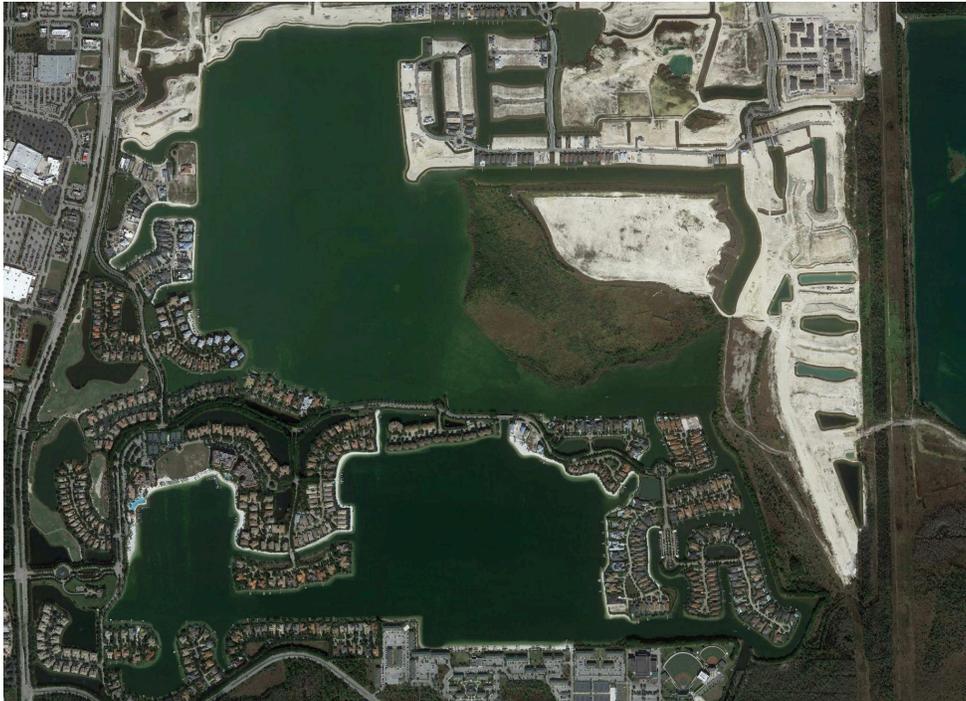


## Electrofishing Study Results & Fishery Analysis

PROPERTY NAME: Miromar Lakes  
REPORT DATE: 2/6/2024  
SUBMITTED BY: David Beasley

SAMPLING DATES: January 10, 2024  
SUBMITTED TO: Bruce Bernard & Richard Freeman



The electrofishing report is designed to provide an in-depth representation and analysis of the current state of the fishery. The results allow our biologists to make educated and precise decisions on any improvements that may be needed to meet your goals. The findings and their significance are followed by a discussion including management recommendations.

### **Goals**

Establish and maintain a healthy fishery with good water clarity as well as minimal midge populations.

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**Methods (Approach)**

A Midwest Lake Electrofishing System was used to collect all fish that were observed. Information was gathered on all fish collected during standardized sampling event(s). Length, weight, and abundance data were recorded and logged into a database. Relative weights were calculated for Largemouth Bass and Bluegill. Size classes for all species were determined to evaluate the health of the fishery.

Relative Weights

Relative Weight (Wr) is the ratio of the actual weight of a fish to what a healthy fish of the same length should weigh, called standard weight. Fish with high relative weights are fat while those with low relative weights are thin. Comparing Wr is a preferred method of biologists to understand how a fishery is responding to management practices. Proper attention to Wr in relation to the time of year is important when drawing conclusions regarding a fishery. Relative weights of bass below 90 could be an indication of a lack of food resources or difficulty obtaining prey. A relative weight of 100 would indicate a bass of “normal weight” relative to its length and would be desired for a balanced fishery. Those desiring a trophy bass fishery should aim to maintain relative weights of 110 and above.

$$Wr = \frac{\text{Actual Weight of Captured Fish}}{\text{Standard Weight of Fish at Same Length}} \times 100$$

**Relative Weight Reference**

Wr	Condition of Fish
100	Healthy
110	Trophy

**Site Description:**

	Spring 2022	Winter 2023
Date	3/21/22	1/10/24
Time of day	7:00 pm - 11:00 pm	5:45 am - 11:00 am
Water Temperature (°F)	NA	67
Secchi (inches)	48 inches	48 inches
Water Color	Clear	Clear

