

**Innsbrook Resort Lake Report 2017**  
**Alpine Lake and Lake Lucern**  
**August 29, 2017**

The Missouri Department of Conservation (MDC) has provided management recommendations to Innsbrook Resort for over 40 years. Nearly 30 electrofishing surveys have been conducted on 19 different lakes.

Management recommendations have focused on quality and abundance of largemouth bass and bluegill populations, while also providing suggestions to improve habitat conditions.

Common trends have been identified over the years. Results of the surveys have suggested mostly low-quality bass populations, very little hard cover and aquatic plants, and generally good bluegill populations based on size structure.

**Alpine Lake**

**Survey Results 2017**

Note: Alpine Lake was first surveyed in 2017, so no past data exists for comparison.

**Largemouth Bass**

A high number of largemouth bass were captured at a rate of 108/hr. Bass ranged in size from 4.5 to 16.4 inches. Roughly 33% of the population that was greater than 8 inches was also greater than 12 inches, but only 2% of the population was greater than 15 inches.

**Bluegill**

Very low numbers of bluegill were captured at a rate of 56/hour; however, the size structure was very good. Fifty-seven percent of the population that was greater than 3 inches was also greater than 6 inches, while 19% of the population was greater than 8 inches.

**Redear Sunfish**

Very low numbers of redear sunfish were captured at a rate of 18/hour, but like the bluegill, their size structure was very good. Eighty-six percent of the population that was greater than 4 inches was also greater than 7 inches, while 71% of the population was greater than 9 inches.

**Other Species**

Green sunfish were captured in abundance and ranged from 1.0 to 9.4 inches.

Four channel catfish were captured, ranging in size from 21.0 to 27.2 inches. (Note: This type of electrofishing gear is generally not effective for sampling catfish).

One black crappie measuring 8.4 inches was captured.

## **Current Status of Alpine Lake**

### Largemouth Bass

Electrofishing results indicate that the largemouth bass population is stunted. The high catch rate of bass coupled with a low percentage of individuals captured over 12 inches indicate a slow-growing, over-abundant bass population. Bass were observed to be thinner than desired, also suggesting an over-abundance.

### Bluegill

Although catch rates on bluegill were low, the size structure was very good. Nearly 20% of all the bluegill captured were over 8 inches.

### Redear Sunfish

Although catch rates on redear sunfish were very low, the size structure was very good. Over 70% of all the redear sunfish captured were over 9 inches.

### Habitat

Woody habitat and aquatic vegetation needs substantial improvement. Woody habitat would most benefit the largemouth bass. Aquatic vegetation, especially in shallow areas, would benefit bluegill, redear sunfish, and all juvenile fish.

### Water Quality

During the 2017 sample, the water temperature was 75°F. Secchi reading was 120 inches, indicating very clear water conditions.

## **Objectives for Alpine Lake**

MDC has not been provided clear objectives for Alpine Lake. Fishery management in small impoundments realistically leads managers/owners to decide between one of two options: managing for large bluegill (or panfish in general) or managing for large bass. Striving to achieve a “best of both” fishery has been proven to be extremely difficult and often unattainable for a variety of reasons. When deciding an objective, factors such as impoundment size, fertility, and the current condition of the fish population should be considered.

## **MDC Recommendations**

Based on electrofishing survey results, a quality panfish population is present in Alpine Lake. Therefore, MDC recommends focusing management efforts to preserve and enhance the existing bluegill and redear sunfish populations by improving near shore, aquatic vegetation. Planting spatterdock, pickerelweed and arrowhead will provide habitat for bluegill, redear sunfish, juvenile fish of all species, and the macroinvertebrates upon which these fish prey.

If harvest of panfish (bluegill and redear sunfish) is desired, implementing a panfish regulation of 8 fish per day, 8 inches or longer would help to preserve and sustain the existing panfish population for anglers to enjoy.

