Columbia River Salmon and Steelhead Recreational Anglers Board
Application for Funding

Applicants: Washington Department of Fish and Wildlife (WDFW)
Hatchery/Wild Interactions Unit, Supplementation Research Team
Ben Truscott and Jay Deason

Contact: Ben Truscott email: ben.truscott@dfw.wa.gov office: 509-664-3148 x.277

Proposal Title: Enhanced Upper Columbia River Tributary PIT Tag Monitoring – Methow River - **new**

Type of Proposal:
New or expanded fishing opportunities provided through enhanced passive integrated transponder (PIT) tag monitoring in the Methow River. Improved PIT tag monitoring will enable WDFW to calculate accurate and timely adult escapement estimates by origin (hatchery/wild) and monitor changes in run size and origin throughout a given run or season.

Date of Submission: June 30, 2016

Effective Period of Funding:
August 2016 – July 2017. Operations and maintenance after installation funded by WDFW (through contract with BPA).

Amount of Funding Requested: $83,705 requested / $23,075 existing/cost share

Activity to be Funded:
Replace existing instream PIT tag detection site (IPTDS) installed near the mouth of the Methow River (RKM 1.0) with upgraded QuBE controller and IS1001 antenna control nodes (ACN). Build new, rugged HDPE antennas to pair with QuBE system.

Background:

The existing IPTDS network in the Upper Columbia River basin spans from the mouths of the major population tributaries (Wenatchee, Entiat, Methow and Okanogan Rivers) throughout the majority of all anadromous spawning reaches. The detection sites are part of a multi-agency study, funded by the Bonneville Power Administration and local public utility districts, intended to assess viable salmonid population parameters in the Upper Columbia River. Specific PIT tag detection sites were selected (e.g., near river mouth/confluence or below spawning habitat) in order to collect information on the entire population and/or estimate escapement into a specific tributary or reach.

Instream PIT tag detection technology advanced in the past with the release of multiplexing transceivers, allowing for multiple, larger antennas to be operated by a single transceiver. Multiplexing transceivers rapidly switch between antennas, eliminating interference generated when multiple antennas operate simultaneously in proximity to another. This allows

multiple antennas to operate in series as only one antenna is activated at any given time. While these advances enabled IPTDS to be deployed in various instream habitats with changing environmental conditions, the technology still had limiting factors leading to reduced effectiveness on larger river systems. Particularly, the capability to operate no more than six antennas, decreased read range with larger antennas, and decreased read range with antennas further from the transceiver have limited the capabilities of IPTDS in larger rivers where conditions require wider spans and high read ranges to cover the stream channel. Methods have been developed through collaboration with WDFW and NOAA fisheries to operate two transceivers in close proximity, allowing for IPTDS with up to 12 antennas, however the other limiting factors still remain.

Newly released IPTDS controllers, manufactured by Biomark, Inc., address the limitations of previous transceivers and allow for expanded instream PIT tag detection capabilities. An IPTDS controller, when paired with antennas powered by IS1001 antenna control nodes (ACN; one ACN per antenna), combine to create a high performance detection system that is highly adaptable to applications that require large detection area and experience variable environmental conditions. An IPTDS controller provides the ability to multiplex virtually an unlimited number of individual antennas. Antennas can also be installed up to 1,000 feet away from the controller. Previously, read range decreased significantly with antennas over 100 feet from the transceiver, and distance was limited to a maximum of 200 feet away with specially built antennas. Additionally, read range for an antenna powered by an ACN is 1.5 to 2 times better than antennas powered by previous transceivers.

Antenna construction has also advanced significantly in recent years, with HDPE pipe now being utilized to provide greater durability and impact resistance compared to previous PVC antennas. PVC antennas are still utilized in more stable, lower energy systems, due to lower cost of construction and materials. However, in areas such as the lower Methow River that experience high energy events due to seasonal high flows, freeze/thaw cycles, and heavy debris loads, HDPE antennas are more cost effective as they can sustain much higher energy events without having to be replaced.

