

Stump Lake Stock Assessment, 2001

Introduction

Stump Lake (WBID 00190LNIC) is located south of Kamloops, at an elevation of 750 meters. Access is via Highway 5A. The lake is approximately 780 ha in size and has a maximum depth of 21 meters and mean depth of 11.5 meters. There are two small boat launches located off the highway. A UREP site located along the east side of the lake provides a limited area for camping and a third boat launch site. The surface water conductivity was 1530 $\mu\text{S}/\text{cm}$ and the pH was 8.7 when sampled on the day of netting.

Stump Lake was first stocked in 1911 with 10,000 cutthroat trout fry. No stocking occurred again until 1955, when 10,000 Pennask rainbow trout were put in the lake. Up to 285,000 rainbow trout have been stocked annually since. In 1976, 27,000 kokanee were introduced to the lake. Since then, they have been stocked every year kokanee are available. Stocking numbers have varied greatly over the years in Stump Lake, in response to the changing pH. Brook trout were stocked in the lake in the 1980's, along with the rainbow trout and kokanee, as an experiment when the pH was high. The brook trout did not respond well, and the stocking was stopped. High water table levels in the 1990's created lower pH levels and greatly improved fish survival. During this decade, surplus fish were often stocked in the lake in the fall. Kokanee were not stocked in the lake in 2001 due to a shortage of fish.

There are no special fishing restrictions on the lake, so the regional daily catch quota of 6 trout/char applies. There is a boating speed restriction of 70 km/h.

Study Objectives

In the fall of 2001, a study was undertaken to assess the kokanee population in Stump Lake. The study objective was to determine the size and condition factor of the kokanee. The minimum objective was to capture 50 specimens that contained appropriate age class representation.

Methods

Gillnetting in Stump Lake occurred on September 4, 2001. Two 5-panel gillnets were set in the north end of the lake in the littoral zone near the mouth of the inlet stream. The stream was not flowing at the time of netting. One net was set for 3 hours and the other net was set for 2 hours. The surface water temperature was 18°C on the day of netting.

The fork length and weight were recorded for all caught fish. We attempted to collect scale samples to age the fish, but found most scales had been re-absorbed and gave very inaccurate readings. The fish were then dissected to determine gender, maturity, and presence of internal parasites.

Statistical Analysis

There are a number of statistical errors inherent in condition factor calculations (Cone 1989). Fulton's condition factor (K) was a good choice for analysing the length to weight relationship for most of the lakes sampled in the fall of 2000 (W = weight (g), L = length (mm), $n = -6$).

$$K = \frac{W}{L^3} \times 10^n$$

Cone (1989) identified potential errors associated with the use of Fulton's K when growth is not isometric. Non-isometric growth was evident for a couple of lakes in our sample. As a result, comparisons with the use of Fulton's K was informative to only 2 significant figures. This would permit lake to lake comparisons for most of the lakes sampled, but not all. Therefore, we explored the use of other parameters as indicators of condition factor. Simple least-squares regression parameters were chosen for evaluating the length to weight relationship of fish in the lakes.

$$W = aL^b$$

The length (L) and weight (W) logarithms were calculated for each fish in the samples. The logarithms were graphed to ensure a linear relationship. The parameters a (intercept) and b (slope) were estimated from the following linear regression.

$$\log_e(W) = \log_e(a) + b \log_e(L)$$

The coefficient of variation (cv), in estimate of the slope parameter b , was smaller than the coefficient of variation in estimate of the intercept parameter a (Table 1). In other words, b appears to be a more precise measure of fish condition factor than a . Because of this, b was chosen as the parameter for comparison. Comparing lakes by either b , a , K , relative K_n , or relative W resulted in similar rankings.

Table 1 Statistical parameters of the rainbow trout captured during the Fall 2001 stock assessment, sorted by b .

The normal condition factor range expected for fish in the Kamloops region is slope values (b) from 2.8 to 3.2. Lakes in which the slope is greater than 3 tend to have good conditioned fish, but a smaller rainbow trout population size. Lakes in which the slope value is less than 3 tend to have poorer conditioned fish, but a larger population size. Lakes are managed for different objectives to try and meet the demands of a broad range of anglers. When managed as "quality" or "trophy" lakes, condition factors greater than 3 are the goal. When managed as "family fishery" lakes, condition factors less than 3 are often the goal. However, if the condition factor of the rainbow trout in the lake is greater than 3.2, rainbow trout are almost impossible to catch by anglers due to a very small population size. If the condition factor is less than 2.8, the fish may be hard to catch due to their small size.

Results

The netting exercise in the fall of 2001 produced a total of 80 rainbow trout. The trout ranged in size from 225 mm (136 g) to 450 mm (1296 g). The fish were believed to be aged 2+ and 3+ years. The average condition factor of the rainbow trout in the lake was 3.243 ($n = 80$, $SE = 0.068$)(Table 1).

Discussion

The size of the kokanee in Stump Lake has started to drop in the past few years, likely a result of the changing water chemistry (increase in pH).

No kokanee were stocked in Stump Lake in 2001 due to low returns at Meadow Creek. Sulphurous Lake kokanee have been approved for brood stock egg collection, so there should be kokanee available again for the spring of 2002. Kokanee stocking in Stump Lake should remain as it is, dependent on the availability of stock.

References

Cone, Scott R. 1989. The need to reconsider the use of condition indices in fishery science. Transactions of the American Fisheries Society. 118:510-514.