Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

In reply refer to: PJS — January 29, 1985

To Interested Parties:

SUBJECT: Annual Review of the Columbia River Basin Fish and Wildlife Program Projects for Western Montana--1984

Bonneville Power Administration (BPA) held a public meeting on November 28-29, 1984 for the purpose of review, coordination, and consultation of the BPA-funded projects in Western Montana. The comments received after the meeting were favorable and the participants agreed that the meeting was stimulating and productive. The information exchanged should lead to better coordination with other projects in that area.

The following pages list each Project Title, Project Number, Project Leader and their location, BPA's Project Officer (Contracting Officer's Technical Representative), and a brief summary of the project. Remember: these summaries are preliminary results; they are subject to change and should not be quoted without consulting the Project Leader.

As promised, this information was assembled and is being disseminated to interested parties to further the goals of the meeting. If you have any questions, please feel free to contact the respective Project Leader or the BPA Project Officer at (503) 230-5549.

Sincerely,

Gregory E. Drais
Chief, Biological Studies Branch

DOE/BP-408

TABLE OF CONTENTS

BONNEVILLE POWER ADMINISTRATION
FISH AND WILDLIFE PROGRAM REVIEW, COORDINATION, AND CONSULTATION

Western Montana Project Area

November 28-29, 1984

Edgewater Lodge
Sandpoint, Idaho

FHolm:paw (WP-PJS-4853N)

WILDLIFE IMPACT ASSESSMENT AND MITIGATION PLANS FOR FIVE HYDROELECTRIC PROJECTS IN WESTERN MONTANA (PROJECT NO. 83-464); John Mundinger, Gael Bissell, Daniel Casey, Arnold Olsen, Marilyn Wood, Chris Yde, Department of Fish, Wildlife, and Parks, P.O. Box 67, Kalispell, Montana 59903; 406-755-5505; (BPA Project Officer: Jim Meyer)

Pursuant to the Northwest Power Planning Act of 1980, the Montana Department of Fish, Wildlife, and Parks initiated a program to assess the impacts of hydroelectric development on wildlife resources and to recommend appropriate projects to mitigate these losses. The Department's program, funded by the Bonneville Power Administration, addressed five specific dam projects in western Montana:

1. Libby, operated by the Army Corps of Engineers;

2. Hungry Horse, operated by the Bureau of Reclamation;

3. Cabinet Gorge, operated by Washington Water Power Company;

4. Noxon Rapids, operated by Washington Water Power Company; and

5. Thompson Falls, operated by the Montana Power Company.

The impact assessments documented the best available information on wildlife populations and habitats of the areas inundated by reservoirs. Due to the large number of species affected by these hydroelectric projects, impact analysis were directed at a list of target wildlife species (i.e., those species which received the greatest impacts and best represented the various habitats inundated).

Where sufficient data existed, quantitative estimates of the numbers of animals lost from the ecosystem and/or acres of key habitats inundated, were made. Qualitative loss estimates of low, medium, or high with supporting rationale were also developed for each target species.

To develop appropriate mitigation plans, the estimated losses became the mitigation objectives. To meet those objectives, alternative projects were evaluated using several criteria:

1. numbers of target, nontarget, threatened, or endangered species which could be benefitted by a project;

2. results of coordination;

3. proximity to reservoirs; and

4. status and potential of adjacent lands for enhancement.

Where appropriate, habitat enhancement projects were preferred over land acquisition projects.

Mitigation plans for these five hydroelectric facilities are nearing completion. These plans consist of prioritized projects which, when combined, would meet mitigation objectives for all target species identified in the impact assessments. The reports completed or drafted are listed below:

1. Completed Reports (printed by the Bonneville Power Administration:

   Wildlife Impact Assessment and Mitigation
   Summary - Montana Hydroelectric Projects
   Volume I - Libby Dam
   Volume IIA - Thompson Falls Dam
   Volume IIB - Cabinet Gorge and Noxon Dams
   Volume III - Hungry Horse Dam

2. Draft Reports or Reports nearing completion:

   Wildlife and Wildlife Habitat Mitigation Plan for the Hungry Horse Hydrolectric Project (November 1984)

   Wildlife and Wildlife Habitat Mitigation Plan for the Libby Hydroelectric Project (November 1984)

   Wildlife and Wildlife Habitat Mitigation Plan for the Cabinet Gorge and Noxon Rapids Dams (no date)

   Wildlife and Wildlife Habitat Mitigation Plan for the Thompson Falls Dam (no date)

QUANTIFICATION OF HUNGRY HORSE RESERVOIR WATER LEVELS NEEDED TO MAINTAIN OR ENHANCE RESERVOIR FISHERIES (PROJECT NO. 83-465); Bruce May, Montana Department of Fish, Wildlife, and Parks; P.O. Box 67; Kalispell, MT 59923; (406) 755-5505 (BPA Project Officer: Richard Harper)

The Hungry Horse Reservoir Fisheries Study is part of the Northwest Power Planning Council's fish and wildlife plan to mitigate damages to fish and wildlife resources impacted by hydroelectric development in the Columbia River Basin. The goal of the project is to quantify seasonal water levels needed to maintain or enhance principal game fish species. Any changes in reservoir operation will have to be coordinated with many downstream uses which includes flows for kokanee spawning and egg incubation in the Flathead River and Flathead Lake water elevations. During the first field season in 1983 methods were developed to collect data on (1) recruitment of westslope cutthroat trout from tributary streams; (2) habitat quality in tributary streams; (3) reservoir habitat at 10 foot contour intervals; (4) physical-chemical limnology; (5) fish food availability; (6) seasonal food habits of major fish species; (7) fish abundance and distribution; (8) migration patterns; (9) growth of major game species; and (10) annual mortality rate of westslope cutthroat trout. This data will be used to develop relationships between reservoir operation and habitat availability for fish food organisms and major game species. The impact of reservoir operation upon food availability, growth, condition factors, year class abundance, and annual mortality of westslope cutthroat trout will also be determined.