Proposed Activity:

The Hatchery/Wild Interactions Unit, Supplementation Research Team (WDFW), located in Wenatchee, proposes to upgrade the Lower Methow River IPTDS (LMR). The site is located at RKM 1.0 on the Methow River, on WDFW property. The site would be upgraded to a Biomark antenna controller with 12 ACN's. The new controller and ACN's will increase read range and the coverable stream width compared to the currently installed dual-transceiver system. Additional hardware would be installed to allow for automated data collection and site diagnostic monitoring. This data management suite of equipment greatly increases data quality through remote, real-time data access and redundant data backup. Additionally, operations and maintenance are improved as remote access to site diagnostics provides opportunity to proactively address operational issues, and/or quickly respond to an operational outage. The data management suite is the standard for permanent IPTDS operated in the Upper Columbia River basin. LMR is the last remaining permanent IPTDS in the Upper Columbia River basin without a suite of data management equipment.

New locations upstream of the current site are being investigated for installation. Access to the current site is limited and requires a large photovoltaic array to power the site. Additionally, the current site experiences significant accumulation of ice along the shore and river bottom. When

the ice melts, large chunks break free while still attached to antennas, often causing antennas to break or come unplugged. Alternate sites upstream would be selected if access and power would be improved, with minimal ice accumulation, and while still being in close proximity to the confluence with the Columbia River.
Antennas would be constructed out of HDPE. While the initial cost of HDPE antennas is higher, LMR experiences significant high energy events and HDPE antennas are most suitable for the conditions present. Over 30 PVC antennas have been replaced at LMR over the past four years due to damage caused during high energy events. It is expected that the replacement rate will be significantly reduced with more durable HDPE antennas and a new site.

Effort/Assistance Required:

WDFW requests funding for the labor and materials required to upgrade LMR as described above, and one year of replacement materials (estimated 25% replacement rate). Antennas and ACN's are the most vulnerable components of the system as they are anchored instream and therefore may need to be replaced in the event of loss or damage. Some loss or damage and subsequent replacement of components are unavoidable due to the nature of extreme environmental conditions experienced at IPTDS.

WDFW staff are fully proficient in the construction, installation, and maintenance of IPTDS, leading the deployment and operation and maintenance efforts in the Upper Columbia River basin. As such, considerable cost sharing will be accounted for through in-house expertise, existing fully outfitted antenna construction warehouse, and proven construction, installation and maintenance techniques. WDFW also has existing infrastructure at the current site that will be utilized and previously purchased installation tools (e.g. air compressor, pavement breaker, equipment trailer). Cost sharing on existing infrastructure and installation tools alone totals $23,075, not accounting for the personnel time spent in identifying sites and obtaining necessary permits. WDFW will also provide funding for ongoing operations and maintenance and data management once the system is installed through funding associated with operating existing IPTDS.

PERSONNEL					**$15,078.31**	**Cost Share**
Fish and Wildlife Biologist 2	0.10	mo	@	$4,648	$464.80	
Scientific Technician 4	0.75	mo	@	$4,212	$3,159.00	
Scientific Technician 3	0.95	mo	@	$3,811	$3,620.45	
Scientific Technician 2	0.95	mo	@	$3,290	$3,125.50	
Total	2.75		*Wages Subtotal*		$10,369.75	
Benefits						
OASI		salary	@	6.20%	$642.92	
Retirement		salary	@	11.18%	$1,159.34	
Labor and Industries	2.75	mo	@	$161.16	$443.19	
Health Insurance	2.75	mo	@	$841.00	$2,312.75	
Medical Aide		salary	@	1.45%	$150.36	
			Benefits Subtotal		$4,708.56	
SUPPLIES/EQUIPMENT					**$68,627.36**	
Data Processing Fee	2.8	mo	@	$20.10	$55.28	
Personnel Service Fee		salary	@	0.4058%	$42.08	
06067M 3/4 ton Pickup	(1, 1500)	(mo, mile)	@	($315,$0.44)		$975.00
Cellular Modem	1.0	unit	@	$600		$600.00
Installation Equipment	1.0	unit	@	$21,500		$21,500.00
Antenna Controller	1.0	ea	@	$2,710	$2,710.00	
Antenna Control Node (ACN)	15.0	ea	@	$1,500	$22,500.00	
ACN Communication Board	15.0	ea	@	$400	$6,000.00	
ACN Antenna	15.0	unit	@	$850	$12,750.00	
ACN Canister	15.0	unit	@	$150	$2,250.00	
Power Supply (Thermoelectric Generator)	1.0	unit	@	$10,080	$10,080.00	
Earth Anchors	144.0	unit	@	$75	$10,800.00	
Anchor Straps	288.0	ea	@	$5	$1,440.00	
TOTAL					**$83,705.67**	**$23,075.00**

