

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Stockade, Custer County
MCS-Lake-12-000
2015

Lake Information

Name: Stockade
County: Custer
Surface Area: 129 Acres

Surveys and Investigations

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

| Gear | Date | Effort |
|---------------------------|--------------------|--------------|
| boat shocker (night) | June 03, 2015 | 1200 seconds |
| frame net (std 3/4 in) | September 01, 2015 | 4 net-nights |
| frame net (std 3/4 in) | September 02, 2015 | 4 net-nights |
| std exp gill net (150 ft) | September 01, 2015 | 1 net-nights |
| std exp gill net (150 ft) | September 02, 2015 | 1 net-nights |

Common Fish Species Present

Yellow Perch

Smallmouth Bass

Northern Pike

Largemouth Bass

Bluegill

Black Bullhead

Black Crappie

White Sucker

Bluegill X Gr. Sunfish Hybrid

Golden Shiner

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).

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

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.

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

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

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.

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

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 | | Quality | | Preferred | | Memorable | | Trophy | |
|------------------|-------|------|---------|------|-----------|------|-----------|------|--------|------|
| | (in) | (cm) | (in) | (cm) | (in) | (cm) | (in) | (cm) | (in) | (cm) |
| Bigmouth Buffalo | 11 | 28 | 18 | 46 | 24 | 61 | 30 | 76 | 37 | 94 |
| Black Bullhead | 6 | 15 | 9 | 23 | 12 | 30 | 15 | 38 | 18 | 46 |
| Black Crappie | 5 | 13 | 8 | 20 | 10 | 25 | 12 | 30 | 15 | 38 |

| Species Name | Stock | | Quality | | Preferred | | Memorable | | Trophy | |
|-------------------------------|-------|------|---------|------|-----------|------|-----------|------|--------|------|
| | (in) | (cm) | (in) | (cm) | (in) | (cm) | (in) | (cm) | (in) | (cm) |
| Blue Catfish | 12 | 30 | 20 | 51 | 30 | 76 | 35 | 89 | 45 | 114 |
| Bluegill | 3 | 8 | 6 | 15 | 8 | 20 | 10 | 25 | 12 | 30 |
| Bluegill X Gr. Sunfish Hybrid | 3 | 8 | 6 | 15 | 8 | 20 | 10 | 25 | 12 | 30 |
| Brown Bullhead | 5 | 13 | 8 | 20 | 11 | 28 | 14 | 36 | 17 | 43 |
| Burbot | 8 | 20 | 15 | 38 | 21 | 53 | 26 | 67 | 32 | 82 |
| Channel Catfish | 11 | 28 | 16 | 41 | 24 | 61 | 28 | 71 | 36 | 91 |
| Common Carp | 11 | 28 | 16 | 41 | 21 | 53 | 26 | 66 | 33 | 84 |
| Flathead Catfish | 14 | 35 | 20 | 51 | 28 | 71 | 34 | 86 | 40 | 102 |
| Freshwater Drum | 8 | 20 | 12 | 30 | 15 | 38 | 20 | 51 | 25 | 63 |
| Gizzard Shad | 7 | 18 | 11 | 28 | | | | | | |
| Green Sunfish | 3 | 8 | 6 | 15 | 8 | 20 | 10 | 25 | 12 | 30 |
| Lake Herring | 5 | 13 | 8 | 20 | 11 | 28 | 14 | 35 | 17 | 43 |
| Largemouth Bass | 8 | 20 | 12 | 30 | 15 | 38 | 20 | 51 | 25 | 63 |
| Longnose Gar | 16 | 41 | 27 | 69 | 36 | 91 | 45 | 114 | 55 | 140 |
| Muskellunge | 20 | 51 | 30 | 76 | 38 | 97 | 42 | 107 | 50 | 127 |
| Northern Pike | 14 | 35 | 21 | 53 | 28 | 71 | 34 | 86 | 44 | 112 |
| Paddlefish | 16 | 41 | 26 | 66 | 33 | 84 | 41 | 104 | 51 | 130 |
| Pumpkinseed | 3 | 8 | 6 | 15 | 8 | 20 | 10 | 25 | 12 | 30 |
| Redear Sunfish | 4 | 10 | 7 | 18 | 9 | 23 | 11 | 28 | 13 | 33 |
| River Carpsucker | 7 | 18 | 11 | 28 | 14 | 36 | 18 | 46 | 22 | 56 |
| Rock Bass | 4 | 10 | 7 | 18 | 9 | 23 | 11 | 28 | 13 | 33 |
| Rudd | 6 | 15 | 10 | 25 | 12 | 30 | 15 | 38 | 19 | 48 |
| Sauger | 8 | 20 | 12 | 30 | 15 | 38 | 20 | 51 | 25 | 63 |
| Saugeye | 9 | 23 | 14 | 35 | 18 | 46 | 22 | 56 | 27 | 69 |
| Shorthead Redhorse | 6 | 15 | 10 | 25 | 13 | 33 | 16 | 41 | 20 | 51 |
| Smallmouth Bass | 7 | 18 | 11 | 28 | 14 | 35 | 17 | 43 | 20 | 51 |
| Smallmouth Buffalo | 11 | 28 | 18 | 46 | 24 | 61 | 30 | 76 | 37 | 94 |
| Spotted Bass | 7 | 18 | 11 | 28 | 14 | 35 | 17 | 43 | 20 | 51 |
| Striped Bass | 12 | 30 | 20 | 51 | 30 | 76 | 35 | 89 | 45 | 114 |
| Striped Bass Hybrid (wiper) | 8 | 20 | 12 | 30 | 15 | 38 | 20 | 51 | 25 | 63 |
| 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 |
| White Perch | 5 | 13 | 8 | 20 | 10 | 25 | 12 | 30 | 15 | 38 |
| White Sucker | 6 | 15 | 10 | 25 | 13 | 33 | 16 | 41 | 20 | 51 |
| Yellow Bass | 4 | 10 | 7 | 18 | 9 | 23 | 11 | 28 | 13 | 33 |
| 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).

