SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Angostura Reservoir, Fall River County
ANR-Lake-4-000
2018

Lake Information

Name: Angostura Reservoir

County: Fall River

Surface Area: 4,835 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Aug 28, 2018	8 net-nights
frame net (std 3/4 in)	May 22, 2018	5 net-nights
frame net (std 3/4 in)	May 23, 2018	5 net-nights

Common Fish Species Present

Largemouth Bass

Gizzard Shad

Channel Catfish

Black Crappie

Walleye

Smallmouth Bass

Common Carp

River Carpsucker

Freshwater Drum

Shorthead Redhorse

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.

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

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

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.

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

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).

	Stock		Quality		Preferred		Memorable		Trophy	
Species Name	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(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**

			Abundance		Stock Density Indices				Condition	
Gear	Species	Sample Size (n)	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Crappie	4	0.5	0.4	100		100		97	3
	Channel Catfish	133	10.9	3.5	29	7	1		80	2
	Common Carp	14	1.8	1.5	50	22	0		81	2
	Freshwater Drum	12	1.5	0.8	92		8		88	3
	Gizzard Shad	18	2.1	1.2	100				88	2
	Northern Pike	1	0.1	0.2	100		100		81	
	River Carpsucker	17	2.1	1.7	100		100		94	4
	Shorthead Redhorse	6	0.8	0.7	100		67		86	2
	Smallmouth Bass	46	5.8	3.1	85	8	22	9	95	1
	Walleye	102	12.1	2.0	62	7	6	4	84	1
	Yellow Perch	3	0.4	0.4	33		0		93	3
frame net (std 3/4 in)	Black Crappie	228	22.8	15.3	100		86	3	91	1
	Bluegill	8	0.8	0.6	100		13		106	3
	Channel Catfish	106	7.9	3.1	9	5	0		79	1
	Common Carp	55	5.5	2.2	47	10	0		80	2
	Gizzard Shad	18	1.8	1.3	100				79	1
	River Carpsucker	1	0.1	0.1	100		100		107	
	Smallmouth Bass	5	0.5	0.3	80		0		85	3
	Walleye	33	3.2	1.3	94		59	13	74	2
	White Sucker	1	0.1	0.1	100		100		86	

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.

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std frame net	Black Crappie									8.7		8.7
	Bluegill									0.4		0.4
	Common Carp									0.4		0.4
	River Carpsucker									0.5		0.5
	Walleye									0.6		0.6
AFS std gill net	Black Crappie									1.8	0.5	1.2
	Bluegill									0.1		0.1
	Channel Catfish									4.6	10.9	7.8
	Common Carp									1.5	1.8	1.7
	Freshwater Drum									0.6	1.5	1.1
	Gizzard Shad									5.1	2.1	3.6
	Largemouth Bass									0.3		0.3
	Northern Pike									0.5	0.1	0.3
	River Carpsucker									3.0	2.1	2.6
	Shorthead Redhorse									1.1	0.8	1.0
	Smallmouth Bass									6.3	5.8	6.1
	Walleye									11.0	12.1	11.6
	White Sucker									0.1		0.1
	Yellow Perch										0.4	0.4
frame net (std 3/4 in)	Black Bullhead			0.3			1.1					0.7
	Black Crappie	5.5	2.9	26.4	3.9	11.3	7.0	5.9	8.3		22.8	10.4
	Bluegill	16.3	5.9	0.8	4.5	8.1	2.0	1.4	0.6		0.8	4.5
	Bluegill X Gr. Sunfish Hybrid					0.3						0.3
	Channel Catfish	3.3	8.1	3.4		0.1	1.3	0.3	6.3		7.9	3.8
	Common Carp	0.3	1.1	0.6		0.4	2.6	0.3	0.9		5.5	1.5
	Freshwater Drum	0.1	0.9			0.0						0.3
	Gizzard Shad		0.0								1.8	0.9
	Green Sunfish				0.1	0.9						0.5
	Largemouth Bass								0.6			0.6
	Northern Pike				0.1		0.1					0.1
	River Carpsucker	0.6	0.8	0.6	0.1	0.3	0.5		0.3		0.1	0.4
	Rock Bass	0.1				0.8	0.1	0.1				0.3
	Shorthead Redhorse		0.5		0.1		0.1	0.3				0.3
	Smallmouth Bass	0.4	0.3	0.3	0.5		1.4		0.4		0.5	0.5

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
frame net (std 3/4 in)	Walleye	0.6	1.1	0.9	0.8	0.8	1.3	1.3	1.9		3.2	1.3
	White Sucker		0.1				0.4	0.1			0.1	0.2
	Yellow Perch	0.1		0.3				0.0				0.1
std exp gill net	Black Crappie	0.3	1.0	2.5	0.8	1.3	3.3	2.3	4.3			2.0
	Bluegill				0.3				0.3			0.3
	Channel Catfish	26.5	13.8	24.0	9.8	13.5	16.8	8.8	10.8			15.5
	Common Carp	3.5	10.0	8.8	6.0	6.0	3.0	6.5	4.5			6.0
	Freshwater Drum	4.0	1.3	1.5	1.8	2.3	4.3	2.0	5.0			2.8
	Gizzard Shad	0.5	0.0	0.3	0.3	2.8	2.5	5.8	2.8			1.9
	Largemouth Bass	0.3	1.5	0.5			0.3		0.3			0.6
	Northern Pike	0.8		0.3	0.5	0.3		1.8	1.0			0.8
	River Carpsucker	1.3	2.5	1.0	3.5	2.5	2.0	2.0	1.5			2.0
	Shorthead Redhorse	3.3	2.8	0.3	1.5	5.0	8.5	4.8	4.5			3.8
	Smallmouth Bass	4.3	6.8	4.0	12.8	5.3	4.3	5.0	5.0			5.9
	Spottail Shiner	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0
	Walleye	21.8	21.5	16.5	21.5	25.3	29.5	28.0	25.8			23.7
	White Sucker	0.5					0.3	0.8	0.5			0.5
	Yellow Perch	17.0	12.0	9.0	2.8	3.0	3.8	3.0	2.0			6.6

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.

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std frame net	Black Crappie	PSD									100	
		PSD-P									63	
		Wr									101	
	Common Carp	PSD									50	
		PSD-P									25	
		Wr									83	
	River Carpsucker	PSD									100	
		PSD-P									80	
		Wr									100	
	Walleye	PSD									86	
		PSD-P									71	
		Wr									80	
AFS std gill net	Black Crappie	PSD									100	100
		PSD-P									86	100
		Wr									110	97
	Channel Catfish	PSD									27	29
		PSD-P									0	1
		Wr									88	80
	Common Carp	PSD									50	50
		PSD-P									0	0
		Wr									87	81
	Gizzard Shad	PSD									100	100
		Wr									101	88
	Largemouth Bass	PSD									100	
		PSD-P									50	
		Wr									112	
	River Carpsucker	PSD									100	100
		PSD-P									100	100
		Wr									100	94
	Shorthead Redhorse	PSD									100	100
		PSD-P									78	67
		Wr									92	86
	Smallmouth Bass	PSD									68	85

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std gill net	Smallmouth Bass	PSD-P									18	22
		Wr									98	95
	Walleye	PSD									65	62
		PSD-P									5	6
		Wr									88	84
frame net (std 3/4 in)	Black Crappie	PSD	66	61	100	94	73	95	100	79		100
		PSD-P	14	22	50	32	26	68	94	60		86
		Wr	104	102	99	95	94	98	99	111		91
	Channel Catfish	PSD	0	6	4		0	10	0	32		9
		PSD-P	0	0	0		0	0	0	0		0
		Wr			86		86	85	79	96		79
	Common Carp	PSD	0	89	60		100	62	100	50		47
		PSD-P	0	11	0		33	5	0	0		0
		Wr		80	78		83	82	73	99		80
	Gizzard Shad	PSD		0								100
		Wr										79
	Largemouth Bass	PSD								100		
		PSD-P								75		
		Wr								109		
	River Carpsucker	PSD	100	100	100	100	100	100		100		100
		PSD-P	100	100	100	100	100	100		100		100
		Wr		87			109	90		108		107
	Shorthead Redhorse	PSD		100		100		0	100			
		PSD-P		100		100		0	100			
		Wr		90		103		75	78			
	Smallmouth Bass	PSD	0	0	100	25		91		67		80
		PSD-P	0	0	0	0		18		0		0
		Wr	102	93	92	93		95		93		85
	Walleye	PSD	60	89	100	83	100	100	100	69		94
		PSD-P	40	44	57	50	67	20	80	38		59
		Wr	82	75	86	90	89	85	80	86		74
std exp gill net	Black Crappie	PSD	100	50	60	33	100	54	56	76		
		PSD-P	100	0	10	33	60	54	56	18		
		Wr	103	105	116	82	108	108	118	105		
	Channel Catfish	PSD	2	11	21	13	15	27	11	28		
		PSD-P	0	0	0	0	0	1	0	0		

