KALISPEL TRIBAL HATCHERY

LARGEMOUTH BASS SUPPLEMENTATION STUDY

INTRODUCTION

In 1987, the Northwest Power Planning Council (NPPC) amended its Columbia River Basin Fish and Wildlife Program to include a resident fish substitution policy. This policy called for substitution of resident fish in areas where anadromous fish historically occurred, but were blocked with the construction of the Chief Joseph and Grand Coulee Dams. One of the first projects adopted by NPPC was the "Assessment of fishery improvement opportunities in the Pend Oreille river within the boundaries of the Kalispel Indian Reservation" (Ashe, *et al* 1992). The purpose of this three-year study was to establish baseline information of existing fish populations and habitat; and identify possible methods of improving fisheries within the reservoir. Recommendations from this study are proposed as resident fish substitution under the Northwest Power Planning Council's 1987 Resident Fish Substitution Policy.

The assessment identified several factors within the reservoir that limited the fisheries opportunities within the Box Canyon reservoir. Some of these factors include water elevation fluctuations; lack of overwinter cover for age 0+ bass; and inadequate recruitment of largemouth bass into the system. The University of Idaho also performed a study in within this timeline (Bennett, Liter) and concurred with the above factors and proposed similar recommendations of the assessment study published by Ashe.

Based on these findings, biological objectives for largemouth bass (*Micropterus salmoides*), bull trout (*Salvelinus confluentus*), and cutthroat trout (*Oncorhynchus clarki*) were identified and incorporated into the NPPC's program. The largemouth bass biological objectives were as follows.

- Increase the biomass of harvestable largemouth bass in the Box Canyon reservoir from the current 6 pounds/acre to an interim target of 8 pounds/acre by 2003 and a final target of 12 pounds/acre by the year 2008.

- Increase age 0+ largemouth bass overwinter survival from current levels of 0.4-3.9 percent to approximately 15-20 percent.

Specific recommendations or strategies to attain these biological objectives were also formulated and presented to the NPPC for approval and funding. These recommendations are as follows.

- Operate and maintain low-capital warm water hatchery constructed on the Kalispel Indian Reservation to produce 100,000 largemouth bass fry and 50,000 fingerlings for release into Box Canyon reservoir.

- Construct, operate, and maintain water control structures on the Pend Oreille wetlands wildlife project for the purpose of creating bass nursery sloughs.

- Construct, place, and maintain artificial cover structures to increase the amount of bass age 0+ fry winter cover in the Box Canyon reservoir. The purpose of the cover is to increase the overwinter survival of age 0+ largemouth bass.

- Monitor effectiveness of largemouth bass supplementation.

The main objective for this study is to test the survivability of hatchery-raised bass through their first year following planting. Expected interpretations include strategies for release size and outplanting locations.

METHODS AND MATERIALS

All hatchery-raised largemouth bass released into the reservoir will be marked with a coded-wire tag. The location of the tag will identify the particular release-size. All supplementation efforts shall be performed within a 20-30 miles stretch of the 57 mile long Box Canyon reservoir that currently provides suitable largemouth bass habitat. Specific outplanting locations will focus on areas which currently support a viable largemouth bass population. A list of the outplanting locations along with stocking sizes are listed in Table 1, below.

Table 1. Outplanting locations and release numbers

Outplanting Location	Fry	Fingerling	Fingerling 1+	Totals
Rednours slough	33,333	15,000	1,667	50,000
Dike slough	33,333	15,000	1,667	50,000
Campbell slough	33,334	15,000	1,666	50,000
Totals	100,000	45,000	5,000	150,000

Three different fish sizes will be released at each location. The first stocking will take place in early summer and will consist of approximately 100,000 fry (~55mm). The second stocking will take place in early fall and consist of approximately 45,000 fingerlings (~125mm). A third stocking will take place the following spring with approximately 5,000 fingerlings age 1+. Each group of fish will have its own distinctive mark that will indicate the specific release size (Figure 1).