| Gear | Species | Abundance | | Stock Density Indices | | | Condition | | |
|------------------------|-------------------------------|----------------|-------|-----------------------|-------|-------|-----------|-----|-------|
| | | CPUE | CI-80 | PSD | CI-80 | PSD-P | CI-80 | Wr | CI-80 |
| boat shocker (night) | Largemouth Bass | 84.0 | 184.7 | 46 | 15 | 18 | 12 | 125 | 27 |
| | Smallmouth Bass | 0.0 | 0.0 | 0 | | 0 | | | |
| frame net (std 3/4 in) | Black Bullhead | 471.1 | 195.8 | 0 | | 0 | | 84 | 1 |
| | Black Crappie | 5.3 | 5.0 | 69 | 11 | 2 | | 109 | 3 |
| | Bluegill | 12.8 | 6.4 | 93 | 4 | 23 | 6 | 111 | 5 |
| | Bluegill X Gr. Sunfish Hybrid | 0.1 | 0.2 | 100 | | 100 | | | |
| | Largemouth Bass | 0.1 | 0.2 | 100 | | 0 | | 110 | |
| | Northern Pike | 0.6 | 0.5 | 40 | | 0 | | 81 | 3 |
| | Smallmouth Bass | 0.4 | 0.5 | 67 | | 33 | | 95 | 6 |
| | White Sucker | 0.1 | 0.2 | 100 | | 100 | | 102 | |
| | Yellow Perch | 3.0 | 1.1 | 92 | | 42 | 16 | 78 | 2 |
| | std exp gill net (150 ft) | Black Bullhead | 41.0 | 126.2 | 0 | | 0 | | 98 |
| Black Crappie | | 0.5 | 1.5 | 0 | | 0 | | 96 | |
| Bluegill | | 1.5 | 1.5 | 100 | | 100 | | 102 | 4 |
| Golden Shiner | | 0.0 | 0.0 | | | | | | |
| Largemouth Bass | | 0.5 | 1.5 | 100 | | 0 | | 131 | |
| Northern Pike | | 5.5 | 13.9 | 64 | | 9 | | 90 | 3 |
| White Sucker | | 0.5 | 1.5 | 100 | | 100 | | 109 | |
| Yellow Perch | | 61.5 | 130.8 | 62 | 6 | 15 | 5 | 89 | 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.

| Gear | Species | CPUE | | | | | | | | | | Avg |
|------------------------------|----------------------------------|------|-------|------|-------|-------|-------|-------|------|-------|-------|-------|
| | | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | |
| boat shocker (night) | Largemouth Bass | | 210.0 | | | 67.7 | 97.6 | 171.0 | 36.0 | 121.0 | 84.0 | 112.5 |
| | Smallmouth Bass | | 58.0 | | | 6.1 | 6.0 | 20.0 | 4.0 | 12.0 | 0.0 | 15.2 |
| boat shocker (night, AC) | Largemouth Bass | | | | 146.2 | | | | | | | 146.2 |
| | Smallmouth Bass | | | | 12.2 | | | | | | | 12.2 |
| frame net (std 3/4 in) | Black Bullhead | | | 0.1 | 1.3 | 0.3 | | 1.1 | 0.3 | 0.9 | 471.1 | 67.9 |
| | Black Crappie | | | 2.3 | 8.8 | 8.1 | 0.9 | 1.6 | 0.4 | 1.6 | 5.3 | 3.6 |
| | Bluegill | | | 4.5 | 15.8 | 58.4 | 2.8 | 3.1 | 4.6 | 3.5 | 12.8 | 13.2 |
| | Bluegill X Gr. Sunfish Hybrid | | | | | | | | | | 0.1 | 0.1 |
| | Golden Shiner | | | | | | | | 0.0 | | | 0.0 |
| | Largemouth Bass | | | 0.1 | | | | | | | 0.1 | 0.1 |
| | Northern Pike | | | 0.5 | 1.0 | 0.6 | 0.9 | 0.3 | 0.9 | 1.5 | 0.6 | 0.8 |
| | Smallmouth Bass | | | | | 0.1 | | | | | 0.4 | 0.3 |
| | White Sucker | | | 0.1 | 1.9 | 0.3 | 0.4 | | | 0.3 | 0.1 | 0.5 |
| | Yellow Perch | | | 2.8 | 20.4 | 20.4 | 35.6 | 67.9 | 48.0 | 197.5 | 3.0 | 49.5 |
| std exp gill net (150 ft) | Black Bullhead | | 1.0 | | 0.5 | 1.0 | | | 1.0 | 0.5 | 41.0 | 7.5 |
| | Black Crappie | 4.0 | 7.0 | 22.5 | 18.0 | 4.0 | 3.5 | 6.5 | 8.5 | 10.5 | 0.5 | 8.5 |
| | Bluegill | | | | 1.0 | 0.5 | | 2.5 | 6.5 | 2.0 | 1.5 | 2.3 |
| | Golden Shiner | | | | | | | | | | 0.0 | 0.0 |
| | Largemouth Bass | 0.5 | | | | | | 0.5 | | | 0.5 | 0.5 |
| | Northern Pike | 11.0 | 7.0 | 7.0 | 7.0 | 0.5 | 2.5 | 0.5 | 1.0 | 4.5 | 5.5 | 4.7 |
| | Smallmouth Bass | 5.0 | | | 0.5 | 0.5 | | | | 0.5 | | 1.6 |
| | White Sucker | 4.5 | 1.0 | 3.5 | 6.0 | 1.5 | 0.5 | 1.0 | | 1.0 | 0.5 | 2.2 |
| Yellow Perch | 34.5 | 56.0 | 32.5 | 87.5 | 22.0 | 138.5 | 160.0 | 218.5 | 91.0 | 61.5 | 90.2 | |
| std frame net (3/8 inch) | Black Bullhead | 0.1 | 0.4 | | | | | | | | | 0.3 |
| | Black Crappie | 5.3 | 11.6 | | | | | | | | | 8.5 |
| | Bluegill | | 3.3 | | | | | | | | | 3.3 |
| | Largemouth Bass | 0.0 | | | | | | | | | | 0.0 |
| | Northern Pike | 1.3 | 1.9 | | | | | | | | | 1.6 |
| | Smallmouth Bass | 0.5 | 0.1 | | | | | | | | | 0.3 |
| | White Sucker | 3.3 | 2.9 | | | | | | | | | 3.1 |
| Yellow Perch | 12.0 | 5.9 | | | | | | | | | 9.0 | |