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
std exp gill net	Channel Catfish	Wr	82	82	83	83	86	82	87	83		
	Common Carp	PSD	36	43	20	25	63	67	58	33		
		PSD-P	0	0	6	8	0	0	0	0		
		Wr	84	87	84	84	84	83	87	82		
	Gizzard Shad	PSD	100	0	0	100	9	100	100	100		
		Wr	107		112	105	94	90	97	93		
	Largemouth Bass	PSD	0	0	0			0		100		
		PSD-P	0	0	0			0		0		
		Wr	124	112	112			119		120		
	River Carpsucker	PSD	80	100	100	93	100	100	100	100		
		PSD-P	60	100	100	71	100	88	100	83		
		Wr	94	94	96	94	91	91	93	105		
	Shorthead Redhorse	PSD	100	100	100	100	45	97	100	100		
		PSD-P	15	73	100	83	25	18	26	67		
		Wr	95	93	87	95	89	86	90			
	Smallmouth Bass	PSD	41	44	63	39	67	82	80	70		
		PSD-P	12	7	13	8	10	24	15	25		
		Wr	108	99	99	98	96	95	97	101		
	Walleye	PSD	53	53	70	48	55	59	58	36		
		PSD-P	8	6	9	6	9	6	14	5		
		Wr	86	83	85	88	85	85	92	85		

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+
2016	116		189 (26)	251 (56)	264 (10)	298 (4)	308 (20)				
2014	108		207 (14)	241 (20)	264 (60)	309 (4)	269 (11)	320 (2)			
2012	58			236 (44)	279 (10)	304 (2)	316 (2)				
2011	412		145 (2)	242 (273)	285 (86)	299 (46)	334 (6)				
2009	112	127 (52)	221 (48)	272 (12)							

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	95	303 (26)	392 (44)	442 (17)	474 (2)	544 (2)			588 (1)	496 (1)	633 (2)
2017	84	285 (18)	392 (54)	431 (9)					568 (3)		
2016	204	308 (126)	397 (62)		445 (8)	524 (6)			606 (2)		
2015	228	279 (92)	390 (21)	447 (25)	460 (46)	515 (16)	523 (10)	610 (6)	584 (4)	515 (6)	623 (2)
2014	236	290 (60)	381 (63)	426 (82)	464 (17)	525 (4)	599 (4)	617 (2)		576 (2)	485 (2)
2013	192	264 (2)	359 (110)	442 (53)	525 (2)	517 (23)					662 (2)
2012	182	276 (78)	384 (70)	471 (9)	497 (14)	525 (2)	514 (5)	519 (2)			723 (2)
2011	142	251 (22)	381 (54)	456 (29)	475 (15)	483 (5)	523 (15)		544 (2)		499 (2)
2010	170	267 (24)	379 (110)	445 (14)	496 (12)	502 (6)				519 (4)	
2009	156	291 (66)	401 (10)	435 (33)	452 (33)	435 (3)	555 (4)	525 (2)	514 (2)		584 (4)

Fish Condition

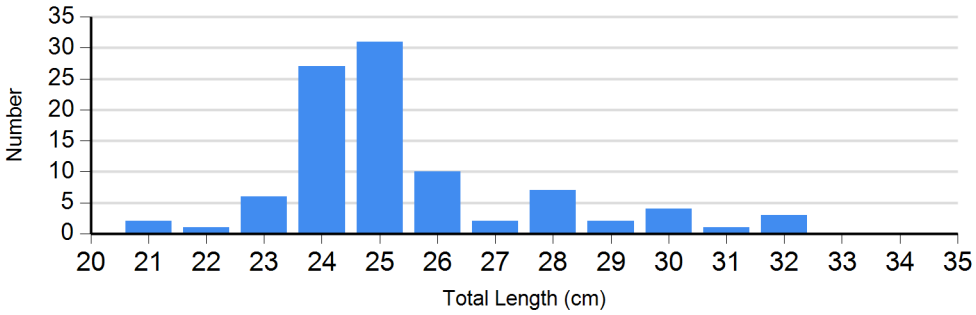
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2014	6	99 (0.3)	30	102 (1.1)	70	97 (0.7)	6	96 (1.1)
	2015	0		6	106 (1.6)	70	99 (0.6)	18	98 (1.2)
	2016	24	113 (2.9)	22	116 (1.2)	50	112 (1.1)	20	104 (1.1)
	2017	0		36	108 (1.1)	52	98 (1.0)	8	94 (3.0)
	2018	0		33	94 (1.2)	182	91 (0.4)	13	87 (1.9)
Channel Catfish Gill Net	2014	98	82 (0.7)	34	81 (3.6)	2	115 (0.0)	0	
	2015	62	86 (1.1)	8	92 (3.0)	0		0	
	2016	62	81 (0.7)	24	89 (0.9)	0		0	
	2017	27	88 (1.9)	10	86 (2.3)	0		0	
	2018	62	79 (1.3)	24	86 (1.9)	1		0	
Common Carp Gill Net	2014	8	83 (1.4)	16	83 (0.9)	0		0	
	2015	22	88 (0.9)	30	87 (0.7)	0		0	
	2016	24	88 (0.6)	12	77 (0.4)	0		0	
	2017	6	83 (3.8)	6	91 (4.1)	0		0	
	2018	7	83 (2.1)	7	80 (2.4)	0		0	
Walleye Gill Net	2014	96	88 (0.8)	126	83 (0.4)	12	77 (1.3)	2	79 (0.0)
	2015	94	95 (0.5)	98	91 (0.5)	30	87 (0.8)	2	81 (0.0)
	2016	132	85 (0.4)	64	86 (0.6)	8	76 (1.4)	2	65 (0.0)
	2017	31	88 (1.4)	53	89 (0.7)	2	78 (5.7)	2	83 (4.1)
	2018	37	87 (1.0)	54	82 (0.6)	5	77 (2.7)	1	73

Length Frequency Distribution

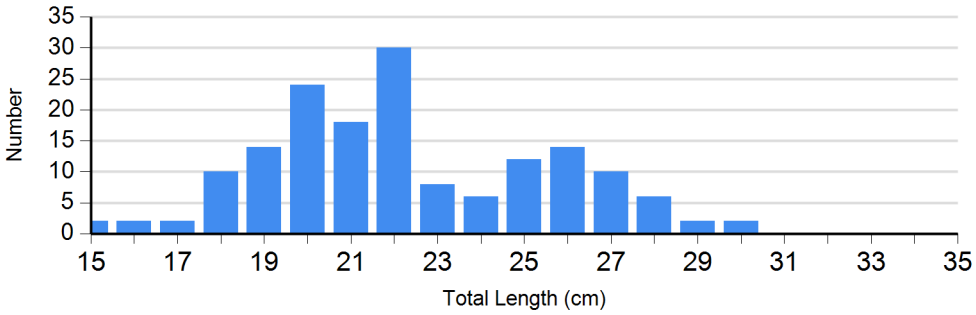
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net

