Statement of Work Report

Data Current as of: 03/17/2015
Report Printed: 03/17/2015

Project Title: Okanogan Basin Monitoring & Evaluation Program (OBMEP)
Project #: 2003-022-00
Contract Title: 2003-022-00 EXP MONITOR/EVAL OKANOGAN BASIN (OBMEP)
Contract #: 63963 [ISSUED]
Province: Columbia Cascade **Subbasin:** Okanogan
Workorder ID: 188017 **Task ID:** 1
Perf. Period Budget: $2,755,000 **Perf. Period:** 3/1/2014 - 2/28/2016
Contract Type: Contract (IGC) **Pricing Type:** Cost Reimbursement (CNF)
Contractor(s): Colville Confederated Tribes (Prime - COLVILLE00)
BPA Internal Ref: 63963
SOW Validation: Last validated 01/08/2014 with 0 problems, and 0 reviewable items

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Work Element Table of Contents:

Work Element - Work Element Title	EC Needed*	Estimate	(%)
A : 185. Produce Pisces Status Report - Periodic Status Reports for BPA		$7,049	(0 %)
B : 165. Produce Environmental Compliance Documentation - Environmental Compliance		$29,954	(1 %)
C : 156. Develop RM&E Methods and Designs - Publish OBMEP protocols as needed	*	$37,359	(1 %)
D : 157. Collect/Generate/Validate Field and Lab Data - Juvenile steelhead population estimates, fish densities, and watershed health indicators.	*	$171,880	(6 %)
E : 157. Collect/Generate/Validate Field and Lab Data - Enumerate adult returns to the Okanogan River basin	*	$613,549	(22 %)
F : 157. Collect/Generate/Validate Field and Lab Data - Monitor threats to salmonid habitats at up to 50 sites annually	*	$345,530	(13 %)
G : 157. Collect/Generate/Validate Field and Lab Data - Water quality and quantity data needed to evaluate salmonid habitat status and trends	*	$377,459	(14 %)
H : 119. Manage and Administer Projects - Manage Projects: produce necessary documents, estimates, and personnel managment		$203,887	(7 %)
I : 191. Watershed Coordination - Project coordination/public outreach		$239,544	(9 %)
J : 160. Create/Manage/Maintain Database - Manage, maintain, and expand the OBMEP database		$360,783	(13 %)
K : 162. Analyze/Interpret Data - Analyze collected and historical data		$232,720	(8 %)
L : 141. Produce Other Report - BiOp RPA and other technical reports		$77,783	(3 %)
M : 132. Produce (Annual) Progress Report - Produce annual report based on tasks identified within this scope of work 1/1/2014 - 12/31/2014		$28,752	(1 %)
N : 132. Produce (Annual) Progress Report - Submit Progress Report for the period 1/1/2015 to 12/31/2015		$28,751	(1 %)
	Total:	$2,755,000	

***** Environmental Compliance (EC) needed before work begins.

Contract Description:

Project goal:
Monitoring and Evaluation of summer steelhead and their habitats at a sub-basin scale requires a long-term commitment as most outcomes will not be realized for 7 to 20+ years. The first 7 years of this project (prior to 2011) were used to establish the program and all its elements, and establish a baseline to compare with future data collection. This project is designed to ultimately achieve the following goals:

1. Determine if there is a meaningful biological change at the population scale for summer steelhead in the Okanogan basin (7-20+ year time frame).

2. Determine if there is a meaningful change in selected physical salmonid habitat parameters over time (12-20+

year time frame).

3. Determine if change is occurring in VSP parameters from the cumulative habitat restoration actions occurring throughout the Okanogan basin (12-20+ year time frame).

4. Establish quantitative data where little existed and fill data gaps necessary to recovery listed salmonid species (1-20+ year time frame).

5. Administer contracts and ensure that this effort continues (long-term) in a scientifically sound manner that is closely coordinated across the Okanogan River Basin, Geo-political boundaries, Upper Columbia ESU, Columbia River Basin, and Pacific Northwest region (20+ year time frame).