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 | Year | | | | | | | | | |
|---------------------------|---------------|-------|------|------|------|------|------|------|------|------|------|------|
| | | | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| frame net (std 3/4 in) | Black Crappie | PSD | | | 11 | 39 | 46 | 100 | 77 | 67 | 38 | 69 |
| | | PSD-P | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | | Wr | | | 100 | 102 | 101 | 91 | 103 | 105 | 106 | 109 |
| | Northern Pike | PSD | | | 75 | 88 | 60 | 100 | 50 | 71 | 67 | 40 |
| | | PSD-P | | | 0 | 13 | 40 | 43 | 50 | 57 | 50 | 0 |
| | | Wr | | | | 91 | 103 | 95 | 96 | 98 | 92 | 81 |
| | Yellow Perch | PSD | | | 14 | 42 | 50 | 52 | 76 | 99 | 97 | 92 |
| | | PSD-P | | | 9 | 3 | 1 | 1 | 3 | 26 | 42 | 42 |
| | | Wr | | | | | 91 | 95 | 93 | 96 | 89 | 78 |
| std exp gill net (150 ft) | Black Crappie | PSD | 0 | 0 | 0 | 25 | 88 | 57 | 0 | 6 | 33 | 0 |
| | | PSD-P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Wr | 111 | | 102 | 107 | 102 | 107 | 117 | 109 | 108 | 96 |
| | Northern Pike | PSD | 18 | 86 | 100 | 93 | 100 | 100 | 0 | 100 | 89 | 64 |
| | | PSD-P | 0 | 0 | 7 | 0 | 100 | 20 | 0 | 0 | 44 | 9 |
| | | Wr | 103 | 100 | 98 | 96 | 104 | 96 | 98 | 88 | 98 | 90 |
| | Yellow Perch | PSD | 48 | 2 | 5 | 13 | 48 | 65 | 74 | 76 | 85 | 62 |
| | | PSD-P | 23 | 0 | 0 | 0 | 0 | 2 | 9 | 30 | 21 | 15 |
| | | Wr | 91 | 88 | 87 | 90 | 98 | 99 | 100 | 95 | 98 | 89 |
| std frame net (3/8 inch) | Black Crappie | PSD | 74 | 1 | | | | | | | | |
| | | PSD-P | 40 | 1 | | | | | | | | |
| | | Wr | 102 | 98 | | | | | | | | |
| | Northern Pike | PSD | 70 | 53 | | | | | | | | |
| | | PSD-P | 20 | 0 | | | | | | | | |
| | | Wr | 99 | 99 | | | | | | | | |
| | Yellow Perch | PSD | 66 | 34 | | | | | | | | |
| | | PSD-P | 18 | 9 | | | | | | | | |
| | | Wr | | 99 | | | | | | | | |

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+ |
| 2006 | 42 | 144 (5) | 163 (5) | 220 (5) | 234 (1) | 257 (25) | | | | | |

Species: Yellow Perch

| Mean Length (expanded sample number) at capture by age | | | | | | | | | | | |
|--|-----|-------------|--------------|-------------|--------------|--------------|--------------|-------------|-------------|------------|-----|
| Year | N | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
| 2014 | 181 | | 177 (18) | 210 (73) | 243 (3) | 236 (5) | 243 (27) | 245 (24) | 241 (35) | | |
| 2013 | 437 | | 193 (134) | 228 (25) | 230 (29) | 242 (68) | 247 (102) | 243 (17) | 254 (55) | 265 (8) | |
| 2012 | 292 | 142 (29) | 185 (24) | 204 (23) | 234 (11) | 227 (103) | 239 (55) | 233 (49) | | | |
| 2011 | 277 | | 158 (9) | 186 (25) | 205 (111) | 217 (49) | 217 (84) | | | | |
| 2010 | 43 | | | 155 (6) | 180 (10) | 207 (21) | 211 (8) | | | | |
| 2006 | 98 | 134 (47) | 165 (20) | 221 (2) | 243 (29) | | | | | | |