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## **Results**

### Fishery at a Glance

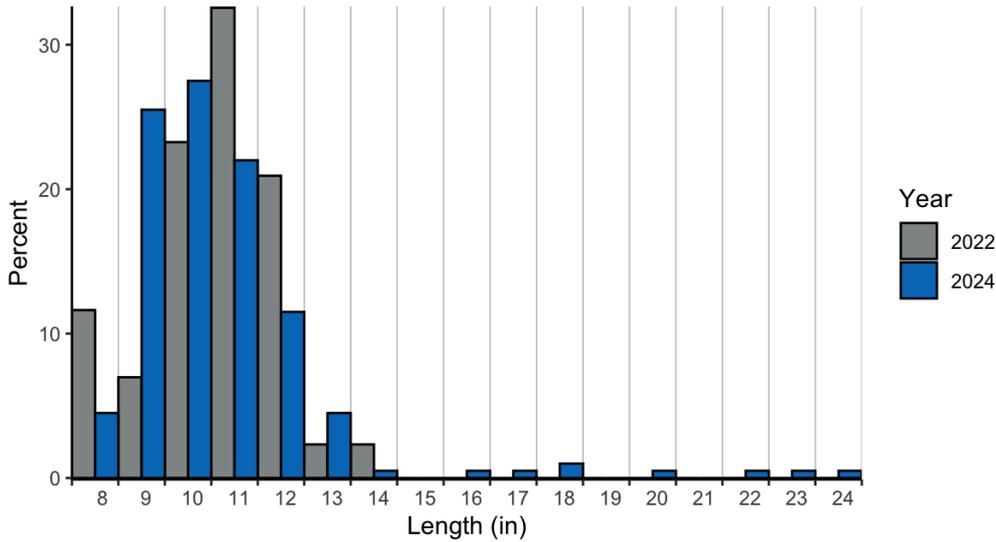
- We collected nine species of fish in 2024: Bluegill (15), Largemouth (240), Redear Sunfish (41), Blue Tilapia (10), Florida Gar (20), Mayan Cichlid (4), Green Sunfish (2), Threadfin Shad and (6) Killifish (2).
- 129 of the 240 bass collected were considered stock size (over 8 inches).
- We removed 233 small and underweight Largemouth Bass. All Tilapia, Gar, Cichlids, and Green Sunfish were also removed.
- The predator to prey ratio is 'poor' with far more predators present in the lake than prey based on catch-per-unit-effort (CPUE).
- Based on the goals, young-of-the-year Bluegill counts were 'absent' and adult numbers were 'very rare'.

### **Largemouth Bass:**

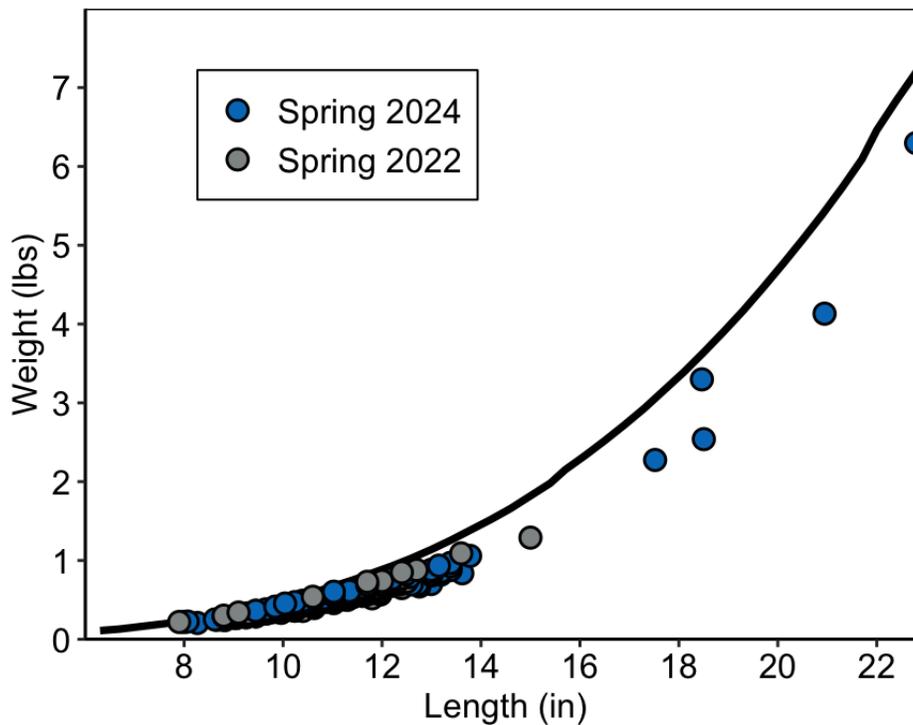
	Spring 2022	Winter 2024	Desired Range/Goal
CPUE (All Fish)	109.5	154.8	60-75 for quality fishery
CPUE (Stock Size $\geq 8''$ )	67	129.0	40-60 for quality fishery
Relative Weight (Wr, 8"+)	61.8 - 113.8 Average = 81.2	43 - 135 Average = 80.3	100 for healthy
Weight (lbs.)	0.22-1.29 Average = 0.58	0.05 - 8.1 Average = 0.6	
Length (in.)	4.5 - 15.0 Average = 9.5	5.1 - 24.6 Average = 10.3	

