



## **Evaluation of Herbicide Impacts on the Fish Community of Lake Chetac**

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### **Introduction**

This document was prepared to address fishery concerns on Lake Chetac that have been raised in response to the herbicide treatment of 90.8 acres of the north end of Lake Chetac (shown in Figure 1). The Hayward fish team surveyed Lake Chetac in 2009 and 2013 as a part of our baseline monitoring schedule. We returned in the spring and late-summer of 2014 to gather more data regarding possible fishery impacts from herbicide treatments that occurred in the spring of 2013 and 2014.

We have conducted several special evaluations on this lake to address questions raised by concerned stakeholders and to understand any possible effects that herbicide treatments in the lake might be having. Bluegill are a primary species of interest in Lake Chetac and are thus the focal species in this report. This report is organized under major questions that stakeholders have raised concerning the fishery which we hope to address within this report. The questions are:

**Question 1: Are fish avoiding the herbicide treatment area?**

**Question 2: Are the bluegill in Lake Chetac in worse condition, or skinnier, because of the herbicide treatment?**

**Question 3: Has herbicide treatment hurt reproduction of panfish?**

**Question 1: Are fish avoiding the herbicide treatment area?**

Fishery survey data presented in this section is from boom electrofishing surveys conducted in the spring of the year. In 2009 only one transect was surveyed (approximate location of T4 in Figure 1). In 2013 locations T1, T2, T3, and T4 were surveyed. In 2014 locations T1 and T2 were surveyed again and T5 was added to provide a sample from the immediate vicinity of the herbicide treatment.



**Figure 1.** Map of Lake Chetac showing the herbicide treatment area and the fishery survey locations in spring of 2013 and 2014.

The 2013 and 2014 surveys were both conducted after the herbicide treatment for that year had already occurred (Table 1). During electrofishing surveys all species of fish were captured and counted which provides a relative estimate of species abundance and size.

**Table 1.** Herbicide treatment and fishery survey dates on Lake Chetac.

Year	Herbicide Treatment Date	Fish Survey Date
2009	None	5-19
2013	5-28	6-8
2014	5-20	5-27

Electrofishing capture rates for bluegill by transect are summarized in Table 2. In general, electrofishing capture rates were **highest** on the north end of the lake in both 2013 and 2014. Surveys in T5 (immediately adjacent to and within the herbicide treatment area) showed capture rates and sizes of bluegill that were similar if not higher than other areas of the lake. There is limited evidence that abundance has increased since 2009, but the 2009 survey included only one transect and may not have been representative of the whole population. Size of bluegill surveyed is shown in Table 3 as the percentage of bluegill in each sample that were over 7 inches in length. Size appears to be declining in Lake Chetac over time (Table 3).

**Table 2.** Relative abundance of bluegill (# caught per mile surveyed) across transects in 3 different survey years. See Figure 1 for transect locations. Transects are shown in geographic order from north (T5) to south (T4).

Transect	Year		
	2009	2013	2014
T5	-	-	250
T1	-	324	288
T2	-	204	146
T3	-	184	-
T4	153	84	-
Average	153	199	228

**Table 3.** Relative size of bluegill (% of fish over 7 inches) across transects in 3 different survey years. See Figure 1 for transect locations. Transects are shown in geographic order from north (T5) to south (T4).

Transect	Year		
	2009	2013	2014
T5	-	-	20.8
T1	-	23	17
T2	-	25	11
T3	-	25	-
T4	42.5	21	-
Average	42.5	23.5	16.3

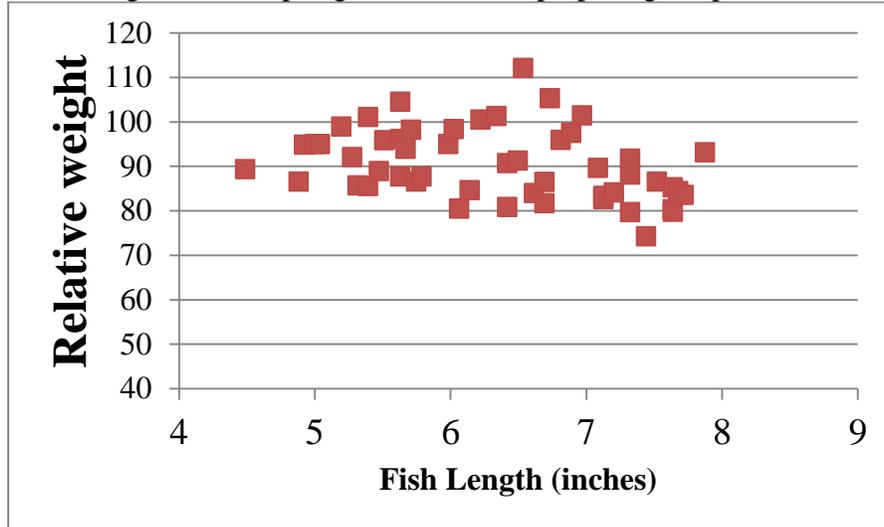
### **Conclusions on Question 1**

There is no evidence from electrofishing data that bluegill are avoiding the area of Lake Chetac that received herbicide treatment or that the treatment has decreased abundance of bluegill. In fact, both the abundance and size of bluegill in 2013 and 2014 appear to be generally higher in the north end of the lake where herbicide treatments occurred, and decrease as you go south.

