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**KALISPEL RESIDENT FISH PROJECT
KALISPEL TRIBAL HATCHERY
OPERATIONS AND MAINTENANCE**

Annual Report 1999



DOE/BP-35750-2



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Kalispel Resident Fish Project

Kalispel Tribal Hatchery Operations and Maintenance

1999 Annual Report

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Abstract

In October of 1997, The construction of the Kalispel Tribal Hatchery was complete. No spawning activity was recorded for the spring of 1998. On June 14, 1999 the first spawn at the Kalispel Tribal Hatchery was successful. A total of seven nests were fertilized that produced approximately 144,000 fry. The second spawn occurred on July 13, 1999 and a total of six nests were fertilized producing approximately 98,0000 fry. The total amount of largemouth bass fry produced at the Kalispel Tribal Hatchery was 242,000.

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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 the NPPC was the "Assessment of Fishery Improvement Opportunities in the Pend Oreille River" (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 included 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 during this time (Bennett, Liter, 1991) and concurred with the above factors and proposed similar recommendations of the assessment study published by Ashe.

Ashe, *et al* (1991) indicated that growth rates of largemouth bass during the first four years in the Box Canyon Reservoir were lower than bass from other locations of the northern United States, and conversely, growth rates after the fourth year were comparable or even higher than other locations. The slower growth combined with a high rate of juvenile mortality associated with overwintering have reduced the potential for the bass population within the reservoir. Current largemouth bass density estimates are approximately 6 pounds per surface acre in the Box Canyon Reservoir.

In 1991, Ashe and Bennett suggested the possibility of an off-site rearing facility to supplement the number of juvenile largemouth bass within the reservoir. Supplemental stocking of yearling largemouth bass has been proven successful in other reservoirs. In Chatfield reservoir, Colorado, largemouth bass were hatchery-reared to one year of age using intensive and extensive culture from 1978 to 1981. Subsequent samples of age 2 bass in the reservoir comprised 12%, 59%, and 59% of the population, during sample years 1980, 1981, and 1982, respectively (Kreiger and Puttman 1986). Increase in the age 2 class fish were directly attributed to hatchery supplementation.

Based on these findings, biological objectives for largemouth bass (*Micropterus salmoides*) were identified and incorporated into the Northwest Power Planning Council's program. The largemouth bass biological objectives are 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 the 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 a low-capital warm water hatchery to be constructed on the Kalispel Indian Reservation. This hatchery will be able to produce 100,000 largemouth bass fry and 50,000 bass fingerlings for release into the 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.

In 1996, construction activities commenced on the largemouth bass hatchery. The completion date of the hatchery was November, 1997. Upon completion of the hatchery, the largemouth bass brood fish will be collected and transferred to the hatchery for spawning. The initial outplanting of juvenile largemouth bass into the Box Canyon reach of the Pend Oreille river is scheduled for the summer of 1999.

Description of Project Area

The Pend Oreille River begins at the outlet of Pend Oreille Lake, Idaho and flows in a westerly direction to Dalkena, Washington. From Dalkena, the river turns and flows north into British Columbia, where it eventually ties into the Columbia River. The approximate drainage area at the international border is 65,300 km² (Barber *et al.* 1990). The normal high flow month is June with a mean discharge of 61,858 cfs, the normal low flow month is August with a mean discharge of 11,897 cfs (Barber *et al.* 1990). The Box Canyon reservoir has 47 tributaries and covers 90 river kilometers of the Pend Oreille River. The reservoir entails the portion of the river between the Albeni Falls and Box Canyon dams.

The Kalispel Tribal Hatchery is located on the northern boundary of the Kalispel Indian Reservation on the 436 acre Pend Oreille Wetlands Wildlife Mitigation Project. The project is situated along the east side of the Pend Oreille river, approximately nine miles north of Usk, Washington.

Methods and Materials

Supplementation

All hatchery-raised largemouth bass will be marked with a coded-wire tag to distinguish them from the natural bass population. Electronic detection equipment will be used to identify all hatchery-raised bass during sampling efforts. The location of the coded-wire tag will identify the size of the fish at release. Three different outplanting locations have been identified: Rednours slough, Dike slough, and Campbell slough (Figure 1). At this time, two separate release sizes and times have been determined.