Although Alpine Lake is not considered a small impoundment at 237 acres, its size presents a challenge when trying to improve the size structure of bass through harvest. If there is a desired objective to significantly improve the current size structure of the largemouth bass population, intensive harvest would be needed. This would require strongly encouraging anglers to harvest according to the current slot limit (with an emphasis on bass under 12 inches). Harvest recommendations would be 50 bass per acre per year for at least 2 years, reassess the population by conducting a creel survey and adjust as necessary. This would mean the removal of roughly 24,000 bass, which would be a monumental undertaking.

For the reasons outlined above, an objective to create a high-quality bass population through intensive harvest of bass is not recommended. MDC recommends managing Alpine Lake for quality panfish through habitat enhancement and a regulation change to protect larger panfish.

To determine the correct number of channel catfish to stock, consider the number harvested the previous year, plus 10% for natural mortality, not to exceed 20 fish per acre. Fish should be 8 to 10 inches.

Harvest all green sunfish, regardless of size.

Near shore (from the shoreline to a depth of 4 feet) aquatic vegetation was very limited. MDC recommends planting spatterdock, pickerelweed and arrowhead.

Brushy cover needs to be added to the lake. Standard recommendation is to maintain 2 brush piles per acre. Each brush pile should be about 15 feet in diameter and placed in water no deeper than 8 feet. Brush can consist of cedar trees or recycled Christmas trees anchored to the lake bottom with concrete blocks and nylon rope.

## **Lake Lucern**

### **Survey Results 1978**

Lake Lucern was surveyed in 1978, 1998 and 2017.

#### **Largemouth Bass**

A moderate number of largemouth bass were captured at a rate of 67/hr. Bass ranged in size from 4.5 to 13.4 inches. The size structure of the population was poor. Only 6% of the population that was greater than 8 inches was also greater than 12 inches, with none of the population measuring greater than 15 inches.

#### **Bluegill**

High numbers of bluegill were captured at a rate of 232/hour; however, the size structure was decent. About 62% of the population that was greater than 3 inches was also greater than 6 inches, while 1% of the population was greater than 8 inches.

#### **Other Species**

Green sunfish were captured and ranged from 4.0 to 8.4 inches.

Golden shiners were captured and ranged from 5.0 to 9.4 inches.

## **Survey Results 1998**

### **Largemouth Bass**

Low numbers of largemouth bass were captured at a rate of 43/hr. Bass ranged in size from 4.0 to 13.4 inches. The size structure of the population continued to be poor. Only 10% of the population that was greater than 8 inches was also greater than 12 inches, while none of the population was greater than 15 inches.

### **Bluegill**

Catch rates for bluegill dropped significantly from the 1978 sample (232/hr.) to a rate of 70/hr., however the size structure was somewhat similar. About 51% of the population that was greater than 3 inches was also greater than 6 inches, while none of the population was greater than 8 inches.

### **Other Species**

Green sunfish were captured and ranged from 2.5 to 7.4 inches.

One channel catfish measuring 22.2 inches was captured. (Note: This type of electrofishing gear is generally not effective for sampling catfish).

## **Survey Results 2017**

### **Largemouth Bass**

Largemouth bass catch rates at 65/hr. were higher than in 1998 (43/hr.) and were very similar to catch rates in 1978 (67/hr.). Bass ranged in size from 5.0 to 21.5 inches. The size structure of the population improved from the 1998 sample. Roughly 10% of the population that was greater than 8 inches was also greater than 12 inches, 8% of the population measured greater than 15 inches and 6% of the population was greater than 18 inches.

### **Bluegill**

Catch rates for bluegill continued to decline from previous surveys to 35/hr.; however, size structure improved from 1998. About 81% of the population that was greater than 3 inches was also greater than 6 inches, but none of the population was greater than 8 inches.

### **Redear Sunfish**

Low numbers of redear sunfish were captured at a rate of 30/hr.; however, size structure was very good. Ninety-four percent of the population that was greater than 4 inches was also greater than 7 inches, while 39% of the population was greater than 9 inches. No redear sunfish were captured during previous samples for comparison.