- The catch-per-unit-effort (CPUE) for Largemouth Bass is greater than the desired range (60 - 75 fish/hour), and as a result are suppressing the forage population.
- The size distribution of the bass population reflects a classic stunted population, with very few fish present over 14 inches (Figure 1).
- The length-weight relationship demonstrates that the Largemouth Bass are underweight relative to their length, with only 1 of the 228 fish measured above the goal of 100 set for the fishery (Figure 2).
- A negative trend was observed in relative weight as a function of length, indicating as bass get longer they are not finding enough food (Figure 3).

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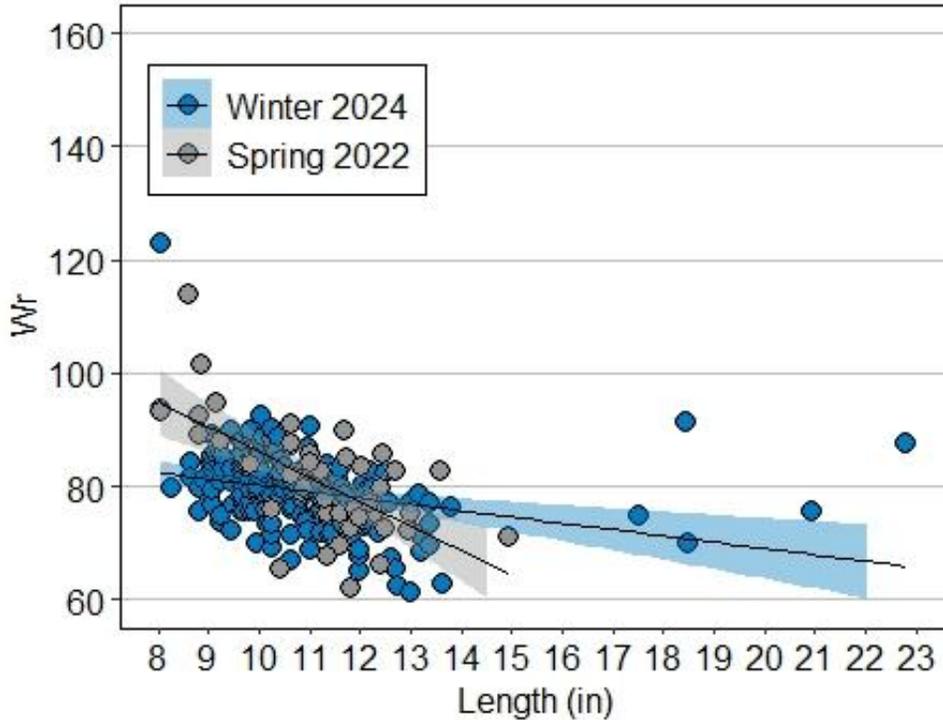


**Figure 1** – Largemouth Bass size distribution. Note: This is not representative of the individual counts of fish of each size, but their proportion of the population.



**Figure 2** – Largemouth Bass relative weights plotted on a Wr goal line of 100.

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**Figure 3** – Largemouth Bass relative weights versus length.