All outplanting locations will be sampled with a Smith-Root electro-shocking boat. For a more detailed description of the supplementation monitoring and evaluation efforts, refer to the Kalispel Tribal Hatchery Supplementation Plan located in Appendix A.

Hatchery Operation

Raceway spawning of largemouth bass will be employed at the Kalispel Tribal Hatchery. Raceway spawning of largemouth bass has been proven successful at the Jake Wolf Hatchery, San Marcos, TX and other largemouth bass hatcheries (Tom Hays, personal communication). This technique allows the hatchery staff to easily observe the brood fish and determine the extent in which successful spawning is taking place. The use of artificial spawning nests will enable the hatchery staff to transport the fertilized eggs from the raceway to the hatchery troughs for intensive rearing. This reduces the number of brood fish required for achieving the Annual Production Goals for the hatchery.

In the fall of 1997, 12-15 pairs of brood fish were gathered and brought into the hatchery for acclimation. The estimated acclimation period for the brood fish is at least 12 months. In the spring, the brood fish will be closely monitored while the water temperature is slowly increased. Once the water temperature in the raceway approaches 65° F, artificial spawning mats will be placed along each side of the raceway. Approximately 16 nests will be placed in the 60 ft. raceway. Brood fish requirements are determined based on a need of 150,000 32 mm fry and assuming 67% survival. During spawning activities at the hatchery, the two rearing sloughs will be fertilized to enhance phytoplankton blooms. The phytoplankton blooms provide a vegetative food source for zooplankton which the newly hatched fry will feed upon.

During each of the spawning periods, the artificial nests with eggs will be allowed to remain in the raceway for 1-2 days before being transferred to the incubation troughs. Each of the incubation troughs can be partitioned off to separate the nests that are more than 2 days apart. This reduces the size disparity and any losses due to cannibalism. The unhatched eggs will be immediately treated with daily static bath treatment of Formalin until the eggs hatch (3-4 days). The newly hatched fry will remain in the trough for an additional 7-10 days until they “swim-up” in search of food. At this time, the fry will be transported to the rearing sloughs for grow-out.

The largemouth bass fry will remain in the fertilized slough for a period of 8-10 weeks until they reach a collectable size (~40 mm). At this time, the fry will be collected, transferred to the hatchery for marking, and later transported to the predetermined release site. Approximately 50,000 bass fry will be retained in the hatchery and trained on artificial feed until they reach fingerling size (~75 mm). The fingerlings will be raised in the hatchery at an initial density of 0.25 lb./ft³. They will be trained to receive artificial feed until they achieve a density of up to 1.0 lb./ft³. At this maximum density, the four indoor troughs can accommodate up to 45,000 65 mm fingerlings (assuming 90% survival) and the raceway can accommodate up to 100,000 75 mm fingerlings. The first bass fry released into the reservoir will be coded-wire tagged in the nape. The second outplanting of fingerlings will be coded-wire tagged in the cheek.

Two rearing sloughs will be used to hold and raise the newly hatched largemouth bass fry. Each slough has a water control structure (dam) at its mouth and a 4 inch water supply from the pump station. The dams have an overflow spillway and a 6 inch gate valve for draining the slough during fish harvest and pond maintenance. The south slough has the potential for an air supply line at a future date. This air line will enable the intensive rearing and over-wintering of fish in the slough. Fresh water to the sloughs is supplied by two submersible pumps located in the pump station.

Monitoring and Evaluation

Supplementation

Monitoring and evaluation of supplementation efforts will be conducted by electro-shocking the outplanting locations following release. All hatchery-raised largemouth bass will be marked with a coded-wire tag. The location of the tag will identify the size of the fish at the time of release. Strategies on the most effective release size will then be formulated to best accomplish our biological objectives. For a more detailed description of the supplementation monitoring and evaluation efforts, refer to Appendix A.

Hatchery Operation

Efficiency of the hatchery operation will be closely monitored by the hatchery staff. Listed below are factors that will be monitored at the hatchery (physical and biological) and are derived from Piper *et al.* (1992).

Physical aspects

- Volume of water used in each trough during hatchery operations.
- Amount of water flow (gallons/minute) into each trough during hatchery operations.
- Water temperature.

Biological aspects

- Percent survivability from fry to egg.