## Other Species

Green sunfish were captured and ranged from 1.0 to 6.9 inches.

## **Current Status of Lake Lucern**

### Largemouth Bass

Although catch rates for largemouth bass were moderate, the size structure continues to be less than desirable. The size structure from the 1998 survey indicated that only 10% of the population that was greater than 8 inches was also greater than 12 inches, while none of the population was greater than 15 inches. In 2017 the size structure improved slightly with roughly 10% of the population that was greater than 8 inches was also greater than 12 inches, 8% of the population greater than 15 inches and 6% of the population greater than 18 inches.

Water clarity negatively influenced the ability to capture fish, likely resulting in a lower catch rate than expected. If water clarity had been better, it is likely that more smaller fish would have been captured, resulting in a much lower percentage of fish over 18 inches. Most of the bass captured were between 9.0 to 12.4 inches with only 5 largemouth bass over 15 inches. Body condition of the fish captured was much thinner than desired.

The size structure of the largemouth bass suggests the population is, or is moving towards being stunted. The relatively good size structure of the bluegill population supports this finding. The average length at which a bass population will stunt varies and is determined by impoundment size, fertility, prey abundance, and other factors.

### Bluegill

Catch rates for bluegill were low; however, the size structure was decent. Over 80% of all the bluegill captured that were greater than 3 inches were also greater than 6 inches. Only 2 individuals in the 3.0 to 4.9 inch categories were captured. The largest number of individuals captured were in the 7.5 to 7.9 size group. This size structure provides additional indications of a stunted bass population.

### Redear Sunfish

Catch rates on redear sunfish were also very low; however, the size structure was very good. Ninety-four percent of the population that was greater than 4 inches was also greater than 7 inches, while 39% of the population was greater than 9 inches.

### Habitat

Woody habitat and aquatic vegetation needs substantial improvement. Woody habitat would most benefit the largemouth bass. Aquatic vegetation, especially in shallow areas, will benefit bluegill, redear sunfish, and all juvenile fish.

### Water Quality

During the 2017 sample, water temperature was 67°F. Secchi reading was 11 inches, indicating very turbid water conditions. The turbidity likely hindered the ability to see and capture fish.

## **Objectives for Lake Lucern**

MDC has not been provided clear objectives for Lake Lucern. Fishery management in small impoundments realistically leads managers/owners to decide between one of two options: managing for large bluegill (or panfish in general) or managing for large bass. Striving to achieve a “best of both” fishery has been proven to be extremely difficult and often unattainable for a variety of reasons. When deciding an objective, factors such as impoundment size, fertility, and the current condition of the fish population should be considered.

## **MDC Recommendations**

Based on electrofishing survey results, a quality panfish population is possible for Lake Lucern. Therefore, MDC recommends focusing management efforts to preserve and enhance the existing bluegill and redear sunfish populations by improving near shore, aquatic vegetation. Planting spatterdock, pickerelweed and arrowhead will provide habitat for bluegill, redear sunfish, juvenile fish of all species, and the macroinvertebrates upon which these fish prey.

If harvest of panfish (bluegill and redear sunfish) is desired, implementing a panfish regulation of 8 fish per day, 8 inches or longer would help to preserve and sustain the existing panfish population for anglers to enjoy.

Although Lake Lucern at 40 acres is not nearly as large as Alpine Lake, intensive harvest of bass to improve size structure would still be challenging. If there was a desired objective to significantly improve the current size structure of the largemouth bass population, intensive harvest, according to the current slot limit (with an emphasis on bass under 12 inches) would be required. Harvest recommendations would be 50 bass per acre for at least 2 years, reassess the population by conducting a creel survey and adjust as necessary. This would mean the removal of 4,000 bass.

For the reasons outlined above, an objective to create a high-quality bass population through intensive harvest of bass is not recommended. MDC recommends managing Lake Lucern for quality panfish through habitat enhancement and a regulation change to protect larger panfish.