This program is designed to address a multitude of questions and at the same time eliminate duplication of work, reduce costs, and increase monitoring efficiency. The implementation of valid statistical designs, probabilistic sampling, standardized data collection protocols, consistent data reporting methods, and selection of sensitive indicators will increase monitoring efficacy. For this program to be successful, all organizations involved must be willing to cooperate and freely share information. Cooperation includes sharing monitoring responsibilities, adjusting or changing sampling methods to comport with standardized protocols, adhering to statistical design criteria, and strict use of informatics to distribute and archive data. In those cases where the standardized method for measuring an indicator is different from what was used in the past, it may be necessary to measure the indicator with both methods for a few years so that a relationship can be developed between the two methods.

Primary Goal for 2014 and 2015:
Continued implementation of existing standardized OBMEP protocols with adjustment made to improve analytical and reporting tools. Up to now, our efforts have largely focused on development of the infrastructure to collect high quality data and establishing a baseline of status data upon which future comparisons can be based. As we transition from our first round of data collection into our second, we can enhance understanding of the anadromous fish populations and habitat within the Okanogan River Basin with expanded trend analysis that is primarily focused on summer steelhead. These data can also be used in the Okanogan River Basin as the basis for evaluating the overall effectiveness of salmon recovery and restoration projects.

Although we cannot hope to answer all possible management questions, we will attempt to address as many fundamental questions related to management and recovery of anadromous salmonids as our funding allows, including basic uncertainties about targeted fish population processes, with respect to both the trends in abundance and the factors regulating salmonid population dynamics. This program will help resource managers prescribe well-coordinated management actions and evaluate diagnostic units where progress or or failures are occurring relative to measures of abundance, productivity, distribution, and trends.

The Colville Tribes have used, extended, and modified the structure and methods employed by the Monitoring Strategy for the Upper Columbia Basin (Hillman 2004) for use in the Okanogan subbasin in the design of the OBMEP program. OBMEP is aligned tightly with the priorities expressed in documents and guidelines put out by The Columbia Basin Monitoring and Evaluation Project (CSMEP), Pacific Northwest Aquatic Monitoring Partnership (PNAMP), Northwest Power and Conservation Council's (NPCC) Fish and Wildlife Program, Subbasin Plans, NOAA Fisheries guidance, 2008 BIOP and monitoring appendix P, the Upper Columbia Salmon recovery Plan, Upper Columbia Biological Strategy, Environmental Protection Agency (EPA), Washington Department of Ecology, and the Independent Scientific Review Panel (ISRP).

The Okanogan Subbasin Plan calls for its vision to be supported by nine priority themes that represent the large scale agreement between all stakeholders within the subbasin. The eighth theme is “continue Research, Monitoring, and Evaluation” and OBMEP is specifically linked to this activity.

“Continued Research, Monitoring, and Evaluation: To apply adaptive management and make informed decisions will require an on-going commitment to research, monitoring and evaluation. Research allows important questions to be answered in a scientific rather than subjective manner and allows the best possible decisions on how and why to take a specific course of action. A considerable lack of knowledge exists in the Okanogan and this situation will continue to exist without continued research efforts. Evaluation of monitoring data, remote sensing data, and information from areas outside the Okanogan subbasin will also provide a mechanism to determine if progress is being made toward achieving the priority themes, and objectives contained in the subbasin plan. To track progress

and inaugurate an adaptive management process, the subbasin plan relies upon a sound monitoring framework outlined under the Okanogan Basin Monitoring and Evaluation Program (OBMEP). This program was developed concurrently with Bonneville and NOAA fisheries IMW pilot studies in the Wenatchee, John Day and Salmon River systems; with guidance provided by the Pacific Northwest Aquatic Monitoring Partnership; the Coordinated Systemwide Monitoring and Evaluation Projects; the federal Research Monitoring and Evaluation Program, and, is directly linked to the Upper Columbia Salmon Recovery plan as the monitoring vehicle for listed stocks in the Okanogan subbasin. This monitoring plan will also continue to evolve as the region continues toward a fully integrated regional monitoring approach, but has at its core, the ability to effectively track status and trend for fish populations and habitat indicators in the interim. Specific monitoring elements targeting hatchery and wild fish performance, disease, genetics, fish morphology, ecological interactions and other parameters will be added as additional production programs come on line."(Okanogan Subbasin Plan, Management Plan, page 9).