During 1983 and 1984, stream habitat surveys were completed on 69 reaches in 52 streams. Emigration of westslope cutthroat trout juveniles in 12 streams and the spawning run into Hungry Horse Creek were monitored. A total of 3,044 juveniles and 445 adult cutthroat trout were tagged to determine movement patterns.

The availability of fish food organisms was investigated. Zooplankton densities exhibited considerable variation seasonally and among the sampling stations. Densities were similiar to those recorded in Flathead Lake, but were less than those found in Lake Koocanusa. Densities of terrestrial and aquatic insects of the surface film varied considerably among the seasons. Peak terrestrial numbers occurred in August and September while densities of aquatic Dipteran were highest in April. Dipteran larvae dominated the benthic fauna. Dipteran abundance in areas deeper than 10 meters were approximately six times greater than in the frequently dewatered shallow areas.

An analysis of stomachs from westslope cutthroat trout indicated that adult cutthroat feed primarily on terrestrial insects in summer and fall while the juveniles utilize aquatic Dipteran extensively in the summer and terrestrial insects in the fall. The diet of juveniles and adults changed to primarily Daphnia in November and December when terrestrial insects were no longer available.

Catches in floating gill nets indicated that westslope cutthroat trout densities were higher in the upper part of the reservoir than near the dam.

A mean catch of 9.1 cutthroat per net was recorded in the Sullivan area in April as compared to only 2.2 fish per net in Emery area near the dam. Bull trout and mountain whitefish populations also appeared to be higher in the Sullivan area than in the Emery area.

The catch of cutthroat trout in purse seine hauls was used to calculate population estimates in the spring and fall for the Sullivan area using an area-density equation. The wide confidence limits associated with the estimates indicated that a larger sample size is needed to obtain reliable population estimates.

LOWER FLATHEAD SYSTEM FISHERIES STUDY (PROJECT NO. 83-1); David Cross, Fisheries Study Director; Confederated Salish and Kootenai Tribes, P.O. Box 98, Pablo, MT 59855; (406) 675-4600 (BPA Project Officer: Tom Vogel)

The completion of the Lower Flathead System Fisheries Study will fulfill program measures 804(a)(3) and 804(b)(6) of the Columbia Basin Fish and Wildlife Program. The purpose of the study is to provide a technical data base for the fisheries resources of the lower Flathead System from which an array of management/mitigation alternatives will be developed covering the present status of hydroelectric development and operation.

The objectives of the study are:

1. Assess existing aquatic habitat in the lower Flathead River and its tributaries and its relationship to the present size, distribution, and maintenance of all salmonid species, northern pike, and largemouth bass populations.

2. Assess how and to what extent hydroelectric development and operation affects the quality and quantity of aquatic habitat in the lower Flathead River and its tributaries and life stages of existing trout, pike, and largemouth bass populations. Evaluate the potential for increasing quality habitat and thus food and game fish production, through mitigation.

3. Assess existing aquatic habitat in the South Bay of Flathead Lake and its relationship to the present size, distribution, and maintenance of yellow perch, largemouth bass, northern pike, mountain whitefish, and lake whitefish populations in the bay.

4. Assess how and to what extent hydroelectric development and operation affects the quality and quantity of aquatic habitat in South Bay and life stages of existing target fish populations.

5. Develop an array of fisheries management options to mitigate the impacts of present hydroelectric operations, demonstrating under each management option how fish populations and hydroelectric generation capabilities would be modified.

This study has two divisions. One deals with the main river and its tributaries, the other with the South Bay of Flathead Lake. Each division of the study has two phases; Phase I developed the study plan and methodology for the completion of Phase II work. Phase II consists of an analysis of the present status of fish populations and aquatic habitat of the lower system. The results of Phase II will be a management alternative matrix which will be used by Tribal decisionmakers and other interested parties in making informed management decision for the necessary level of mitigation, protection, or enhancement of Tribal fisheries resources.

The observed structure of trout populations in the lower Flathead River points to spawning and recruitment problems most likely caused by hydroelectric operations and sedimentation. Among the consequences of the present hydroelectric operational regime are constant, rapid changes in river discharge during spawning and incubation periods which cause water velocity and depth to constantly vary over spawning gravels, possibly exceeding tolerance limits of adults and inhibiting spawning behavior, dewatering redds and exposing them to freezing temperatures, stranding of fry, and probably displacing juveniles to habitats less suitable for survival. Constant water level fluctuation over backwater vegetation has been identified as creating major problems in successful northern pike spawning and recruitment, by preventing access to spawning sites and dewatering pike eggs.

Using weirs we have confirmed the use of two major tributaries, the Jocko River and Mission/Post Creek, as spawning sites for main river trout. Based upon stock assessments conducted at 22 permanent stations, the upper ends of the tributaries support healthy resident populations of brook and cutthroat trout. Rainbow and brown trout predominate in the lower reaches which may be a reflection of main river stocks utilizing the lower reaches of the tributaries for spawning.

Phase I work completed in FY 1984 for the lake division included the mapping of habitat types throughout South Bay and the evaluation of physical habitat using SCUBA techniques and a dive sled. Permanent habitat transects; water quality stations; and sites for sampling fish with gillnets, seines, and traps were established. Techniques for handling and processing data were tested and established.

In FY 1985 instream flow studies using IFIM will be initiated on the main river and tributaries. We will continue investigations into the population structure of target fish species and how it may be related to hydroelectric operations. Data on the spatial and temporal distribution of target fish species in the South Bay will be correlated with identified habitat types and lake levels.