- Food and diet
 1. Cost/pound for fish food.
 2. Relationship between the amount of feed to the amount of actual fish growth.
- Fish
 1. Amount of brood fish and number of eggs produced per female.
 2. Amount and weight of fry hatched during the spawn.
 3. Amount and weight of fry planted into the rearing sloughs.
 4. Amount of fry transported from rearing sloughs to the outplanting location.
 5. Weight gain/loss of brood fish (pre-spawn and post-spawn).
 6. Date eggs fertilized, hatched, transferred to sloughs, and outplanted.
 7. First feeding of fry.
- Occurrence and type of diseases affecting brood fish and fry and their possible contributing factors.

Rearing sloughs

Physical aspects

- Volume (acre feet), average depth of slough.
- Amount of inflow required to maintain water level in the slough.
- Average water temperature.
- Fertilization date, type, amount, cost, and results.
- Amount of phytoplankton blooms and zooplankton.

Biological aspects

- Percent survivability from fry to fingerling.
- Food and diet
 1. Cost per pound of feed and the cost per pound of fish gained.
 2. Amount of food fed as percentage of fish body weight.
 3. Pound of food fed per pound of fish produced.
- Fish
 1. Gain in weight.
 2. Average length and weight before release into sloughs.
- Disease
 1. Occurrence, kind, and possible contributing factors.

Results and Discussion

Construction of the hatchery building, pump station, and raceway was completed in October of '97. The first order of business was to gather the brood fish that would produce the hatchery bass fry. The hatchery staff was able to gather 27 brood fish from the reservoir and start the acclimation period. The hatchery staff was optimistic in hoping that these fish would spawn the following spring but this never occurred. During this time however, the hatchery staff was able to fine-tune the water system and de-bug most of the operation.

On June 14, 1999, the hatchery staff noticed the first spawn. During the next four days, the brood fish spawned a total of six times on the artificial nests. The hatchery staff estimate about 144,000 bass hatched during this first spawn. The second spawn started on July 13, 1999. A total of seven nests were fertilized and hatched in a two day span. The hatchery staff estimates 98,000 fry were hatched during this time. Listed below is a description of each spawn and the number of fry produced from each nest.

Table 1. 1999 largemouth bass spawning record and production

Date of Spawn	Nest #	Date of Hatch	Date of Swim-up	Estimated # Fry
June 14, 1999	5	June 18, 1999	June 26, 1999	24,000
June 14, 1999	16	June 18, 1999	June 26, 1999	24,000
June 15, 1999	2	June 18, 1999	June 26, 1999	24,000
June 15, 1999	8	June 18, 1999	June 26, 1999	24,000
June 16, 1999	6	June 20, 1999	June 26, 1999	24,000
June 17, 1999	8	June 20, 1999	June 26, 1999	24,000
July 13, 1999	2	July 17, 1999	July 25, 1999	14,000
July 13, 1999	12	July 17, 1999	July 25, 1999	14,000
July 13, 1999	15	July 17, 1999	July 25, 1999	14,000
July 14, 1999	1	July 18, 1999	July 26, 1999	14,000
July 14, 1999	3	July 18, 1999	July 26, 1999	14,000
July 14, 1999	9	July 18, 1999	July 26, 1999	14,000
July 14, 1999	14	July 18, 1999	July 26, 1999	14,000
Total Fry Produced				242,000

In the fall of 1999, the hatchery encountered a major set back. The hatchery staff moved the brood fish to the effluent ponds while painting the raceway. The outflow stand pipe broke and left the brood fish high and dry. We were able to gather half of the brood fish but they later succumbed to *Saprolegnia*. Once the raceway was painted, the hatchery staff gathered 25-30 new brood fish for next year's production.

The 1999 Annual Operating Plan listed four objectives for the year. Listed below are the 1999 objectives along with the amount of progress achieved for the year.

Objective 1. Egg collection, spawning, and incubation of largemouth bass eggs to meet 1999 Annual Production Goals.

On June 14, 1999, the brood fish began their first spawn. The second spawn took place on July 13, 1999. The hatchery staff estimates 242,000 largemouth bass fry were produced at the hatchery during this time. Most of the egg collection, spawning, and incubation techniques described in the Kalispel Tribal Hatchery Production Procedures were used during the spawn.

The brood fish from last year are no longer part of the operation. A broken stand pipe left these fish high and dry. The hatchery staff has currently gathered new brood fish and are gearing up for next years production.