**Bluegill:**

	Spring 2022	Winter 2024	Goal
CPUE (All Fish)	15.6	9.7	250-350 for Quality Fishery
Relative Weight (Wr)	—	75.8 - 100.1 Average = 86.1	100 for healthy
Weight (lbs.)	—	0.08 - 0.27 Average = 0.15	
Length (in)	2.8 - 5.4 Average = 3.6	3.4 - 7.3 Average = 4.96	

- The CPUE was lower than desired for a healthy fishery.
- Only 10 Bluegill were collected in 2022 and 15 collected in 2024. The population is small in both size and quantity. (Figure 4).
- The adult Bluegill population is poor, with a Wr of 86 (Figure 5).
- The Bluegill of all sizes require increased access to ample forage as indicated by their relative weights (Figure 6).

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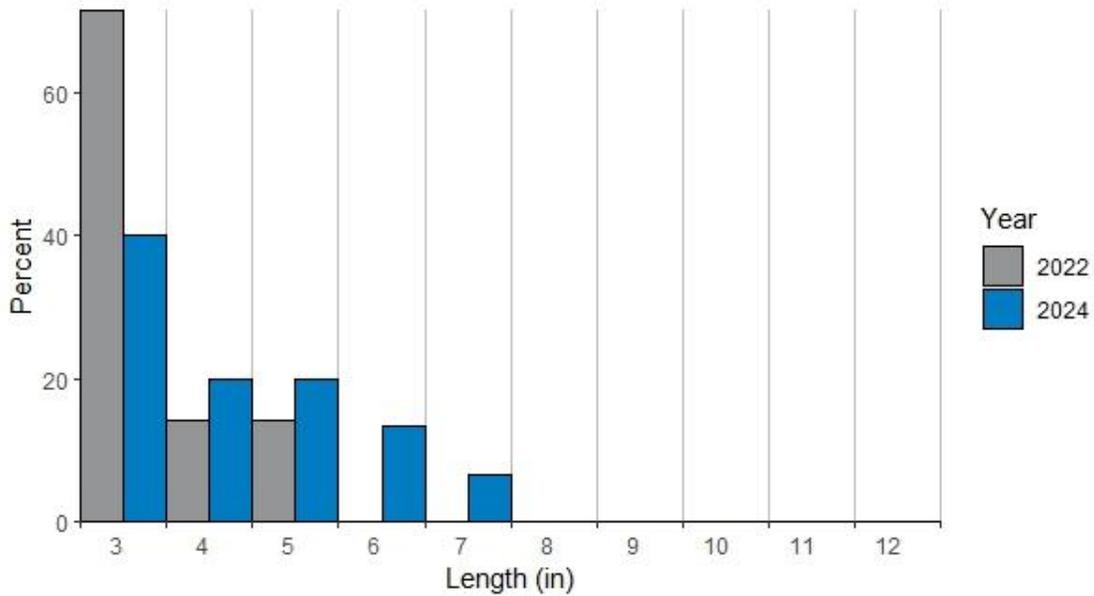


Figure 4 – Bluegill size distribution.