IMPACTS OF WATER LEVELS ON BREEDING CANADA GEESE AND THE METHODLOGY FOR MITIGATION AND ENHANCEMENT IN THE FLATHEAD DRAINAGE (PROJECT NO. 83-2); Confederated Salish and Kootenai Tribes (BPA Project Officer: Jim Meyer)

This study was contracted to the Confederated Salish and Kootenai Tribes by the Bonneville Power Administration in December 1982, pursuant to section 4(h) of the Pacific Northwest Power Planning and Conservation Act of 1980 (P.L. 96-501). Scope of the first contract limited the study area to the lower Flathead River. Since October 1, 1984, the study area now includes the southern portion of Flathead Lake and the lower Flathead River from Kerr Dam to the confluence with the Clark Fork River near Paradise, Montana. Objectives of the study are:

1. Monitor Kerr Dam discharge rates and resulting river and lake water levels;

2. Estimate goose production; identify important nesting areas and relate these areas to water levels;

3. Evaluate goose nest site selection and its relation to water level fluctuations;

4. Determine the population impacts of providing artificial nest sites secure from water fluctuations;

5. Monitor brood activity and evaluate habitat selection; relate the effects of water level fluctuations to important habitats;

6. Formulate and implement limited habitat manipulation experiments; and

7. Formulate mitigation/management recommendations necessary to protect and enhance Canada goose populations in the lower Flathead drainage under current and potential future hydroelectric operations and development.

Goose territorial pair surveys were conducted on the river by boat and plane to evaluate methods of obtaining a reliable index of the goose nesting population. We observed no significant difference between boat and aerial surveys or morning and afternoon surveys. Morning surveys were more precise than afternoon surveys. The pairs/nest ratio was 1.4 for both morning boat and aerial surveys. Fifty-two artificial nest structures have been placed on the river; 26 structures contain expanded shale nest material and 26 contain ponderosa pine/cedar bark mixture. Seven structures were used by nesting geese in 1984; 5 of the structures used contained the bark mixture and 2 contained shale. Mean loss of bark nest material was 17 percent (range 4-36 percent), and no loss of shale occurred after 1 year. Severe ice flows appear to occur often enough on the river to make the use of rock pillar structures unfeasible unless they are placed out of river channels. Fifty-six nests and 74 percent nesting success were observed on the river in 1984. Nest flooding in 1983 and 1984 was low. Water levels did not reach the high water mark (HWM) until after all nests had hatched on the river. During both 1983 and 1984 approximately one-third of all goose nests were located at or below the HWM which indicates the potential for significant nest flooding should water levels reach the HWM during the nesting period. Predation was the most significant cause of nest loss on the river.

Discharge rates less than 6000 cfs likely allow predators access to some nesting islands. During the nesting period, minimum daily flows were commonly less than 6000 cfs which likely resulted in the observed predation rates. When broods were located, ground observers recorded activity-time budget data. Various feeding, resting, movement, and alert behaviors were recorded for goslings and associated adults. Habitat use data were also recorded. Future analyses will evaluate how available habitats are used by brooding geese which will then allow us to determine how water fluctuations affect goose broods.

Pair surveys on Flathead Lake were conducted during morning by boat and aircraft. No significant differences were observed between the two methods but the ratio of mean numbers of pairs observed to nests present was 0.50-0.75 considerably lower than on the river. Artificial nest structures planted with Kentucky bluegrass sod and crested wheatgrass seeds will be placed on Wildhorse Island and monitored. Flathead Lake islands had 164 nests with 72 percent success, comparable to previous years. All nests were natural ground nests constructed above the HWM, and most predation was avian. Goose broods on the lake were surveyed by boat, aircraft, and radio-collared adults with broods were tracked via telemetry. The most drastic fluctuation of water levels on Flathead Lake occurs during the brood rearing period when the lake is filled. Expansive mudflats are gradually inundated over a 2.5-month period between mid-April and July 1, corresponding to the time of gosling growth and development.

Habitat analyses have concentrated on describing areas important to geese during nesting and brooding, determining selection criteria for these habitats, and evaluating the impacts of water level fluctuations on these habitats. Both nest site selection and brood habitat use was significantly different from available habitats on the lake and river. All ground nests on the lower river were on islands; 65 percent were in shrub habitat and most had dense vertical cover near the nest below 1 m and sparse cover above 2 m height. Ninety-two percent of ground nests were less than 5 m inland and more than half were at or below HWM, although none were flooded in 1984. On the lake, ground nesting geese preferred mixed deciduous and coniferous forest areas in dense vertical cover above the HWM. Brood areas on the lower river were predominately grainfields, short herbaceous habitat, dense shrubs, and vegetated gravel bars. On the southern portion of the lake, brood use was concentrated in marshes, mudflats, and tall herbaceous habitats. Both short term and seasonal water level fluctuations on the river and lake appear to affect plant succession, composition, and the accessibility of habitats important to brooding geese.

EFFECTS OF WATER LEVELS ON PRODUCTIVITY OF CANADA GEESE IN NORTHERN FLATHEAD VALLEY (PROJECT NO. 83-498); Daniel Casey and Marilyn Wood, Montana Department of Fish, Wildlife, and Parks; P.O. Box 67; Kalispell, MT 59903; (406) 755-5505 (BPA Project Officer: Jim Meyer)

The Fish and Wildlife Program of the Northwest Power Planning Council calls for wildlife mitigation at hydroelectric projects in the Columbia River System. Operation of Hungry Horse Dam on the South Fork Flathead River causes sporadic water level fluctuations along the mainstem Flathead River downstream. Seasonal water level fluctuations and substantial habitat losses have occurred as a result of construction and operation of Kerr Dam, which regulates Flathead Lake. These fluctuations may impact goose populations through flooding or erosion of nesting and brood-rearing habitats, and increased susceptibility of nests and young to predation. The Bonneville Power Administration has funded a 3-year study to evaluate these effects.