The Annual Production Goals for the year called for producing 100,000 largemouth bass fry and 50,000 largemouth bass fingerlings. The hatchery was able to produce 242,000 largemouth bass fry. The hatchery staff was unable to collect the most of the newly-hatched fry for tagging due to high water and predation in the sloughs. The time in which the newly hatched fry were ready to transfer to the growout sloughs, the Pend Oreille River elevation was approximately 2040'. The height of the dams at the sloughs is 2035'. Because of the limited food reserves of the bass fry, these needed to be immediately planted in the sloughs. The hatchery staff constructed a barrier over the top of the dam in an attempt to keep the fry in and the predators out but this was ineffective. Despite all of these efforts, we were only able to collect 500 fry from the sloughs.

Objective 2. Develop fry and fingerling rearing methods to meet 1999 APG.

Fry rearing strategies include all activities from fry “swim up” to transportation of the fry to the outplanting location. These rearing activities have been formulated and are documented in the Methods and Materials sections of this document. The collection of the newly hatched fry from the rearing slough will be tough to say the least. The hatchery staff was unable to collect most of the fry transferred to the sloughs for growout. Water elevation and predation were problems in the sloughs. The collection techniques employed throughout the year will need to be improved. The construction of a net along the top of the dams will hopefully resolve these two problems.

Objective 3. Identification of 1999 distribution dates and locations for outplanting largemouth bass fry and fingerlings.

Three outplanting locations were identified for 1999. They include the Rednours slough, Dike slough, and Campbell slough (figure 1). These sites will also be used for 2000. Outplantings are scheduled for August/September (fry) and October/November (fingerlings).

Objective 4. Monitor effectiveness of hatchery supplementation. Complies with the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program under section 10.8B.19.

A Kalispel Tribal Bass Hatchery Supplementation Plan has been prepared and is attached as Appendix A.

Summary and Conclusions

The brood fish were able to acclimate themselves and successfully spawned in the concrete raceway. This was the most critical element of the hatchery production operation. With a successful spawning season, the hatchery staff was able to “test” most of the production procedures and identify some small items not previously described. The hatchery was successful in producing the Annual Production Goal of 150,000 largemouth bass fry. The hatchery staff was unable to collect most of the newly-hatched fry from the rearing sloughs due to high water. The height of the dams at the sloughs is 2035 feet and during the spring the Pend Oreille River well exceeded this. Because of the limited food reserves of the bass fry, they need to be immediately planted in the sloughs. The hatchery

staff constructed a barrier over the top of the dam in an attempt to keep the fry in and the predators out but this was ineffective. Despite all of these efforts, we were only able to collect 500 fry from the sloughs. Most of the 242,000 fry produced at the hatchery were lost over the dam when the river level dropped. Although we were unable to complete the hatchery operation we were successful in supplementing the Box Canyon reservoir with largemouth bass fry. These high water problems will hinder the hatchery operation on an annual basis.

There are a few small items that will need corrected by next year's spawn. These include a secure netting attached to the dams; installation of a predator netting over the two effluent ponds; and insulating the raceway building. Although these items by themselves were not limiting the production operation, together they add up to very important factors affecting our operation.

Literature Cited

- Ashe, B.L., K.L. Lillengreen, J.J. Vella, L.O. Clark, S. Graves, M.R. Barber, G.J. Nenema, jr., and A.T. Scholz. 1991. Assessment of the Fishery Improvement Opportunities on the Pend Oreille River. Upper Columbia United Tribes Fisheries Center. BPA Annual Report, Contract No. DE-A179-88BP39339.
- Barber, M.R., B.L. Renberg, J.J. Vella, A.T. Scholz, K.L. Woodward and S. Graves. 1990. Assessment of the Fisheries Improvement Opportunities on the Pend Oreille River. Upper Columbia United Tribes Fisheries Center. Annual report 1990.
- Bennett, D.H., and M.Liter. 1991. Water quality, fish and wildlife characteristics of Box Canyon Reservoir, Washington. Department of Fish and Wildlife Resources, College of Forestry, Wildlife and Range Sciences, University of Idaho, section 3: Fish completion Report 1989-90.
- Hays, T. 1995. Assistant Manager, Jake Wolf Hatchery. Personal Communication.
- Piper, R.G., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler and J.R. Leonard. 1982. Fish Hatchery Management. U.S. Fish and Wildlife Service. Washington, D.C.