2023 Lake Isabel Survey Summary

Water: Lake Isabel   **County:** Dewey

Legal Description: T17N-R22W-S16   **GPS:** 45.436386, -101.418060

Surface Area: 81 Acres   **Class:** Warm Water Permanent
Maximum Depth: 25 feet   **Mean Depth:** 8.8 feet

Lake Isabel is an 81-acre impoundment on Firesteel Creek, 2.5 miles north of the City of Isabel in northwest Dewey County. The dam grade and entire lake is within a 640-acre Game Production Area owned and managed by the South Dakota Department of Game, Fish and Parks. A gravel road through the GPA encompasses the lake providing access from SD HWY 65. A concrete plank ramp and dock provide boat access on the north shoreline and an ADA accessible wooden fishing pier is present on the south shoreline. A small park area maintained by the City of Isabel is located near the boat ramp.

Primary game fish managed at Lake Isabel include Largemouth Bass, Black Crappie, Yellow Perch, Bluegill and Walleye. Northern Pike and Black Bullhead also have a historical presence. In 2021 the water level was drawn down to facilitate repair of the outlet structure. Local runoff refilled the impoundment during the spring of 2022. No occurrences of winterkill have been documented at Lake Isabel. A fish consumption advisory on Northern Pike over 25 inches and Largemouth Bass over 17 inches for elevated levels of mercury has been issued at Isabel.

Lake Isabel was surveyed on June 13-15, 2023, utilizing ¾ inch standard frame nets sets and AFS standard gill net sets. Yellow Perch, Bluegill, Black Crappie, Northern Pike, and Walleye were observed during the 2023 survey. Electrofishing was not completed in 2023 to monitor Largemouth Bass, however a healthy bass population is known to be present.

- **Yellow Perch:** 10.8 fish per frame net set were observed with individual lengths ranging between 6 and 12 inches. Many size classes of perch were sampled indicating a well-balanced population. Relative condition (weight at length) was slightly above the state average.

- **Bluegill:** Catch rates were relatively high with 10.6 individuals sampled in each frame net. Many of the Bluegill were young fish between 4 and 6 inches, with several fish around 8 inches also observed. Condition was well above the state average.

- **Black Crappie:** During the 2023 netting efforts 5.8 adult black crappie were captured per frame net. Fish of all sizes were recorded with numerous individuals over 8 inches.

- **Other Species:** 12 Northern Pike and 3 Walleye were also documented during the 2023 fish population survey. Scheduled stockings of Walleye fingerlings occur biannually.

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Isabel, Dewey County
GRA-Lake-613-000
2023

Lake Information

Name:	Isabel	**Maximum Depth:**	25 Feet
County:	Dewey	**Mean Depth:**	9 Feet
Legal Description:	T17-R22-S16		
Surface Area:	107 Acres		

Surveys and Investigations

Survey methods used by gear type, date, and effort.

Gear	Date	Effort
AFS std gill net	Jun 14, 2023	2 net-nights
frame net (std 3/4 in)	Jun 14, 2023	5 net-nights
frame net (std 3/4 in)	Jun 15, 2023	5 net-nights

Common Fish Species Present

Largemouth Bass

Bluegill

Black Crappie

Walleye

Yellow Perch

Northern Pike

Terminology

Catch per unit effort (**CPUE**) refers to the relative abundance of a species. It is defined as the number of fish captured per unit of effort (i.e., number of fish captured per net-night or number of fish captured per hour electrofishing). In this report CPUE is typically given for only stock-length fish (see length categories table for stock lengths).

A statewide effort to help make netting efforts comparable to all waters sampled across the state, occurred in 2017, with a switch to American Fisheries Society gill nets. Past gill netting efforts were completed with different style/types of nets and are not comparable side by side.

- **AFS std gill net** – 80 ft experimental gill net containing eight panels (10 ft each) of varying monofilament meshes of 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25 and 2.50 inches.

- **std experimental gill net for non-Missouri River waters** - 150 ft experimental gill net containing six panels (25 ft each) of varying monofilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.

- s**td experimental gill net for Missouri River reservoirs** – 300 ft experimental gill net containing six panels (50 ft each) of varying multifilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.

$$CPUE = \frac{number\ of\ fish}{effort}$$

Population size structure is quantified using the indices proportional size distribution of quality-length fish (**PSD**) and proportional size distribution of preferred-length fish (**PSD-P**). These indices indicate the proportion of stock-length fish that are equal to or greater than a given length. Minimum lengths for stock, quality and preferred length fish are given in the length categories table.

$$PSD = \left(\frac{number\ of\ fish \geq quality\ length}{number\ of\ fish \geq stock\ length}\right) \times 100$$

$$PSD-P = \left(\frac{number\ of\ fish \geq preferred\ length}{number\ of\ fish \geq stock\ length}\right) \times 100$$

Relative weight (**Wr**) is used to quantify fish plumpness. Relative weight is the ratio of what a fish weighs (W) compared to a length-specific standard weight (Ws) multiplied by 100. Relative weight values of 95-105 are commonly cited as optimum values, but values in the 80s are common during summer sampling in South Dakota.

$$Wr = \left(\frac{W}{Ws}\right) \times 100$$

Confidence intervals (**CI**) are provided for many of the estimates calculated in this report. The confidence interval provides a range in which the true mean is expected to fall. For example, with an 80% CI we are 80% confident that the interval contains the true value.

Length categories include stock (**S**), quality (**Q**), preferred (**P**), memorable (**M**) and trophy (**T**). Length categories for most species have been defined based on a percentage of the world record length for that species. Some species mentioned in this report do not have defined length categories. Length categories for species used in this report are provided in the following table. Measurements are the minimum total length for each category and are reported in inches (in) and centimeters (cm).

Species Name	Stock (in)	Stock (cm)	Quality (in)	Quality (cm)	Preferred (in)	Preferred (cm)	Memorable (in)	Memorable (cm)	Trophy (in)	Trophy (cm)
Black Bullhead	6	15	9	23	12	30	15	38	18	46
Black Crappie	5	13	8	20	10	25	12	30	15	38
Bluegill	3	8	6	15	8	20	10	25	12	30
Brown Trout	8	20	12	30	16	40	20	50	18	46
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Lake Trout	12	30	20	50	26	65	31	80	39	100
Largemouth Bass	8	20	12	30	15	38	20	51	25	63
Muskellunge	20	51	30	76	38	97	42	107	50	127
Northern Pike	14	35	21	53	28	71	34	86	44	112
Pumpkinseed	3	8	6	15	8	20	10	25	12	30
Rainbow Trout	10	25	16	40	20	50	26	65	31	80
Rudd	6	15	10	25	12	30	15	38	19	48
Sauger	8	20	12	30	15	38	20	51	25	63
Smallmouth Bass	7	18	11	28	14	35	17	43	20	51
Walleye	10	25	15	38	20	51	25	63	30	76
White Bass	6	15	9	23	12	30	15	38	18	46
White Crappie	5	13	8	20	10	25	12	30	15	38
Yellow Bullhead	4	10	7	18	9	23	11	28	14	36
Yellow Perch	5	13	8	20	10	25	12	30	15	38

