

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Swan Lake, Turner County
2102-F-21-R-47
2014



Figure 1. Swan Lake, Turner County

Legal Description: T97N-R53W-Sec 15-16

Location from nearest town: 3 miles north and 1 mile west of Viborg, SD

Surface Area: 208 acres

Meandered (Y/N): Yes

OHWM elevation: 1651.6

Outlet elevation: 1651.7

Max. depth at outlet elevation: 6 feet

Observed water level: normal

Contour map available: Yes

Watershed area: 81,913 acres

Shoreline length: 3.8 miles

Date set: April, 1983

Date set: April, 1983

Mean depth at outlet elevation: 3 feet

Lake volume: 719 acre-feet

Date mapped: 1985

DENR beneficial use classifications: (5) warmwater semipermanent fish life propagation, (7) immersion recreation, (8) limited-contact recreation and (9) fish and wildlife propagation and stock watering.

Introduction

General

Swan Lake, a shallow, marginal lake located near the town of Viborg, was so named because it is supposedly shaped like a swan. The lake receives heavy use because of its proximity to Sioux Falls and the number of people living around it.

Ownership of Lake and Adjacent Lakeshore Properties

Swan Lake is listed as a meandered public water in the State of South Dakota Listing of Meandered Lakes. The South Dakota Department of Game, Fish, and Parks (GFP) owns and maintains an access area on the south shore of the lake. The remaining lakeshore property is privately owned and heavily developed.

Fishing Access

The Swan Lake Access Area contains a boat ramp with a dock. The north shore of the lake contains several shore fishing areas.

Water Quality and Aquatic Vegetation

Throughout history, Swan Lake has been plagued with heavy nutrient and sediment loading from the watershed. Compounding the problem was a poorly-designed water diversion system that directed untreated water from Turkey Ridge Creek into the lake to maintain water levels. From 1992-1998, the diversion was closed, erodible shorelines were rip-rapped and over 400,000 cubic yards of sediment were dredged from the basin. A prolonged period of drought with subsequent declines in lake levels prompted the redesign and construction of a new diversion structure accompanied by an operating plan that only allows diversion of high-quality water in the fall and winter. This new system has restored lake levels.

The water temperature during this year's survey was 24°C (76°F) and water clarity was 43 cm (17 in, Table 1). Some cattails were observed.

Table 1. Water temperature, Secchi depth and observations/comments on water quality and aquatic vegetation in Swan Lake, Turner County, 2005-2014.

<i>Year</i>	<i>Water Temp °C (°F)</i>	<i>Secchi Depth cm (in)</i>	<i>Observations/Comments (algae, aquatic vegetation, water quality, etc.)</i>
2014	24 (76)	43 (17)	Cattails
2013	25 (77)	28 (11)	Sago pondweed and cattails
2011	27 (80)	23 (9)	Sago pondweed
2009	23 (74)	23 (9)	Cattail, bulrushes, sedges, and sago pondweed
2007	-- (--)	-- (--)	No observations were recorded

Fish Community

For its size, Swan Lake has a diverse fish community (Table 2).

Table 2. Fish species commonly found in Swan Lake, Turner County.

Game Species	Other Species
Walleye	Common Carp
Yellow Perch	White Sucker
Black Crappie	Bigmouth Buffalo
Northern Pike	Shortnose gar
Black Bullhead	River Carpsucker
Bluegill	
White crappie	
Channel Catfish	
Green sunfish	
Orange-spotted sunfish	

Fish Management

Despite being shallow, Swan Lake does not suffer from frequent fish kills (Table 3). Populations of walleye, yellow perch and black crappie are maintained by stocking fingerling and adult fish (Table 4).

Table 3. Fish kill history for Swan Lake, Turner County.

Year	Severity	Comments
1999	Moderate	8/5/99 carp, bullhead, black crappie, northern pike, yellow perch
2008	Light	Winterkill Common carp, black crappie
2010	Light	Summer black crappie and white crappie

Table 4. Stocking history for Swan Lake, Turner County, 2005-2014.

Year	Number	Species	Size
2005	5,984	Walleye	Fingerling
2006	4,892	Black Crappie	Adult
	18,265	Walleye	Fingerling
	3,960	Yellow Perch	Juvenile
2009	1,080	Walleye	Large Fingerling
2010	18,200	Walleye	Fingerling
2011	2,260	Yellow Perch	Adult
	438	Walleye	Large Fingerling
2012	36,750	Walleye	Fingerling
2014	232,000	Walleye	Fry

Methods

Swan Lake was sampled June 25-26, 2014 with three overnight gill-net sets and five overnight trap-net sets. 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. 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.