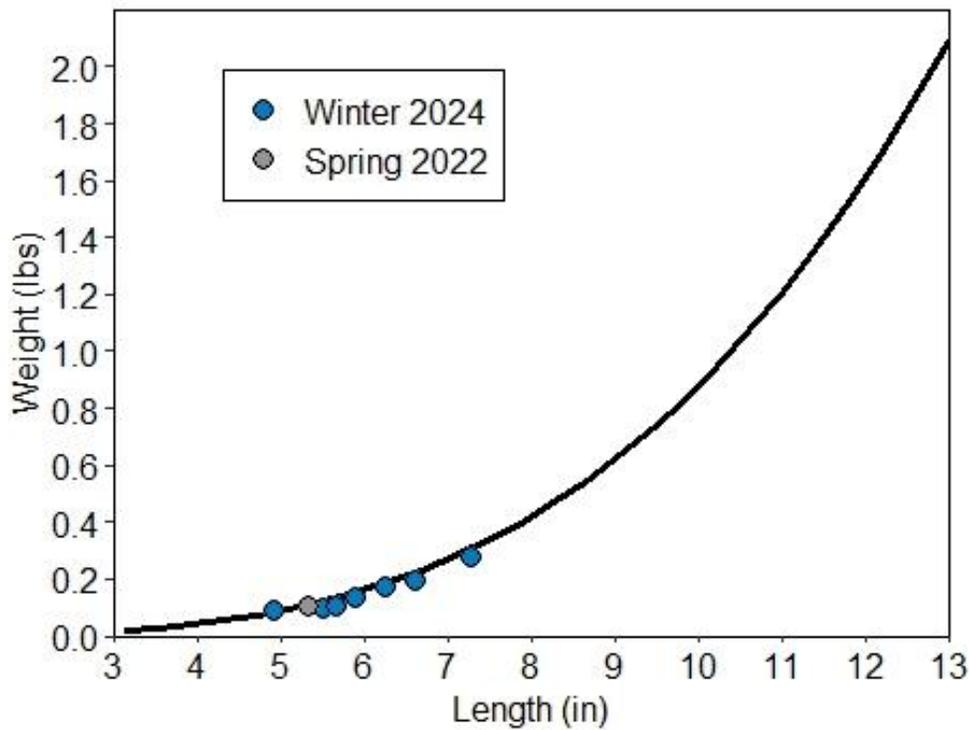
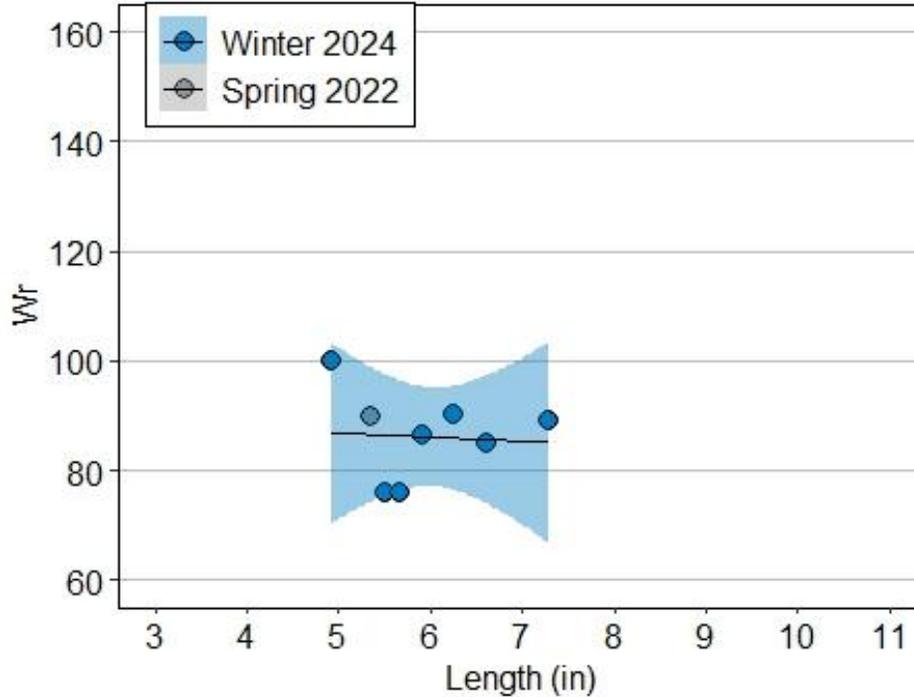


Figure 5 – Bluegill relative weights plotted on a  $W_r$  goal line of 100.

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**Figure 6** – Bluegill relative weights versus length.

**Redear Sunfish:**

	Spring 2022	Winter 2024	Goal
CPUE (All Fish)	37.4	26.4	50-100
Wr	70.6 - 118.8 Average = 103.1	64 - 107.6 Average = 90.5	100
Weight (lbs.)	—	0.097 - 0.67 Average = 0.35	
Length (in.)	3.1 - 11.0 Average = 8.2	4.33 - 9.84 Average = 7.62	

- The CPUE was lower than desired for a healthy fishery.
- Only 24 Redear Sunfish were collected in 2022 and 41 collected in 2024. The population is low. (Figure 7).
- The adult Redear Sunfish population is underweight, with a Wr of 91 (Figure 8).
- The Redear Sunfish of all sizes require increased access to ample forage as indicated by their relative weights (Figure 9).