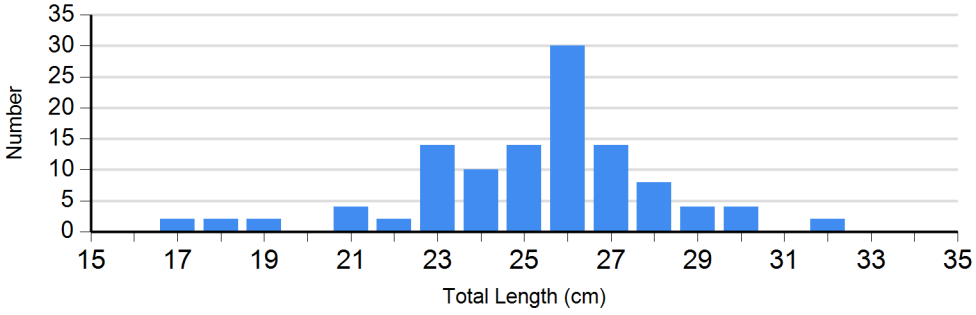


2017

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



2013



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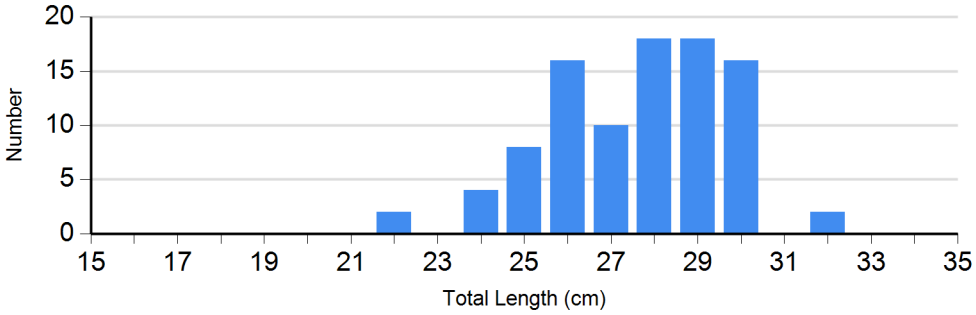
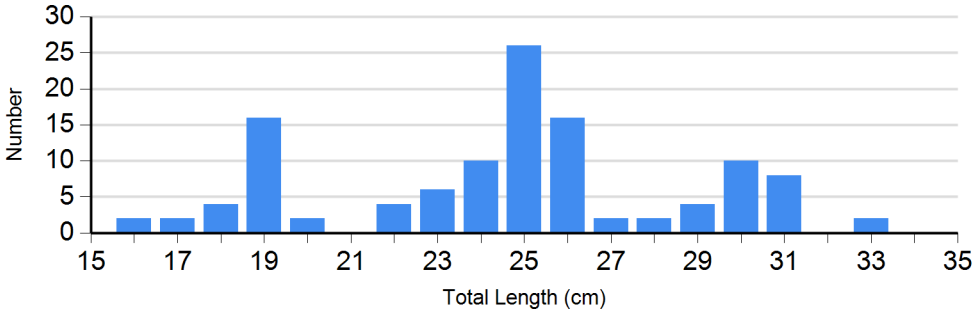
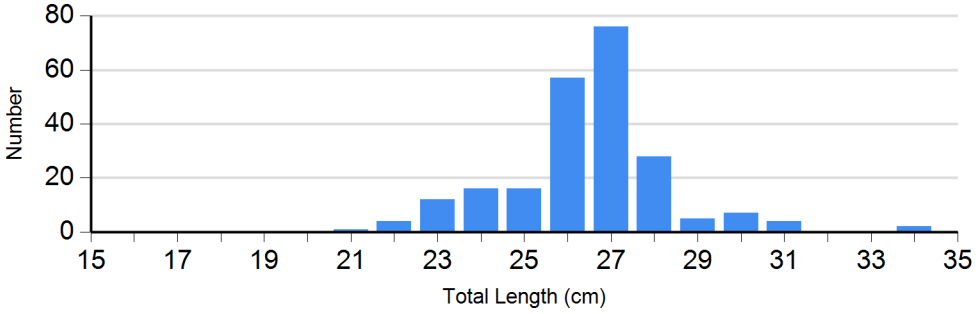


2015

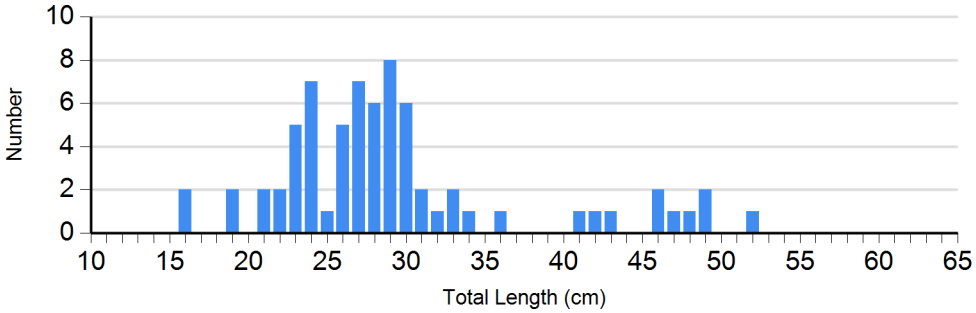


2016

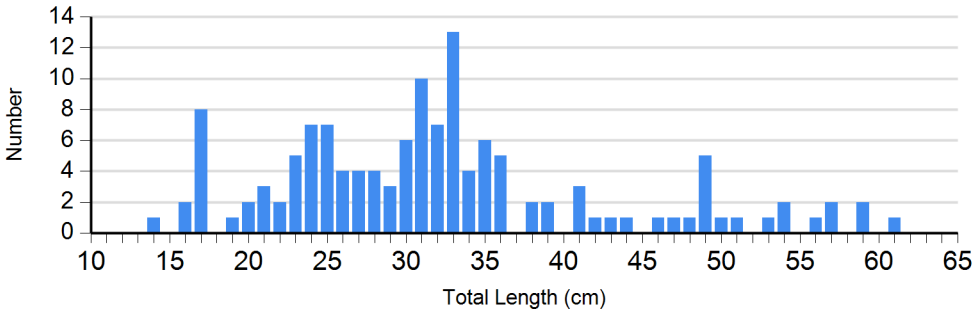


2018

Species: Channel Catfish
Gear: AFS std gill net

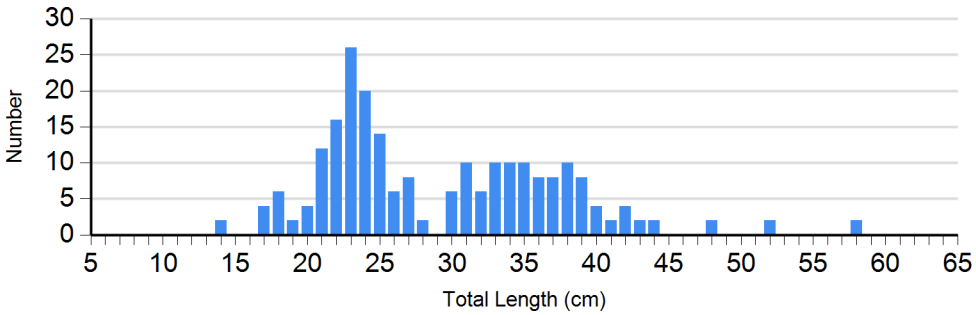


2017

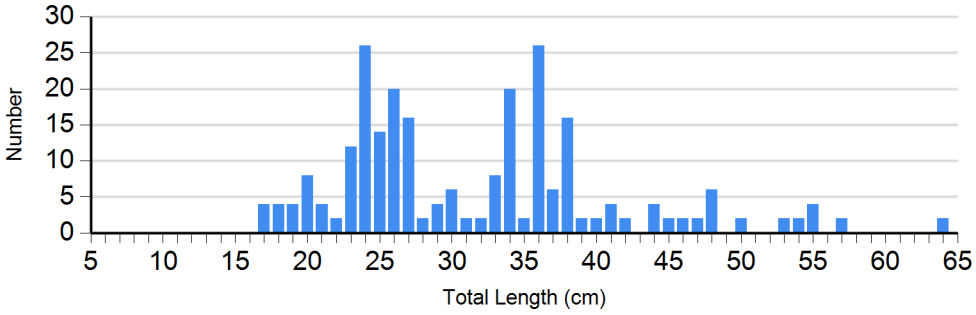


2018

Species: Channel Catfish
Gear: std exp gill net



2013



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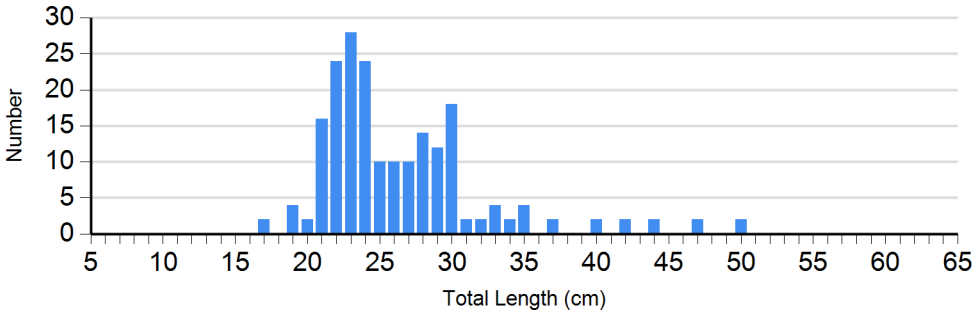