Results and Discussion

Net Catch Results

Walleye were the most abundant species sampled in the gill nets making up 66% of the total catch (Table 5). Over half of the walleyes sampled were sub-stock (< 25 cm or 10 in) in length (Table 6). Black bullheads were the most common species sampled in the trap nets followed by hybrid sunfish and white suckers (Table 7). Nearly all fish in the trap nets were stock length or longer (Table 8).

Table 5. Total catch from three overnight gill nets set in Swan Lake, Turner County, June 25-26, 2014.

<i>Species</i>	<i>#</i>	<i>%</i>	<i>CPUE</i> ¹	<i>80% C.I.</i>	<i>Mean CPUE*</i>	<i>PSD</i>	<i>RSD-P</i>	<i>Mean Wr</i>
Walleye	142	66.4	47.3	<u>+6.5</u>	11.7	18	2	86
Black Bullhead	41	19.2	13.7	<u>+5.2</u>	12.6	2	0	--
Bigmouth Buffalo	16	7.5	5.3	<u>+2.6</u>	5.7	--	--	--
White Sucker	7	3.3	2.3	<u>+0.9</u>	3.0	--	--	--
Common Carp	4	1.9	1.3	<u>+0.4</u>	3.0	--	--	--
Channel Catfish	3	1.4	1.0	<u>+0.7</u>	1.9	--	--	--
Hybrid Sunfish	1	0.5	0.3	<u>+0.4</u>	0.0	--	--	--

*10 years (2005-2014)

Table 6. CPUE by length category for selected species sampled with gill nets in Swan Lake, Turner County, June 25-26, 2014.

<i>Species</i>	<i>Substock</i>	<i>Stock</i>	<i>S-Q</i>	<i>Q-P</i>	<i>P+</i>	<i>All sizes</i>	<i>80% C.I.</i>
Walleye	27.0	20.3	16.7	3.3	0.3	47.3	<u>+6.5</u>
Black Bullhead	--	13.7	13.3	0.3	--	13.7	<u>+5.2</u>
Bigmouth Buffalo	2.7	2.7	--	2.7	--	5.3	<u>+2.6</u>
White Sucker	--	2.3	--	--	2.3	2.3	<u>+0.9</u>
Common Carp	1.0	0.3	--	0.3	--	1.3	<u>+0.4</u>
Channel Catfish	0.3	0.7	--	0.7	--	1.0	<u>+0.7</u>
Hybrid Sunfish*	--	--	--	--	--	0.3	<u>+0.4</u>

*No length categories established. Length categories can be found in Appendix A.

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

Table 7. Total catch from five overnight trap nets set in Swan Lake, Turner County, June 25-26, 2014.

<i>Species</i>	<i>#</i>	<i>%</i>	<i>CPUE</i>	<i>80% C.I.</i>	<i>Mean CPUE*</i>	<i>PSD</i>	<i>RSD-P</i>	<i>Mean Wr</i>
Black Bullhead	202	51.5	40.4	+14.7	134.1	5	0	--
Hybrid Sunfish	74	18.9	14.8	+11.8	2.5	--	--	--
White Sucker	53	13.5	10.6	+2.7	7.9	100	100	--
White Crappie	25	6.4	5.0	+2.5	15.5	28	28	108
Common Carp	16	4.1	3.2	+2.0	1.8	75	0	--
Walleye	13	3.3	2.6	+1.0	2.4	83	50	88
Channel Catfish	4	1.0	0.8	+0.6	0.9	--	--	--
Green Sunfish	2	0.5	0.4	+0.3	3.1	--	--	--
Bluegill	2	0.5	0.4	+0.3	0.2	--	--	--
Bigmouth Buffalo	1	0.3	0.2	+0.3	1.0	--	--	--

*10 years (2005-2014)

Table 8. CPUE by length category for selected species sampled with trap nets in Swan Lake, Turner County, June 25-26, 2014.

<i>Species</i>	<i>Substock</i>	<i>Stock</i>	<i>S-Q</i>	<i>Q-P</i>	<i>P+</i>	<i>All sizes</i>	<i>80% C.I.</i>
Black Bullhead	--	40.4	38.2	2.2	--	40.4	+14.7
Hybrid Sunfish*	--	--	--	--	--	14.8	+11.8
White Sucker	--	10.6	--	--	10.6	10.6	+2.7
White Crappie	--	5.0	3.6	--	1.4	5.0	+2.5
Common Carp	0.8	2.4	0.6	1.8	--	3.2	+2.0
Walleye	0.2	2.4	0.4	0.8	1.2	2.6	+1.0
Channel Catfish	0.4	0.4	0.2	0.2	--	0.8	+0.6
Green Sunfish	--	0.4	0.4	--	--	0.4	+0.3
Bluegill	--	0.4	0.2	0.2	--	0.4	+0.3
Bigmouth Buffalo	--	0.2	--	0.2	--	0.2	+0.3

*No length categories established. Length categories can be found in Appendix A.