The number, location, and success of goose nests were determined through pairs surveys, and nest searches. Indices of indicated pairs suggest there may have been 75-100 occupied nests in the study area; 44 were located in 1984. Twenty were island ground nests; 19 were tree nests; 5 were man-made structures. Hatching success was 76 percent. Sixty-one percent of all nests were in deciduous forest habitat; 87 percent were on riparian bench or island landforms. Seventy-four percent of all nests were within 5 m of the seasonal high water mark (HWM) and 85 percent of ground nests were 1 m or less above the HWM. Woody stem density and overstory canopy coverage were less at nest sites than at surrounding points. Shrub, litter, and forb were the dominant cover classes in the vicinity of ground nests. Snag nests were mostly in cottonwood (*Populus* sp.); mean values for dbh, nests height, and tree height were 0.95 m, 17.4 m, and 19.6 m, respectively.

Production, habitat use, and distribution of broods were documented through aerial, boat, ground, and observation tower surveys. The Flathead Lake Waterfowl Production Area (WPA) received the greatest use by broods; 70 percent of 105 brood observations recorded April-June were in the open water/mudflat zone of the WPA, on the north shore of Flathead Lake.

Lake and river water level regimes were compared with the chronology of important periods in the nesting cycle. Fluctuations in the river levels during the earliest stages of egg-laying may disrupt some island ground nests. Low lake levels in May and early June coincide with the brood-rearing period. Mudflats are heavily used by broods, but their effect on survival still needs documentation. Continued documentation of nesting and brood-rearing habitat, nesting success, and gosling survival in relation to water level fluctuations will hopefully allow managers to optimize compatibility between water level regimes and goose production. Preliminary recommendations to protect and enhance Canada goose habitat and production are being developed.

EFFECTS OF THE OPERATION OF HUNGRY HORSE DAM ON KOKANEE IN THE FLATHEAD RIVER SYSTEM (PROJECT NO. 81S-5, RIVER SEGMENT); John Fraley, Montana Department of Fish, Wildlife, and Parks; Box 67; Kalispell, MT 59901; (406) 755-5505 (BPA Project Officer: Tom Vogel)

This study began in 1979 under Bureau of Reclamation Funding and continued in 1982 with funding provided by the Bonneville Power Administration. Major emphasis has been on fine tuning the flow recommendations in the mainstem Flathead River, monitoring their effect on kokanee reproduction and recommending management strategies to enhance the mainstem kokanee fishery. The overall management goal for kokanee in the Flathead System is to provide a balance of size and numbers of fish for spawning escapement and angling, while maintaining a diversity of spawning areas. Major objectives of the study are:

1. Continue to develop the stock recruitment relationship for kokanee in the river system begun in 1979.

2. Quantify effects of the amount and timing of controlled flows on distribution and reproductive success of kokanee in the reregulated portion of the Flathead River. Determine the relative contributions of day and nighttime spawning.

3. Determine relative contributions of major river system spawning areas to total kokanee population.

4. Identify timing and destination of successive runs of kokanee spawners in the Flathead River and their use by fishermen, and determine if timing is affected by discharge from Hungry Horse Dam.

The 1984 kokanee run was the second strongest over the past 6 years. An estimated 86,500 kokanee spawned in McDonald Creek; 7,500 in the South Fork of the Flathead; 2,400 in the Whitefish River and 350 in the Middle Fork of the Flathead. An estimated 12,500 fish had spawned in the mainstem Flathead River by early November; that figure is expected to increase by up to 50 percent after the final survey is completed in early December. Anglers harvested 12,000 kokanee during the first 2 weeks of September, prompting an early closure of the 1984 kokanee fishing season in the river system.

Numbers of kokanee in the mainstem and South Fork are higher than expected based on the 1980 parental run, due partly to the controlled flows from Hungry Horse Dam begun in 1980 and control of angler harvest. The mainstem population is expected to recover to levels approaching the management goal of 165,000 post harvest spawners by the late 1990's.

Preparation of the final report and study recommendations will begin in January and be completed by September 1985. Several articles for publication are in various stages of preparation or have been submitted to scientific journals. The effects of the controlled flows on the recovery of the mainstem kokanee population will be evaluated through 1987.

IMPACTS OF WATER LEVEL FLUCTUATIONS ON KOKANEE REPRODUCTION IN FLATHEAD LAKE (PROJECT NO. 815-5); Janet Decker-Hess, Montana Department of Fish, Wildlife, and Parks; Kalispell, MT 59903; (406) 755-5505 (BPA Project Officer: Tom Vogel)

A study was initiated in the Fall of 1981 to document the effect of Kerr and Hungry Horse dams operation on kokanee reproductive success in shoreline areas of Flathead Lake. Objectives of the study are:

1. Delineate extent of successful shoreline spawning in Flathead Lake above and below minimum pool, and determine the impacts of the historical and present operation of Kerr and Hungry Horse dam;

2. Quantify and qualify the influence of groundwater and other factors on reproductive success; and

3. Determine the actual and potential contributions of shoreline spawning areas to the total kokanee population.

Shoreline spawning in Flathead Lake is currently (1981-83) contributing only 3 percent to the total spawning population. An average of 780 redds have been located in shoreline areas in the 3 years of study. Nearly 60 percent of the redds have been constructed above the drawdown zone of the upper 10 feet of the lake. Habitat most conducive to embryo survival has been located in gravels above minimum pool prior to exposure by lake drawdown. Following an average exposure of 51 days, survival was reduced to 31 percent. Exposure to ambient air temperatures of -10°C for a 2-week period in December had a similar affect on survival. Based on survival data collected from hatchery experiments, experimental egg plants and natural redds, a significant negative relationship was determined between embryo survival and length of exposure by lake drawdown. This relationship did not include redds exposed to ambient air temperatures less than -10°C or redds where more than 50 percent of the eggs had hatched. Completed mortality occurred to alevins after 48 hours of dewatering. The extent to which fry successfully can emerge from stranded redds wetted by groundwater only is currently unknown.