Catch Summary of Stock Length Fish

Catch per unit effort (CPUE), proportional size distribution (PSD), proportional size distribution of preferred length fish (PSD-P), and relative weight (Wr) for species sampled in survey with 80% confidence interval (CI-80).
* Methods/Species that ignore stock length

| Gear | Species | Sample Size (n) | Abundance | | Stock Density Indices | | | | Condition | |
			CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Northern Pike	2	1.0	0.0	100		50		83	5
	Walleye	1	0.5	1.5	100		0		91	
	Yellow Perch	2	1.0	3.1	100		0		93	10
frame net (std 3/4 in)	Black Crappie	74	5.8	2.3	62	9	17	7	104	3
	Bluegill	106	10.6	6.2	48	7	16	5	125	6
	Northern Pike	10	1.0	0.5	100		80		93	3
	Walleye	2	0.2	0.2	50		50		82	2
	Yellow Perch	108	10.8	5.8	50	7	14	5	95	1

10-Year Catch Per Unit Effort by Gear and Species

Catch per unit effort (CPUE) and average (Avg) of species across 10 years using different gear types.
* Methods/Species that ignore stock length

Gear	Species												
							CPUE						
		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg	
AFS std gill net	Black Crappie					1.3			0.5		0.0	0.60	
	Bluegill					0.3			0.0		0.0	0.10	
	Northern Pike					2.0			2.5		1.0	1.83	
	Walleye					0.8			0.5		0.5	0.60	
	Yellow Perch					31.3			5.5		1.0	12.60	
boat shocker (night)	Largemouth Bass	13.0				39.5	35.5	73.0				40.25	
	Smallmouth Bass	3.0				0.0	0.0	0.0				0.75	
	Walleye*	9.0				0.0	0.0	0.0				2.25	
frame net (std 3/4 in)	Black Bullhead	4.8				0.0			0.5		0.0	1.33	
	Black Crappie	8.0				17.4			10.0		5.8	10.30	
	Bluegill	1.0				9.2			11.3		10.6	8.03	
	Largemouth Bass	0.0				0.0			0.1		0.0	0.03	
	Northern Pike	0.5				0.8			0.5		1.0	0.70	
	Sunfish Hybrid	0.0				0.0			0.1		0.0	0.03	
	Walleye	0.1				0.0			0.3		0.2	0.15	
	Yellow Perch	0.7				9.8			1.8		10.8	5.78	
std exp gill net	Black Bullhead	2.0										2.00	
	Black Crappie	2.5										2.50	
	Northern Pike	3.0										3.00	
	Walleye	5.0										5.00	
	Yellow Perch	5.5										5.50	

10-Year Size Structure and Condition Statistics by Gear and Species

Species proportional size distribution (PSD), proportional size distribution of preferred length fish (PSD-P), and relative weight (Wr) collected by different gear types across 10 years.

Gear	Species	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AFS std gill net	Black Crappie	PSD					80			100		
		PSD-P					0			0		
		Wr					98			107		
	Bluegill	PSD					100					
		PSD-P					0					
		Wr					93					
	Northern Pike	PSD					100			100		100
		PSD-P					88			80		50
		Wr					91			97		83
	Walleye	PSD					100			100		100
		PSD-P					67			50		0
		Wr					89			95		91
	Yellow Perch	PSD					15			36		100
		PSD-P					0			5		0
		Wr					99			100		93
boat shocker (night)	Largemouth Bass	PSD	100				81	75	71			
		PSD-P	69				43	46	41			
		Wr	104				107	105	106			
	Walleye	PSD	56									
		PSD-P	11									
		Wr	85									
frame net (std 3/4 in)	Black Crappie	PSD	85				63			59		62
		PSD-P	20				3			3		17
		Wr	97				102			103		104
	Bluegill	PSD	80				48			66		48
		PSD-P	40				0			4		16
		Wr	107				101			110		125
	Largemouth Bass	PSD								100		
		PSD-P								100		
		Wr								106		
	Northern Pike	PSD	100				100			100		100
		PSD-P	40				50			40		80

			Year									
Gear	Species	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
frame net (std 3/4 in)	Northern Pike	Wr	88				95			93		93
	Walleye	PSD	100				0			33		50
		PSD-P	100				0			33		50
		Wr	80							84		82
	Yellow Perch	PSD	43				12			17		50
		PSD-P	29				8			6		14
		Wr	87				91			96		95
std exp gill net	Black Crappie	PSD	100									
		PSD-P	40									
		Wr	94									
	Northern Pike	PSD	100									
		PSD-P	83									
		Wr	84									
	Walleye	PSD	90									
		PSD-P	50									
		Wr	91									
	Yellow Perch	PSD	55									
		PSD-P	0									
		Wr	91									

Back-Calculated Lengths

Mean species back-calculated total length (mm) at age, standard error (SE), and sample size (N).

Species: Black Crappie

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2022	1	14	106 (2)									
2021	2	5	97 (1.4)	129 (1.9)								
2020	3	3	102 (12.7)	139 (6.7)	163 (2.3)							
2018	5	3	118 (2)	156 (10.6)	183 (9.9)	210 (6.1)	229 (6.9)					
2017	6	6	110 (3.9)	137 (3.2)	162 (2.8)	181 (1.8)	197 (2.8)	209 (2.3)				
2016	7	6	117 (1.9)	146 (4.9)	167 (6.7)	186 (8.4)	201 (8.4)	214 (8.3)	227 (7.9)			
2015	8	7	118 (5.5)	146 (5.8)	167 (5.1)	184 (4.3)	199 (3.2)	210 (2.6)	220 (3.7)	231 (4.8)		
2014	9	1	100	131	160	175	197	207	221	233	248	
2013	10	1	104	104	141	141	161	161	180	180	200	200
Weighted Mean		46	109	140	166	185	201	208	220	226	224	200

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2022	1	14										
2021	2	5										
2020	3	3										
2018	5	3										
2017	6	6										
2016	7	6										
2015	8	7										
2014	9	1										
2013	10	1										
Weighted Mean		46										

Species: Bluegill

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2021	2	35	76 (2.5)	119 (4)								
2020	3	10	80 (2.9)	122 (5.8)	157 (7.8)							
2019	4	7	83 (8.3)	115 (15.7)	151 (12.8)	170 (16.3)						
2018	5	1	81	116	144	169	185					
2017	6	3	95 (2)	137 (10.3)	164 (5.4)	187 (1.5)	200 (3.6)	213 (6.8)				
2016	7	1	80	107	128	158	169	186	198			
2014	9	1	90	117	144	158	170	179	188	200	213	
Weighted Mean		58	79	120	154	172	187	201	193	200	213	

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2021	2	35										
2020	3	10										
2019	4	7										
2018	5	1										
2017	6	3										
2016	7	1										
2014	9	1										
Weighted Mean		58										

Species: Walleye

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2020	3	1	184	234	284							
2015	8	1	240	305	332	371	414	463	504	546		
Weighted Mean		2	212	270	308	371	414	463	504	546		

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2020	3	1										
2015	8	1										
Weighted Mean		2										

Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Black Crappie

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2023	74	128 (26)	146 (9)	181 (3)		243 (5)	220 (9)	237 (9)	241 (10)	253 (2)	215 (2)
2021	100		160 (20)	176 (18)	213 (38)	233 (4)	232 (18)	260 (1)			
2018	178	126 (6)	145 (51)	198 (18)	203 (23)	209 (29)	219 (15)	222 (16)	222 (15)	246 (6)	241 (2)
2014	81		137 (3)	193 (11)	217 (36)	244 (19)	252 (5)	262 (6)	262 (1)		

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2023	106		134 (75)	186 (14)	196 (9)	193 (3)	221 (4)	212 (2)		220 (1)	
2021	112		123 (31)		165 (37)		185 (43)	203 (1)			
2018	92		116 (22)	134 (14)	154 (27)	186 (6)	174 (14)	182 (11)			
2014	10			126 (1)	126 (1)	172 (1)	172 (1)	186 (2)	204 (2)	211 (2)	

Species: Largemouth Bass

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2020	73	204 (8)	251 (10)	296 (5)	325 (7)	340 (6)	368 (9)	388 (1)	401 (7)	427 (9)	473 (11)
2018	71	166 (5)	194 (3)	243 (10)	292 (5)	325 (10)	342 (15)	403 (8)	385 (5)	436 (3)	439 (10)
2014	14	133 (1)				376 (5)	387 (2)	403 (5)		533 (1)	

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2021	2				454 (1)	553 (1)					
2014	12	232 (3)			400 (4)		543 (5)				

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2021	22			191 (1)	190 (19)	270 (1)	185 (2)				

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	125	146 (56)	156 (29)	179 (7)	196 (22)	216 (8)	237 (3)				
2014	11			162 (4)		227 (6)	244 (1)				

Fish Condition

Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

| | | Length Groups | | | | | | | |
| | | S-Q | | Q-P | | P-M | | M | |
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2021	41	109 (0.8)	56	99 (0.8)	3	92 (1.3)	0	
	2023	22	112 (3.0)	26	102 (3.2)	10	94 (1.4)	0	
Bluegill Frame Net	2021	38	112 (1.1)	71	109 (0.8)	4	104 (2.8)	0	
	2023	55	134 (7.9)	34	120 (4.2)	17	106 (1.4)	0	
Largemouth Bass Electro Fishing	2019	18	103 (3.2)	20	107 (3.1)	30	105 (1.5)	3	108 (6.1)
	2020	21	106 (2.1)	22	104 (2.2)	29	107 (3.8)	1	114
Northern Pike Gill Net	2021	0		2	95 (0.4)	7	99 (2.7)	1	94
	2023	0		1	79	1	87	0	
Walleye Gill Net	2021	0		1	91	1	99	0	
	2023	0		1	91	0		0	
Yellow Perch Gill Net	2021	14	102 (1.6)	7	100 (1.9)	1	83	0	
	2023	0		2	93 (7.4)	0		0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: frame net (std 3/4 in)
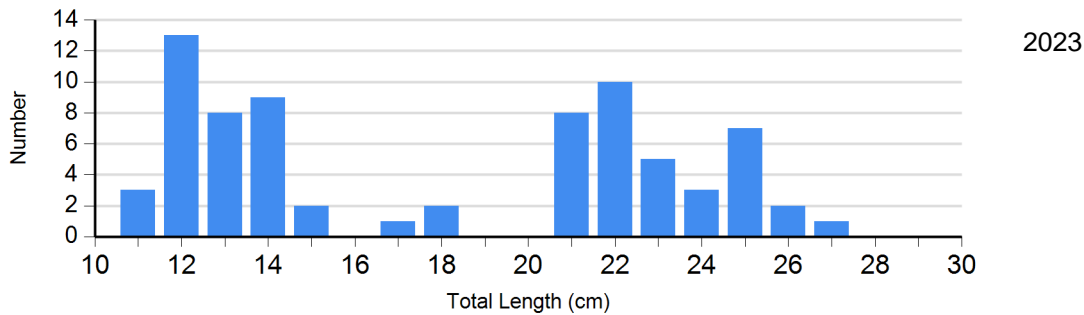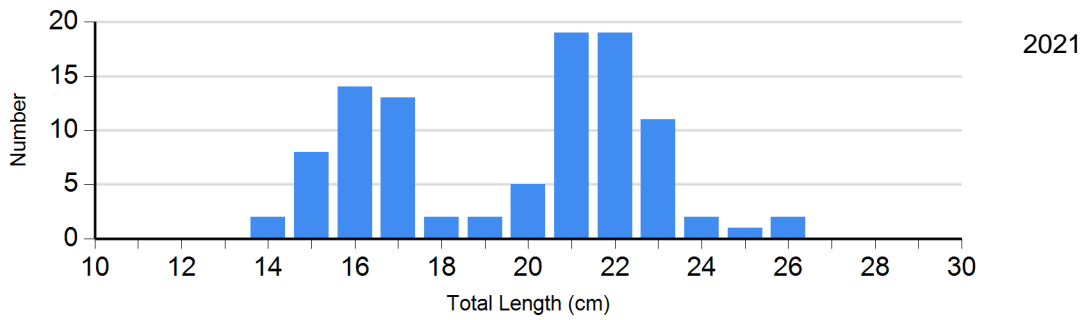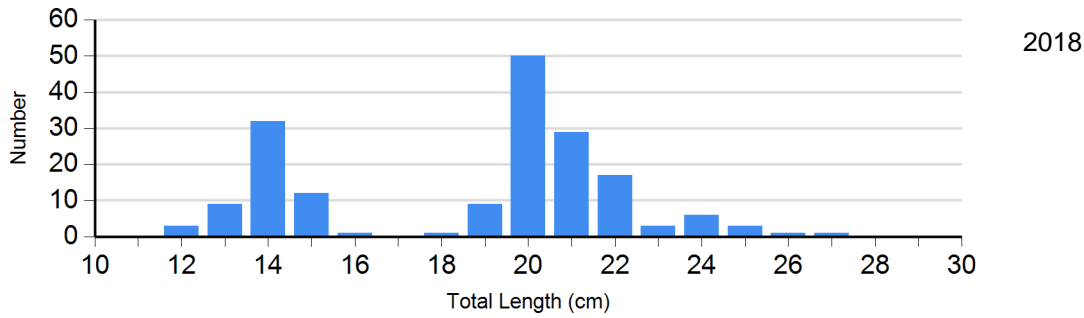
2018

2021

2023

Species: Bluegill
Gear: frame net (std 3/4 in)

