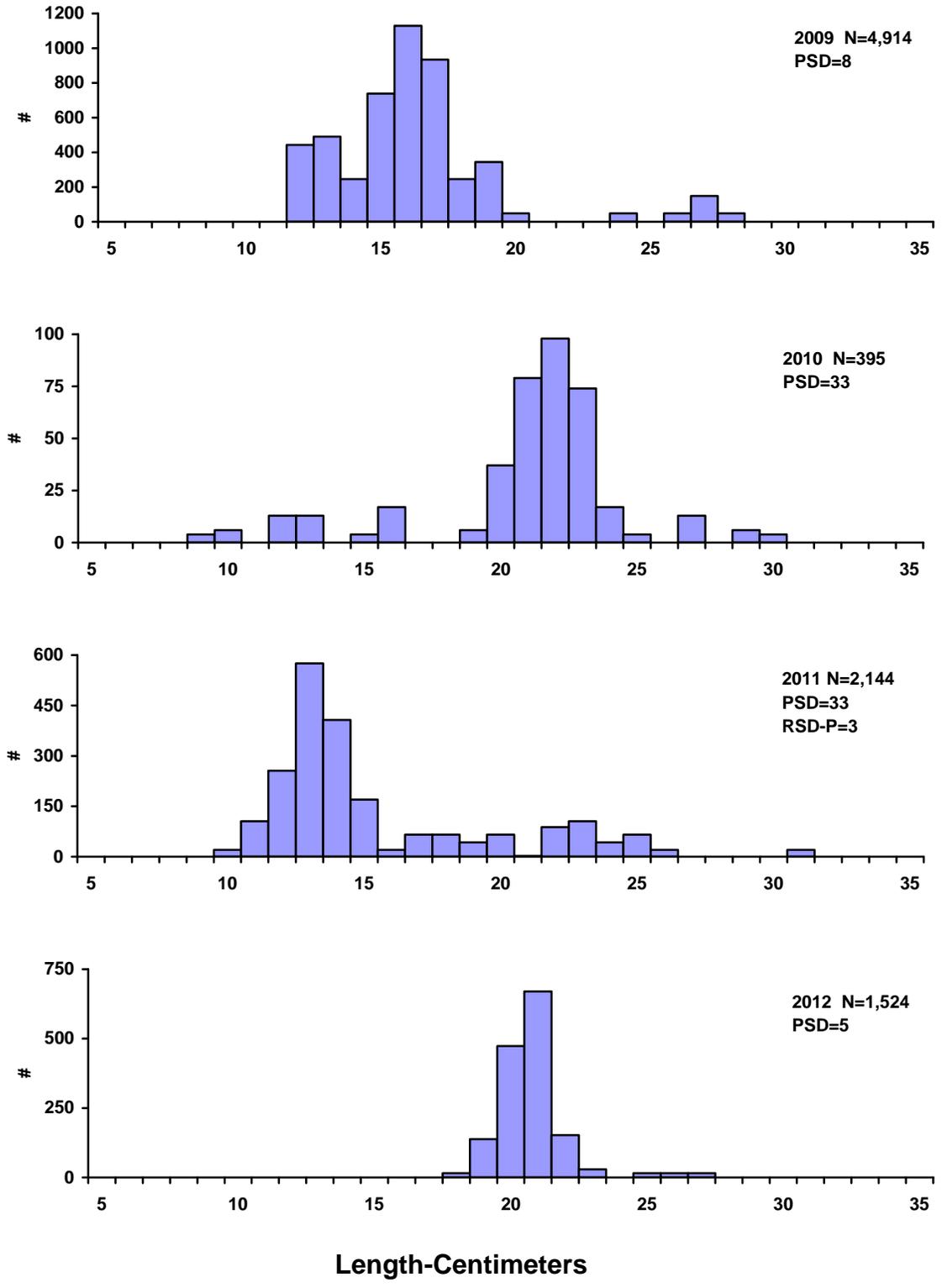


Figure 5. Length frequency histograms for black bullheads sampled with trap nets in East Vermillion Lake, McCook County, 2009-2012.