Need for Proposed Activity:

Instream PIT tag detection technology performs well on smaller streams and tributaries where stream widths are less than 20 m and water depths less than 2-3 feet during base flows. These environmental conditions are typical for many smaller tributaries in the Upper Columbia River basin, such as the Chiwawa and Twisp Rivers. Due to the success experienced in deploying IPTDS in smaller tributaries, researchers have continued to expand the range in which IPTDS are deployed. Methods have been developed to synchronize two transceivers so that IPTDS could be installed on streams up 50 m wide during base flows. However, detection efficiency for IPTDS deployed on larger systems has not been as high compared to systems on smaller streams. The main factors that have lead to decreased efficiency on larger rivers is decreased read range on antennas further from the transceiver and increased height of water above antennas. This proposal addresses the factors limiting efficiency of IPTDS on larger rivers by upgrading to a new controller system with increased capabilities. Specifically, the new controller system provides increased antenna read range and increased antenna distance from the controller, allowing for greater coverage of stream depth and width. In addition to the transceiver, the site would also be upgraded with a data management system. The data management equipment allows for remote access, automated error alerts, automated data uploads to PTAGIS, and operational troubleshooting. These features enabled by the data management system greatly reduce the time required for data handling and maintenance. The peripheral environmental dataloggers operated by the data management system will provide data for efficiency modeling and further investigations into migration cues and timing.

All necessary permits, including ESA coverage, have been obtained to install an IPTDS at the location selected.

Benefit of Proposed Activity:

Public/Angler Benefit:

WDFW and other agencies invest considerable resources in PIT tagging hatchery and wild juvenile and adult salmonids for research purposes. Recently, WDFW has developed methods to estimate adult escapement utilizing IPTDS data. Improvements to IPTDS will enable WDFW to calculate escapement estimates with greater precision and accuracy than previous estimates. Escapement estimates would inform fish management, allowing for fisheries to be managed with knowledge of the most up to date and accurate data on run size, timing, and origin. The data set provided from IPTDS is available in near real-time, providing the opportunity to monitor and adjust fisheries throughout the season based on timely passage data.

Exact angler days, extent of area open, and economic value cannot be determined specifically for this proposal. However, the potential for increases in all of these areas exist due to the increase in available information used to determine fisheries. For example, it may be determined from PIT tag data that a run consists of a large hatchery origin component, in which case a season may be opened for more areas, and/or a longer period of time, and/or with higher daily limits. Additionally, informed decisions managing fisheries and in-season adjustments may result in better returns in subsequent years, benefitting both recovery and future fisheries.

Benefit to Resource:

Recovery and management efforts will be greatly enhanced with improved data from IPTDS. Researchers can utilize data from IPTDS to analyze recovery efforts, calculating metrics such as smolt-to-adult returns (SAR). SARs can be compared across groups with varied exposure

to habitat, hatchery, harvest and hydro conditions, informing recovery action effectiveness monitoring. With PIT tags all metrics can also be compared across specific release groups, brood years and/or age classes.

Additional Considerations: