# 2023 Woodruff Lake Survey Summary

Woodruff Lake is located 12 miles east of Blunt just off Highway 14 at the Woodruff Lake State Game Production Area. It is an 88-acre lake with a mean depth of 6 feet and maximum depth of 12 feet. Access at Woodruff consists of a single narrow concrete plank boat ramp and space for vehicle and boat trailer parking is limited. The majority of the shoreline is covered in cattails. It is managed as a multi-species fishery consisting of panfish (Bluegill, Yellow Perch, and Green Sunfish), Channel Catfish, Northern Pike, Black Bullhead, Common Carp, and Largemouth Bass. Sampling occurs every three years, consisting of frame netting in late spring.

- **Bluegill:** The catch rate of Bluegill in 2023 was 15.2 fish per frame net. Of the Bluegill sampled, 0% were 8 inches or larger. Bluegill condition was good with a relative weight (Wr) of 102*, but most of the fish sampled were less than 3 inches total length.

- **Black Bullhead:** The catch rate of Black Bullhead in 2023 was 110.4 fish per frame net. Of the Black Bullhead sampled, 7% were 6 inches or larger, with 0% larger than 9 inches. Black Bullhead condition was good with a relative weight (Wr) of 79.

- **Yellow Perch:** The catch rate of Yellow Perch in 2023 was 0.6 fish per frame net, prompting a supplemental stocking. Of the Yellow Perch sampled, 33% were 5 inches or larger, with no fish above 10 inches. Perch condition was excellent with a relative weight (Wr) 97.

In 2023, 100 adult Yellow Perch were stocked to maintain the fishery.

Created 02/06/2024 by Liz Renner

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
## Woodruff, Hughes County
### MKN-Lake-265-000
### 2023

## Lake Information

**Name:** Woodruff

**County:** Hughes

**Legal Description:** T112-R74-S18

**Surface Area:** 88 Acres

**Maximum Depth:** 12 Feet

**Mean Depth:** 6 Feet

## Surveys and Investigations

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

| Gear | Date | Effort |
|---|---|---|
| AFS std frame net | May 30, 2023 | 5 net-nights |
| frame net (std 3/4 in) | May 31, 2023 | 5 net-nights |

## Common Fish Species Present

Largemouth Bass

Black Bullhead

Bluegill

Channel Catfish

Common Carp

Yellow Perch

Northern Pike

Green Sunfish

## 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 frame net | Black Bullhead | 751 | 110.4 | 61.6 | 0 | | 0 | | 80 | 1 |
| | Bluegill | 39 | 7.8 | 9.8 | 0 | | 0 | | | |
| | Channel Catfish | 7 | 1.4 | 1.1 | 57 | | 14 | | | |
| | Common Carp | 4 | 0.8 | 0.8 | 25 | | 0 | | | |
| | Green Sunfish | 3 | 0.6 | 0.9 | 0 | | 0 | | | |
| | Northern Pike | 3 | 0.6 | 0.9 | 100 | | 0 | | | |
| | Yellow Perch | 1 | 0.2 | 0.3 | 0 | | 0 | | | |
| frame net (std 3/4 in) | Black Bullhead | 1204 | 131.4 | 80.9 | 7 | 1 | 0 | | 79 | 1 |
| | Bluegill | 76 | 15.2 | 23.3 | 0 | | 0 | | 120 | 2 |
| | Channel Catfish | 5 | 1.0 | 1.5 | 40 | | 0 | | 97 | 4 |
| | Common Carp | 2 | 0.4 | 0.4 | 100 | | 0 | | 93 | 3 |
| | Northern Pike | 2 | 0.4 | 0.4 | 50 | | 50 | | 122 | 28 |
| | Yellow Perch | 3 | 0.6 | 0.9 | 33 | | 0 | | 97 | 5 |