Within the Okanogan subbasin, independent research projects and piecemeal monitoring activities were conducted by various state, federal, tribal, agencies, and to some extent by watershed councils or landowners, until the creation of OBMEP. Today, these efforts are coordinated into a cohesive overall framework for RM&E efforts related to salmon and steelhead fish stocks.

OBMEP is specifically designed to address status and trend monitoring for the Okanogan subbasin over the next 20+ years. Benefits to generating information on listed and non-listed fish will accrue in three different ways: (i) by supporting direct management of these species with respect to exploitation and recovery planning; (ii) by supporting the planning, development and implementation of restoration and recovery actions directly benefiting the listed populations; and (iii) by supporting the planning, development and implementation of management actions indirectly impacting salmonid populations.

In 2011, the CHaMP monitoring program was given policy guidance related specifically to the needs of habitat status and trend monitoring program operating within the Columbia River Basin by the directors of BPA, NPCC, NOAA, USFS, USFWS, and USBOR. Collectively, they wanted habitat monitoring programs to provide usable information that helps feed: 1) the Endangered Species Act Viable Salmonid Population criteria, 2) Expert panel process for crediting, 3) Timely fisheries management and adaptive management, 4) A mechanism for project selection, 5) updated limiting factors including a way to prioritize restoration actions and areas, and 6) a mechanism for evaluating habitat restoration actions in terms of status, trend, and effectiveness. Much of our work over the last 3 to 4 years has focused on development of habitat reporting tools that we believe meet all of the objectives outlined by the policy director and by the end of this contract period we will have reports that compile all our habitat data through 2013 into this new format.

Sampling Design:
The Colville Tribes have used, extended, and modified the structure and methods employed by the Integrated Status and Effectiveness Monitoring Program (ISEMP), Columbia Habitat Monitoring Program (CHaMP), and the Monitoring Strategy for the Upper Columbia Basin (Hillman 2004) for use in the OBMEP program. OBMEP is aligned tightly with the priorities expressed in documents and guidelines put out by the Columbia Basin Monitoring and Evaluation Project (CSMEP), Pacific Northwest Aquatic Monitoring Partnership (PNAMP), Northwest Power and Conservation Council's (NPCC) Fish and Wildlife Program, Subbasin Plans, NOAA Fisheries guidance, 2008 BIOP and monitoring appendix P, the Upper Columbia Salmon recovery Plan, Upper Columbia Biological Strategy, Environmental Protection Agency (EPA), Washington Department of Ecology, and the Independent Scientific Review Panel (ISRP). The intent of status/trend monitoring is to accurately describe existing conditions in the Okanogan River basin and to document changes in conditions over time. This requires temporal and spatial replication as adapted from Hillman (2004), we implemented and modified the EMAP sampling framework, a statistically based and spatially explicit sampling design, to quantify trends in juvenile and adult salmonids and status and trends in stream and riparian habitats. For more information see Hillman (2004).

In the Okanogan basin, EMAP sites were selected according to the generalized random tessellation stratified design (GRTS+) (Stevens 1997; Stevens and Olsen 1999; Stevens and Urquhart 2000; Stevens 2002). Briefly, the GRTS design achieves a random, nearly regular sample point pattern via a random function that maps two-dimensional space onto a one-dimensional line (linear space). A systematic sample is selected in the linear space, and the sample points are mapped back into two-dimensional space. The GRTS design is used to select samples for all panels. The OBMEP site selection process began with collaboration with Tony Olsen and the EPA regional office located in Corvallis, OR, who provided the random sample of 300 possible sites. Once selected, OBMEP verified these sites for access, secured landowner permissions when necessary, and reduced the list to the