Groundwater is playing a key role in prolonging embryo survival in redds constructed above minimum pool. Three variations in the groundwater reaction to lake stage fluctuation were identified in shoreline spawning areas: adjustment of the groundwater instantaneously with lake stage, a temporal lag between groundwater and lake stage and the groundwater table reacting independently of lake stage. Survival in exposed redds was lowest in the instantaneous areas and greatest in the independent areas. Modeling of groundwater reaction to various operational scenarios is currently being developed for use in developing mitigation alternatives.

After analysis of the historic operation of Kerr Dam, it is believed that the dam has, and is continuing to have, a significant impact on successful shoreline spawning of kokanee salmon in Flathead Lake. Based on the evidence that prolonged exposure of salmonid embryo by dewatering causes significant mortality, the number of days the lake was held below various foot increments

(2884 ft to 2888 ft) during the incubation period was investigated. The annual change in the number of days the lake was held below 2885 ft was further investigated because 80-90 percent of the redds constructed in spawning areas above minimum pool during this study were above this level. The operation since 1977 was found to be the least conducive to successful shoreline spawning since the earliest operation of the dam.

A significant relationship was established between female kokanee length, which is a measure of year class strength, and the number of days that lake levels were held below 2885 ft from 1966-1983. This relationship indicated that kokanee year class strength in Flathead Lake has been affected by the operations of Kerr Dam. The addition of lake level data improved the correlation of the Flathead River gauge height model, indicating kokanee year class strength has been affected by the operations of both Kerr and Hungry Horse dams.

The final phase of this study will involve the development of mitigation alternatives for kokanee shoreline spawning loss as a result of Kerr Dam construction and operation. The first step in this phase will involve the defining of kokanee shoreline spawning habitat. Probability-of-use curves will be developed for depth, substrate, dissolved oxygen, and groundwater apparent velocity. Upon completion of the curves, potential shoreline spawning habitat will be determined for Flathead Lake and kokanee loss based on existing habitat will be derived. Various operational scenarios including groundwater modeling will be developed to determine possible operational changes which would compensate for historic kokanee loss. Other mitigation alternatives excluding operational changes will also be developed.

QUANTIFICATION OF LIBBY RESERVOIR LEVELS NEEDED TO MAINTAIN OR ENHANCE RESERVOIR FISHERIES (PROJECT NO. 83-467); Brad Shepard, Montana Department of Fish, Wildlife, and Parks, P.O. Box 67, Kalispell, MT 59903 (406) 755-5505, (206) 293-7639 (BPA Project Officer: Richard Harper)

Study objectives are:

1. quantify available reservoir habitat for target fish species (species of the genus Salmo including westslope cutthroat trout, rainbow trout, and their hybrids; kokanee; burbot; northern squawfish; peamouth; and redside shiners) and fish food organisms;

2. determine the abundance, growth, and distribution of fish within Libby Reservoir and its U.S. tributaries and their use of available habitat;

3. determine the abundance and availability of fish food organisms to fish in Libby Reservoir;

4. quantify fish use of available food items;

5. develop relationships between reservoir operation and reservoir habitat for fish and fish food organisms; and

6. estimate impacts of reservoir operation on the reservoir fishery.

The project consists of four phases:

1. planning, equipment acquisition, and testing of methodologies suited to meet project objectives;

2. data gathering, compilation, and interpretation;

3. development of model to predict impacts of reservoir operation upon reservoir fisheries; and

4. report preparation including recommended operation of Libby Dam to maintain or enhance the reservoir fishery.

The project was initiated in May 1983. Planning and equipment acquisition were completed by July 1983. Equipment was tested and methodologies were evaluated from August 1983 to October 1984. During this same time period, data were collected. Phase I of the project has been completed with the following findings and recommendations:

1. Emphasize collecting water temperature and euphotic zone depth data, while de-emphasizing collection of dissolved oxygen, pH, and conductivity data. Measurements of these latter three parameters indicated they remained within ranges recommended as optional for salmonids (Raleigh et al. 1984, Hickman and Raleigh 1982) throughout the year.

2. Digitize existing contour maps of the reservoir into a computer and adopt existing computer programs to estimate water surface area, water volume, wetted reservoir bed area, and shoreline length by 10-foot (3 m) contour interval.

3. Eliminate physical habitat surveys within the reservoir fluctuation zone. Preliminary investigations indicated target gamefish species did not use physical habitat features for cover or spawning habitat successfully within the reservoir, instead, fish distribution appeared to be dependent upon thermal regimes and food availability.

4. Use habitat surveys and spawning site surveys in reservoir tributaries to segregate tributary reaches into habitat quality classes based on spawning and rearing potential. Select a range of representative stream reaches to electrofish during 1985 in order to develop a predictive equation which will predict rearing potential based on habitat information.

5. Document the feasibility of revegetating the fluctuation zone to provide bank stability, improve nutrient cycling, and provide habitat for fish food organisms.

6. Verify our ability to visually identify species of the genus Salmo using external morphological characteristics and document the extent of hybridization between westslope cutthroat trout and rainbow trout using electrophoretic techniques.