Table 9. Gill-net (GN) and trap-net (TN) CPUE for selected fish species sampled in Swan Lake, Turner County, 2005-2014.

Species	Gear	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bigmouth	GN	15.0		7.3		1.7		--		5.0	5.3
Buffalo	TN	0.4		2.3		2.8		--		0.4	0.2
Black	GN	10.0		6.3		16.3		21.3		8.0	13.7
Bullhead	TN	14.8		9.8		539.4		162.0		38.2	40.4
Black	GN	--		1.0		--		--		--	--
Crappie	TN	--		22.8		12.4		--		--	--
Channel	GN	4.5		3.7		2.0		0.3		--	1.0
Catfish	TN	1.0		0.3		1.0		0.8		1.4	0.8
Common	GN	1.5		2.7		2.3		7.7		2.3	1.3
Carp	TN	2.0		4.0		0.4		0.6		0.4	3.2
Green	GN	--		--		--		--		--	--
Sunfish	TN	--		1.0		4.0		13.0		0.2	0.4
Shortnose	GN	--		--		--		0.3		--	--
Gar	TN	0.2		0.5		--		0.6		1.0	--
Walleye	GN	4.5		4.0		1.3		10.3		3.0	47.3
	TN	0.4		5.5		--		2.8		3.2	2.6
White	GN	1.5		2.3		18.0		0.7		--	--
Crappie	TN	1.4		7.8		73.2		5.8		--	5.0
White	GN	--		1.0		1.3		11.3		2.3	2.3
Sucker	TN	--		2.3		11.0		18.8		4.4	10.6
Yellow	GN	0.5		0.3		0.7		3.3		--	--
Perch	TN	0.4		0.3		1.6		2.0		--	--

Walleye

Management Objective

- Maintain a walleye population with a total gill-net CPUE of at least 10.

Management Strategy

- Stock walleye small fingerlings at the rate of 70/acre (14,560) as needed to achieve the management objective.

Walleye abundance was at a 10-year high in 2014 (Table 10). There was a large year class of walleye ranging in length from 18-30 cm (Figure 3) that were either naturally produced in 2013 or slow-growing age-2 fish from the 2012 fingerling stocking (Table 11).

Table 10. CPUE, PSD, RSD-P, and mean Wr for all walleye sampled with gill nets in Swan Lake, Turner County, 2005-2014. Stocked years are shaded.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CPUE	4.5		4.0		1.3		10.3		3.0	47.3
PSD	--		0		--		7		--	18
RSD-P	--		0		--		0		--	2
Mean Wr	--		79		--		92		--	86

Table 11. Walleyes stocked into Swan Lake, Turner County, 2005-2014.

Year	Number	Size
2005	5,984	Fingerling
2006	18,265	Fingerling
2009	1,080	Large Fingerling
2010	18,200	Fingerling
2011	438	Large Fingerling
2012	36,750	Fingerling
2014	232,000	Fry