Fish Condition

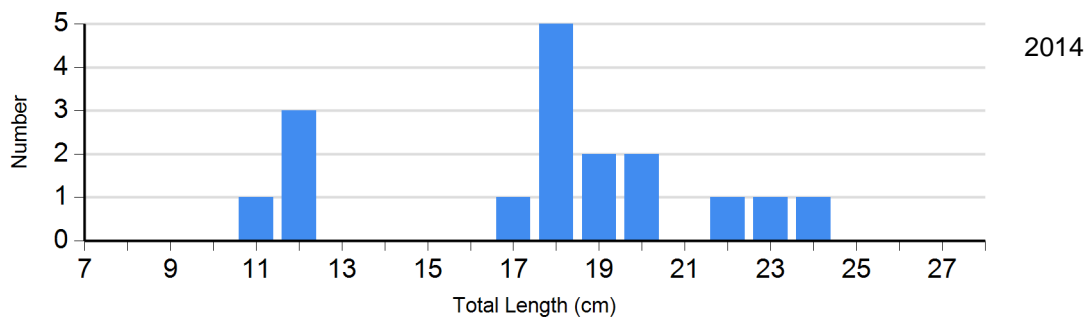
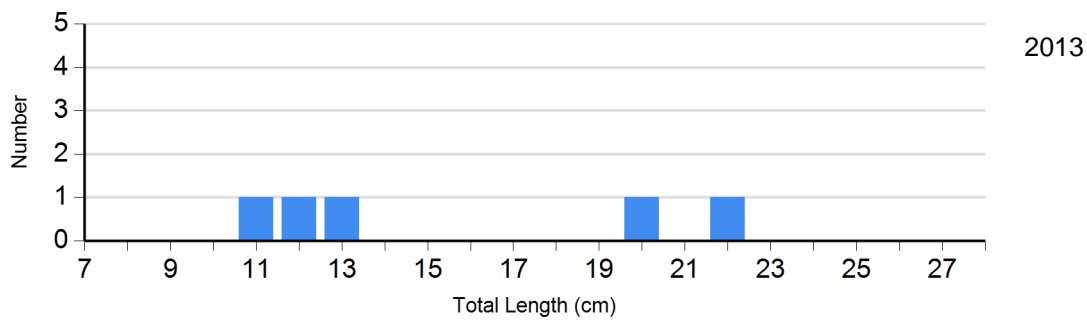
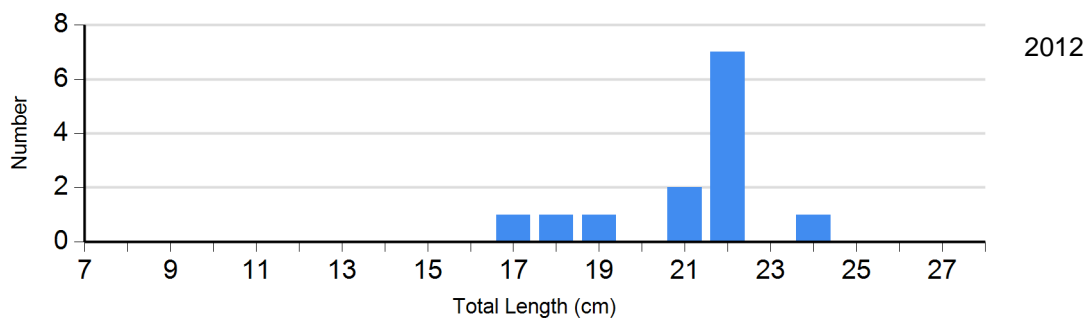
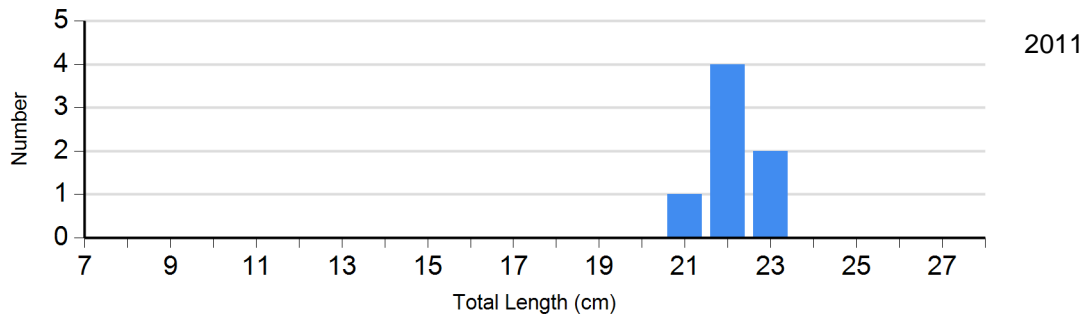
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

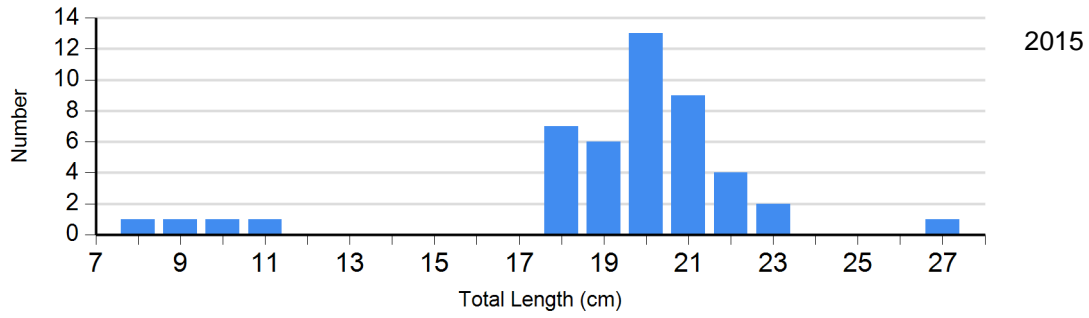
| Species | Year | Length Groups | | | | | | | |
|----------------------------|------|---------------|--------------|-----|---------------|-----|-------------|---|---------|
| | | S-Q | | Q-P | | P-M | | M | |
| | | N | Wr (SE) | N | Wr (SE) | N | Wr (SE) | N | Wr (SE) |
| Black Crappie Frame Net | 2011 | 0 | | 7 | 91 (1.2) | 0 | | 0 | |
| | 2012 | 3 | 108 (3.5) | 10 | 102 (1.7) | 0 | | 0 | |
| | 2013 | 1 | 115 | 2 | 100 (10.7) | 0 | | 0 | |
| | 2014 | 8 | 112 (3.4) | 5 | 97 (5.1) | 0 | | 0 | |
| | 2015 | 13 | 119 (3.5) | 28 | 106 (1.4) | 1 | 63 | 0 | |
| Northern Pike Gill Net | 2011 | 0 | | 4 | 98 (4.7) | 1 | 87 | 0 | |
| | 2012 | 1 | 98 | 0 | | 0 | | 0 | |
| | 2013 | 0 | | 2 | 88 (0.3) | 0 | | 0 | |
| | 2014 | 1 | 95 | 4 | 101 (1.3) | 4 | 97 (5.4) | 0 | |
| | 2015 | 4 | 88 (2.5) | 6 | 90 (3.6) | 1 | 94 | 0 | |
| Yellow Perch Gill Net | 2011 | 96 | 102 (1.2) | 176 | 98 (0.4) | 5 | 93 (2.0) | 0 | |
| | 2012 | 83 | 100 (1.3) | 209 | 101 (0.8) | 28 | 91 (2.2) | 0 | |
| | 2013 | 104 | 92 (0.6) | 204 | 96 (0.6) | 129 | 94 (0.6) | 0 | |
| | 2014 | 27 | 98 (1.3) | 116 | 99 (0.8) | 39 | 93 (0.9) | 0 | |
| | 2015 | 47 | 91 (0.8) | 57 | 88 (0.9) | 19 | 86 (1.4) | 0 | |