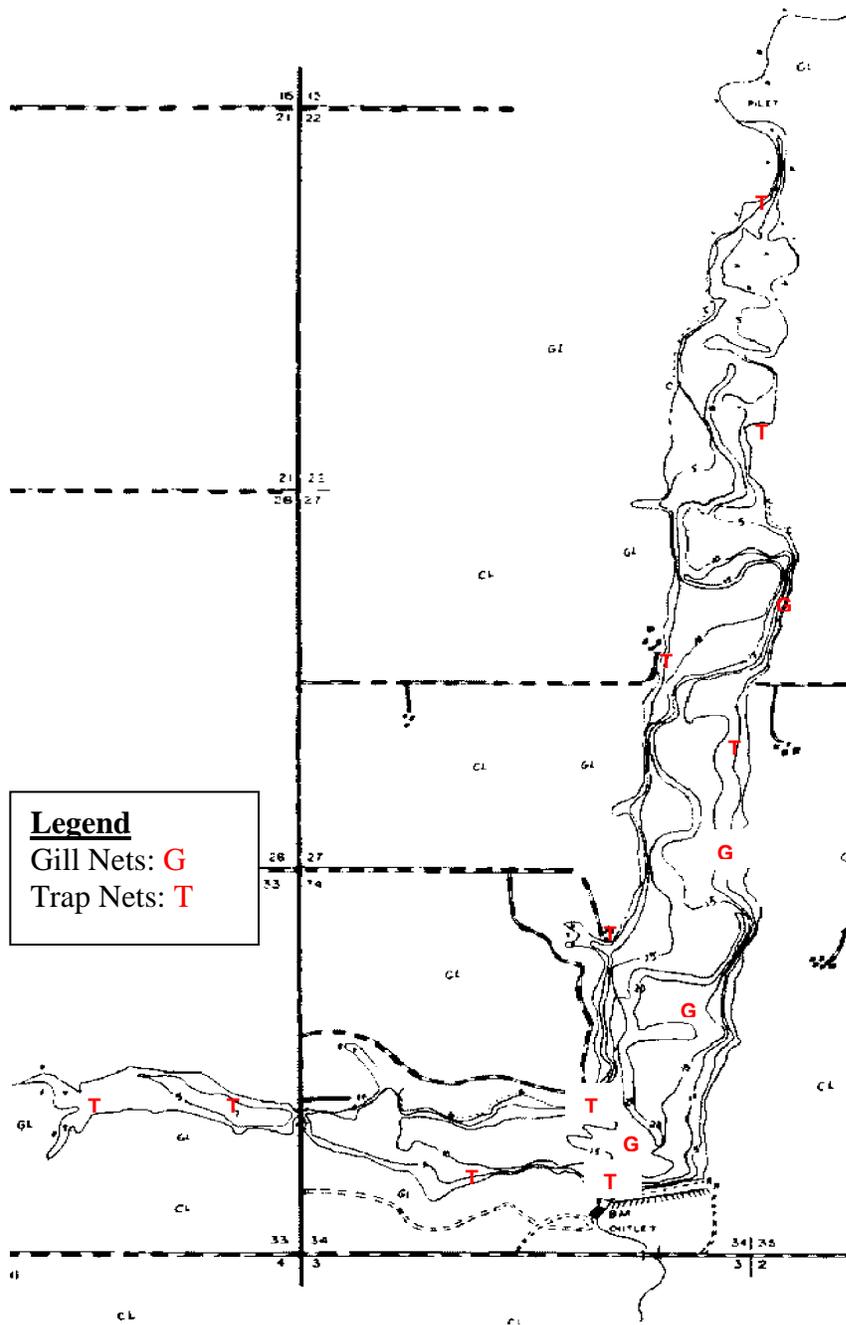


Figure 6. Sampling locations on East Vermillion, McCook County, 2012.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters (inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Freshwater drum	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.