

VIDEO MONITORING

8812005

SHORT DESCRIPTION:

Enumerate fish passage in the Yakima Basin using video technology. Various life history datum types are recorded. The fish passage data is used for M/E and management purposes. Improvements to the video monitoring system are constantly being investigated and implemented as funding allows.

SPONSOR/CONTRACTOR: Y/KFP

Yakama Indian Nation
Mel Sampson, Policy Advisor/Project Coordinator
PO. BOX 151, Toppenish, WA 98948
509/865-6262 yinmel@wolfenet.com

SUB-CONTRACTORS:

IntSTATs

GOALS

GENERAL:

Adaptive management (research or M&E), Program coordination or planning

ANADROMOUS FISH:

O&M, Research, M&E

NPPC PROGRAM MEASURE:

7.4K.1

RELATION TO MEASURE:

The Video Monitoring Project is part of the Monitoring and Evaluation component of the Y/KFP

OTHER PLANNING DOCUMENTS:

Wy Kan Ush Me Wa Kush Wit. 1996. Final Draft. Vol. I, Section 5D (Monitoring). More general applicable sections are: Recommended Actions for the Yakima River System- Part (9a), page 59; spring chinook- Part (9b), page 60, fall chinook- Part (9c), page 60, summer chinook- Part (9d), page 60, coho- Part (9e), page 60, sockeye- Part (9f), page 60, steelhead- pages 60-61.

TARGET STOCK

LIFE STAGE

MGMT CODE (see below)

Coho	Adult	SE
Toppenish/steelhead	Adult	WS
Satus/steelhead	Adult	WS
Naches/steelhead	Adult	WS
Upper Yakima/steelhead	Adult	WS
Lower Yakima/fall chinook	Adult	WS
Marion Drain/fall chinook	Adult	WS
American/spring chinook	Adult	WS
Naches/spring chinook	Adult	WS
Upper Yakima/ spring chinook	Adult	WS

Addresses resident fish substitution for areas that previously had salmon and steelhead but where anadromous fish are now irrevocably blocked by federally operated hydropower developments

BACKGROUND

Stream name:

YAKIMA

Subbasin:

YAKIMA

Land ownership:

FEDERAL

HISTORY:

The Y/KFP has been in the Fish and Wildlife plan since 1982. The Yakima phase of the Project initially included an all stock initiative. There still remains an all stock initiative but not all at once. The Policy Group's preferred an all stock initiative. There still remains an all stock initiative but it will be implemented through a phase in process. The Policy Group's preferred alternative that's included within the FEIS is to implement the supplementation aspects for Spring Chinook and develop and implement a monitoring plan for the now released coho in the basin. The other stocks will be implemented through a tiering process. The Klickitat aspect of the Project currently is doing fishery surveys, population monitoring, habitat inventory, and engineering surveys of passage barriers in the Klickitat River watershed. This is consistent with the Preliminary Design Report. This project is a component of the monitoring/evaluation program for the YKFP. It provides fish passage information for the fish managers in the Yakima Basin.

BIOLOGICAL RESULTS ACHIEVED:

Light systems were tested at the right bank vault. The BOR and YIN staff are currently analyzing the data and will report the results in spring 1997. In 1996 the BOR and YIN staff began to research available video hardware/software (off the shelf type) to make improvements to the existing video monitoring systems (video monitoring and data management). This joint task will continue in 1997. Ongoing fish counts and collection of associated data are also being made. Daily salmonid fish passage is recorded year-round at Prosser and Roza dams. The annual natural escapement is recorded for spring chinook, fall chinook, steelhead and coho. Other data recored includes: estimated fork length (from suitable fish images), run time, marked fish (currently adipose clipped) and, fish ladder usage by each species. All video tapes are archived for potential future need by the Y/KFP. This data is a critical for the monitoring and evaluation of the Y/KFP.