150 sites spilt between the United States and Canada portions of the Okanogan basin. After the first 5 years and statistical analysis conducted on data collected from the Wenatchee ISEMP, a series of modifications and changes to the original design were suggested and at the same time the Columbia Habitat Monitoring Program (CHaMP) was born to replace the Wenatchee ISEMP effort. From the ISEMP 2010 findings we adjusted our site selection in the Okanogan River basin to a 4-year rotating panel design and included stratification for EDT stream reach (hydrologic, biologic, and modeling stream reach breaks) with a filter designed to eliminate replication within a given stream reach. We had a small number of additional sites to add to our sampling universe as a result of applying these rules and selected to locate these new sites at or near the mid point of the longest remaining EDT reaches that were not previously monitored, with a net reduction from 150 sites to 125 sites that are sampled within a given full panel rotation. A map of these sites and the hierarchical structure of EDT reaches and diagnostic units that make up the Okanogan River Subbasin can be obtained on our web-site at: http://nrd.colvilletribes.com/obmep/uscansites.htm.

The Monitoring Strategy for the Upper Columbia Basin (Hillman 2004) recommends a suite of biological and physical/environmental indicators suitable for status and trend monitoring. Not all indicators listed in the Hillman document are relevant for the Okanogan subbasin. The protocols provide general instructions for collecting data, but specific methodologies that alter temporal, spatial, and economic realities make sampling some of the indicators more feasible than others. The indicators selected and the methods used to collect these data were adapted from Hillman (2004). Protocols were developed specifically for the Okanogan Basin Monitoring and Evaluation Project (OBMEP) to be compatible with both the Monitoring Strategy for the Upper Columbia Basin (Hillman 2004) and the Ecosystems Diagnosis and Treatment (EDT) model input fields. The EDT process was previously used to identify limiting factors for anadromous fish in the assessment portion of the Okanogan Subbasin Plan and its ongoing use will require periodic updates of these data to establish a baseline then future iterations by which to make trend comparisons. The EDT reporting tools have been completely redesigned for this effort to address policy guidance provided by BPA, NPPC, NOAA, USFS,USFWS, and USBOR whom want habitat monitoring effort to effectively feed: 1) the Endangered Species Act Viable Salmonid Population criteria,2) Expert panel process for crediting 3) provide useful and timely information for fisheries management and adaptive management, 4) provide a mechanism for project selection,5) provide information in limiting factors and a way to prioritize restoration actions and areas, and 6) provide an evaluation of habitat status and trend plus project effectiveness.

To summarize data management activities to date, considerable investments have been made in developing a functional database system that allows for data to be collected in the field and assimilated with a minimum of man power and repetitive analysis. However, what remains to be completed is to connect this database with the regional data repositories like Stream-net. Work at this scale will begin in 2014 but OBMEP will play only a minor roll in helping the region close this gap with additional support channeled through the coordinated assessment project and stream-net. Through these collaborative and coordinated efforts OBMEP data will become more available for use by BPA, NPCC, PNAMP, and other established regional programs in the Columbia River Basin. We will continue to provide input and products derived from our own experiences in the Okanogan. On a more local scale, OBMEP provides information to state-wide salmon recovery efforts and regional forums across the upper Columbia ESU and Columbia Cascade province. We coordinate monitoring and evaluation efforts with the Upper Columbia Regional Technical Team.

The Okanogan River is an international watershed and the OBMEP project does not stop at international borders. We facilitate collecting seamless data by collaborating with the Okanogan Nation Alliance (ONA), who in turn facilitates collaboration with other Canadian stakeholders such as Environment Canada; the Ministry of Land, Water, and Air Protection; and the Department of Fisheries and Oceans. We developed clear guidance for the collection of all field data. To vet our standardized field protocols, the Canadian effort in the Okanagan River Basin was phased in one year after data collection began in the United States portion of the Okanogan River Basin. By 2011, Canada will have it's first full panel rotation completed. The phased approach allowed us to assess the compatibility of our guidance documents through field testing. Within the Okanogan subbasin, our efforts are coordinated with other management agencies and stakeholder groups that are collecting information to ensure that no duplication of effort occurs within this watershed. Data are consolidated within the OBMEP program and onto a server located at our offices and also distributed to NMFS, UCSRB, DART, and summarized into annual reports and presentations that are provided to BPA and other regional stakeholders on both sides of the border.

There have been numerous recent administrative and scientific calls for a comprehensive monitoring and evaluation program to provide consistent, region-wide information about the status of salmon populations and their response to management actions (Botkin et al. 2000, ISAB 2001, ISRP 2001, ASMS 2010, Crawford and Rumsey 2011). In

addition, the Biological Opinion on the Federal Columbia River Power System requires the development and implementation of a coordinated monitoring and evaluation program (NOAA Fisheries 2008). The call for developing a consistent, region-wide monitoring program has been strong and widespread. The OBMEP project increases our ability to conduct effective recovery planning and address a number of outstanding scientific agendas. This comprehensive monitoring program provides a scientifically robust method for evaluating the status of the Okanogan River anadromous fish populations while contributing information essential for evaluating the ESU for progress toward recovery goals such as the de-listing criteria defined by the regional TRTs who identified the OPkanogan River basin as having the highest extinction risk and the largest survival gap within the Upper Columbia steelhead ESU (NOAA Fisheries 2008). A basin-wide monitoring program also provides the means to develop and refine appropriate performance measures and standards for conservation actions, thus giving managers the information to quantitatively assess the impact that composite restoration actions have on fish populations and OBMEP is specifically called for to contribute steelhead information for the Okanogan River population for RPA 50.4 (Crawford and Rumsey 2011). This work will help to address actions outlined in the NOAA fisheries 2008 Biological Opinion for the the Federal Columbia River Power System (RPA's 50.4, 50.6, 56.1, 56.3, 71.4, 72.1), specifically fish population and habitat status monitoring for listed Summer steelhead within the Okanogan River.

Statement of Work Report

Work Element Details

A: 185. Produce Pisces Status Report

Title: Periodic Status Reports for BPA

Description: The Contractor shall report quarterly on the status of milestones and deliverables in Pisces. When indicating a deliverable milestone as COMPLETE, the contractor shall provide metrics and the final location (latitude and longitude) prior to submitting the report to the BPA COTR.

Estimated level of Effort: 0.03 FTEs/year.

Deliverable Specification:

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Mar-Jun 2014 (3/1/2014 - 6/30/2014)	7/1/2014	7/15/2014	Completed	
B. Jul-Sep 2014 (7/1/2014 - 9/30/2014)	10/1/2014	10/15/2014	Completed	
C. Oct-Dec 2014 (10/1/2014 - 12/31/2014)	1/1/2015	1/15/2015	Completed	
D. Jan-Mar 2015 (1/1/2015 - 3/31/2015)	4/1/2015	4/15/2015	Active	
E. Apr-Jun 2015 (4/1/2015 - 6/30/2015)	7/1/2015	7/15/2015	Active	
F. Jul-Sep 2015 (7/1/2015 - 9/30/2015)	10/1/2015	10/15/2015	Active	
G. Oct-Dec 2015 (10/1/2015 - 12/31/2015)	1/1/2016	1/15/2016	Active	
H. Final Jan-Feb 2016 (1/1/2016 - 2/28/2016)	2/14/2016	2/28/2016	Active	

B: 165. Produce Environmental Compliance Documentation

Title: Environmental Compliance

Description: Develop and submit permit applications for electro-fishing and PIT-tagging, plus the installation of monitoring devices(i.e., fish guidance structures, video counting stations, stream gauging stations, and PIT tag arrays). Receive authorization by regulatory agency to install needed infrastructure items and collect biological data related to this monitoring and evaluation effort. This work element will minimize potential negative impacts of this project.

Estimated Level of Effort: 0.15 FTEs/year.