7. Continue using horizontal and vertical gill nets to document seasonal and annual fish abundance in near-shore and limnetic zones, collect age-growth information, collect stomachs for food habits analyses, and obtain population statistics. Use log transformations of net catches to compare seasonal and annual changes in abundance. Continue using vertical gill nets to document vertical distribution of fish.

8. Preliminary population estimates of Salmo spp. using purse seine catches indicated we can expect a 95 percent confidence limit to fall within 30-40 percent of our estimate in the limnetic zone (water deeper than 12 m), but the need to use a correction factor to provide a near-shore estimate results in a 95 percent C.I. of 200-300 percent for near-shore estimates solely on limnetic estimates. We need to conduct a creel census to obtain harvest estimates and provide an alternative population estimate through tag return information to verify our purse seine estimates.

9. Populations of kokanee can be estimated using hydroacoustic sampling at night during August.

10. Annual and seasonal growth of target gamefish are difficult to estimate using scale samples, probably because of the varying growth environments juvenile and subadult trout inhabit and the year round food resources available in Libby Reservoir. We plan on using first year reservoir growth as interpreted from otoliths and empirical measurements to evaluate reservoir growth.

11. Trout in Libby Reservoir appear to move throughout the reservoir based on tag return information. There may be a slight down-reservoir trend in overall movement patterns with some tagged fish recovered below Libby Dam. Voluntary tag returns by anglers to date has been approximately 10 percent.

12. Zooplankton abundance can be measured using a Wisconsin-type net, but zooplankton distribution was patchy. The Wisconsin-type net appeared to be more efficient than a plexiglass Schindler-type trap. This result contradicts the literature and we have no reasonable explanation for this.

13. Benthic macroinvertebrates were dominated by Diptera and Oligochaeta and density was a function of the frequency the substrate was wetted. Permanently wetted substrates contained up to four times the biomass of Diptera larvae as occasionally dewatered substrates which in turn contained up to seven times the biomass as frequently dewatered substrates.

14. Densities of terrestrial and aquatic macroinvetebrates upon the reservoir's surface were very patchy and varied both temporally and spatially. We may modify our sampling program to sample a much larger area over a stratified time period.

15. Preliminary investigation of stomachs collected during 1983-84 seem to be consistent with McMullin's (1979) findings that westslope cutthroat trout and rainbow trout feed on zooplankton during the winter, shift to Diptera adults in the spring as they become available, then shift to terrestrial insects in summer. Rainbow trout utilized more zooplankton throughout the year than cutthroat trout which fed almost exclusively on Diptera adults and terrestrial insects through the spring and summer.

16. Preliminary work by the USGS showed that reservoir fish populations were controlled by more than the single variable of reservoir drawdown.

URAL-TWEED BIGHORN SHEEP - WILDLIFE MITIGATION (PROJECT NO. 84-39, MDFWP-5196); Chris Yde, Montana Department of Fish, Wildlife, and Parks, P.O. Box 67, Kalispell, MT 59903; (406) 755-5505 (BPA Project Officer: Jim Meyer)

The overall Ural-Tweed Bighorn Sheep project was designed to mitigate the impacts to the sheep population resulting from the construction of the Libby hydroelectric facility. The project is a cooperative effort between the Montana Department of Fish, Wildlife, and Parks and the Kootenai National Forest. The primary objectives of the portion of the project to be completed by the Montana Department of Fish, Wildlife, and Parks are:

1. Plan and design travel corridors to facilitate movement of bighorn sheep across Highway 37 to the habitat improvement projects;

2. Determine the effectiveness of the habitat improvement projects in enhancing habitat for bighorn sheep and other wildlife; and

3. Outline a program to maintain a viable Ural-Tweed bighorn sheep population.

Additionally, the Department will cooperate in the design and scheduling of the proposed habitat manipulations.

The project was initiated October 1, 1984, and has been funded through December 31, 1985. To date, activities have included: (1) field coordination with the Forest Service to determine the design and scheduling of the habitat treatments to be accomplished during the current funding period; (2) determination of the methodologies to be utilized in monitoring the pre- and post-treatment vegetation within the treatment areas; and (3) obtaining necessary field equipment. Additionally, a modified corral trap has been constructed at a mineral lick in an attempt to capture sheep that utilize the area during late fall and early winter.

During the remainder of the contract period activities will focus on meeting the primary objectives of the project. Five to seven adult bighorn sheep will be captured and fitted with radio transmitters and their movements and habitat preferences determined through periodic relocations using aerial and ground surveys. Additionally, baseline population information will be gathered so that the predicted response in the size of the population can be monitored throughout the project.

Standardized transects will be established and read within each treatment area prior to the initiation of the habitat manipulation. These transects will be monitored during the spring and early summer of each year to determine the pre- and post-treatment vegetative composition and production. This monitoring will allow for the evaluation of the various treatments and, when combined with the information gathered on the bighorn sheep population, will allow for the establishment of a long-term habitat management plan for the entire Ural-Tweed bighorn sheep range.

A combination of known bighorn sheep movements across Highway 37 and the movements observed during the coming year will be used to determine the priority areas within the extensive highwall adjacent to Highway 37 that require modification to facilitate sheep movement across the highway. Travel corridors will be designed and costs estimated so their construction can be programmed in future years of the project.

URAL-TWEED BIGHORN SHEEP-WILDLIFE MITIGATION PROJECT (PROJECT NO. 84-38); Alan Christensen and Don Godtel, Kootenai National Forest, Libby, MT 59923; (406) 293-6211 (BPA Project Officer: Jim Meyer)

Vegetation in various locations along the eastern side of Lake Koocanusa will be manipulated to enhance the quantity and quality of winter and spring forage for a small, native herd of bighorn sheep. This herd, locally called the Ural-Tweed herd, is the only pure, native band of bighorn sheep remaining in Northwest Montana and has significantly declined in number since inundation of their historic winter and spring ranges by Lake Koocanusa.