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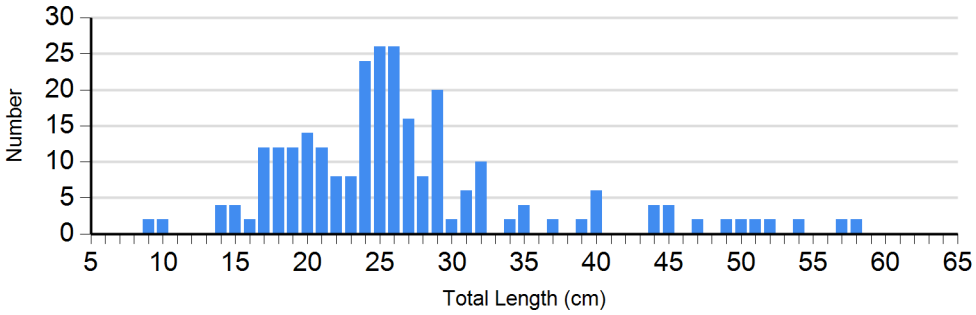
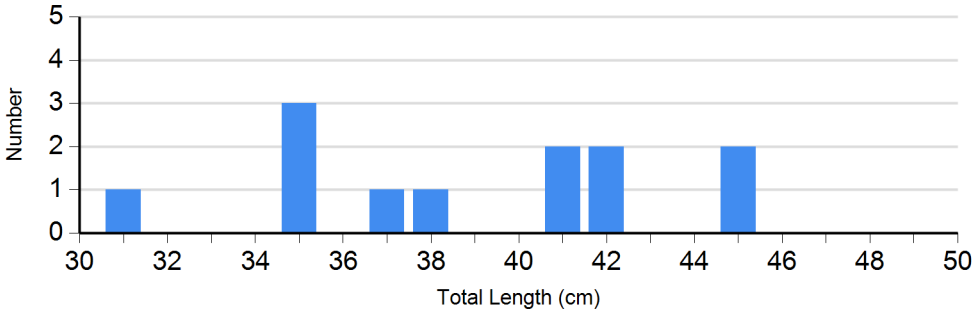
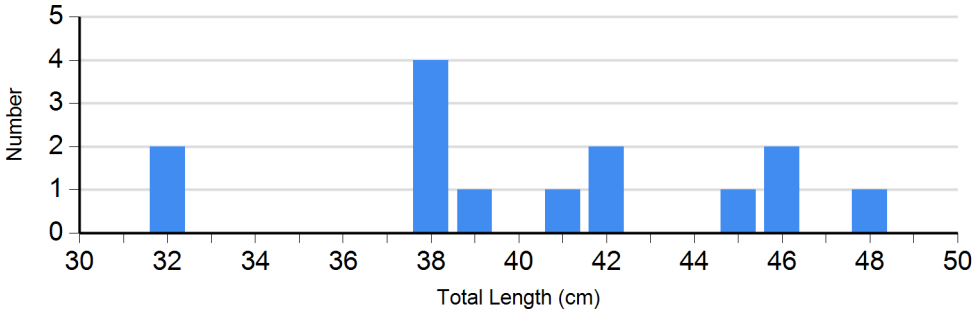


2016

Species: Common Carp
Gear: AFS std gill net

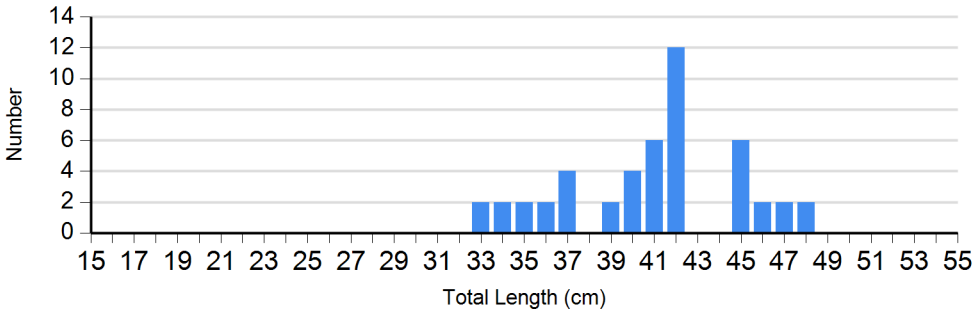


2017



2018

Species: Common Carp
Gear: std exp gill net



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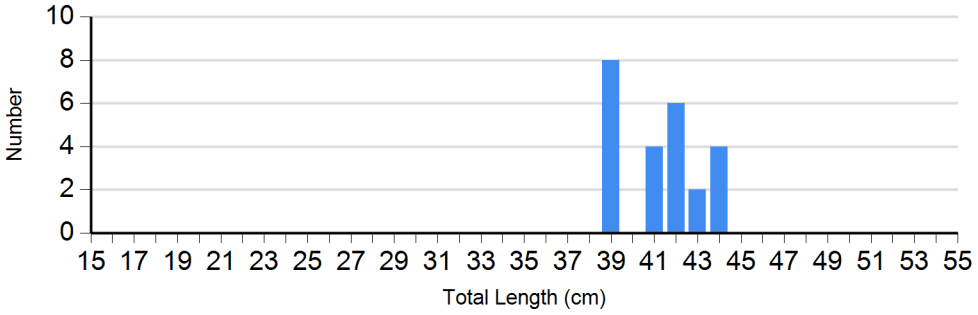

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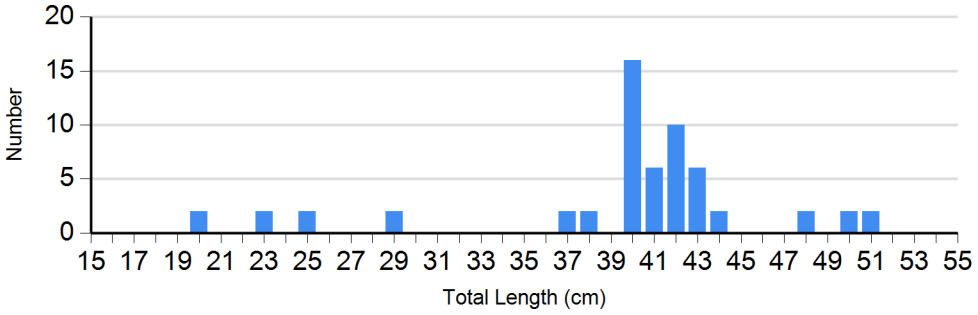

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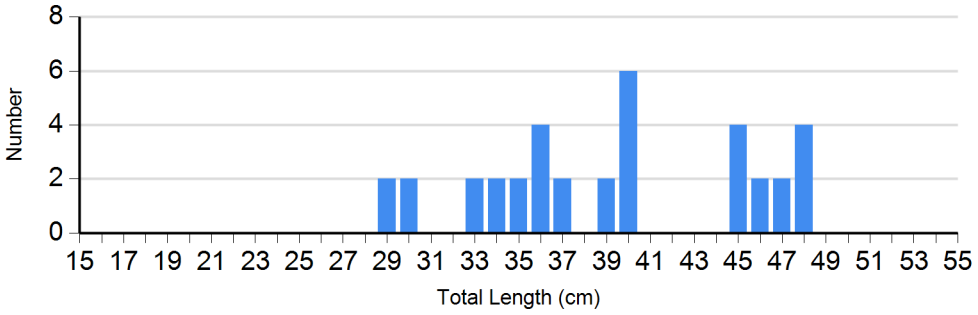
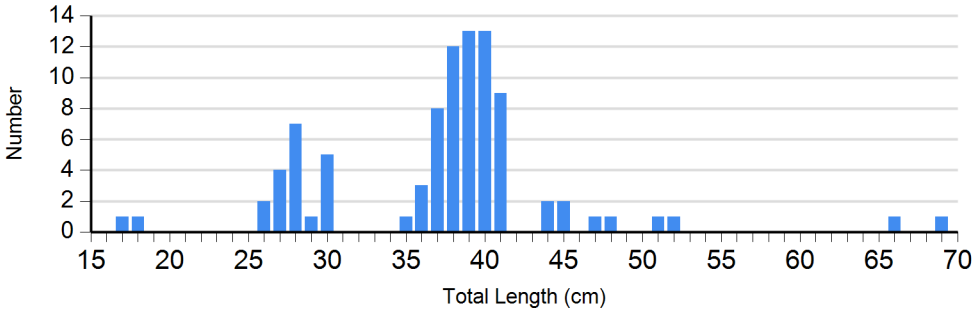