To determine the correct number of channel catfish to stock, consider the number harvested the previous year, plus 10% for natural mortality, not to exceed 20 fish per acre. Fish should be 8 to 10 inches.

Harvest all green sunfish, regardless of size.

Near shore (from the shore to a depth of 4 feet) aquatic vegetation was very limited. MDC recommends planting spatterdock, pickerelweed and arrowhead.

Brushy cover needs to be added to the lake. Standard recommendation is to maintain 2 brush piles per acre. Each brush pile should be about 15 feet in diameter and placed in water that is no deeper than 8 feet. Brush can consist of cedar trees or recycled Christmas trees anchored to the lake bottom with concrete blocks and nylon rope.

## **Other Considerations**

### **Crappie Regulation**

MDC recommends a re-evaluation of the 10-inch length limit on crappie. Crappie have very high reproductive rates and have shown to stunt out around 6 inches in small impoundments. This is well below the current regulation. Instituting a regulation that focuses only on daily limits without a minimum length limit could help improve the overall size structure of the crappie populations. A daily limit should also be generous (e.g. 30 crappie/day) to encourage harvest of crappie.

MDC does not have length limits on crappie, except in reservoirs where there is too much harvest of juvenile crappie that still have significant growth potential.

### **Bluegill Regulation**

Although bluegill harvest may not be high, the size of the individuals being harvested can change the overall size structure of the population. Male bluegills are allocating their energy in one of two ways, reproduction or growth. Breeding males, oftentimes called alpha males, put all their energy towards reproduction meaning they will not grow larger once they've begun breeding. Focusing harvest on the largest bluegill in the lake will force smaller males to shift their energy from growth to reproduction. A population of alpha males could be 8 to 9 inches, however if many or all of them are harvested, the younger age class of males might be only 6 or 7 inches. These younger males will then stop growing and shift their energy towards reproduction, thus shifting the overall size structure down. If the 8 to 9-inch bluegill were released the 6 or 7-inch males would continue to put energy towards growth. The goal is to have non-alpha males close in size to the alpha males so that when alpha males are harvested or die those taking their place are similar or larger in size, thus preserving or improving the overall size structure.

Placing a regulation of 8 panfish/day that must be 8 inches or larger could help to preserve or create a quality panfish fishery over time.

### **Green Sunfish**

Largemouth bass can and will prey upon green sunfish. However, largemouth bass do not prey upon green sunfish as readily as they prey upon bluegill. Angler harvest of green sunfish is also needed to reduce their abundance and competition with small bass. A majority of the time largemouth bass and green sunfish select for different habitat types, bass preferring woody cover, while green sunfish prefer rocky areas like dams. Largemouth bass will often select spawning sites near rocky areas which will bring them close to green sunfish, at which time they will use them as prey. This seasonal predation is not enough to keep green sunfish populations suppressed. Angler harvest of green sunfish is also important to ensure that their populations do not hinder young largemouth bass and bluegill populations.

## **Watershed Care Considerations**

Turbid water conditions were present in Lake Lucern. Sampling occurred following heavy spring rainfall. Sediment is transported during rain events which causes water quality issues and sedimentation. If possible, efforts to trap sediment from land disturbances in the watershed should be considered. If turbid water conditions are constant, clay turbidity might be a factor.

## **Implementation of Management Recommendations**

If Innsbrook wishes to implement fishery management recommendations, MDC can continue to periodically help evaluate and guide management of these lakes. To do so, MDC will rely on Innsbrook remaining actively engaged in management of their lakes by providing management information through creel surveys, fishing tournaments, intensive harvest efforts, fish habitat improvements, etc. Without this active engagement, the utility of further MDC surveys and recommendations would be very limited.

## **Future Plans**

MDC will provide management recommendations for Aspen Lake and Innsbrook Lake after electrofishing surveys are completed in spring of 2018.