2018

2021

2023

Species: Largemouth Bass
Gear: boat shocker (night)
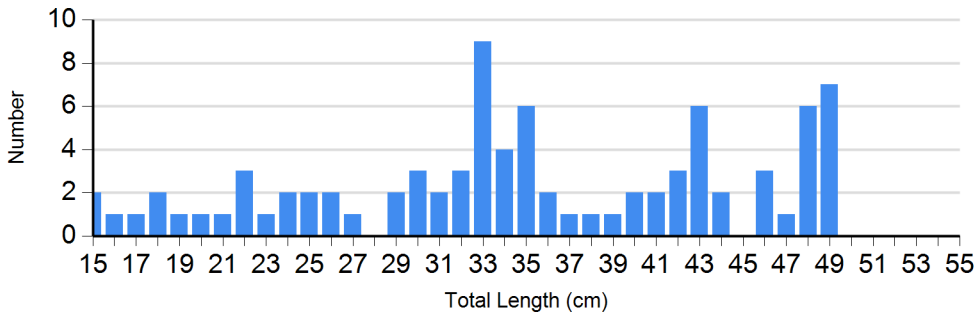
2018
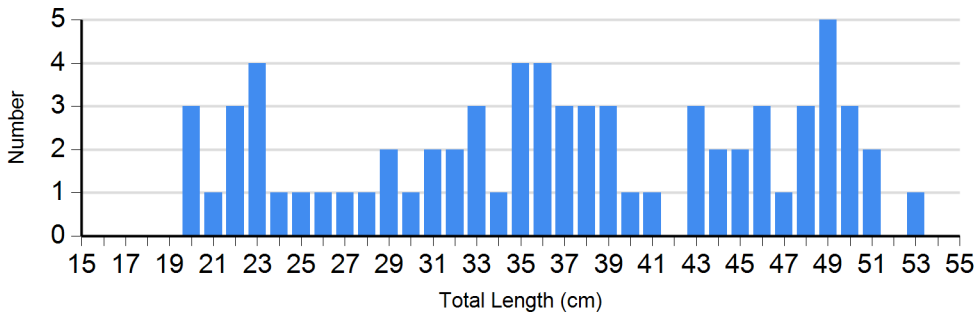
2019
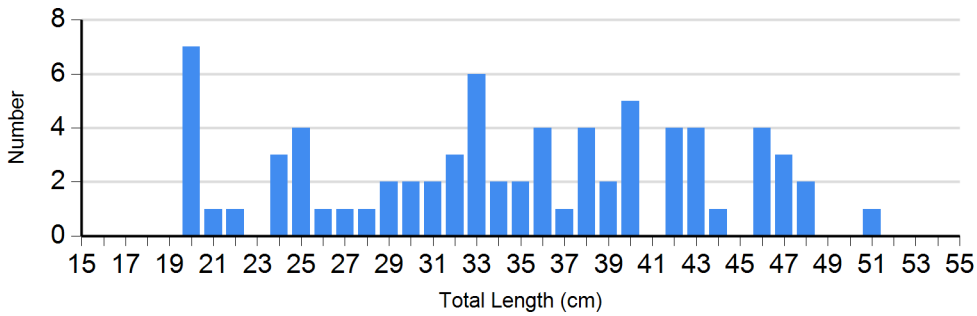
2020

Species: Northern Pike
Gear: AFS std gill net


2021

Species: Yellow Perch
Gear: AFS std gill net

2018

2021
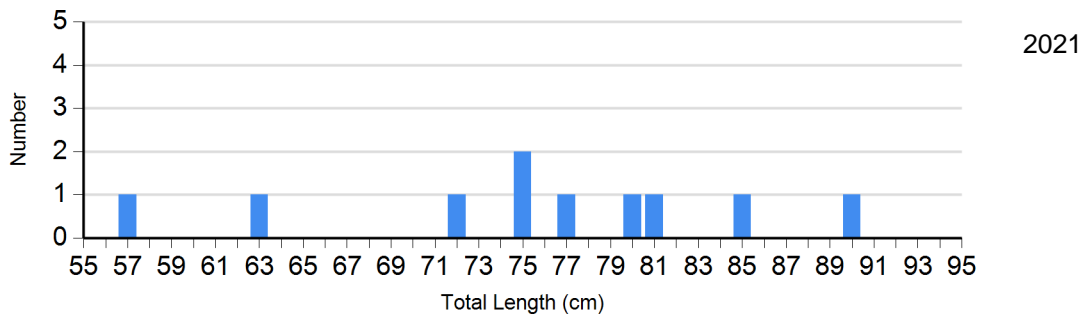
Historic Fish Sizes and Relative Abundance

Size distribution per net by color for species sampled by year.