### **Question 2. Are the bluegill in Lake Chetac in worse condition, or skinnier, because of the herbicide treatment?**

To answer this question we collected 51 bluegill from throughout the lake ranging in length from 4 to 8 inches. Length and weight were measured on each fish which allowed us to calculate “relative weight”. Relative weight is a measurement that compares the actual weight of each fish to a “standard” weight for a fish of that length. Standards are calculated using bluegill from across North America. A relative weight value of 100 represents the 75<sup>th</sup> percentile for the species, or a fish with above average weight for its length. Values of 80-100 were common in Chetac bluegill and fall within a normal range for a bluegill population (Figure 2). Relative weight looked similar across all sizes of fish

examined. It should also be noted that weight of fish fluctuates seasonally and relative weight would be higher in the spring when fish are preparing to spawn.

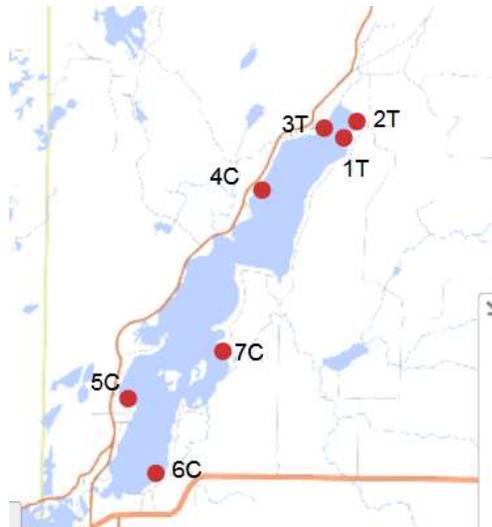


**Figure 2.** Relative weight of bluegill in Lake Chetac, August 2014.

**Conclusions on Question 2.** There is no indication that bluegill in Lake Chetac are in poor condition or are skinnier than a normal bluegill population. Relative weight can be used as an indicator that these fish have access to enough food to maintain normal body condition.

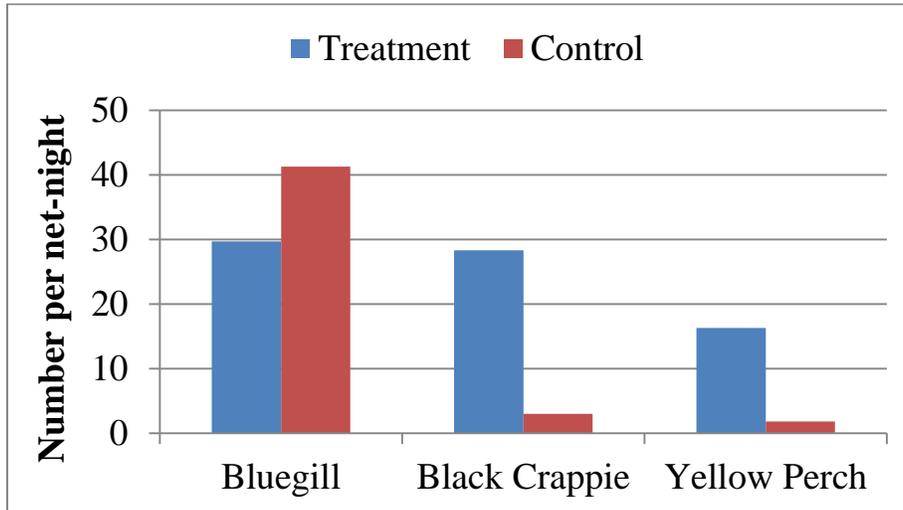
**Question 3. Has herbicide treatment hurt reproduction of panfish?**

To address this question we conducted a mini-fyke netting survey in August with several nets inside the area affected by the herbicide treatment and several nets in other areas of the lake (Figure 3).



**Figure 3.** Net locations for the mini-fyke netting survey conducted on Lake Chetac in August of 2014. Nets denoted with a “T” were in proximity to the herbicide treatment area and those denoted with a “C” were away from the treatment area and are considered controls.

We used mini-fyke net catch rates as a measure of relative abundance of young-of-year panfish (i.e. fish born earlier that same year, 2014). Catch rates for bluegill were high in both the treatment and control areas with averages of 29.7 and 41.3 respectively (Figure 4). Catch rates for black crappie and yellow perch were both considerably higher in the treatment area.



**Figure 4.** Capture rates of three species of young-of-year panfish captured with mini-nets in Lake Chetac, August 2014. Young-of-year panfish were considered to be fish less than 3 inches in length.



**Figure 5.** Photograph of young-of-year panfish from a mini-fyke net in Lake Chetac, August 2014.

### **Conclusions on Question 3**

There is no indication that herbicide treatments have prevented successful spawning or recruitment of panfish. Capture rates for juvenile panfish were as high or higher in the treatment area as the rest of the lake.

Other species were captured in the mini-fyke nets in addition to panfish. Twelve different fish species were observed in both the treatment area and control area, indicating that there is no avoidance of the treatment area and providing further support for the conclusions related to Question 1.

### **Overall conclusions**

While herbicide treatments are likely to have some kind of impact on the aquatic community, to date, there is no indication that treatments on Lake Chetac have caused an area of the lake to be avoided by panfish, decreased body condition of panfish, prevented successful reproduction of panfish, or had a meaningful effect on the fish population that would result in a decrease in the quality of fishing. The area treated with herbicide appears to still be occupied by fish and even shows catch rates of fish in surveys that are consistently higher than the rest of the lake. This area is also still productive in terms of panfish recruitment. During the course of this survey we observed several people catching many fish in the treatment area as well as other areas of the lake.

This is not to say that the fishery of Lake Chetac currently has no problems. Panfish size has been declining over the course of many years and walleye recruitment has dwindled to exceptionally low levels while largemouth bass abundance has increased (see report found [here](#) for more information on these other species). This is a pattern that has been mirrored on many other lakes in the area (see Sissabagama, Nelson, Smith as examples) and appears to be completely unrelated to herbicide application. However, steps are being taken to counteract these negative trends in the fish population including regulation changes and stocking.