Length Frequency Distribution

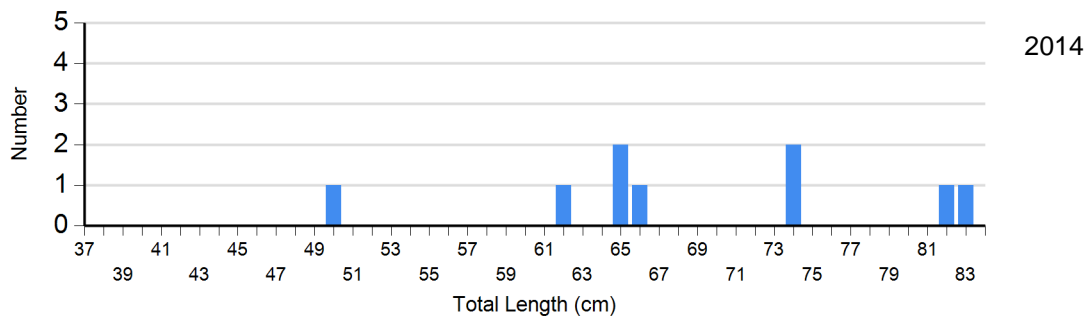
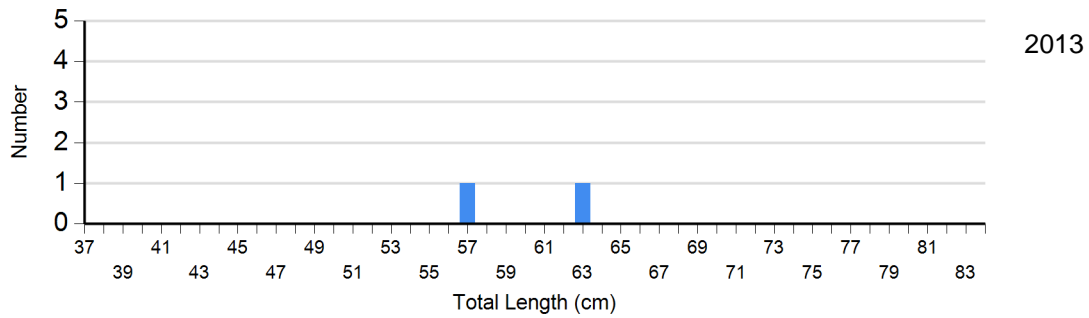
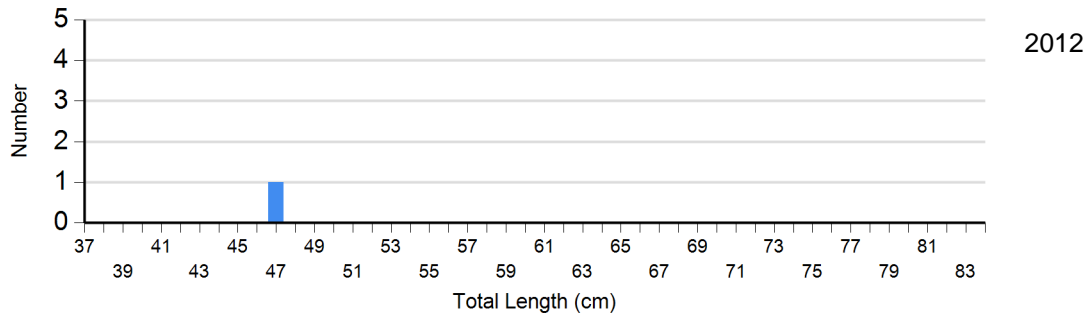
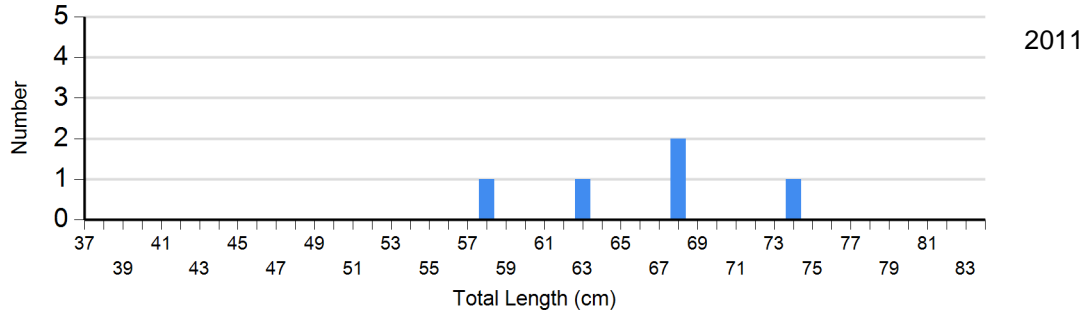
Length frequency histogram of species sampled by year.