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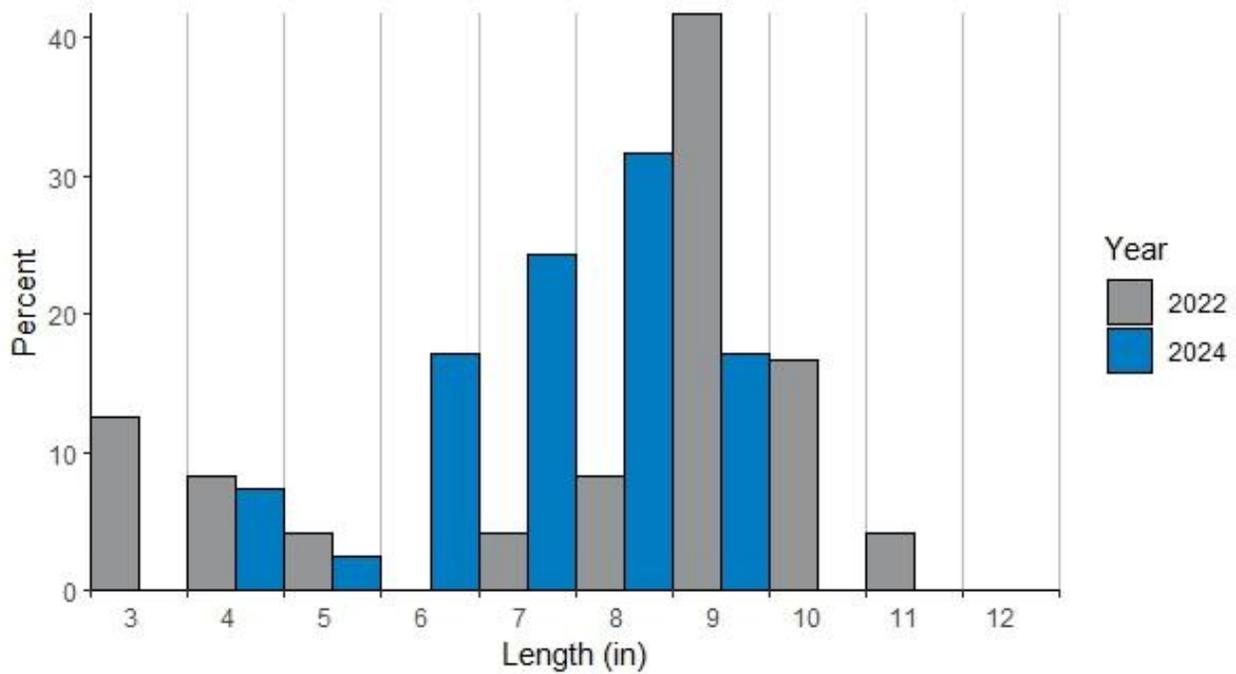


Figure 6 – Redear size distribution.