PROJECT REPORTS AND PAPERS:

Fast, D. E. et al. 1989. Yakima/Klickitat Natural Production and Enhancement Program. Prepared for Bonneville Power Administration. Project No. 88-120. Grant DE-A179-88BP93203.
Hubble J. D. et al. 1990. Yakima/Klickitat Natural Production and Enhancement Program. Prepared for Bonneville Power Administration. Project No. 88-120. Grant DE-A179-88BP93203.
Hubble, J. D. et al. 1991. Yakima/Klickitat Natural Production and Enhancement Program. Prepared for Bonneville Power Administration. Project No. 88-120. Grant DE-A179-88BP93203.
Hubble, J. D. 1992. Yakima/Klickitat Natural Production and Enhancement Program. Prepared for Bonneville Power Administration. Project No. 88-120. Grant DE-A179-88BP93203.
Hubble, J. D. 1993. Yakima/Klickitat Natural Production and Enhancement Program. Prepared for Bonneville •Power Administration. Project No. 88-120. Grant DE-A179-88BP93203.
Hubble, J. D. 1996. Video Monitoring. Prepared for Bonneville •Power Administration. Project No. 93AT11008. (In progress).

ADAPTIVE MANAGEMENT IMPLICATIONS:

The use of video has proven to be a successful method to monitor adult fish passage in the Yakima Basin. In recent years the focus has been on improving fish image quality with the expected outcome of improved data accuracy. Our continued future approach needs to be focused on improving the fish images and to quantify the accuracy of species identification, marks identification and refining data processing protocols. These are all quality control issues. There is a growing interest throughout the Columbia Basin to use video monitoring to enumerate adult and juvenile fish passage. Since video monitoring has a long history in the Yakima Basin, other fishery agencies have made inquiries for advice, etc. to the ongoing work on the Y/KFP. Y/KFP specific, there is the question of, will video monitoring of the adult returns provide the level of data resolution to answer specific M/E questions to measure the success of supplementation?

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

There are two broad objectives of the video monitoring project. First, to make ongoing improvements to the video monitoring sites (at Prosser and Roza dams) and to the VIAS. In addition, to institute statistically defined QC measures that will result in more accurate fish counts and to provide confident intervals for each annual fish run estimate. Secondly, to provide daily, weekly and seasonal fish counts for each salmonid run at Prosser and Roza dams, and to recored the associated life history type data for each salmonid run. Specific objectives in 1997/98 are to: 1) make a final decision on the type of light source to be used and to

begin installation at all viewing vaults, 2) investigate hardware/software improvements to the existing video monitoring system at Prosser and Roza dams and to the VIAS (cost/benefit), 3) Develop statistical methods to better estimate seasonal fish runs, 4) in concert with objective three, make improvements to the VIAS protocols and 5) provide ongoing fish counts and associated data as required for monitoring and evaluation purposes and for in basin fishery managers.

CRITICAL UNCERTAINTIES:

The Project Status Report (1994) delinates resolvable and unresolvable critical uncertainties with respect to M/E.

BIOLOGICAL NEED:

The Y/KFP is in essence an experiment to test the hypothesis that supplementation is a successful method to rebuild natural salmon populations, with adaptive management as the underlying experimental/management approach. This requires that monitoring/evaluation be conducted in order to assess the progress and direction to take with regards to supplementation strategies towards rebuilding of the salmon populations. The Prosser and Roza adult fish monitoring sites provide a key component with respect to monitoring/evaluation of the YKFP, namely estimating run size by species, recording the number of marked from various treatment groups, and the collection of other life history data. In addition, this data is valuable to the fish managers in the basin, who deal with issues outside the scope of the Y/KFP that help to enhance the success of the project (e.g. habitat protection and enhancement).

HYPOTHESIS TO BE TESTED:

That current improvements being made to the video monitoring facilities and to the VIAS will result in improved accuracy in fish enumeration and species identification. (Specific questions to be addressed in 1997 are delineated in the Methodology section).

That external marking methods being devised by the newly formed monitoring/evaluation TAC of the Y/KFP can be successfully integrated by the video monitoring system (this is a future task).

That turbidity significantly affects species/type/mark/maturity identification and enumeration of fish comprising the fall and spring runs past Prosser Dam (will be evaluated in 1997 by a continuous turbidity meter at Prosser).