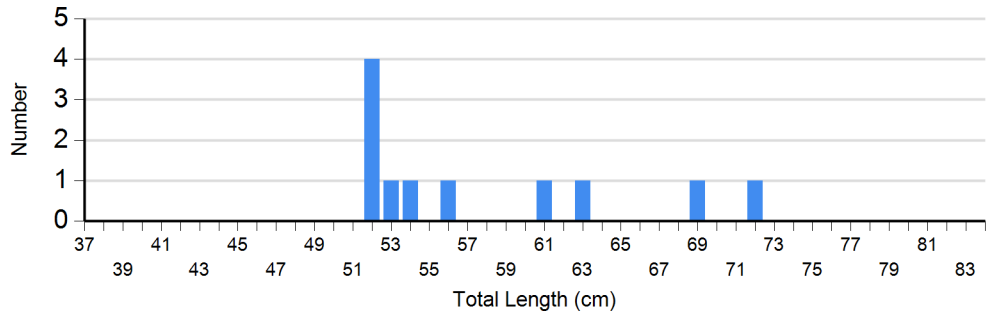
Species: Black Crappie
Gear: frame net (std 3/4 in)





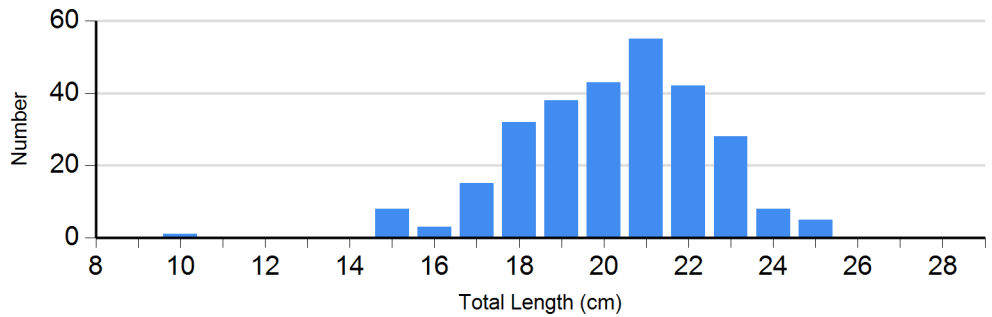
Species: Northern Pike
 Gear: std exp gill net (150 ft)



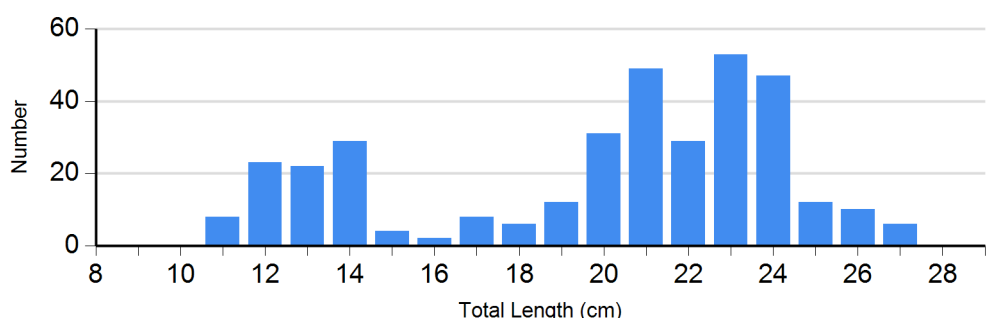


2015

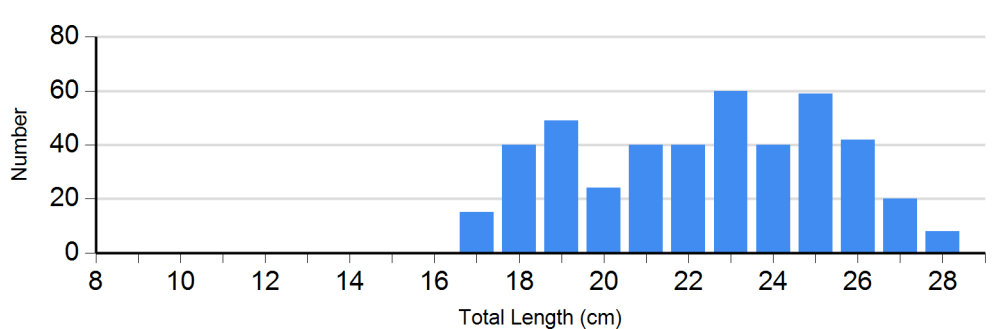
Species: Yellow Perch
Gear: std exp gill net (150 ft)