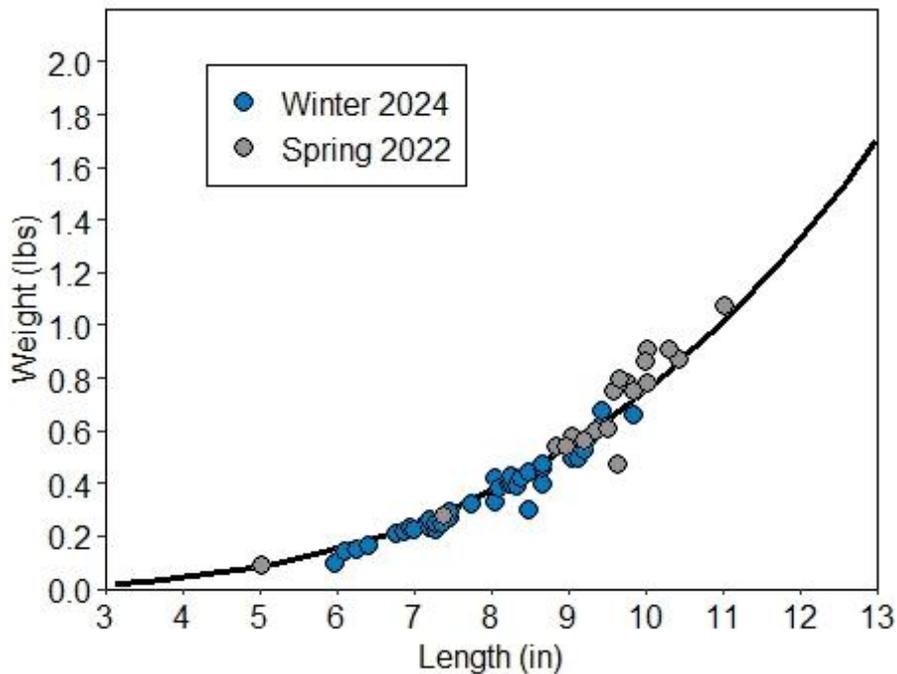
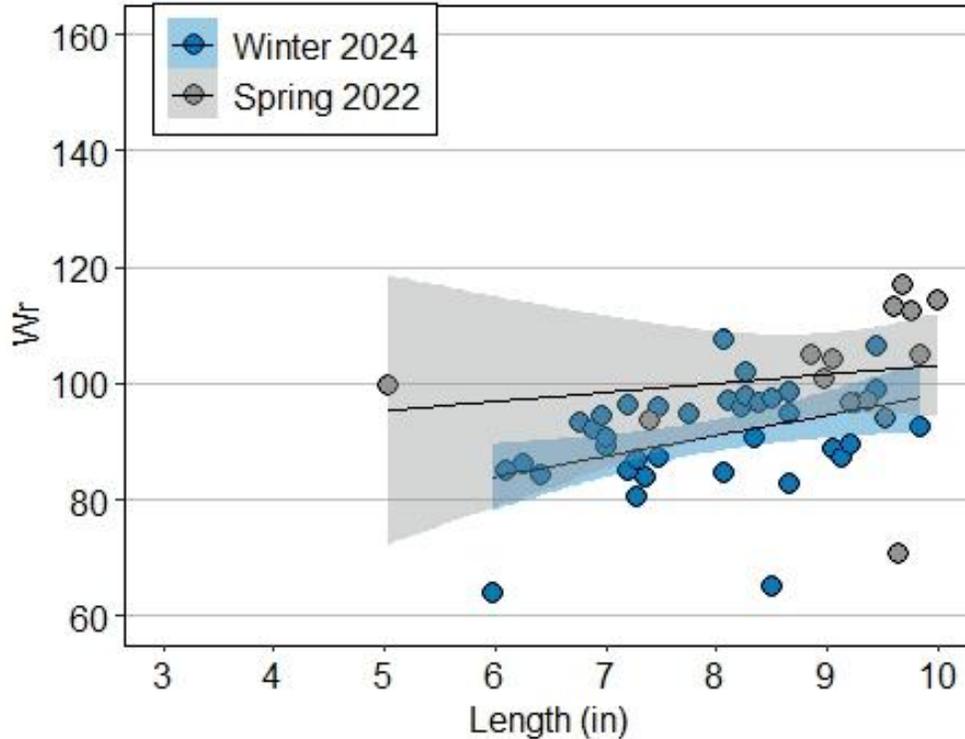


Figure 7 – Redear relative weights versus a  $W_r$  line of 100.

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**Figure 8** - Redear relative weights versus length.

### Fish Habitat

The aquatic vegetation has improved significantly since the last electrofishing study in the spring of 2022. Vegetation coverage is now found in greater than 85 acres of water, which will have a positive impact on the fishery as well as the water clarity and reduced midge population goals. That said, dense cover required by forage fish still needs to be improved through the addition of beneficial aquatic vegetation and artificial structures. The overall fish habitat has improved from 'poor' in 2022 to 'fair' in 2024.

### Water Quality

Dissolved oxygen was tested in several areas within the lake. Onsite observations teamed with the dissolved oxygen data has provided insight regarding the midge issues. We have identified two areas that are 'high risk' for midge issues (Bellini Cove and the Bellini & Anacapri Cove). Improving water quality in these two areas is important if looking to reduce the midges in these areas.

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## **Fishery Assessment**

The findings from January 2024 are similar to what we found in the spring of 2022. The population of forage fish is too low, and the Largemouth Bass (LMB) population is too high. Catch rates of Largemouth Bass were higher this year, which is most likely due to the increase in aquatic vegetation (fish cover). It is uncertain if the bass population is actually increasing, or if they are simply congregating around the vegetation. To understand this detail, bass age data would be needed. Aging the bass and figuring this out is not necessary at this time, as it does not alter the strategies being implemented over the next 12 months.

Fisheries managers compute relative weight to assess fish condition. The Largemouth Bass relative weights are below optimal, which is because their population is too high relative to the forage population. This overpopulation of bass results in most of the forage being consumed while small in size, making it difficult for the forage population to increase.

Bluegill and Redear Sunfish are the base of the food chain and their adult populations are low. It is critical for them to have a well-established population. A primary objective of the management tasks being implemented is to improve their populations.