ALTERNATIVE APPROACHES:

N/A

JUSTIFICATION FOR PLANNING:

N/A

METHODS:

The near term task objectives for the project have been previously stated in the SPECIFIC OBJECTIVES MEASURE section. Thus, I will describe methodology where appropriate for each objective.

OBJECTIVE 1: During the fall 1996 run an evaluation of the infra-red and visible light sources was made at the right viewing vault at Prosser Dam. The results are currently being analyzed. The specific questions addressed were, 1) AIs there a difference in passage behavior (ie. the incidence of Afall back@) in the viewing window at night between flourescent light and infra-red light?@, 2) AIs there a difference in resultant fish image between the two light sources?@, and 3) AIs there a difference in species identification between the two light sources, as defined by the ratio of positive to unknown species identification?@. The experimental approach was to alternate the two light sources and record the amount of fish Afall back@ observed. Initially the light sources were automatically switched every two hours throughout a 24 hr period. Later in the season, the light sources were switched every 24 hours. The test statistics were the mean number of Afall back@ events recored and the mean passage delay time for the season for each light source. Video fish technicians recorded the number of Afall back@ events, and the inital and final passage time for each fish, and recorded the type of light source. The two means will be evaluated using a t-Test. The fish image question is being evaluated on a qualitative basis. The resultant fish images for each light source are either deemed Aacceptable@ or Anonacceptable@ by the video fish technicians. The unknown species identification question will be determined by summing the total number of Aunknown@ type species codes recorded for each light source and testing them with a t-Test.

Preliminary results indicate that there was improved fish passage or passage behavior with the infra-red light system, but a higher quality fish image and less Aunknown@ species code types with the flourescent light source.

OBJECTIVE 2: In 1996 initial discussions between the YIN and BOR ensued to develop a strategy for initating hardware/software improvements to the video monitoring system and to VIAS. Our approach (methodology) is to, first, determine the desired type of video image Anathwav@(from capturing the image at the viewing vaults to output of data for

reports) to pursue. Secondly, to research what is currently available with respect to video/image management hardware/software in the industry. Along with this, to consider how Adaptable is the hardware/software to take advantage of future technological improvements, how well will it blend with what is currently in place?, and to evaluate the cost/benefit to the project. Thirdly, to install a proto-type at the right viewing vault at Prosser and evaluate the system for a full year. Results from this evaluation would dictate future direction and incorporation at the remaining viewing vaults.

OBJECTIVE 3: For the past four years approximately 20% of the video tapes from the spring and fall runs have been double read. This is accomplished by having video fish technician one read video fish technician two's tapes and visa-versa (this is not a true blind evaluation). The tapes are selected randomly, but weighted in proportion to the weekly percent of fish passage relative to the entire run. The level of Agreement between the two video fish technicians is evaluated with respect to total fish per tape, agreement in species identification and fish lengths. Species identification Disagreements between the two video fish technicians are then ranked from most common to least. It is proposed in the 1997 budget to incorporate this QC data to develop statistical Correction factors for video fish technician reader biases, and to determine statistical methods to correct estimated salmonid run sizes and assign a level of confidence in the point estimate. Given the turbidity levels in the Yakima River it is anticipated that there will always be a fraction of Unknown identified fish, and thus the need to develop statistically valid methods to assign them to a known species category.

OBJECTIVE 4: Incorporation of results from Objectives 2 and 3 will be used to re-write the video monitoring operational manual. The expected outcome is a manual that can be used to train new YIN employees and to establish written protocols.