## 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**

| | | CPUE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gear | Species | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | Avg |
| AFS std frame net | Black Bullhead | | | | 7.9 | | | | | | 110.4 | 59.15 |
| | Bluegill | | | | 0.0 | | | | | | 7.8 | 3.90 |
| | Channel Catfish | | | | 0.0 | | | | | | 1.4 | 0.70 |
| | Common Carp | | | | 0.9 | | | | | | 0.8 | 0.85 |
| | Green Sunfish | | | | 5.0 | | | | | | 0.6 | 2.80 |
| | Northern Pike | | | | 0.2 | | | | | | 0.6 | 0.40 |
| | White Sucker | | | | 1.1 | | | | | | 0.0 | 0.55 |
| | Yellow Perch | | | | 0.0 | | | | | | 0.2 | 0.10 |
| frame net (std 3/4 in) | Black Bullhead | 8.4 | | | | | | | | | 131.4 | 69.90 |
| | Bluegill | 0.0 | | | | | | | | | 15.2 | 7.60 |
| | Channel Catfish | 0.0 | | | | | | | | | 1.0 | 0.50 |
| | Common Carp | 6.5 | | | | | | | | | 0.4 | 3.45 |
| | Green Sunfish | 5.0 | | | | | | | | | 0.0 | 2.50 |
| | Largemouth Bass | 0.1 | | | | | | | | | 0.0 | 0.05 |
| | Northern Pike | 0.0 | | | | | | | | | 0.4 | 0.20 |
| | White Sucker | 0.8 | | | | | | | | | 0.0 | 0.40 |
| | Yellow Perch | 0.0 | | | | | | | | | 0.6 | 0.30 |

## 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 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| AFS std frame net | Black Bullhead | PSD | | | | 0 | | | | | | 0 |
| | | PSD-P | | | | 0 | | | | | | 0 |
| | | Wr | | | | | | | | | | 80 |
| | Bluegill | PSD | | | | | | | | | | 0 |
| | | PSD-P | | | | | | | | | | 0 |
| | Channel Catfish | PSD | | | | | | | | | | 57 |
| | | PSD-P | | | | | | | | | | 14 |
| | Common Carp | PSD | | | | 11 | | | | | | 25 |
| | | PSD-P | | | | 0 | | | | | | 0 |
| | Green Sunfish | PSD | | | | 2 | | | | | | 0 |
| | | PSD-P | | | | 0 | | | | | | 0 |
| | Northern Pike | PSD | | | | 100 | | | | | | 100 |
| | | PSD-P | | | | 100 | | | | | | 0 |
| | | Wr | | | | 90 | | | | | | |
| | Yellow Perch | PSD | | | | 0 | | | | | | 0 |
| | | PSD-P | | | | 0 | | | | | | 0 |
| frame net (std 3/4 in) | Black Bullhead | PSD | 1 | | | | | | | | | 7 |
| | | PSD-P | 0 | | | | | | | | | 0 |
| | | Wr | 83 | | | | | | | | | 79 |
| | Bluegill | PSD | | | | | | | | | | 0 |
| | | PSD-P | | | | | | | | | | 0 |
| | | Wr | | | | | | | | | | 120 |
| | Channel Catfish | PSD | | | | | | | | | | 40 |
| | | PSD-P | | | | | | | | | | 0 |
| | | Wr | | | | | | | | | | 97 |
| | Common Carp | PSD | 2 | | | | | | | | | 100 |
| | | PSD-P | 0 | | | | | | | | | 0 |
| | | Wr | 89 | | | | | | | | | 93 |
| | Green Sunfish | PSD | 26 | | | | | | | | | |
| | | PSD-P | 0 | | | | | | | | | |
| | | Wr | 117 | | | | | | | | | |
| | Largemouth Bass | PSD | 0 | | | | | | | | | |
| | | PSD-P | 0 | | | | | | | | | |

| | | | Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gear | Species | Index | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| frame net (std 3/4 in) | Largemouth Bass | Wr | 117 | | | | | | | | | |
| | Northern Pike | PSD | | | | | | | | | | 50 |
| | | PSD-P | | | | | | | | | | 50 |
| | | Wr | | | | | | | | | | 122 |
| | Yellow Perch | PSD | | | | | | | | | | 33 |
| | | PSD-P | | | | | | | | | | 0 |
| | | Wr | | | | | | | | | | 97 |

## Fish Condition

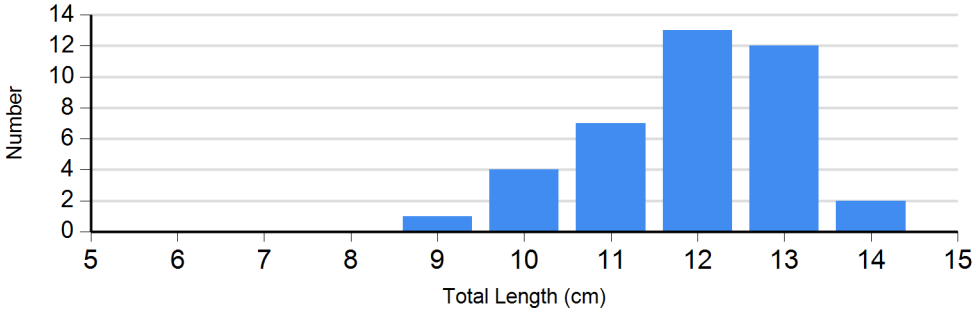
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

| | | Length Groups | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | S-Q | | Q-P | | P-M | | M | |
| Species | Year | N | Wr (SE) | N | Wr (SE) | N | Wr (SE) | N | Wr (SE) |
| Bluegill<br>Frame Net | 2023 | 76 | 120<br>(1.5) | 0 | | 0 | | 0 | |