2016

Species: Walleye
Gear: AFS std gill net



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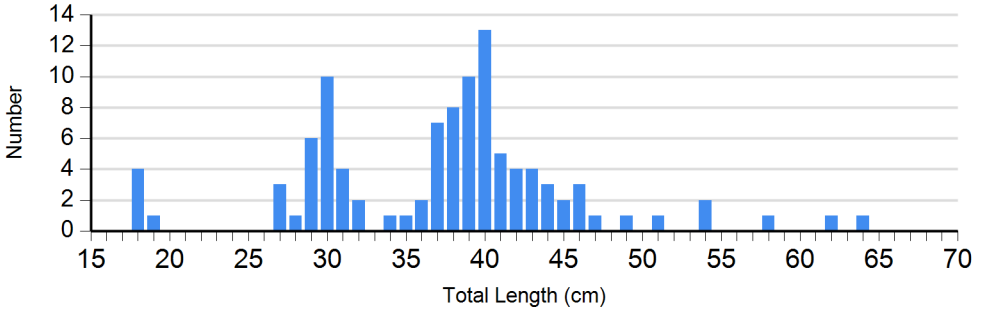
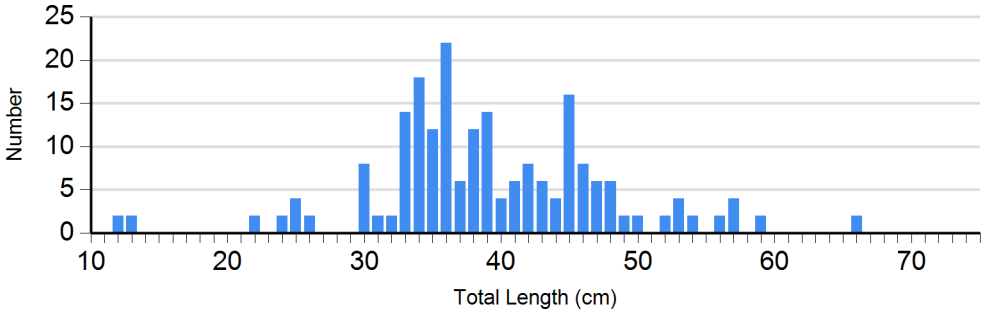
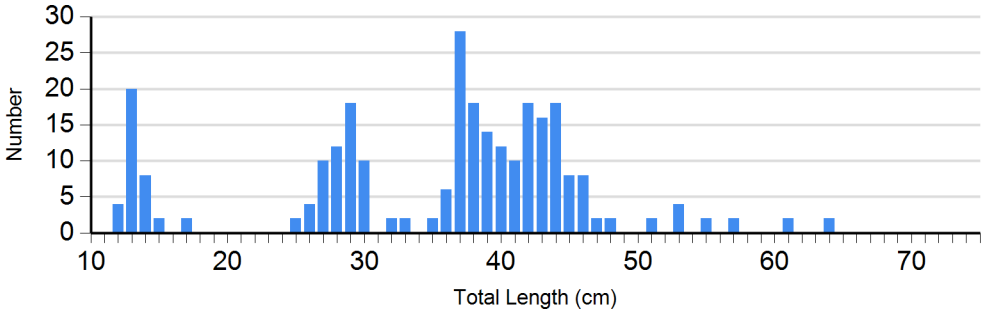


2018

Species: Walleye
Gear: std exp gill net



2013



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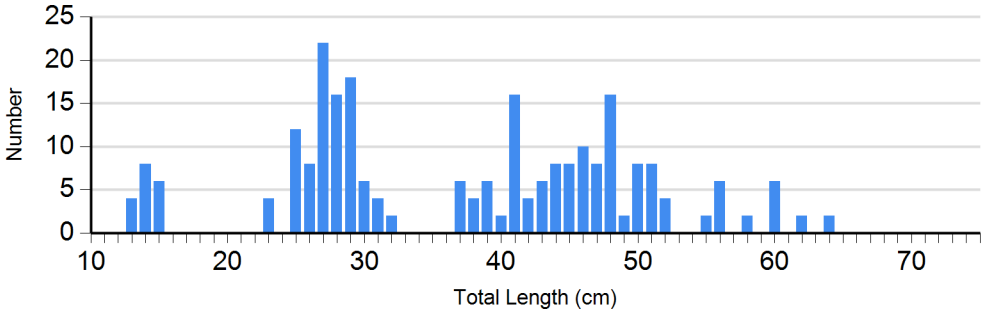
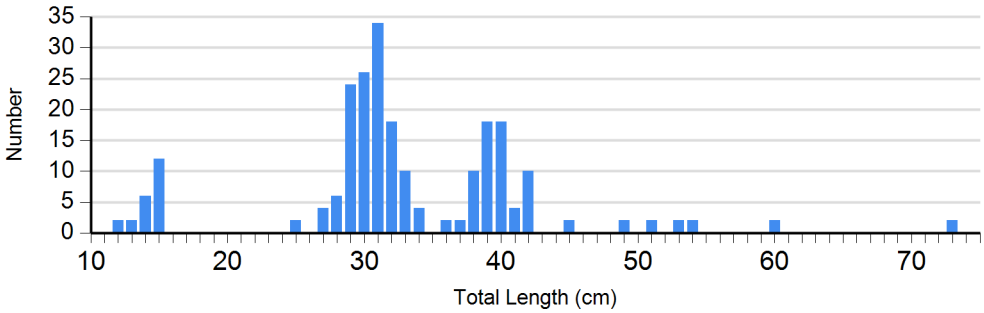