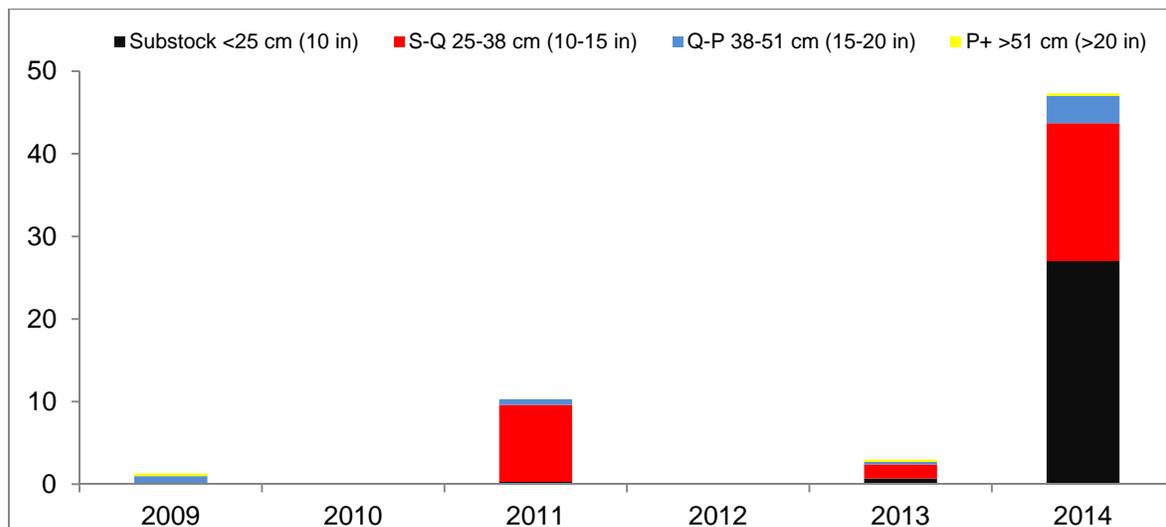


Figure 2. CPUE by length category for walleye sampled with gill nets in Swan Lake, Turner County, 2009-2014.

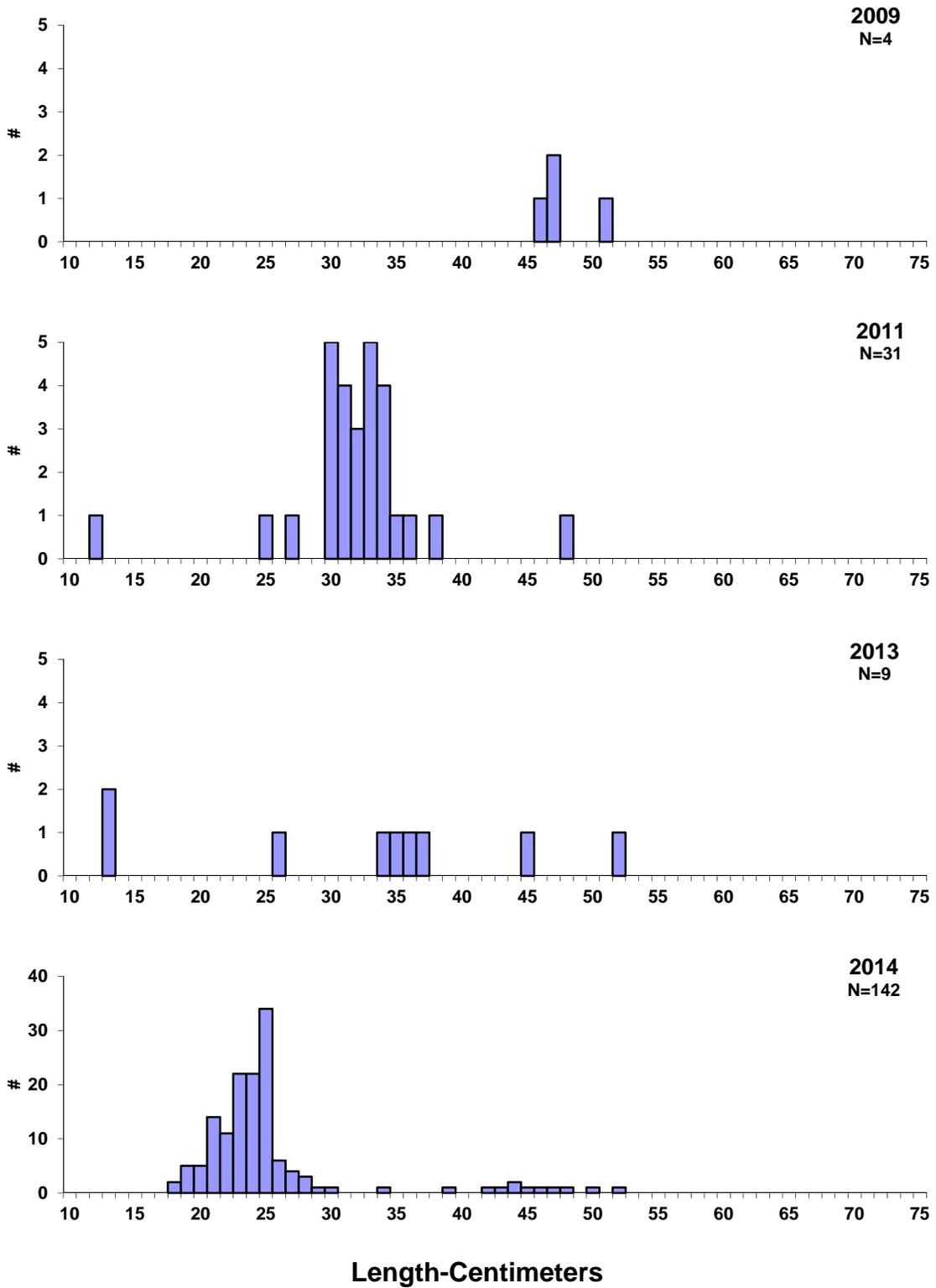


Figure 3. Length frequency histograms for walleyes sampled with gill nets in Swan Lake, Turner County, 2009, 2011, 2013, 2014.