Through the use of mechanical means such as slashing, thinning, and timber removal, ecological succession will be retarded or reversed to increase the quantity of early successional plant stages which support preferred grasses and shrubs. In addition, prescribed burning will be used to reduce fuel loads created by slashing, to stimulate germination of preferred browse such as redstem ceanothus, to release nutrients onsite, and to stimulate the growth of native grasses. Grass seed planting and fertilization will be used to supplement native grasses and to increase production and palatability of grass stands.

These activities will take place over a period of approximately 5 years and about 1300 acres will be treated. These lands are managed by the Kootenai National Forest and have been allocated to management for bighorn sheep and mule deer winter range. At completion, the project will contribute significantly toward mitigation for the Ural-Tweed herd.

CUMULATIVE EFFECTS OF MICROHYDROELECTRIC DEVELOPMENT ON THE FISHERIES OF THE SWAN RIVER DRAINAGE, MT (PROJECT NO. 82-19); Stephen A. Leathe - Montana Department of Fish, Wildlife, and Parks, P.O. Box 67, Kalispell, MT 59901; Michael D. Enk - U.S. Forest Service Flathead National Forest, Swan Lake Ranger District, P.O. Box 370, Bigfork, MT 59911 (BPA Project Officer: Larry Everson)

PROJECT DESCRIPTION

Interest in developing microhydroelectric generation facilities has risen dramatically in the last few years. Little information exists concerning the cumulative environmental and related economic costs associated with multiple developments in a river basin. Therefore, BPA funded a study by Montana Department of Fish, Wildlife, and Parks and the U.S. Forest Service (Flathead National Forest) to investigate means of assessing potential cumulative effects of such development, both in biological and economic terms. The Swan River drainage in Montana was chosen as the study site because preliminary study permits for hydroelectric development were issued by FERC for 20 tributaries of this river system.

ACCOMPLISHMENTS

An aerial survey was conducted to determine the total amount of potential tributary fish habitat in the 671 square mile Swan River drainage. Fish population estimates were obtained from a representative sample of the tributary system to determine species abundance and distribution in relation to proposed small hydro project locations. Stream habitat surveys were conducted in conjunction with fish population estimates on 74 stream reaches to identify factors that influenced fish abundance and could be used in impact modeling. Fish tagging, trapping, and electrofishing studies were conducted to determine life history patterns of the major salmonid gamefish species. Stream discharge patterns were determined at six representative hydro project sites using water level recorders and were compared with instream flow stipulations derived using the wetted perimeter technique. A creel census and economic survey was conducted to determine fishing pressure, harvest, and economic value of the fisheries of Swan Lake (2680 acres), and the Swan River (53 miles) and its tributaries. Also, several methods that could be used to determine the econometric value of potential fishery losses were compared and evaluated.

A comprehensive sediment model based on landtype classifications, history of road construction, and observed levels of fine materials in streambeds was developed for the Swan Valley. The model is capable of predicting changes in stream substrate condition due to sediment production from road and hydroelectric development in the study area. Since juvenile adfluvial bull trout densities were significantly correlated with substrate quality, predicted changes in streambed condition were used to model future bull trout production in affected rearing areas.

PRELIMINARY CONCLUSIONS

Inventory information representing nearly 75 percent of the drainage indicated that brook trout were far more abundant in the tributary stream system (approximately 107,000 fish) than were either cutthroat or juvenile bull trout (65,000 and 31,000 fish, respectively). Based on the results of trapping and tagging studies, it was concluded that tributary brook and cutthroat trout populations were comprised primarily of resident fish. Brook and rainbow trout were the predominant species in two sections of the Swan River. Rainbow trout did not appear to use the tributary system to a significant degree.

Bull trout were the most significant migratory species because of their large size (spawners more than 800 mm total length) and the extensive summer/fall spawning run of 700 to 1000 adults from Swan Lake to a few key spawning streams. Cumulative impact analysis focused on bull trout as the primary species because of their migratory nature, importance as a trophy species, sensitivity to the influences of streambed sedimentation, and intensive use of project streams.

Although habitat degradation from sediment deposition would have a significant effect on fisheries, the dewatering of stream reaches by hydroelectric diversions was expected to cause the most serious and nonrecoverable losses of juvenile bull trout. Stream sedimentation associated with microhydroelectric development was estimated to cause a loss of 0.1 percent to 4.4 percent of juvenile bull trout production in the Swan drainage while dewatering of rearing habitat was estimated to cause additional losses of 0.2 percent to 22.9 percent depending on which projects were constructed. Juvenile bull trout populations in individual streams would suffer losses of up to 10.9 percent due to sediment and up to 62.9 percent due to dewatering. Complete dewatering of all proposed diversion areas would also result in a loss of 17 percent of the cutthroat trout and 4 percent of the brook trout inhabiting the tributary system as well as a loss of 16-20 percent of the bull trout spawning that occurs in the drainage.

It was estimated that 21,700, 16,500, and 10,000 hours were expended annually by anglers on Swan Lake, Swan River, and the tributaries respectively. Using the travel-cost method, the annual value of the fishery in the Swan River drainage was estimated to be $788,000. Four different methods were used to determine the economic value of a 25 percent fish loss in the drainage. The resultant values were $331,000, $250,000, and $122,000 annually for the willingness-to-pay, willingness-to-drive, and hedonic travel-cost methods, respectively. Responses to a willingness-to-sell question were anomalously high. Using the value of $450 per party-visit for bull trout anglers that was derived using the hedonic travel-cost method, the economic value of a 25 percent loss in the drainage-wide bull trout population would be $58,000 per year if such a loss resulted in a similar decline in party visits.

