Narrative

Increased Zone 6 Tribal Fishery Monitoring

Table 1. Proposal Metadata

Project Number	200850200
Proposer	Columbia River Inter-Tribal Fish Commission
Short Description	Increase Zone 6 Tribal Fishery Monitoring
Province(s)	Mainstem
Subbasin(s)	
Contact Name	Stuart Ellis
Contact email	ells@critfc.org

Information transfer:

A. Abstract

This project will increase the fishery monitoring of the Zone 6 tribal fishery. It will help improve the reliability of catch estimates for Zone 6 tribal fisheries by increasing the collection of tribal catch data through increased sample rates and the use of new data collection methods. Tribal catch estimates are required in real time to properly manage fisheries for conservation and to fairly share the harvestable component of upriver runs between treaty and non-treaty fisheries. Estimates of the Zone 6 catch contribute to estimates of total exploitation rates for Columbia River stocks of concern that inform stock assessment models used in recovery planning and biological opinions. Reliable and timely catch estimates are necessary to assure model accuracy, track actual exploitation rates over time, and evaluate the performance of harvest management in meeting conservation and harvest goals specified in biological opinions and regional management agreements. This project is associated with Project 2008-508-00 CRITFC Produce Statistically Valid Harvest Estimates, and Project 2008-907-00 Genetic Assessment of Columbia River Stocks by supplying the additional sampling and analytical support that is likely to be recommended as a result of these projects. This project should not be confused with project 2008-50-800, Produce Statistically Valid Harvest Estimates, which will evaluate the sampling design and estimation methods of the sampling program, and calculate precision of the estimates resulting from the sampling program. Results from project 2008-50-800 may be used to improve the sampling efforts carried out under this project.

B. Technical and/or scientific background

Adequate control of the harvest is the first requirement for meeting conservation and rebuilding goals for exploited fish populations. Harvest control depends on having timely and accurate catch data to track the accumulation of catch relative to a catch target. This is particularly true when ESA-listed populations are incidentally harvested in mixed-stock fisheries targeting robust and productive stock aggregates. Most Columbia River fisheries are constrained by low harvest rates for “stocks of concern” to be compatible with recovery efforts while allowing some access to harvestable fish. Managers are committed to maintain fisheries within these low harvest rates.

Assessing the harvest in real time is key to regulating the fisheries and complying with harvest rate limits.

The majority of tribal mainstem fishing occurs in Zone 6, which extends approximately 150 miles from Bonneville Dam to McNary Dam. Some fishing also occurs by members of the Yakama Nation between Beacon Rock and Bonneville Dam on the Washington shore. Tribal mainstem fisheries are managed for ceremonial, subsistence, and commercial purposes and comprise five general gear types; stationary gillnets, hook-and-line, hoopnets, dipnets, and longlines used in a small winter sturgeon fishery and occasionally at other times of year. Drift gillnets are used to a small degree for salmon and steelhead as well. The hook-and-line, hoopnet, and dipnet gears are used primarily for subsistence fishing, and gillnets may be used for commercial fishing or by special permit for ceremonial fishing. Hoopnets and dipnets are fished from scaffolds erected over moving water. Hoopnets are affixed to the scaffold and fish passively, while dipnets are fished actively by a fisher standing on the scaffold. Scaffold and hook-and-line fishing is generally open all year for subsistence use and for much of the year for commercial use. Ceremonial and subsistence permit gillnet fishing occurs primarily in the spring. Tribal fishers must have a permit from their tribe to participate in this fishery. Commercial gillnet fishing is an open access fishery for any member of the Columbia River Treaty Tribes (Warm Springs, Umatilla, Nez Perce, and Yakama) and is the most intensive fishery, lands the largest harvests, and requires the most catch sampling effort. Commercial gillnet fishing can occur any time from February through October, but most commercial gillnet fishing occurs from late June through early October. Other fisheries requiring monitoring effort include a winter setline fishery targeting sturgeon and a small trap fishery targeting shad.