Recapture rates of the different release sizes will be tested for significance using the Chi^2 test of significance (distribution). All hatchery released fish recaptured during the study will be re-marked and released into the reservoir. The mark-recapture numbers will then be summed up for the entire sampling period (March-October).

$$Chi^2 = \sum \frac{(Observed - Expected)^2}{Expected}$$

Each outplanting location will be sampled monthly (March-October) following release. Three ten-minute transects will be performed at each release site. Two transects shall be located on opposite banks within the slough and another located immediately downstream of the slough in the main channel. All areas will be sampled with a Smith-Root electro-shocking boat. Only largemouth bass will be sampled. A catch per unit effort (CPUE) will be calculated for each transect and release area.

$$CPUE = \sum \frac{Sample\ time}{Fish\ sampled}$$

A Jolly-Seber model will be used to generate survival estimates for the hatchery-raised fish. The data gathered during the study will be entered into a computer-based program entitled “MARK”. This program utilizes a Jolly-Seber model to generate survival estimates. The survival rates between hatchery-raised bass and the native population will be compared, along with different survival rates between release sizes.

The plot-level calls for each sampling area will be as follows:

1. Study name

2. Date
3. Time of day
4. Transect name and number
5. River elevations at Box Canyon, Albeni Falls, and Cusick
6. Water temperature
7. Crew initials

Only largemouth bass will be sampled within each transect. The specific measurements for each fish will be as follows:

1. Species
2. Total length (mm)
3. Total weight (grams)
4. Sex (if possible)
5. Other identifying marks

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NULL HYPOTHESIS

H_o : Survival release size 1 = Survival release size 2 = Survival release size 3

ALTERNATIVE HYPOTHESIS

H_1: Survival release size 1 > Survival release size 2

H_2: Survival release size 2 > Survival release size 1

H_3: Survival release size 1 > Survival release size 3

H_4: Survival release size 3 > Survival release size 1

H_5: Survival release size 2 > Survival release size 3

H_6: Survival release size 3 > Survival release size 2

Release size 1 = Fry age 0+ (approximately 100,000 released)

Release size 2 = Fingerling age 0+ (approximately 45,000 released)

Release size 3 = Fingerling age 1+ (approximately 5,000 released)

EXPECTED INTERPRETATIONS

Increased survivability of hatchery-raised fish within the reservoir shall be the most important variable considered when deciding which stocking size best satisfies the biological objective of increasing the biomass of harvestable bass. Another factor involved in the decision criteria is the overall cost associated with each release size. Generally, the smaller the fish at the time of release, the lower the cost.

NULL HYPOTHESIS (survival 1 = survival 2 = survival 3)

TRUE: If all three release sizes exhibit the same types of survival, then the most cost effective method of release will be employed.

FALSE Go through alternative hypothesis key.

ALTERNATIVE HYPOTHESIS 1 (survival 1 > survival 2)

TRUE: If release size 1 is more cost effective, then release size 1 will be employed. Note finding and go to hypothesis 3.

FALSE: Reject hypothesis, note finding, and go to hypothesis 2.

ALTERNATIVE HYPOTHESIS 2 (survival 2 > survival 1)

TRUE: If release size 2 is more cost effective, then release size 2 will be employed. Note findings and go to hypothesis 3.

FALSE: Reject hypothesis, note finding, and go to hypothesis 3.

ALTERNATIVE HYPOTHESIS 3 (survival 1 > survival 3)

TRUE: If release size 1 is more cost effective, then release size 1 will be employed. Note finding and go to hypothesis 5.

FALSE: Reject hypothesis, note finding, and go to hypothesis 4.

ALTERNATIVE HYPOTHESIS 4 (survival 3 > survival 1)

TRUE: If release size 3 is more cost effective, then release size 1 will be employed. Note finding and go to hypothesis 5.

FALSE: Reject hypothesis, note finding, and go to hypothesis 5.

ALTERNATIVE HYPOTHESIS 5 (survival 2 > survival 3)

TRUE: If release size 2 is more cost effective, then release size 2 will be employed. Note finding and go to hypothesis 6.

FALSE: Reject hypothesis, note finding, and go to hypothesis 6.

ALTERNATIVE HYPOTHESIS 6 (survival 3 > survival 2)

TRUE: If release size 3 is more cost effective, then release size 3 will be employed. Note finding.

FALSE: Reject hypothesis and note finding.