2015

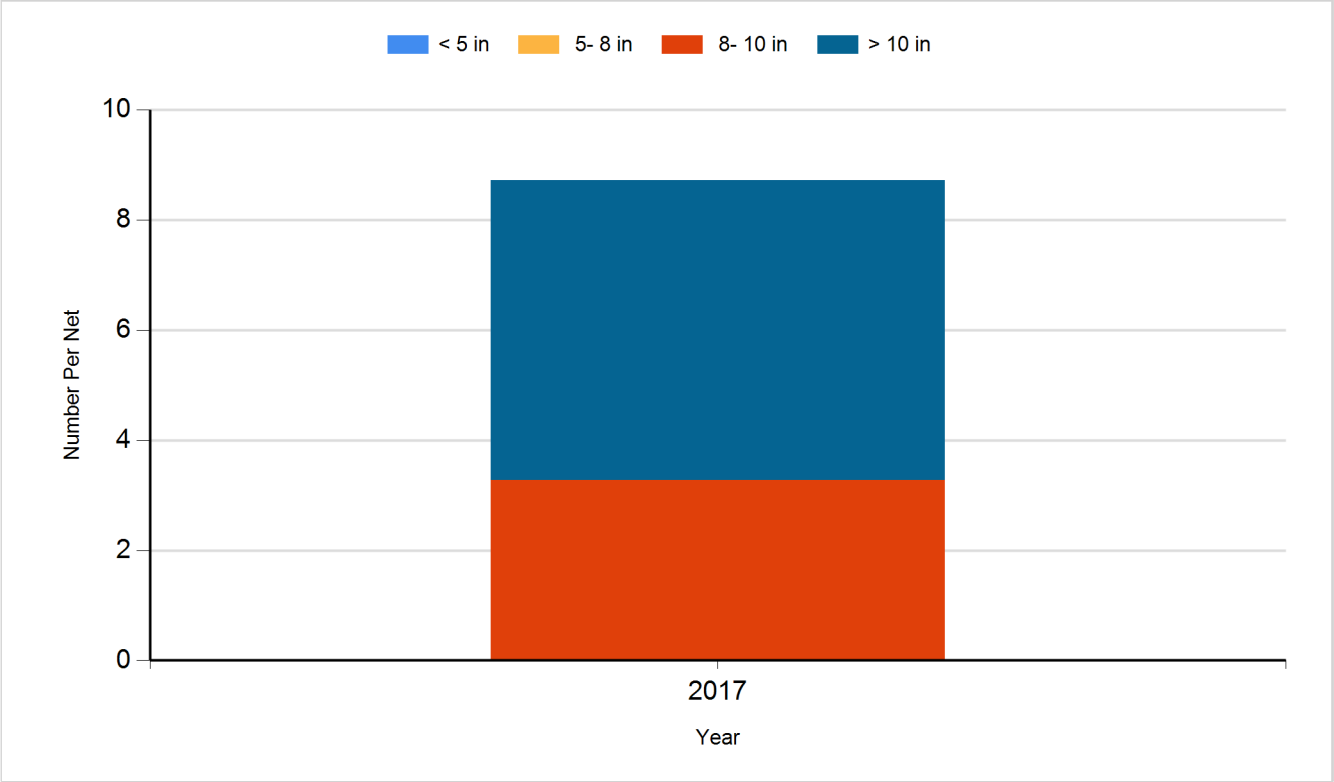


2016

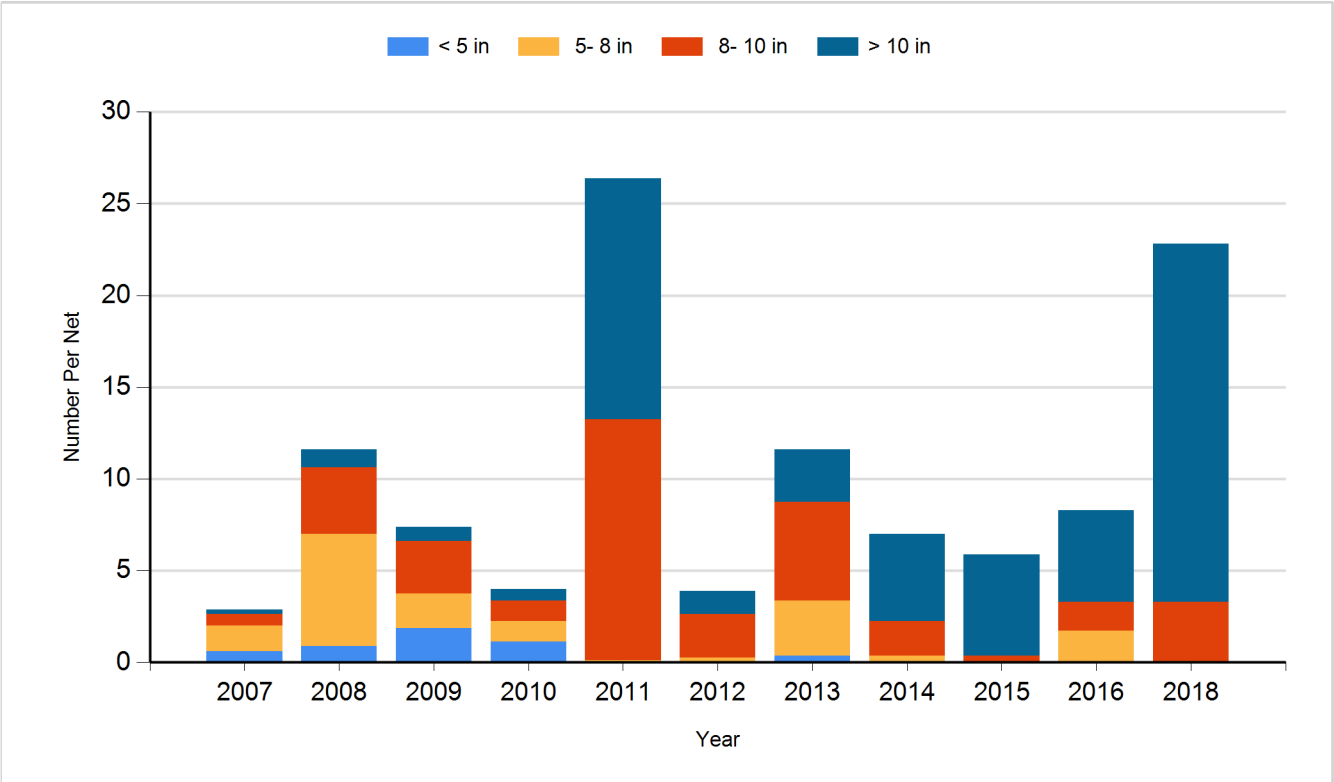
Historic Fish Sizes and Relative Abundance

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

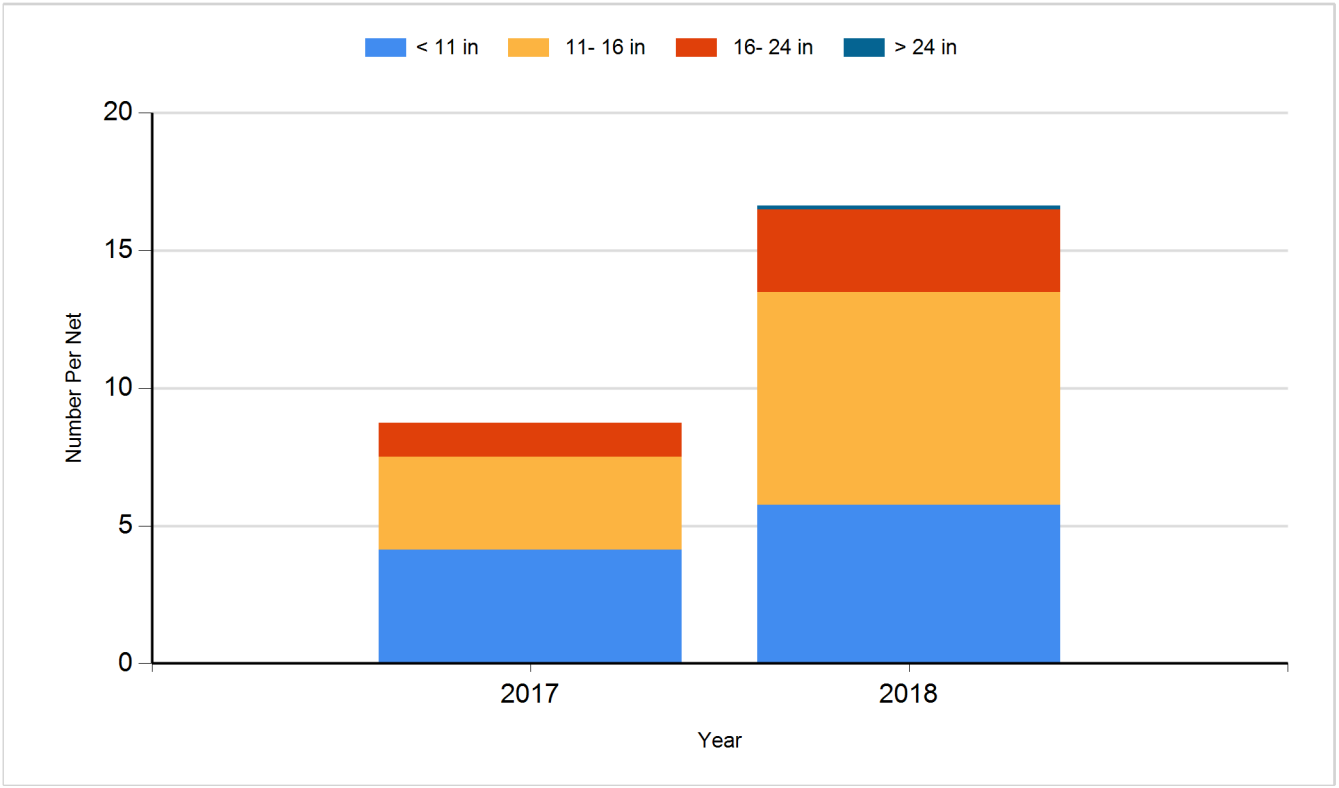
Species: Black Crappie
Gear: AFS std frame net