## **Conclusions & Recommendations**

The lake has made significant progress over the past two years and is building momentum, although it is not easy to see when just looking at the electrofishing data. The community is well on its way to accomplishing the goal of establishing a healthy fishery with good water clarity as well as minimal midge populations.

The path to sustained success has been to improve the fish cover/habitat, then reduce the predator population, then add additional forage fish to restore balance. Completing this process in this order is critical to accomplishing the goals while also maximizing the available budget.

The first step of improving fish cover/habitat is on track. Although fish cover has improved in the form of aquatic vegetation, more work needs to be done to shift away from species that Grass Carp consume. Making a final attempt to establish white water lilies in areas is a priority for 2024. Additionally, artificial fish cover should also be installed to improve the fish cover in areas where vegetation is not tolerated.

Although improving the fish population is a primary strategy to reducing midge issues, we have identified two areas where poor water quality is promoting midge populations while suppressing forage fish population. The two coves identified are Bellini Cove and the Bellini & Anacapri Cove. Improving water quality and sediment health in these two coves should be a top priority.

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**A summary of the 2024 recommendations are:**

Habitat

- Make a final attempt to establish fragrant white water lilies in areas along the preserve. If they survive and grow, this will indicate that more effort should be made to expand their presence. If they fail, then it makes sense to focus on other management improvements. **TBD, ≤ \$25,000**
- Stock Grass Carp if needed. As the growing season progresses, the lake aquatic vegetation coverage will range between 82.5 and 110 acres. As the trend starts indicating coverage will reach 110 acres of vegetation, Grass Carp should be stocked, and herbicides applied if needed to keep the vegetation under control. SOLitudes ongoing monitoring/consulting arrangement will provide the necessary guidance regarding Grass Carp/vegetation management. **TBD, \$3,000 - \$7,500**
- Install artificial fish cover to increase the amount of cover for smaller fish, providing improved odds of their populations expanding. **\$75,000**
- Consider a more permanent barrier repair on the lake's outflow during this year's low water level, helping to prevent Grass Carp from leaving the lake. **\$TBD**

Water Quality

- Improve the water quality and sediment health in Bellini Cove and the Bellini & Anacapri Cove. These two coves have been identified as sources of midges due to water becoming stagnant throughout the year. Estimated cost **\$28,000** to improve the health of the water and sediment. In the future, the mouth of these coves that enter the big lake will need to be deepened, or aeration will need to be installed in the coves to maintain healthy water once the nutrient restoration process is complete. Exporting these nutrients into the big lakes is not recommended.
- Assess dissolved oxygen throughout the lake multiple times throughout the 2024 season. Each cove, as well as the open water should have a dissolved oxygen and temperature profile taken from the same locations throughout the year to identify where water quality is struggling to maintain healthy conditions. This water quality component coupled with the poor fish cover and an out of balanced predator fish to prey fish ratio is driving increased opportunities for midge issues. Once water quality issues are identified, long-term solutions can be implemented to improve the health of the lake. Estimated cost to sample 50+ locations of the waterbody four times (February, April, June and August) **\$8,000** in total. Depending on the results of the water quality testing, additional improvements can be made in 2024 if the board desires to accomplish their goals more quickly.

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**Summary of Budget/Management Tasks**

Fiscal Year	Details - North Lake 5/6	Cost	Notes
2024	Establish Lily Pads	≤\$25,000	Install mature lily pads into enclosures around the preserve area (final attempt if they fail to establish).
2024	Stock Grass Carp	\$3,000 - \$7,500	If vegetation is on track to become problematic, Grass Carp should be stocked in an attempt to reduce the need for herbicides.
2024	Install Artificial Fish Cover	\$75,000	Install artificial fish cover throughout the lake in areas to support forage fish species.
2024	Repair/Replace existing Grass Carp barrier	TBD	The existing barrier will likely be fine in 2024, but at some point the barrier should be replaced.
2024	Midge Improvement & Reduction	\$28,000	Improve the water quality and sediment health in Bellini Cove and the Bellini & Anacapri Cove.
2024	Midge Habitat Assessment	\$8,000	Test dissolved oxygen in 50+ locations throughout the lake and coves to understand where poor water quality is promoting midge populations. (test each location in February, April, June and August)

Thank you,  
 SOLitude Lake Management  
 Fisheries Biologists  
 David Beasley & Alex Johnson

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