Species: Black Crappie
Gear: frame net (std 3/4 in)
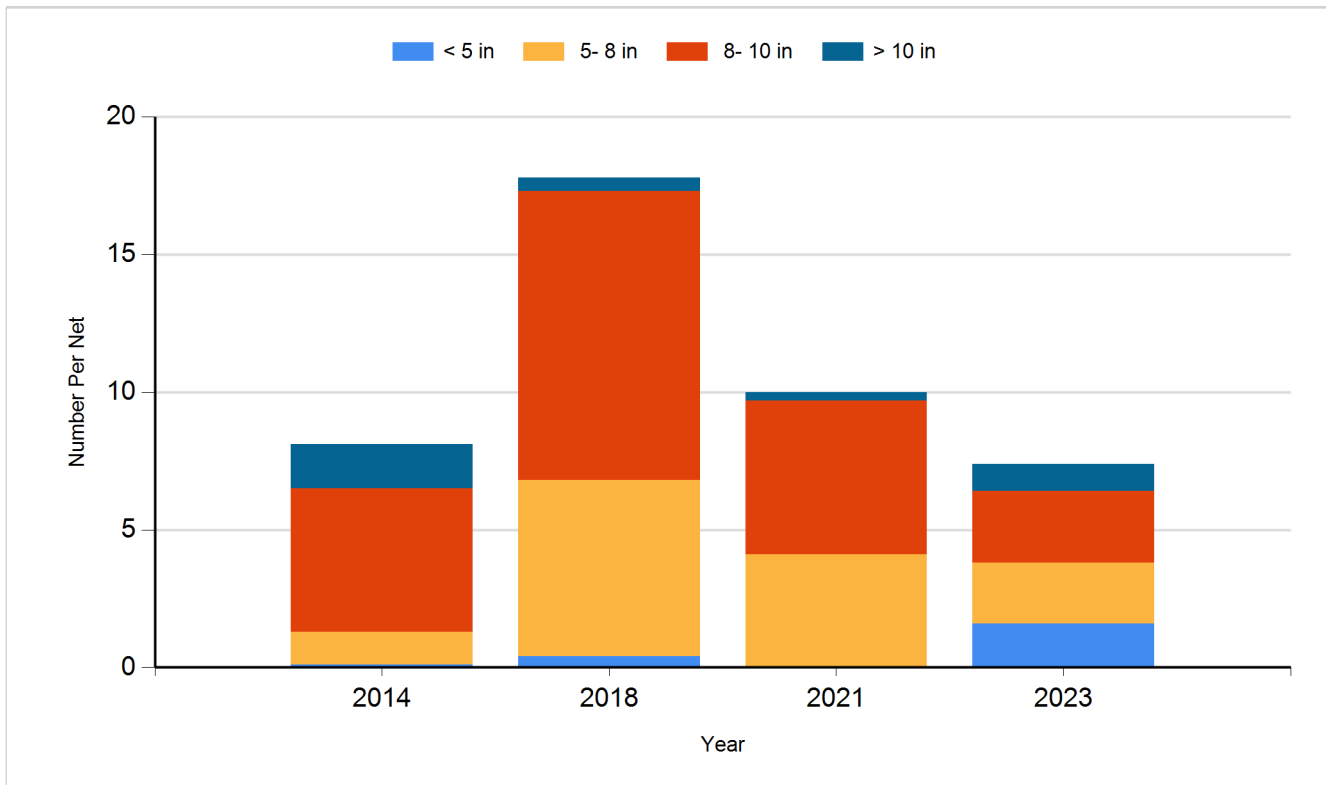
Species: Bluegill
Gear: frame net (std 3/4 in)
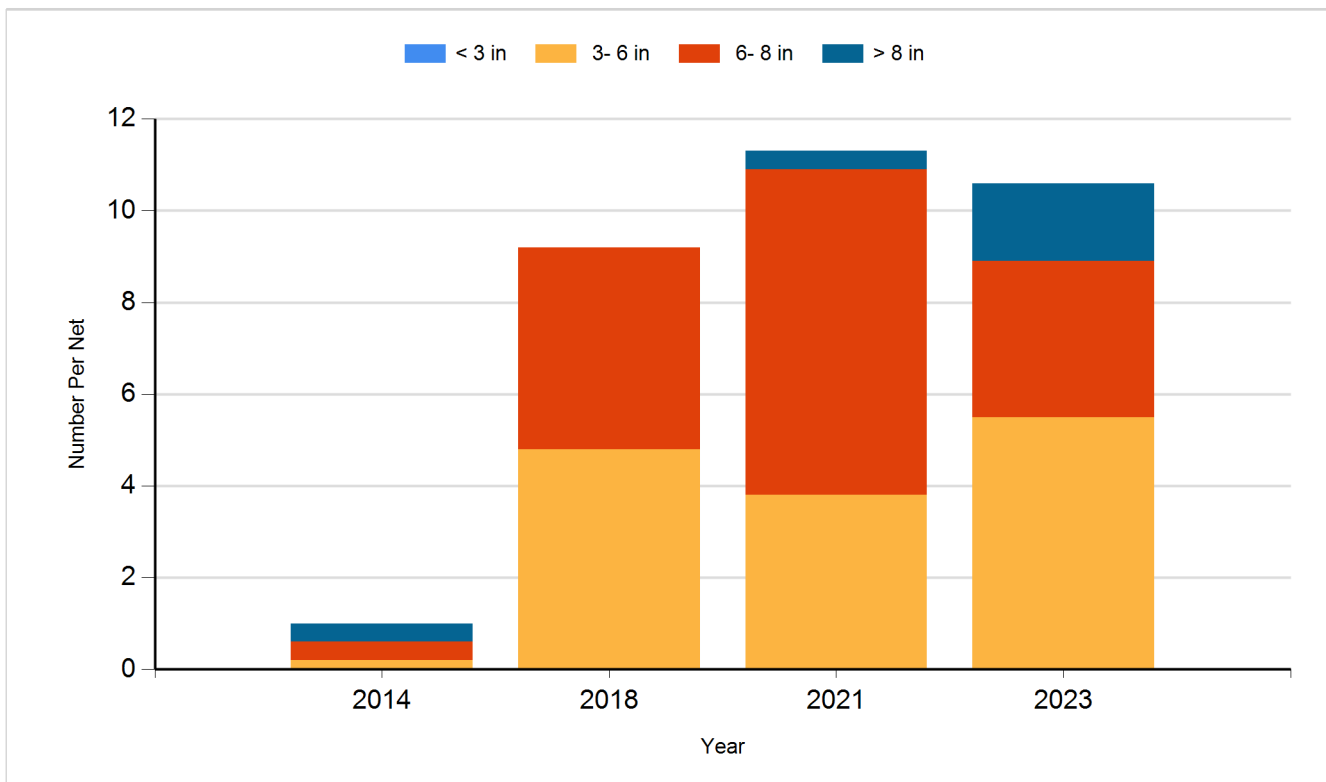
Species: Largemouth Bass
Gear: boat shocker (night)