OBJECTIVE 5: The video monitoring system consists of an analog video camera that records fish passage at Prosser (3 fish ladders) and Roza (1 fish ladder) dams. Presently, the video signal is fed into a time-lapse VHS video recorder (set at a 24 or 48 hr record mode). The VHS tapes are replaced daily or semi-daily. Video fish technicians play-back the video tape on a video editor unit and record fish passage. Information recorded include: species/type/mark(s)/maturity (species codes are also included for a variety of unknown types which involve the combination of all 4 identification parameters), passage date and time, fork length, ladder, the amount of passage delay time, any associated environmental or procedural problems and their duration, and the tape reader. Presently, the data is recorded onto a hard copy form as the tape is being played back, and is later keyed into an ACCESS database on the PC (note- the VIAS which was developed for the project through a separate BPA contract is not operational, and thus has not been incorporated into the daily data management protocol). After tapes are read they are archived at the YIN office.

PLANNED ACTIVITIES

SCHEDULE:

CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:

The only potential cost increase I can envision is the cost to acquire capital video monitoring equipment for the purpose of upgrading the system. The budgets for 1997 and 1998, prepared in 1996, were designed to allow for purchase of necessary video equipment.

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

Expected performance of target population or quality change in land area affected:

1. That improvements to the fish viewing sites will result in the best quality of fish image possible for the Yakima River.
2. That the fish image acquisition and data processing/storage procedures be devised which result in reduced tape processing time, better reader accuracy, better data management/storage protocol, and which takes advantage of current digital technology.
3. That statistical procedures be devised and incorporated from the QC data which results in the best estimate of fish passage for each species.
4. That specific marking techniques are identified that will allow for intrusive interrogation using a video based monitoring system.

Present utilization and conservation potential of target population or area:

N/A

Assumed historic status of utilization and conservation potential:

N/A

Long term expected utilization and conservation potential for target population or habitat:

N/A

Contribution toward long-term goal:

N/A

Indirect biological or environmental changes:

N/A

Physical products:

N/A

Environmental attributes affected by the project:

N/A

Changes assumed or expected for affected environmental attributes:

N/A

Measure of attribute changes:

N/A

Assessment of effects on project outcomes of critical uncertainty:

Hypothesis tests will be designed to test for what are deemed resolvable critical uncertainties.

Information products:

Daily, weekly and annual salmonid fish counts (inclusive of hatchery or marked fish and maturity type). Length frequency histogram for each salmonid species. Percent fish usage at each fish ladder (Prosser). Run time over Prosser and Roza dams for each species. Annual updates on progress on QC related issues.

Coordination outcomes:

Primarily through the Y/KFP monitoring and evaluation task team.

MONITORING APPROACH

The ultimate test of video monitoring, in the context of the Y/KFP, is whether or not the data is of sufficient quality to meet the stipulated M/E requirements stated for the project (these are currently being written by the M/E task team for the Y/KFP).

Provisions to monitor population status or habitat quality:

With respect to adult salmonids spawning ground surveys (redd counts) are conducted for spring chinook, steelhead (Satus & Toppenish basins only) and coho (around release sites). Currently, juvenile for all salmonid species occurs at Chandler Juvenile Facility (smolts and winter parr outmigrants). Currently, juvenile outmigrant monitoring capabilities are being developed at Roza Dam.

Data analysis and evaluation:

Initially, the video monitoring personnel finalize passage counts, etc. and report these results to interested parties. The M/E task t

eam will use this data to evaluate return rates, survival rates from the experimental releases made under the Y/KFP. In-basin fishery managers use this information as well.

Information feed back to management decisions:

Through the M/E task team, then to STAC (science technical advisory committee). Ultimately this feeds backs to the project manager level.

Critical uncertainties affecting project's outcomes:

Refer to the Monitoring and Evaluation Plan, the Project Status Review and Uncertainty Resolution Plan.

EVALUATION

In a general statement, that the data collected is of sufficient quality to meet the prescribed M/E criteria in such a manner as help answer the Y/KFP hypothesis Athat supplementation is a viable method to increase long term natural production@.

