2012 Project Summary, URE-08-12

Project Title: Technical assistance, development, and support to the Yukon River Fish Wheel Salmon Monitoring Project at Rampart Rapids using remote video technology

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Project Objectives

The Rampart Rapids fish Video Monitoring Project (URE-09-12) is an integral part of in-season management of main-stem Yukon River salmon populations, especially for Chinook *Oncorhynchus tshawytscha* and fall chum salmon *O. keta*. The Rampart Rapids video project is located on the main-stem Yukon River, 1,176 km upstream from the Yukon River mouth and 58 km above the confluence of the Tanana River (Figure 1). The fish wheel site is located on the south bank of the Yukon River. The fish species counted at the project are mainly Chinook and chum salmon, along with whitefish species. Because of the technical nature of this project and the data analysis required, there is a continued need for technical assistance, scientific review, and support throughout the annual project operations. The R&E Fund provided funding for this support through URE-08-12. As in previous years, this project has been funded separately from the Rampart Rapids Video Monitoring Project to keep the scientific review process and video technical development independent from the monitoring project.

Specific objectives for Project URE-08-12 include:

1) provide in-season (June – September) technical assistance in video system troubleshooting, repair, and operations for the Rampart Rapids Video Monitoring Project (URE-09-12);
2) integrate new equipment, as needed, into the on-site video system; and
3) assist in post-season data analysis, data checking, annual report editing, and proposal development for the Rampart Rapids Video Monitoring Project (URE-09-12).

Project Summary and Accomplishments

Technical in-season assistance for the Rampart Rapids Video Monitoring Project (URE-09-12).

Because of the technical nature of the video system installed at Rampart Rapids, there is a continued need to be available to help the operator check, diagnose, and repair the video system's component during the operational period of the project. It is beyond any operator's expertise to operate such a system unassisted. The project leader, David Daum made four site visits (June 18–22, July 9–13, July 23–27, and August 6–10) to the Rampart Rapids Video Monitoring Project (URE-09-12) during the 2012 field season. The site visits were used to check the technical operation of the video system, repair aging electrical components, and discuss project specifics with the operator, Stan Zuray. A sporadic video signal interference problem was diagnosed and corrected by replacing corroded electrical connections and coax cable in the Premier Wireless transmitter

installed on the fish wheel. Other coax connections on the fish wheel and back at camp were checked for corrosion. The infrared light screen system was checked for proper aim and target detection. The video fish wheel was checked for "fish-friendly" operation with additional padding added to the live box and repairs to ripped corner webbing on the fish wheel baskets. The video system operated the entire 98 day season without any downtime from system failures.

In-season spreadsheets and data output were checks for content and accuracy. Excel generated formulas were checked for proper outputs. The daily CPUE worksheet template sent out by e-mail to agency and other interesting parties was verified for correctness. Also, numerous phone and e-mail correspondences were made throughout the field season, discussing various aspects and operations of the Rampart Rapids Video Monitoring Project with the Project Leader, S. Zuray. A reoccurring problem with Starband satellite connectivity was diagnosed and fixed. The historic river discharge graph was updated from revised USGS data so 2012 daily water level measurements could be related to historic data on a daily basis in-season. Daily discharge adjustments to raw CPUE data for fall chum salmon were verified. Two water temperature loggers used during the previous season were sent out to Rampart Rapids for re-deployment during fish wheel set-up. Temperature data from 2011 were backed up and archived.

Integrate new equipment, as needed, into the on-site video system and camp operations.
An alternative remote power source, a water turbine generator installed in 2010, was checked for desired output. The water turbine, along with previously installed solar panels, provides 100% of the electrical needs for the Rapids Research Center camp. The video fish wheel site is powered by a water current generator during daytime use and a low energy lighting system is being investigated for nighttime operation; further reducing gasoline usage. New LED spot lights were tested and installed about the video chute, but because of lighting requirements, a Halogen spot light was still required. There is still need for more powerful and white light quality LED lights so the power-demanding Halogen light can be eliminated. This is a continuing effort to further reduce the dependency on expensive gasoline.

Because of the ever changing world of technical equipment and computer operating system upgrades, many of the video system components are becoming obsolete, along with the Salmonsoft video software having compatibility issues with the latest Microsoft operating systems. So far, newer Windows 7 computers can run Salmonsoft using the compatibility mode (useful for running some older computer programs). But Salmonsoft has not been tested on the new Windows 8 operating system. Computer hardware is also changing as to what is available on new machines. For example, the interface between the video switch signal and the computer is through a serial port that is becoming increasingly uncommon in newer computers. After several attempts, a new USB/serial interface was found that worked with the Salmonsoft software. A significant part of the technical time used to support the existing fish wheel video projects (or, for that matter, any technologically intensive endeavor) requires a continued effort to find ways to integrate older developed products into newer systems. Other than the USB/serial interface, no new equipment was upgraded into the video system in 2012.

Post-season data analysis, data checking, and annual report review for the Rampart Rapids Video Monitoring Project (URE-09-12).

The project leader, D. Daum, provided post-season data analysis including water temperature data (download, analyze, and graphics), data integrity check (over three months of video catch data), historic river discharge analysis, and statistical help. The draft 2012 report for the Rampart Rapids video monitoring project (URE-09-12) was reviewed and comments forwarded to S. Zuray for incorporation into the final 2012 report.

Fish wheel efficiency models using main-stem Yukon River discharge levels and chum salmon CPUE data have been used to generate daily abundance estimates for fall chum passing Rampart Rapids. This is the only place in the entire Yukon River drainage where adjustments are made to raw CPUE data. This adjusted data has given fishery managers a meaningful means of interpreting raw catch rates. The chum salmon adjustments were accomplished by using nine years of accurate weekly passage estimates at Rampart Rapids (USFWS mark/recapture study) coupled with discharge measurements from the USGS Yukon River Bridge discharge site. In 2012, the Yukon River Panel requested a method be developed for discharge-adjusted Chinook salmon CPUE catch rates at Rampart Rapids, similar to what is being done for chum salmon. No weekly passage estimates exist for Chinook salmon at Rampart Rapids to allow similar adjustments to raw CPUE data, as for chum salmon. To develop such an adjustment would require run reconstructions at Rampart Rapids using very limited and distant Chinook salmon escapement numbers (i.e., Eagle sonar is 500 miles upstream of Rampart Rapids) and imprecise harvest data. Escapement numbers into unmonitored systems would have to be estimated, although very little, if any, data are available. Methods are being explored to develop a discharge-adjusted relationship, but initial attempts have presented additional challenges compared to the fall chum salmon CPUE adjustment.

Figure 1. Location of the Rampart Rapids Video Monitoring Project site on the mainstem Yukon River above the Tanana River confluence.