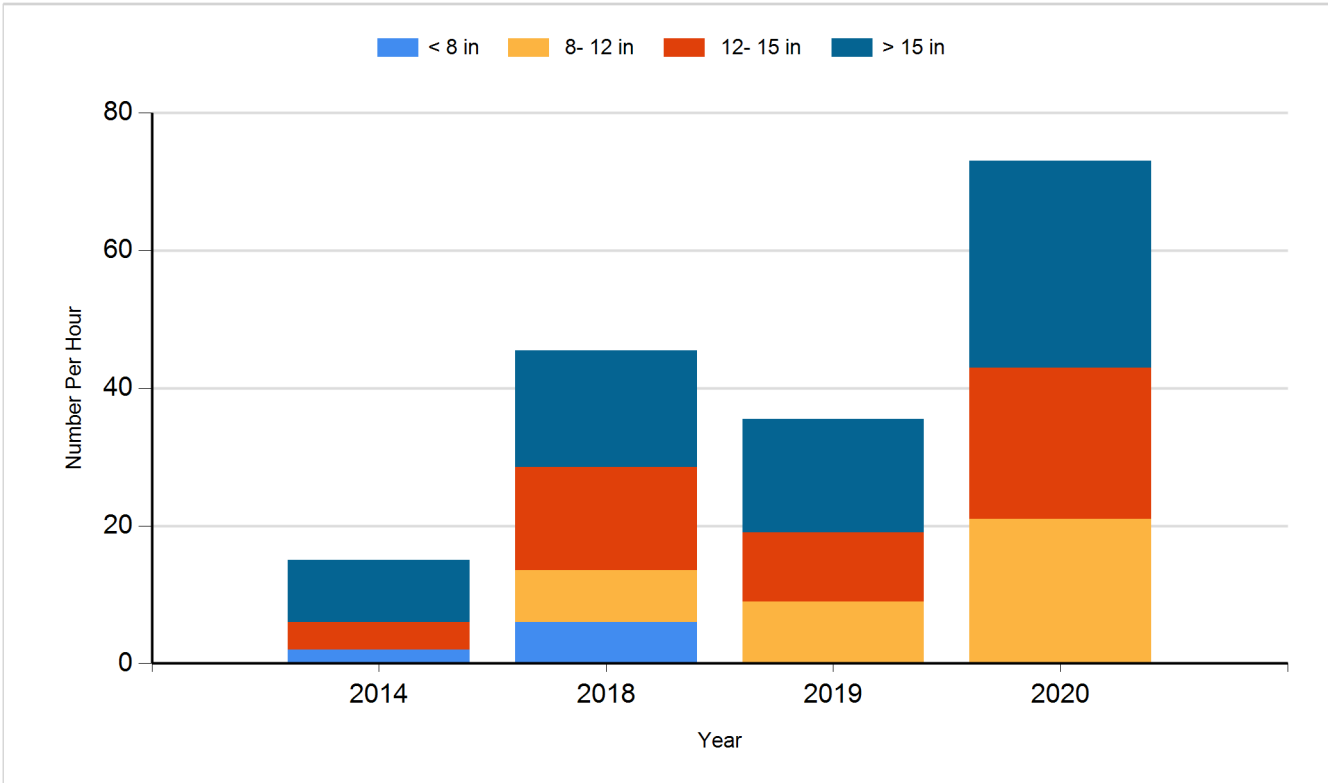
Species: Northern Pike
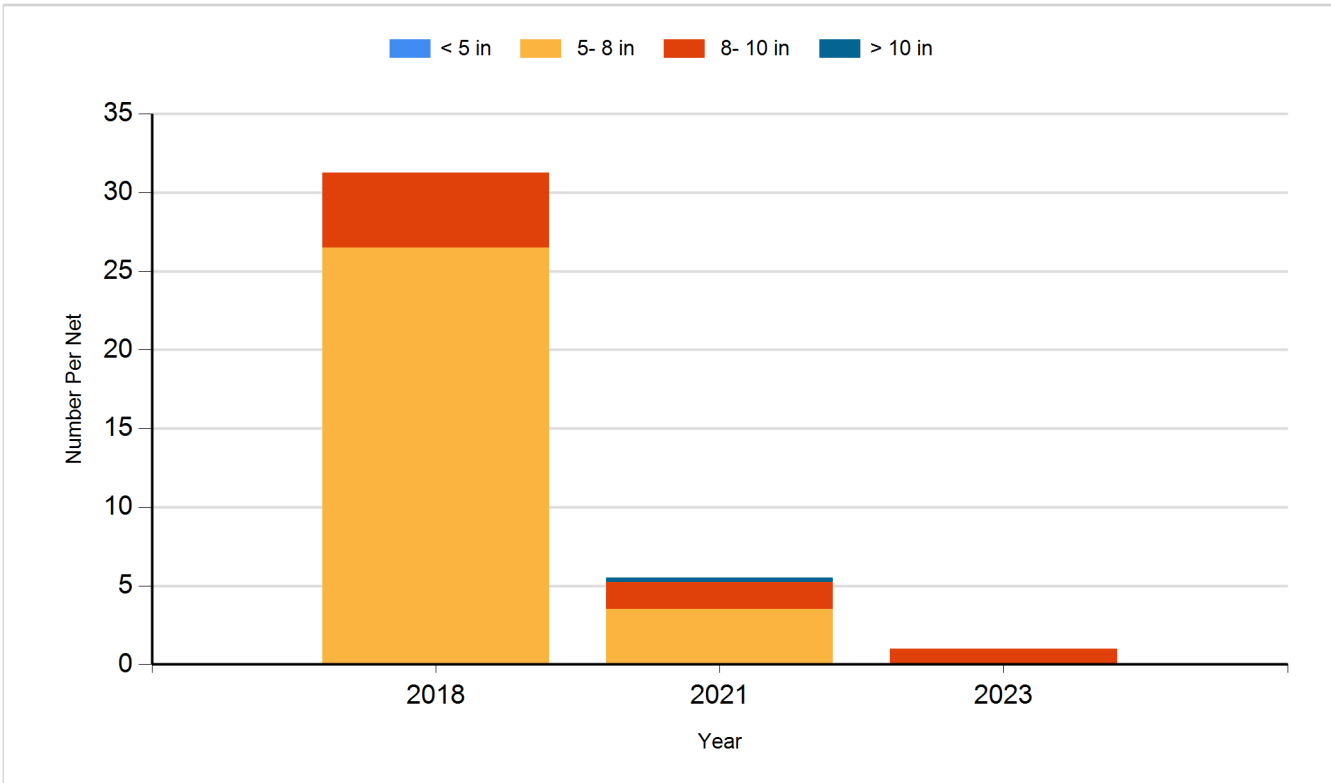Gear: AFS std gill net
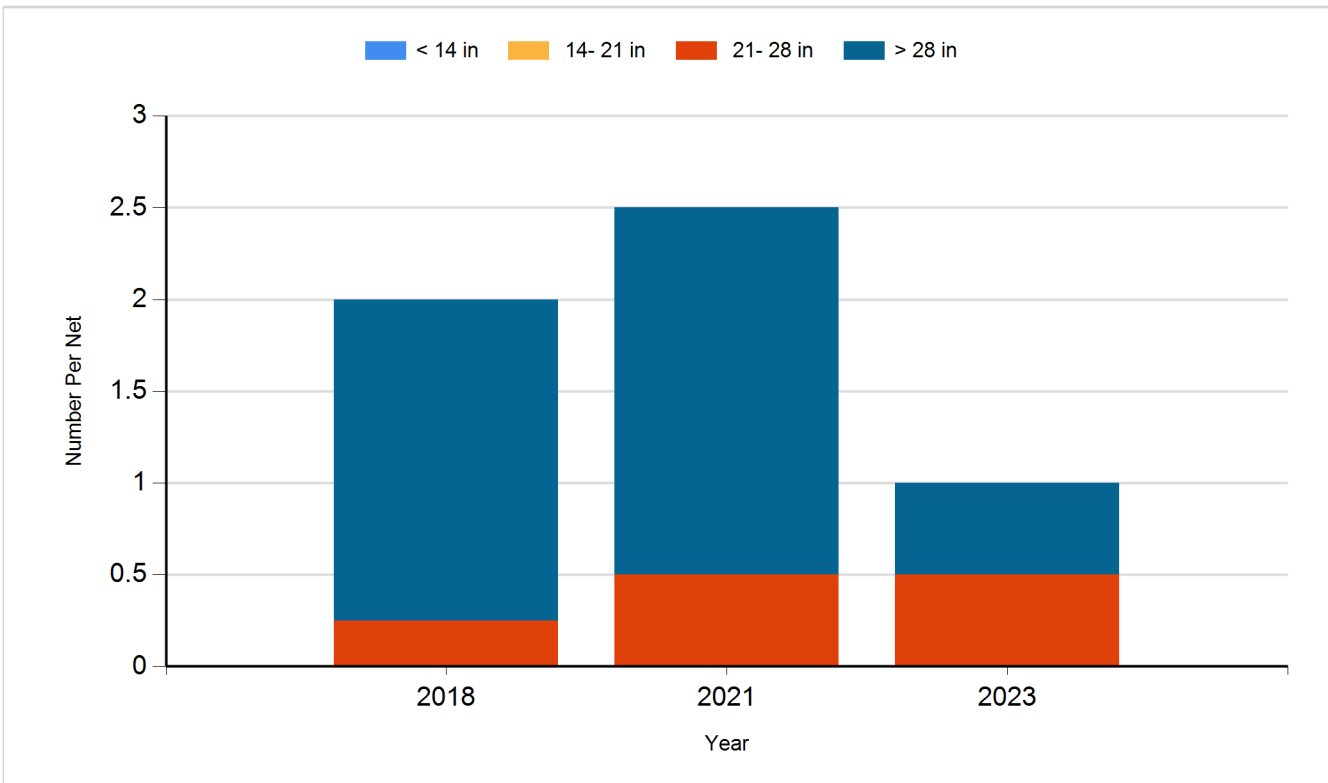
Species: Northern Pike
Gear: std exp gill net
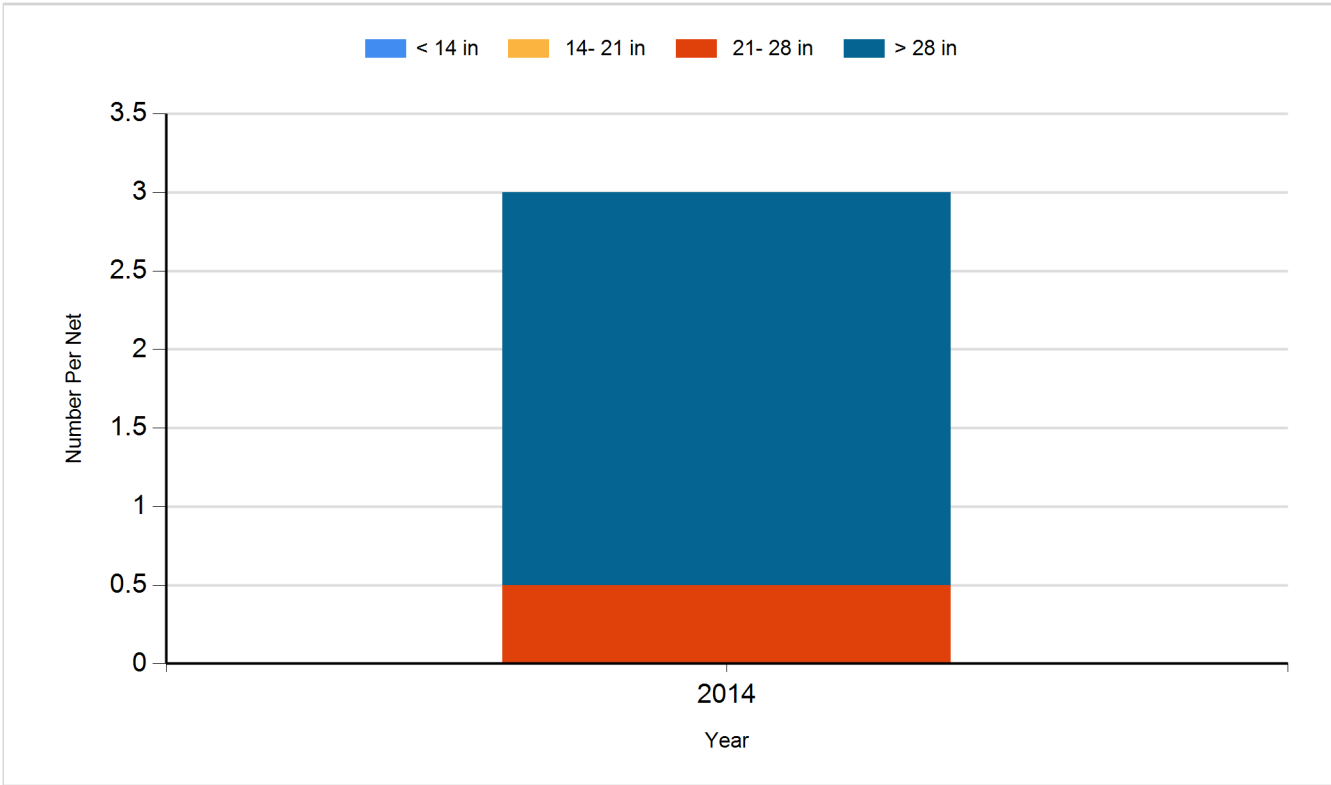
Species: Walleye