Incorporating new information regarding uncertainties:

N/A

Increasing public awareness of F&W activities:

N/A

RELATIONSHIPS

RELATED BPA PROJECT

RELATIONSHIP

9006300	Same as 8812008
8812008 Fisheries Technician Field Activities	Training Assistance for Personnel for YKFP needs.Technical personnel support for field data collection, Task assignments and special projects consistent with Y/KFP objectives and needs.Develop enhancement strategies/production objectives for coho; develop stochastic models for progress assesment for spring/fall chinook and steelhead.Chandler certification study, via estimates of upper Yakima smolt production, will determine performance of hatchery groups to identify impacting factors for monitoring and corrections.Klickitat passage/habitat preliminary design.Design/construction for upper Yakima spring chinook supplementation facilities for Y/KFP.Final design for upper Yakima spring chinook acclimation sites & wells.Develop and test M&E plans for Y/KFP.Initiates the tasks needed to provide basic information from fisheries surveys, population monitoring, habitat inventory & engineering surveys for passage barriers for Preliminary Design Report.Effects of acclimation on the survival of spring chinook salmon. M
8812009	Same as 8812008
8812010	Same as 8812008
9506800 Klickitat Passage/Habitat Preliminary Design	Same as 8812008
8812004	Same as 8812008
9006900 Yakima Hatchery - Final Design	Same as 8812008
9603301 Yakima River Fall Chinook Supplementation	Same as 8812008
9506800 Klickitat Passage/Habitat Preliminary Design	Same as 8812008
8903000 Effects of Acclimation on the Survival of Spring Chinook Salmon	Same as 8812008

5507700 Monitoring of Supplementation Response Variables for YKFP	Same as 8812008
9506401 Refinement of Marking Methods for YKFP Note - Project Is Closing and Will Note Be Seeking Additional Funds in 1998 and Beyond	Same as 8812008
9506402	Same as 8812008
9506404 Policy/Technical Involvement and Planning for YKFP	Same as 8812008
9602000	Same as 8812008
8811500	Same as 8812008

OPPORTUNITIES FOR COOPERATION:

Beginning in 1996, the BOR (Yakima office) assumed an increasing role to make improvements to the video monitoring sites (primarily at Prosser Dam). In addition, the BOR=s research branch (Denver) has provided monies and staff to assist the Yakama Indian Nation to evaluate changes made in the light system at the Prosser right bank vault, and to the video image archiving system (VIAS). This cooperative effort will be ongoing in 1997. The BOR is responsible for most of the maintenance costs for the physical video monitoring sites (Prosser and Roza dams).Adult fish counts will be provided for M/E purposes for the Yakima River Fall Chinook Restoration Project (BPA #9603302) and for the Yakima River Coho Restoration Project (BPA #9603302).

COSTS AND FTE

1997 Planned: \$215,000

FUTURE FUNDING NEEDS:

PAST OBLIGATIONS (incl. 1997 if done):

<u>FY</u>	<u>\$ NEED</u>	<u>% PLAN</u>	<u>% IMPLEMENT</u>	<u>% O AND M</u>
1998	\$30,000	10%	90%	
1999	\$30,000	10%	90%	
2000	\$30,000	10%	90%	
2001	\$30,000	10%	90%	
2002	\$30,000	20%	80%	

<u>FY</u>	<u>OBLIGATED</u>
1993	\$86,358
1994	\$78,526
1995	\$90,870
1996	\$92,949
1997	\$189,310

TOTAL: \$538,013

Note: Data are past obligations, or amounts committed by year, not amounts billed. Does not include data for related projects.

<u>FY</u>	<u>OTHER FUNDING SOURCE</u>	<u>AMOUNT</u>	<u>IN-KIND VALUE</u>
1998	USFS investment funding	\$30,000	
1999	USFS investment funding	\$30,000	
2000	USFS investment funding	\$30,000	
2001	USFS investment funding	\$30,000	
2002	USFS investment funding	\$30,000	

OTHER NON-FINANCIAL SUPPORTERS:

US. Forest Service grazing permittees provide in-kind investment maintenance.

LONGER TERM COSTS:

Continued implementation of operation and maintenance could be reduced to \$20,000 annually if only fence maintenance is found to be necessary.

Continued implementation of operation and maintenance

1997 OVERHEAD PERCENT: 24.2%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:

[Overhead % not provided so BPA appended older data.] Direct project costs