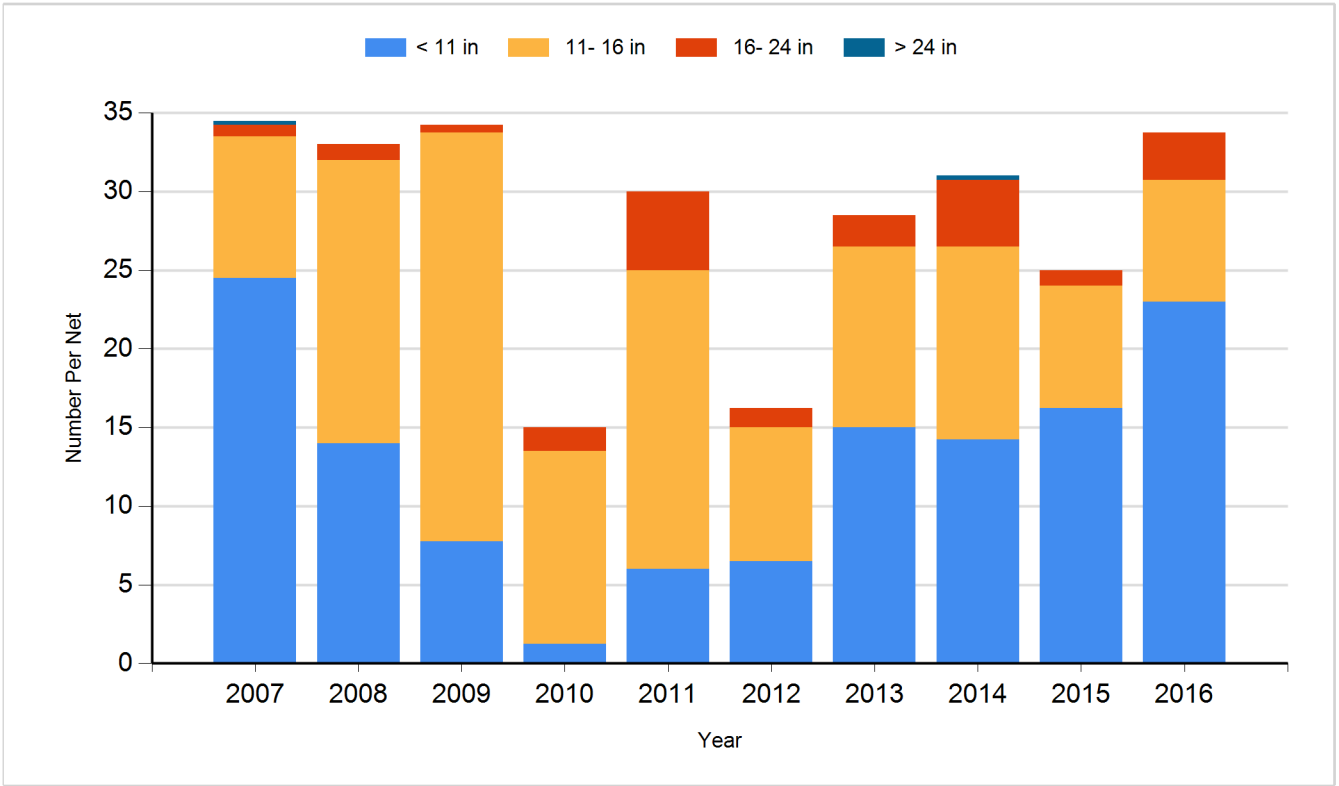
Species: Black Crappie
Gear: frame net (std 3/4 in)



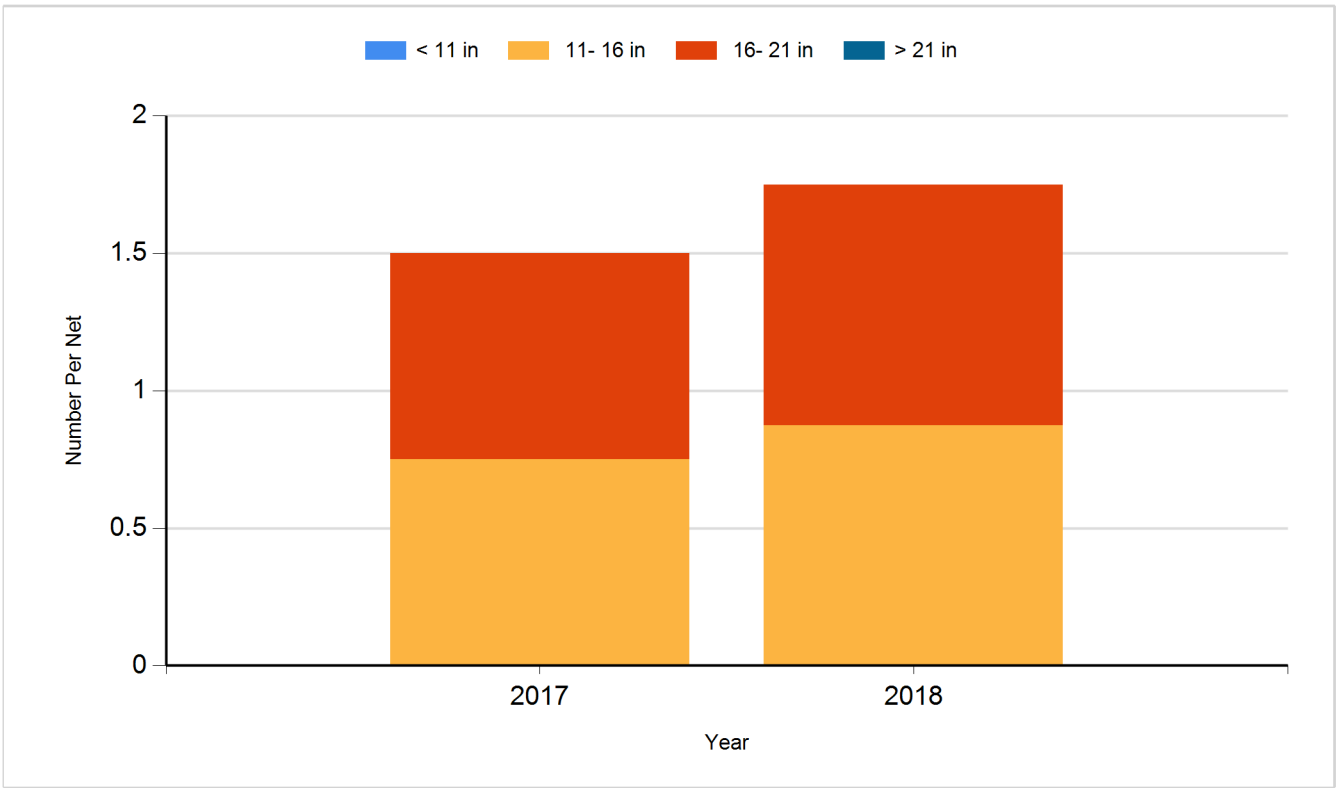
Species: Channel Catfish
Gear: AFS std gill net



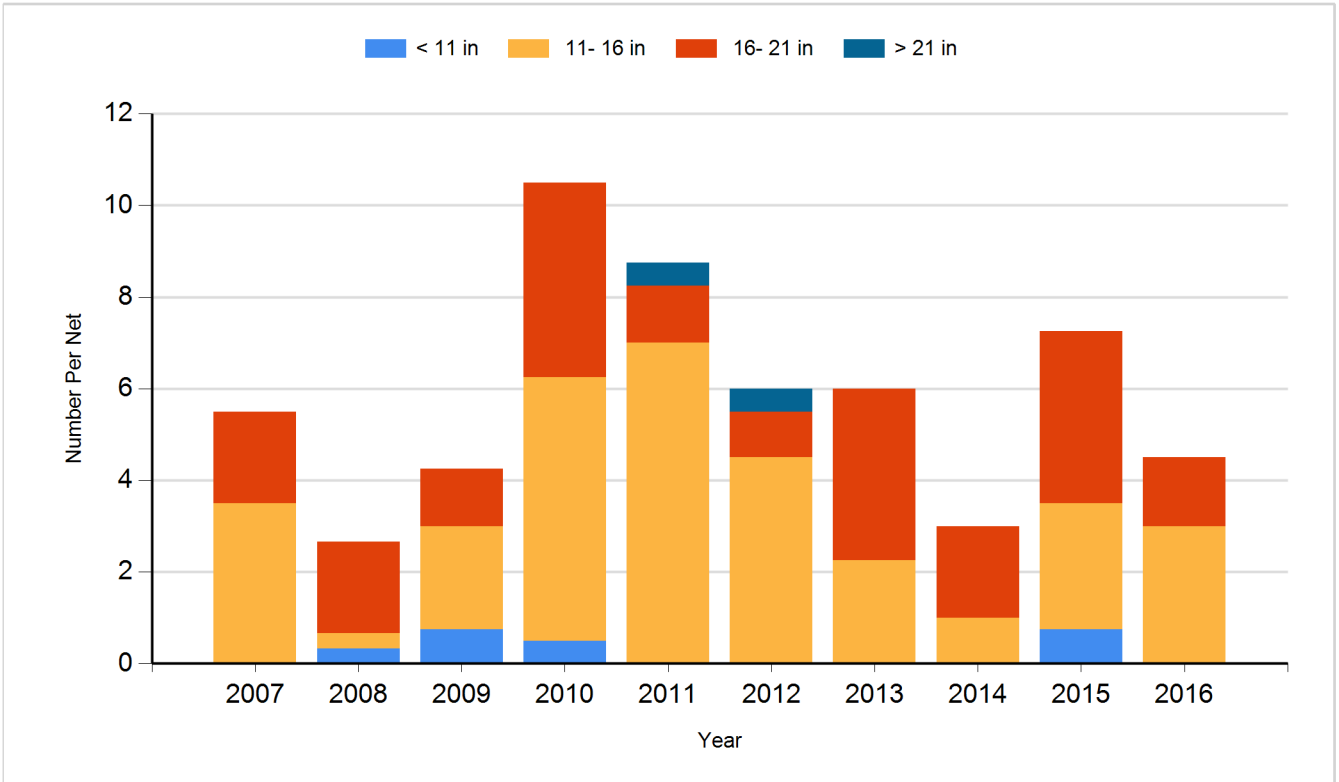
Species: Channel Catfish
Gear: std exp gill net