## Length Frequency Distribution

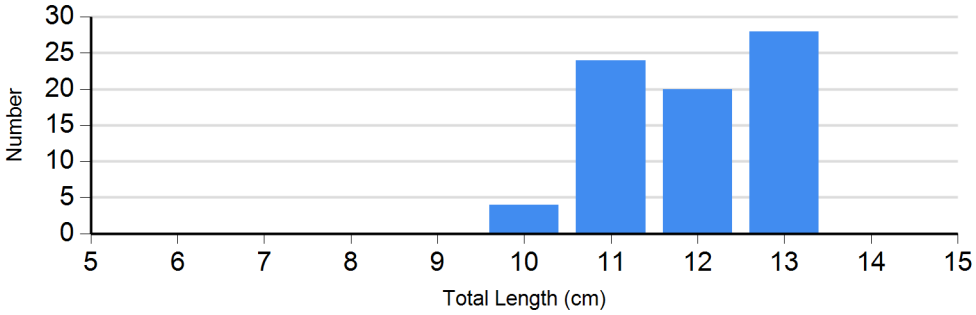
Length frequency histogram of species sampled by year.

Species: Bluegill
Gear: AFS std frame net




2023

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

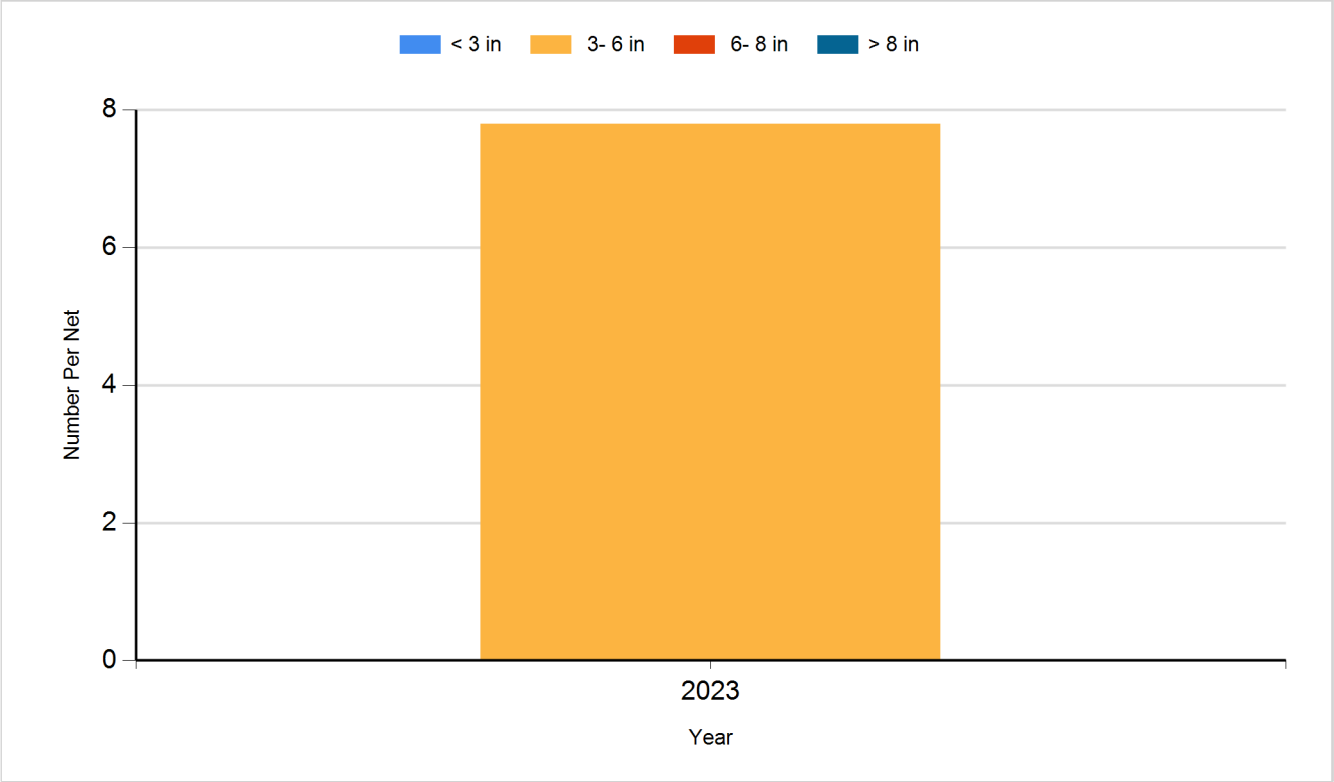



2023

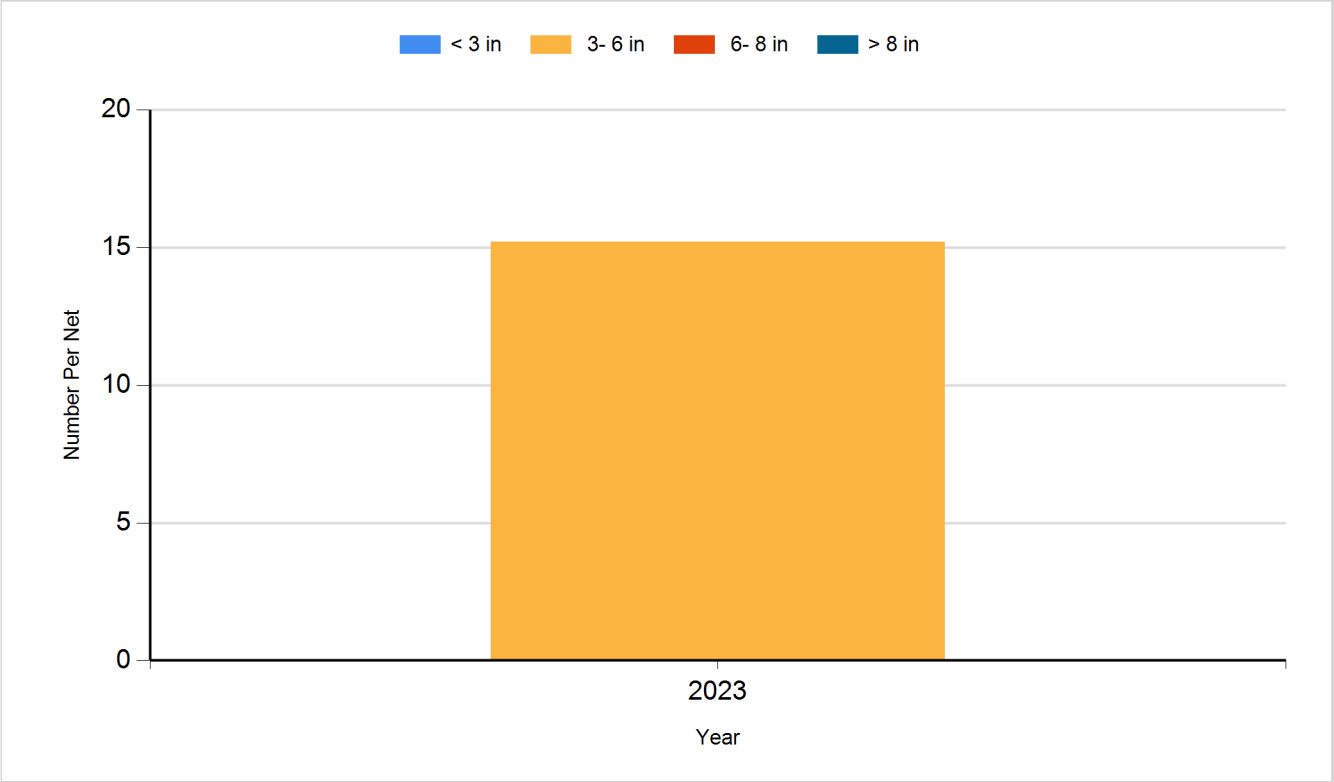
## Historic Fish Sizes and Relative Abundance

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

Species: Bluegill
Gear: AFS std frame net




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



## Fish Stocking

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

| Year | Species | Size | Number |
|---|---|---|---|
| 2012 | Largemouth Bass | Juvenile | 100 |
| 2015 | Largemouth Bass | Juvenile | 500 |
| 2020 | Channel Catfish | Adult | 271 |
| 2021 | Bluegill | Adult | 125 |
| 2023 | Yellow Perch | Adult | 100 |