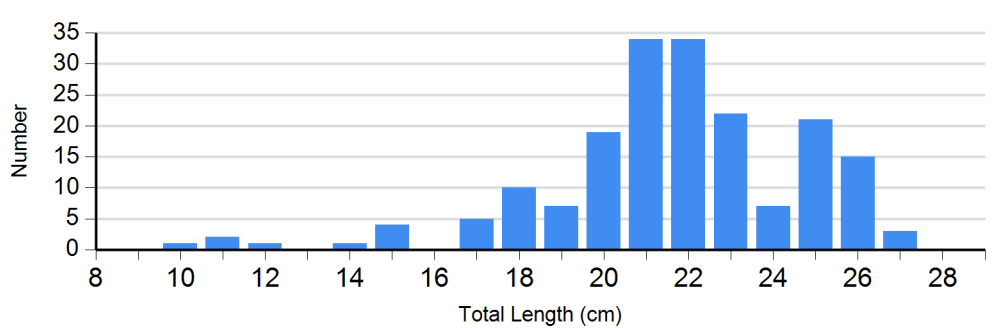
2011



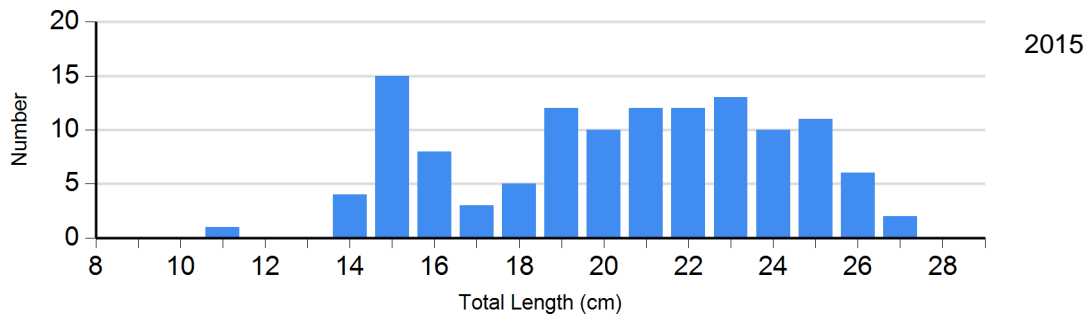
2012



2013



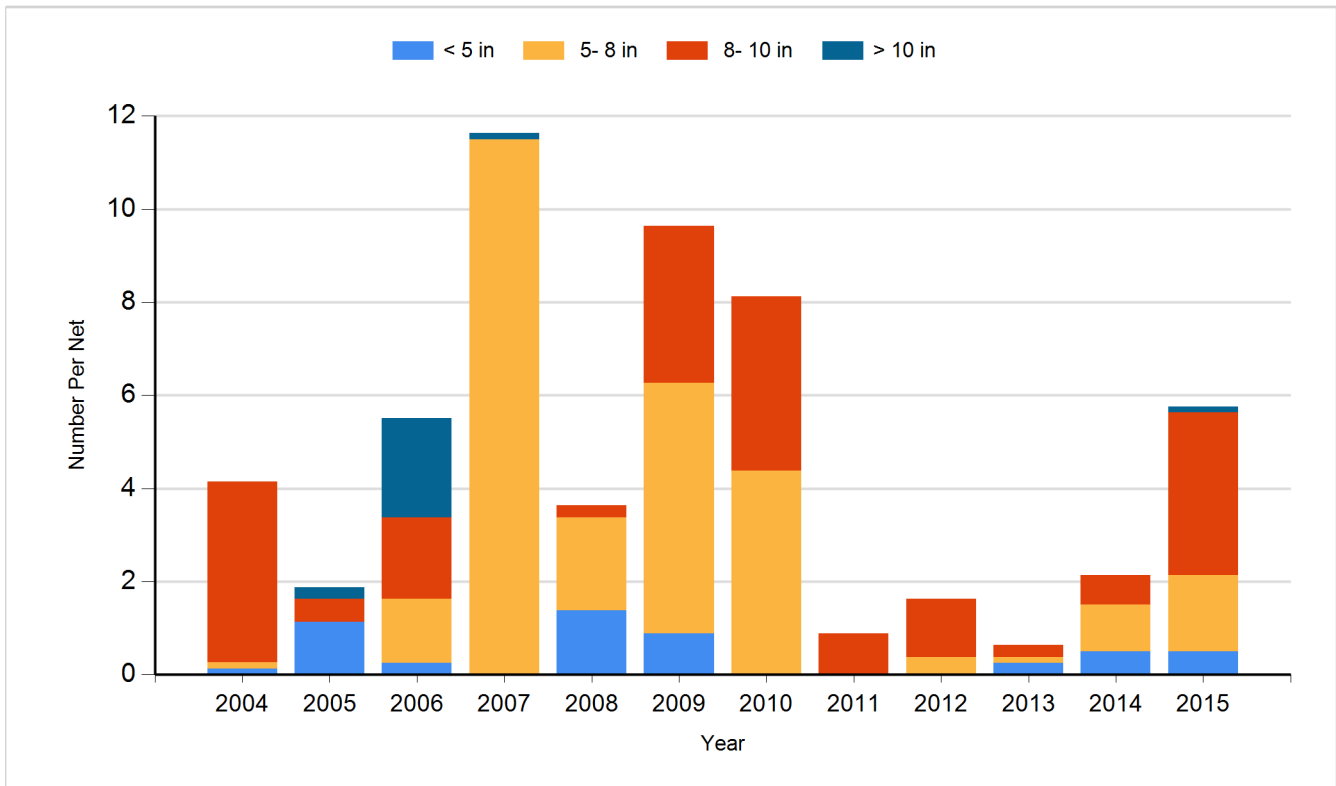
2014



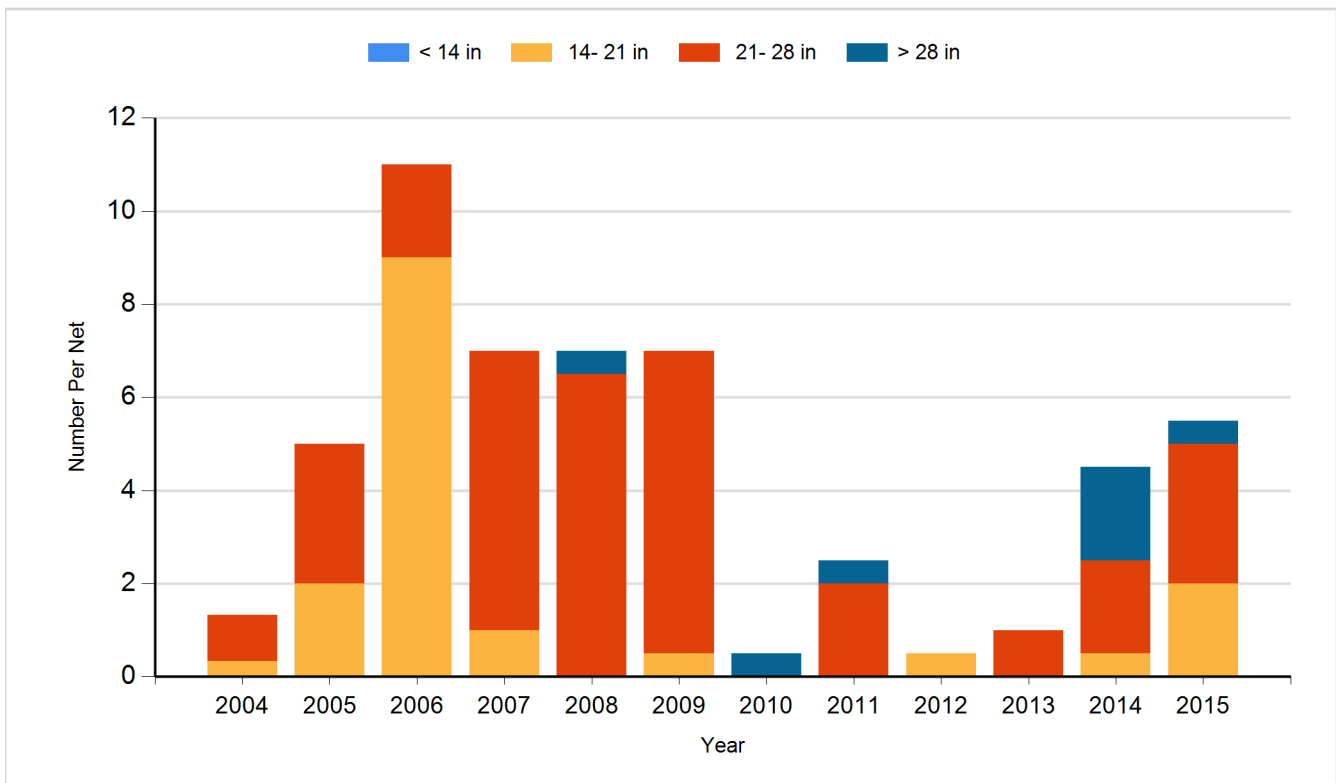
Historic Fish Sizes and Relative Abundance

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

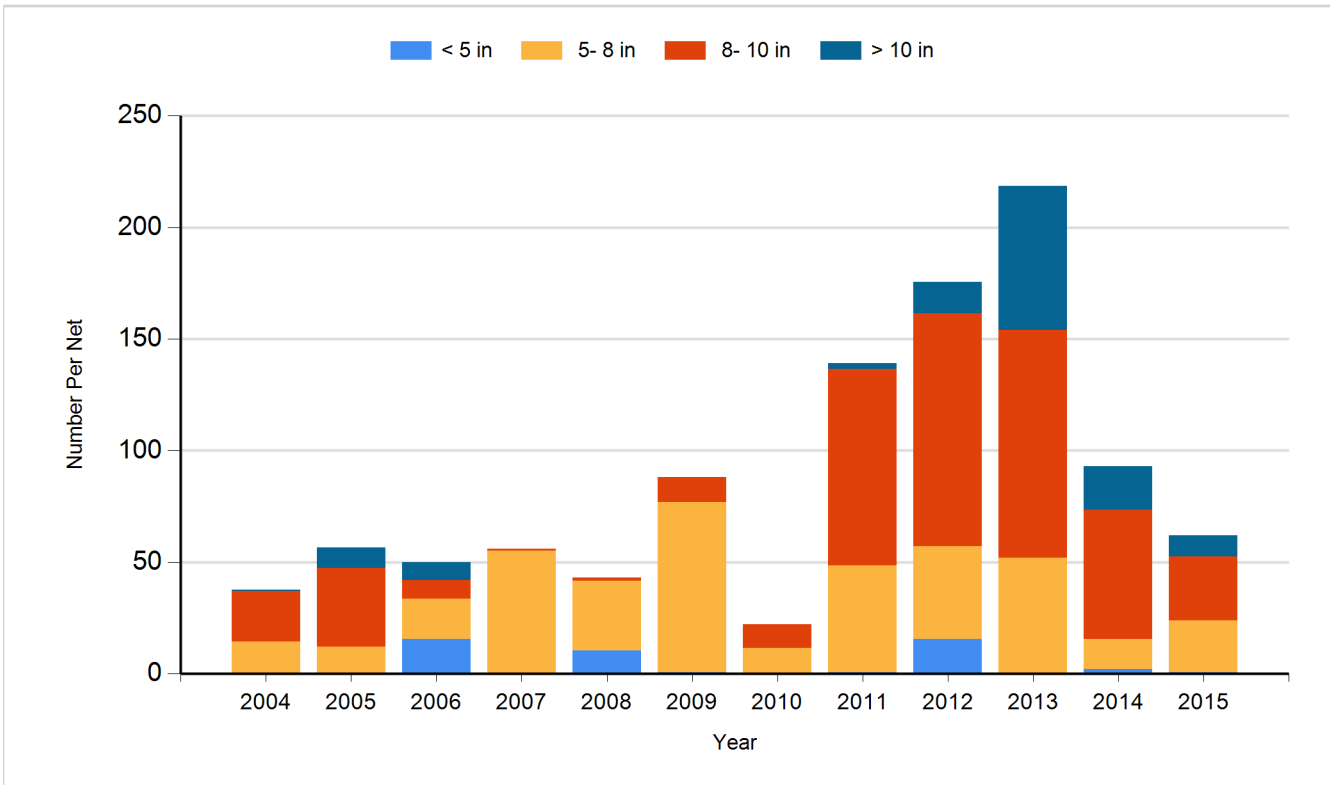
Species: Black Crappie
Gear: Frame Net



Species: Northern Pike
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net



Fish Stocking

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

| Year | Species | Size | Number |
|------|--|------------|--------|
| 2004 | Brown Trout | Catchable | 3,250 |
| 2005 | Brown Trout (Soda Lake) | Catchable | 3,250 |
| 2009 | Rainbow Trout (McConaug Rainbow Trout | Fingerling | 1,500 |
| 2013 | Smallmouth Bass | Fingerling | 4,770 |