Tribal catch estimation is done using basic creel survey techniques that vary slightly for ceremonial, subsistence, and commercial fisheries. The general approach is to estimate total catch as the product of sample catch per unit of effort (CPUE) times total observed effort in the fishery during a stated period of time. Sample CPUE is estimated from direct observations or census of a representative sample of total fishing effort. Monitors attempt to observe at least 20% of the total effort in at least 20% of the time open to fishing for each fishery and gear type. Sample estimates are expanded by time and effort to account for times and gears not directly monitored. CPUE is normally expressed as catch per gear-hour, such as rod-hour or net-hour. Total catch estimates are made for each species, stock (e.g., Group A and B steelhead), and ancestry (wild or hatchery) as needed to comply with specific catch quotas or guidelines.

The basic model is refined slightly for subsistence fisheries. For scaffold/hook-and-line fisheries, the 24-hr day is stratified into three 8-hr sampling periods to account for observed differences in catchability between daylight and dark periods. Monitors are scheduled to obtain at least a 20% time sample in each time stratum in each fishing period (usually Monday-Saturday for subsistence fisheries, often shorter for others). Monitors record the catch per sampled gear by 2-hr periods, and record the total number of active gears including those not sampled. Catch per unit of effort is expanded to total observed effort within time strata to obtain catch per stratum per week and summed across strata to estimate total catch per week.

The catch in ceremonial gillnet permit fisheries is directly observed where possible, but a catch report from the permitted fisherman also is required as a condition of the permit.

Commercial gillnet fisheries present the greatest challenge to accurately estimating the total catch. The commercial catch comprises the great majority of all fish harvested in Zone 6. Until

1994 virtually all commercial fish were sold to wholesale fish buyers, and the tribal commercial catch was simply compiled from sales records, or "fish tickets," issued by the buyers. When wholesale fish prices declined in the early 1990's, tribal fishers began marketing a significant portion of the catch directly to the public in search of better prices. A "port sampling" type of catch monitoring scheme was developed at that time to account for the catch not recorded on fish tickets. However, the logistics of obtaining representative catch data from many dispersed "ports" over effectively 300 miles of shoreline are extremely complex, and funding resources have not kept pace with the increasing demand on monitoring effort.

Commercial gillnet fisheries occur in sets of weekly fishery openings that are usually 2.5 days to 4.5 days long. Monitoring commercial gillnet landings is conducted at numerous developed and undeveloped boat landing sites located on both banks of approximately 150 miles of river. Monitoring crews must be familiar with these landing sites and attempt to synchronize their schedules with those of the fishers so that the catch can be recorded as it is landed. The gillnets are "lifted," or inspected, up to several times per day to preserve product quality, thus landing times can be unpredictable and occur at any time in the 24-hr day although the majority is landed at night or early morning. Monitors attempt to collect catch data on at least 20% of the effort (net-hr) in each fishing day. A sample of fishermen is interviewed during each fishing day to determine the number of nets they have deployed that will serve as the "effort" parameter in sample estimates of CPUE. The catch from these nets is recorded as it is landed to provide estimates of CPUE for the period of time since the nets were last inspected. Total daily catch is estimated by applying average catch/net-hr to estimates of the total daily effort obtained by aerial net counts during each fishing period. Estimates of total daily catch are summed to provide total catch for each weekly fishing period, and these are accumulated to track progress toward catch quotas or harvest rate limits.

Recent changes in management goals and increased abundances of returning upriver adults have allowed the expansion of tribal fisheries for spring and summer Chinook salmon. While this is generally regarded as a good thing, it has stretched fishery monitoring resources beyond the scale to which the monitoring program was designed. Table 1 compares the staff resources needed to monitor Yakama tribal fisheries in 1986 against those required in several of the past five years. Increases in the number and types of fisheries now available to tribal fishers have nearly tripled the need for catch monitoring staff. Note particularly the considerable increase required to provide timely and comprehensive monitoring of the spring, summer, and fall Chinook commercial fisheries in Zone 6.

Table 1. Comparison of fishery monitoring tasks and catch reporting obligations for the Yakama Nation FRMP from 1986 to the present.