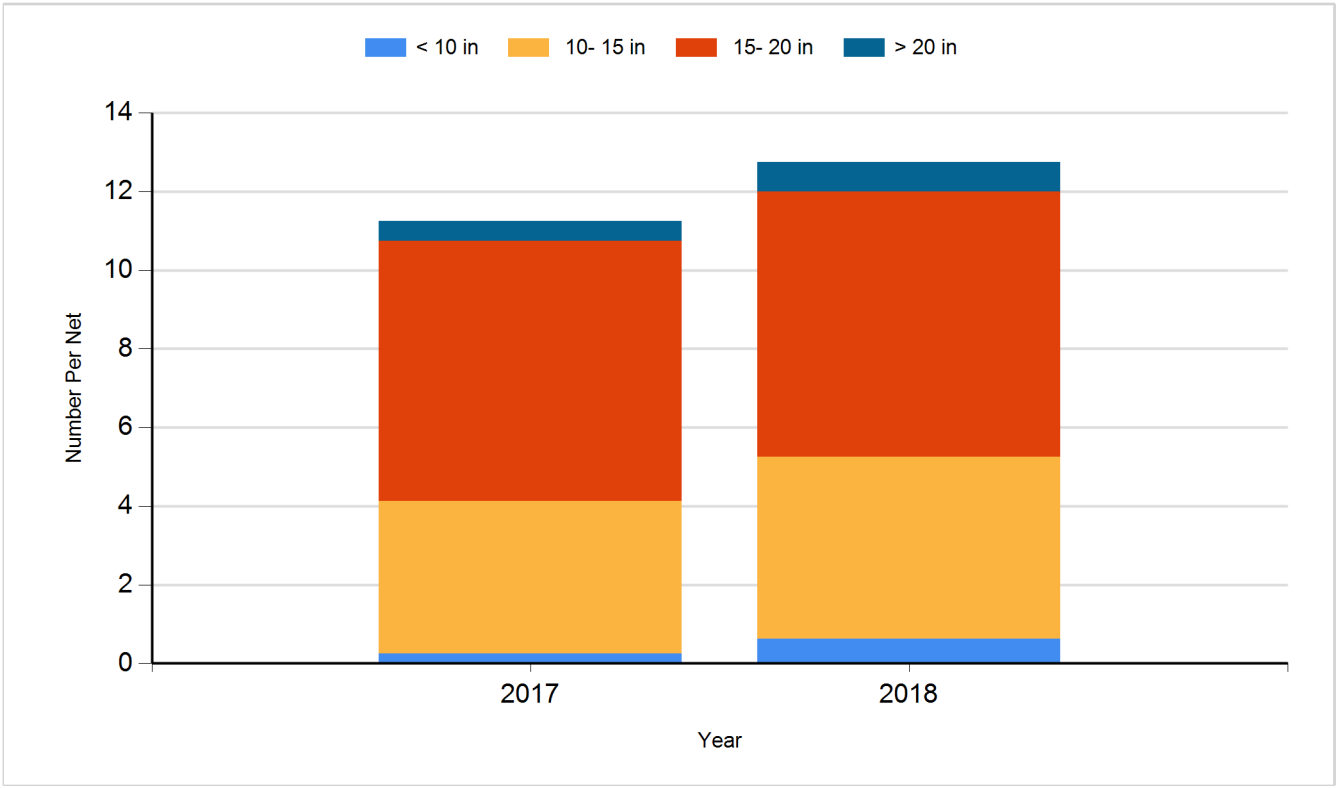
Species: Common Carp
Gear: AFS std gill net



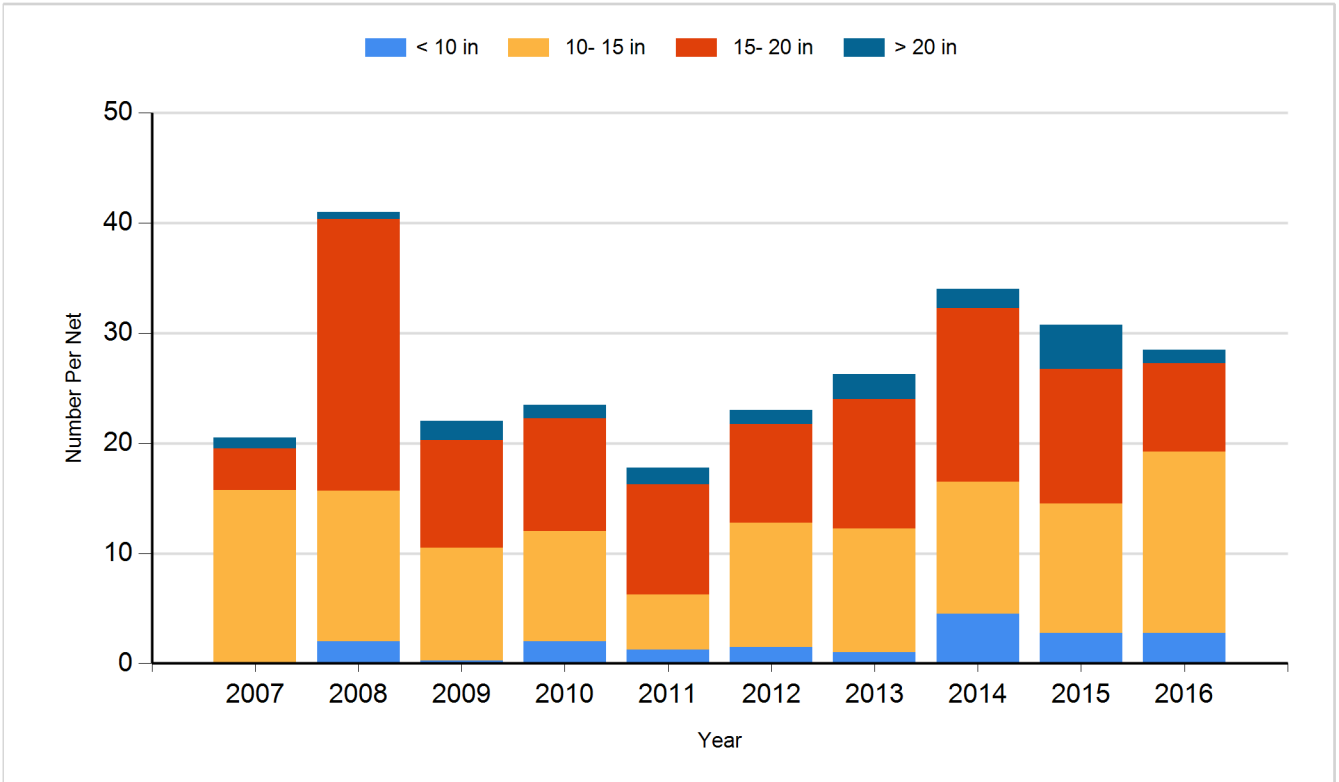
Species: Common Carp
Gear: std exp gill net



Species: Walleye
Gear: AFS std gill net



Species: Walleye
Gear: std exp gill net



Fish Stocking

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

Year	Species	Size	Number
2008	Walleye	Fingerling	479,900
2010	Walleye	Fingerling	289,340
2011	Walleye	Fingerling	310,199
2012	Walleye	Fingerling	476,423
2014	Walleye	Fingerling	549,725
2015	Walleye	Fry	4,702,776
2016	Walleye	Fry	4,809,475
2017	Walleye	Fry	4,609,032
2018	Walleye	Fry	5,000,000