Gear: AFS std gill net
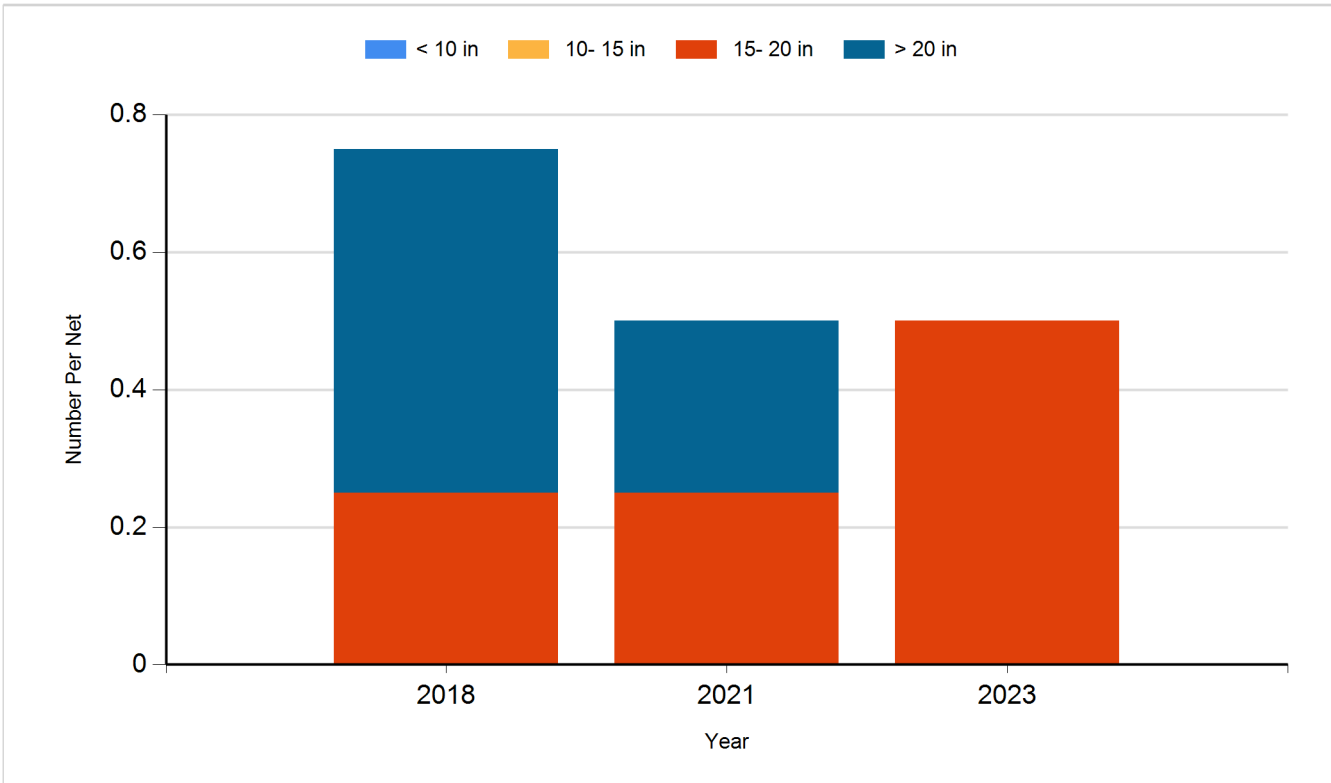
Species: Walleye
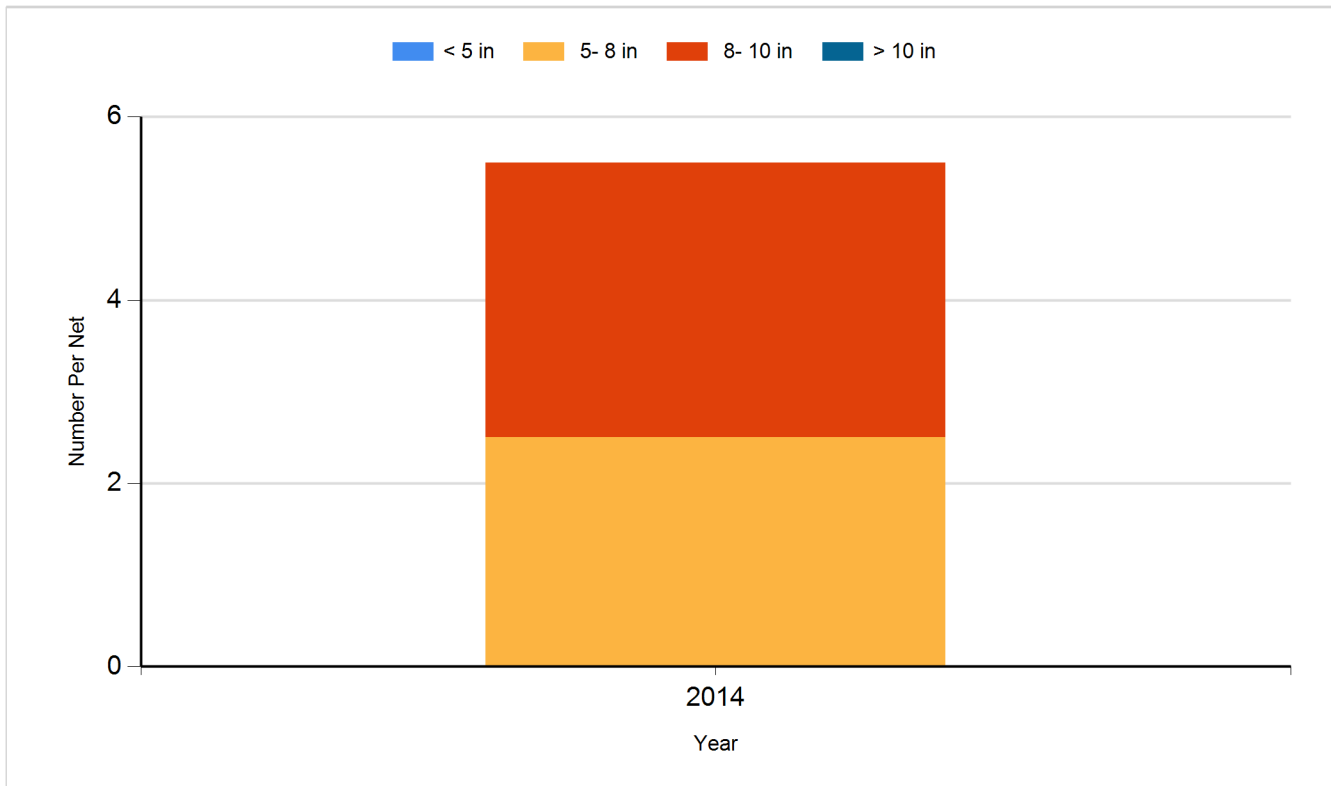Gear: std exp gill net
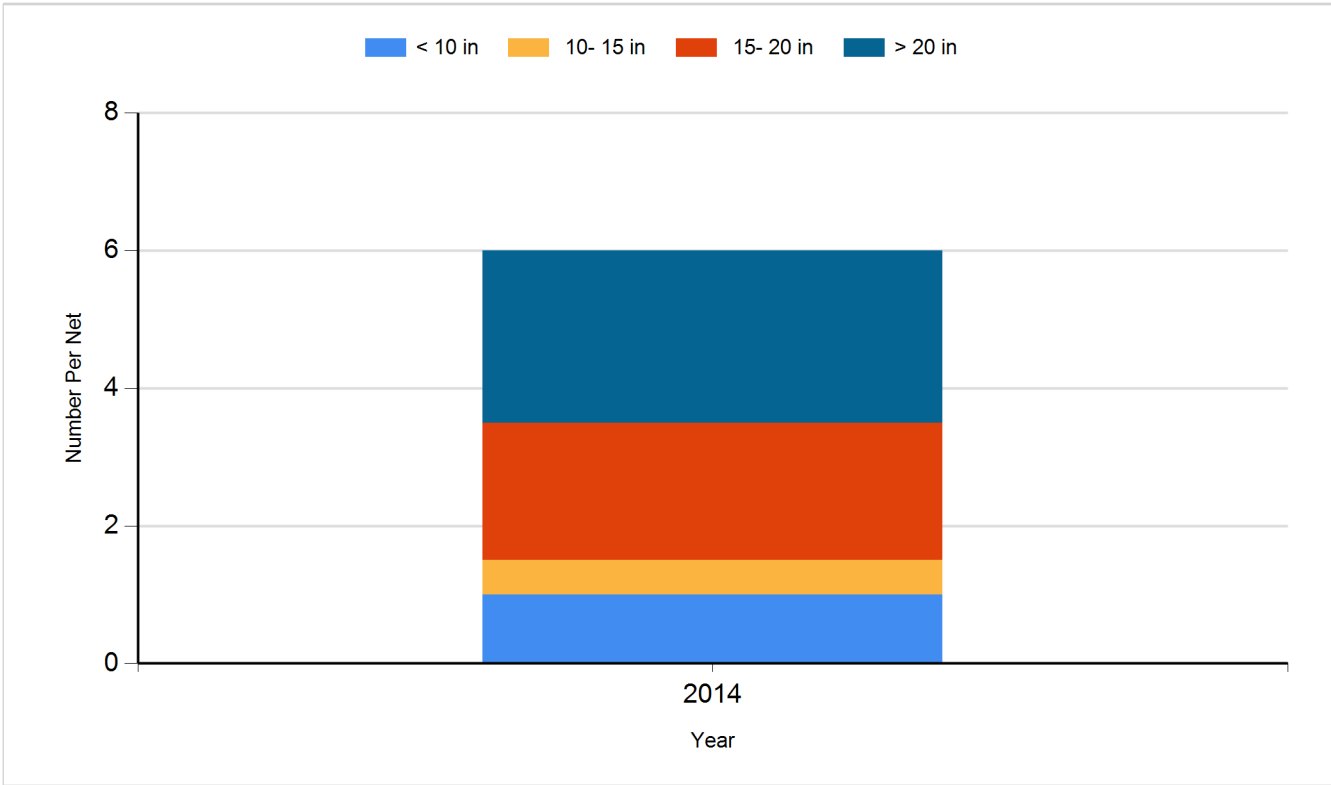
Species: Yellow Perch
Gear: AFS std gill net

Fish Stocking

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2013	Walleye	Large Fingerling	688
2015	Walleye	Large Fingerling	540
2017	Walleye	Large Fingerling	2,800
2019	Walleye	Large Fingerling	2,868
2021	Walleye	Juvenile	1,800
2023	Walleye	Juvenile	1,806