1986 Location	Management Period	Staff Mo.	Recent Location	Management Period	Staff Mo.
Cascade Locks – Columbia R.	Apr - Oct	3.5	Cascade Locks – Columbia R.	Apr – Oct	3.5
Lone Pine – Columbia R.	Apr - Oct	3.5	Lone Pine – Columbia R.	Apr – Oct	3.5
Ceremonial - Columbia R.	Apr - May	2.0	John Day Dam – Columbia R.	Apr – Oct	3.5
Fall commercial – Columbia R.	Aug - Oct	4.0	Ceremonial - Columbia R.	Apr – May	2.0
Yakima River subsistence	Apr - Jul	3.0	Spring commercial – Col. R.	May – Jun	10.0
Klickitat River subsistence	Apr - Dec	4.5	Summer commercial – Col. R.	Jun – Jul	10.0
			Fall commercial – Col. R.	Aug – Oct	12.5
			Yakima River subsistence	Apr – Jul; Sep - Oct	4.0
			Icicle Cr. (Wenatchee) subsist.	May – Jul	2.0
			Klickitat River subsistence	Apr - Dec	4.5

1986 Location	Management Period	Staff Mo.	Recent Location	Management Period	Staff Mo.
			Drano Lake subsist/commercial	Apr – Jun; Oct - Nov	.75
			Wind River subsistence	Apr - Jun	1.5
			Sturgeon subsist/commercial	Jan - Mar	1.5
Total staff months:		**20.5**	**Total staff months:**		**59.25**

Most of the increase in staff requirement has been met by patching together a variety of funding sources, but in many years funding constraints limit sampling rates in some fisheries to less than the 20% rule-of-thumb that is generally considered to deliver acceptable statistical reliability.

Constraints on the level of sampling effort in fisheries may raise questions about the reliability of catch estimates, but it is premature to conclude that current catch estimates are not accurate. If existing fishery monitoring and catch estimation procedures are unbiased, then the additional effort proposed should produce the same catch estimates as the existing program, since both would be, in theory, random, unbiased sampling of the same statistical population. However, reduced sampling effort increases the possibility of biased sampling and resultant errors in estimation, and thus affects the reliability of catch estimates.

Managers also are interested in estimates of the stock composition of the catch for purposes of run reconstruction and evaluating the performance of harvest management in meeting stock-specific targets. An increasing number of PIT tagged fish have been released over recent years for a variety of research purposes. When enough groups of fish are PIT tagged at appropriate rates (so they can serve as indicators of stocks of interest for harvest management), PIT-tagged fish recovered in the catch may provide useful estimates of stock composition and/or harvest rates. In some circumstances it may be possible to utilize PIT tags to validate the catch monitoring and estimation procedures. However, PIT tagged stocks currently may not represent management units used in fishery management and not all populations are PIT tagged. This project will test the feasibility of sampling tribal catches for PIT tags by providing detection equipment and training to the tribal fishery monitors. The PIT information collected will supplement other stock composition information to provide a more comprehensive picture of harvest impacts.

Research/Monitoring/Evaluation

A catch monitoring project is intended in part to monitor and evaluate the effectiveness of harvest control in meeting defined conservation and fishery objectives. Producing accurate and reliable estimates of harvest is critical to assess harvest impacts on stocks of concern, as well as whether harvest objectives are being met. Increased sampling effort and collection of additional information will improve the reliability of catch estimates and the estimated stock composition of the catch. .Project 2008-508-00 will describe the relationship between sampling effort and statistical power of derived catch estimates. Results will inform decisions about the desired level of confidence in catch estimates, level of sampling effort needed to achieve it, and the cost of acquiring it. In conjunction with Project 2008-907-00, genetic samples of the catch will be collected in-season for post-season analysis of stock composition in the Zone 6 harvest, beginning with the 2009 fall season. The additional time and activities associated with that effort must be offset with additional catch monitoring effort to maintain a target sample rate for the fishery. This proposed project is anticipated to support the additional sampling effort needed to maintain a stated level of reliability in catch estimates.

The proposed PIT tag sampling also may eventually be usable to supplement the catch monitoring and estimation procedure. For example, if 1500 tagged adults that represent a managed stock group pass Bonneville and are exposed to a 10% harvest rate in Zone 6, 150 should be "recaptured" in the overall harvest. If a sample rate of 20% has been achieved and the harvest rate accurately estimated, an expected 30 fish would be detected (150 * 20%). While random binomial variation will affect the actual results, any large deviation from the expected value of 30 would be cause for concern. If the PIT tagged fish only represented part of a managed group, then the run timing of the PIT tagged fish might be different than the managed group as a whole and harvest estimates from PIT tagged fish might not be comparable to harvest rates from fishery monitoring. Reporting and analyzing this would be a useful product of this project. PIT tag detections in fisheries may be useful for the researchers who PIT tagged the fish.

C. Rationale and significance to regional programs

The estimation of Zone 6 catch and derived estimates of harvest rates are necessary to inform and complement regional efforts to recover ESA-listed Columbia River salmonid populations. Columbia River salmonids may encounter a sequence of discrete fisheries from southeast Alaska to northern California. Stock assessment and population viability models supporting biological opinions and recovery goals incorporate estimates of the exploitation rates acting on specific populations after recruitment to ocean and in-river fisheries. The exploitation rate is calculated as the sum of all harvests of target stocks divided by the total number of recruits entering the first fishery. Exploitation rates are indexed in VPA, AHA, and other such models used to assess stock status for recovery planning. Reliable catch data also are needed to track whether model assumptions of fishery impacts are correct and stable over time. Finally, catch data are necessary to demonstrate whether actual harvest rates and quotas are within limits established by the *2008-2017 United States v. Oregon* Management Agreement and the biological opinion that provides ESA coverage for that agreement.

Catch estimates for Zone 6 fisheries also contribute to the evaluation of fishery impacts and rebuilding progress for Columbia River stocks considered in the Pacific Salmon Treaty annexes. The U.S./Canada treaty describes fishing patterns, harvest limits, and abundance triggers that control the management of ocean fisheries off Alaska, British Columbia, and the southern U.S. Columbia River fishery impacts are included in exploitation rate analyses to track compliance with harvest sharing and rebuilding provisions in the treaty.

Monitoring and catch estimation for Zone 6 fisheries also are required to comply with federal law. The 2008-2017 *United States v Oregon* Management Agreement contains specific catch limits and harvest sharing provisions that are intended to assist in rebuilding upriver stocks and ensure fair sharing of the harvestable fish between Treaty and non-Treaty fisheries. As an order of the federal court, the provisions in the Management Agreement are binding on the parties to the lawsuit and failure to comply is subject to judicial relief. Accurate and reliable catch accounting is both an order of the court and a check on compliance by the parties.

This project is also related to RPA #62 in the FCRPS BiOp (RM&E strategy 5 – Harvest Research, Monitoring, and Evaluation).

D. Relationships to other projects

Table 2 summarizes the relationship of this project to other ongoing projects. This project will contribute to Project #200850800 Produce Statistically Valid Harvest Estimates and utilize the results to adjust catch sampling rates as appropriate. Staff implementing Project #200850800 will coordinate with monitoring staff in the field to become familiar with existing sampling procedures and circumstances of the fishery.

Fishery monitors also will assist in the collection of tissue samples from the landed catch for genetic analysis pursuant to Project #200890700, Genetic Assessment of Columbia River Stocks. Catch monitors will directly assist tissue samplers in accessing landed fish by providing transportation and securing necessary permissions to sample fish.

This project will integrate to a limited degree with Project 198605000 - Evaluate Sturgeon Populations in the Lower Columbia River, which funds the collection of catch data for white sturgeon in tribal commercial and subsistence fisheries. That project is focused on sampling the catch in winter commercial and subsistence fisheries targeting white sturgeon. This proposed project will share monitoring staff with that project who will record incidental landings of white sturgeon in commercial and subsistence salmon fisheries.

Table 2. Relationship to existing projects

Funding Source	**Project #**	**Project Title**	**Relationship (brief)**
BPA	200850800	Produce Statistically Valid Harvest Estimates.	Results may be utilized to modify sampling protocols.
BPA	200851800	Upstream Migration Timing	PIT tags from this project may be recovered in tribal fisheries
BPA	200850300	Sockeye Studies	PIT tags from this project may be recovered in tribal fisheries
BPA	198605000	Evaluate Sturgeon Populations in the Lower Columbia River	Provides limited funding for catch monitoring in Zone 6 sturgeon fisheries
BPA	200890700	Genetic Assessment of Columbia River Stocks	Catch monitors will assist in obtaining genetic samples from the Zone 6 fishery
BIA	8503223	ESA Monitoring	Supports Zone 6 fishery monitoring and the collection of catch data relevant to ESA-listed stocks
BIA	8503220	Fisheries Program Development	Supports the collection of catch data for tribal subsistence fisheries in Zone 6 and tributaries

E. Project history (for ongoing projects)

This is a newly funded project with no history.

F. Proposal biological/physical objectives, work elements, methods, and metrics

Related to all Objectives
Work Elements:
119. Manage and Administer Projects: Project Management
This will include project administration, internal coordination, and contract development.

132. Produce (Annual) Progress Report: Submit Progress Report for 1/1/2009 to 12/13/2009.
This progress report will summarize the project objectives, completed and uncompleted deliverables, problems encountered, lessons learned. Date range 1/1/2009-12/31/2009.

185. Produce Pisces Status Reports: Periodic Status Reports for BPA
CRITFC shall report on the status of milestones and deliverables in Pisces. Reports shall be completed either monthly or quarterly as determined by the BPA COTR.

Objective 1. Total Catch Sampling for Tribal Mainstem Fisheries

Work Elements:

157. Collect/Generate/Validate Field Data: Total Catch Sampling of Tribal Fisheries
This project will provide a subcontract to the Yakama Nation Fisheries Department to perform enhanced total catch monitoring of Zone 6 tribal fisheries. Yakama Nation staff will generate total catch estimates based on monitoring data.

157. Collect/Generate/Validate Field Data: Assess feasibility of Sampling of Tribal Fisheries for PIT tags.
This project will provide a subcontract to the Yakama Nation Fisheries Department to perform assess feasibility of collecting PIT tags from Zone 6 tribal fisheries. Yakama Nation staff will explore methods of sampling tribal fisheries for PIT tags. PIT tag data from fish sampled will be reported to PTAGIS.

Objective 2. Report total catches from Zone 6 Tribal Mainstem Fisheries. (This work is part of the requirements of the U.S. v. Oregon Management Agreement.)

161. Disseminate Raw/Summary Data and Results: Report Tribal Mainstem Harvest.
Total catch estimates will be reported to the *U.S. v. Oregon* Technical Advisory Committee. Catch data, when final are summarized annually in, "Joint Staff Reports" which are available at: http://wdfw.wa.gov/fish/crc/crcindex.htm

G. Monitoring and evaluation
This project will monitor and evaluate results based on whether fisheries are monitored and total catch estimates are generated and reported. Catch monitoring is based on a creel survey type method. The target monitoring rate is to sample 20% of the landed catch. The *U.S. v. Oregon* Technical Advisory Committee will review the total catch estimates and provide input on any needed modifications.

H. Facilities and equipment
Project oversight and management will be completed at the Columbia River Inter-tribal Fish Commission in Portland, Oregon,

Equipment required will include four PIT tag detection wands.

I. References

None

J. Key personnel

Stuart Ellis will oversee and manage this project and both of the objectives. Time allocation to this project is below. The balance of allocated funds will be subcontracted to the Yakama Nation to provide PIT tag detectors and partial support for seasonal fishery monitors.

- Stuart Ellis, 1.2 months (FTE)

Stuart Ellis

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Education

B.S., Fishery Science, Oregon State University, 1992

Appointment

2000-present Harvest Management Biologist, Columbia River Inter-Tribal Fish Commission