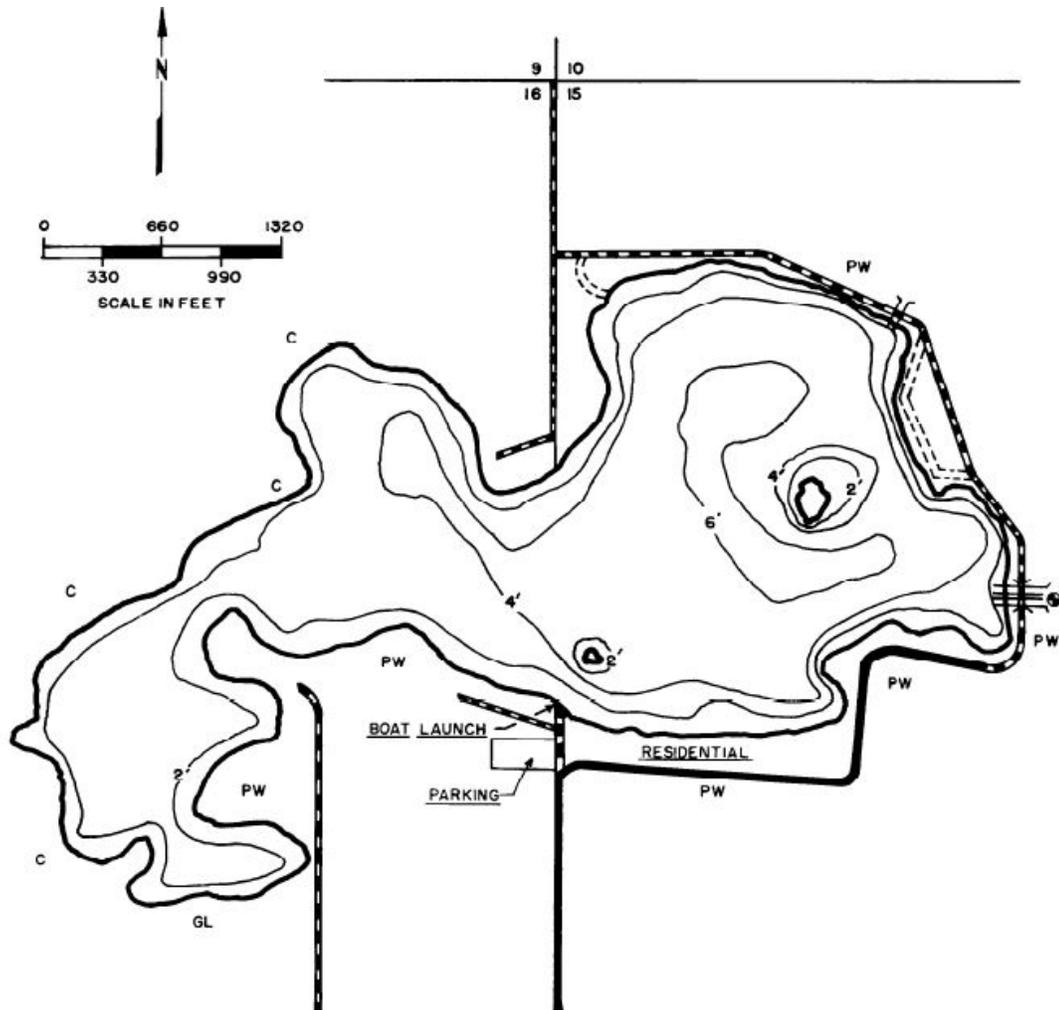


Figure 8. Contour map of Swan Lake, Turner County.

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.

Species	Stock	Quality	Preferred	Memorable	Trophy
Common carp	28	41	53	66	84
White Sucker	15	25	33	41	51
Bigmouth buffalo	28	41	53	66	84
Black bullhead	15	23	30	38	46
Channel catfish	28	41	61	71	91
Northern pike	35	53	71	86	112
White Bass	15	23	30	38	46
Green Sunfish	8	15	20	25	30
Bluegill	8	15	20	25	30
Smallmouth bass	18	28	35	43	51
Largemouth bass	20	30	38	51	63
White crappie	13	20	25	30	38
Black crappie	13	20	25	30	38
Yellow perch	13	20	25	30	38
Walleye	25	38	51	63	76
Freshwater Drum	20	30	38	51	63

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.