EVALUATION OF MANAGEMENT FOR WATER RELEASES FOR PAINTED ROCKS RESERVOIR, BITTERROOT RIVER, MT (PROJECT NO. 83-463)

Dennis Workman and Mark Lere, Montana Department of Fish, Wildlife, and Parks, 3201 Spurgin Road, Missoula, MT 59801; (406) 721-5808 (BPA Project Officer: Fred Holm)

Baseline fisheries and habitat data were gathered during 1983 and 1984 to evaluate the effectiveness of supplemental water releases from Painted Rocks Reservoir in improving the fisheries resource in the Bitterroot River. Discharge relationships among mainstem gaging stations varied annually and seasonally. Flow relationships in the river were dependent upon rainfall events and the timing and duration of the irrigation season. Daily discharge monitored during the summers of 1983 and 1984 was greater than median values derived at the USGS station near Darby. Supplemental water released from Painted Rocks Reservoir totalled 14,476 acre-feet in 1983 and 13,958 acre-feet in 1984. Approximately 63 percent of a 200 m^3/sec test release of supplemental water conducted during April 1984, was lost to irrigation withdrawals and natural phenomena before passing Bell Crossing. A similar loss occurred during a 200 m^3/sec test release conducted in August 1984. Daily maximum temperature monitored during 1984 in the Bitterroot River averaged 11.0, 12.5, 13.9, and 13.6 C at the Darby, Hamilton, Bell, and McClay stations, respectively. Chemical parameters measured in the Bitterroot River were favorable to aquatic life. Population estimates conducted in the Fall of 1983 indicated densities of I+ and older rainbow trout (Salmo gairdneri) were significantly greater in a control section than in a dewatered section (p 0.20). Numbers of I+ and older brown trout (Salmo trutta) were not significantly different between the control and dewatered sections (p 0.20). Population and biomass estimates for trout in the control section were 631/km and 154.4 kg/km. In the dewatered section, population and biomass estimates for trout were 253/km and 122.8 kg/km. The growth increments of back-calculated length for rainbow trout averaged 75.6 mm in the control section and 66.9 mm in the dewatered section. The growth increments of back-calculated length for brown trout averaged 79.5 mm in the control section and 82.3 mm in the dewatered section. Population estimates conducted in the Spring of 1984 indicated densities of mountain whitefish (Prosopium williamsoni) greater than 254 mm in total length were not significantly different between the control and dewatered sections (p 0.20). Young of the year rainbow trout and brown trout per 10 m of river edge electrofished during 1984 were more abundant in the control section than the dewatered section and were more abundant in side channel habitat than main channel habitat. Minimum flow recommendations obtained from wetted perimeter-discharge relationships averaged 8.5 m^3/sec in the control section and 10.6 m^3 sec in the dewatered section of the Bitterroot River. The quantity of supplemental water from Painted Rocks Reservoir needed to maintain minimum flow recommendations is discussed in the Draft Water Management Plan for the Proposed Purchase of Supplemental Water from Painted Rocks Reservoir, Bitterroot River, Montana (Lere, 1984).

FHolm:paw (WP-PJS-4853N)

BONNEVILLE POWER ADMINISTRATION
FISH AND WILDLIFE PROGRAM
REVIEW, COORDINATION, AND CONSULTATION

Western Montana Project Area

November 28-29, 1984
Edgewater Lodge
Sandpoint, Idaho

Meeting Agenda

November 28, Wednesday

8:15 a.m.	Introduction
8:45 a.m.	Project No. 83-464, MDFWP "Evaluation of the Effects on Wildlife and Wildlife Habitat Associated With Development of Hydroelectric Projects in Montana"
9:25 a.m.	Project No. 83-465, MDFWP "Quantification of Hungry Horse Reservoir Levels Needed to Maintain or Enhance Reservoir Fisheries"
10:05 a.m.	Break
10:20 a.m.	Project No. 83-1, Salish/Kootenai Indian Tribe "Lower Flathead River System Fisheries Study"
11:20 a.m.	Project No. 83-2, Salish/Kootenai Indian Tribe "Impacts of Water Levels on Breeding Canada Geese and the Methodology for Mitigation and Enhancement in the Flathead Drainage"
12:00 p.m.	Lunch
1:00 p.m.	Project No. 83-498, MDFWP "Effects of Water Levels on Productivity of Canada Geese in the Northern Flathead Valley"
1:40 p.m.	Project No. 81S-5, MDFWP "Effects of Operation of Kerr and Hungry Horse Dam on Reproductive Success of Kokanee in the Flathead System"
3:00 p.m.	Break
3:30 p.m.	Open Discussion - Flathead River Basin

November 29, Thursday

8:15 a.m.	Project No. 83-467, MDFWP "Quantification of Libby Reservoir Levels Needed to Maintain or Enhance Reservoir Fisheries"
8:55 a.m.	Project No. 84-39, MDFWP "Ural-Tweed Bighorn Sheep-Wildlife Mitigation Project"
9:25 a.m.	Project No. 84-38, USFS "Ural-Tweed Bighorn Sheep-Wildlife Mitigation Project"
9:55 a.m.	Break
10:15 a.m.	Project No. 82-19, MDFWP "Cumulative Impact Study of Microhydro Sites, Swan River"
10:55 a.m.	Project No. 83-463, MDFWP "Evaluation of Water Releases at Painted Rock Reservoir"
11:35 a.m.	Project No. 84-19, IDFG "Cabinet Gorge Kokanee Fish Hatchery"
12:15 p.m.	Closing Remarks

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November 28, 1984

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