Deliverable Specification: Documentation and assistance to support BPA's Environmental Compliance Group (permit applications, ESA documents, etc.). Will vary based on the type of activity.
Copies and consultations will be provided for all applicable work performed during the performance period of this contract.

Planned Metrics:
* Are herbicides used as part of work performed under this contract?: No
* Will water craft, heavy equipment, waders, boots, or other equipment be used from outside the local watershed as part of work performed under this contract?: No

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Obtain BPA's EC Lead sign-off that EC requirements are complete	3/1/2014	3/31/2014	Completed	The EC? column on the contract SOW tab in Pisces must have a "full moon" for each work element requiring environmental compliance before ground-disturbing implementation of that work element can begin. You will receive verbal or email notification from the EC Lead when a work element or, in rare instances, a portion of a work element is approved for implementation.
B. Use Best Management Practices to stabilize soils and prevent spread of noxious weeds	3/1/2014	3/1/2014	Completed	Use applicable BMPs to retain existing vegetation and achieve re-establishment of vegetation in disturbed areas to at least 70% of pre-disturbance levels. Visit chapter 7.3 of http://www.ecy.wa.gov/pubs/0410076.pdf for BMPs to consider for construction contracts and http://wdfw.wa.gov/publications/01330/wdfw01330.pdf for guidance on re-vegetation in the Columbia River Basin.
C. Determine if contract work could adversely affect Pacific lamprey	3/1/2014	3/1/2014	Completed	Contractor will review work proposed under this contract and determine the following: 1) Will field work take place in any area where lamprey may be present? (Any tributary or subbasin where anadromous fish exist is also accessible Pacific lamprey habitat.) 2) Are there any stream disturbing activities or instream activities that could adversely impact Pacific lamprey? Examples of activities posing a threat to lamprey may include (this list is not intended to be all-inclusive): aquatic habitat improvements, fish passage improvements, culvert replacements, water diversions, altered management of water flows, dewatering of any portions of streams, or alteration of irrigation practices. If the answer is yes to BOTH 1 and 2, the contractor must implement USFWS Best Management Practices to Minimize Adverse Effects to Pacific Lamprey (Entosphenus tridentatus) http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/pdf/Best%20Management%20Practices%20for%20Pacific%20Lamprey%20April%202010%20Version.pdf (BMPs).
D. Report lamprey observation and catch data to USFWS	3/1/2014	2/28/2016	Active	All contractors doing instream work in anadromous fish areas (e.g., surveys, habitat improvements, electrofishing, screwtraps, etc.) are required to report annually, by Feb 15 each year, on lamprey observations or catch, including zero, during the previous calendar year to christina_luzier@fws.gov at US Fish and Wildlife Service. A data template is available (http://www.efw.bpa.gov/contractors/docs/Lamprey_Database_Template.xls) and should include the following information: 1) BPA project, 2) BPA contract number, 3) observation or catch date, 4) location (river mile or GPS), 5) species, 6) species id confidence, 7) photo taken, 8) a "sample taken" field such as genetic sample, fin clip, other biological sampling done, 9) sampling technique, 10) sampling effort, 11) number of ammocoetes (larval stage with undeveloped eyes, found burrowed in substrate), 12) number of macropthalmia (free-swimming juvenile stage with developed eyes) and 13) number of adults. See page 10 of USFWS Best Management Practices to Minimize Adverse Effects to Pacific Lamprey (Entosphenus tridentatus) http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/pdf/Best%20Management%20Practices%20for%20Pacific%20Lamprey%20April%202010%20Version.pdf (BMPs) for life stage pictures.
E. Inspect water craft, waders, boots, etc. to be used in or near water for aquatic invasive species	3/1/2014	2/28/2016	Active	Aquatic invasive Species Guidance: Uniform Decontamination Procedures: http://www.aquaticnuisance.org/wordpress/wp-content/uploads/2009/01/Recommended-Protocols-and-Standards-for-Watercraft-Interception-Programs-for-Dreissenid-Mussels-in-the-Western-United-States-September-8.pdf -- Best management guidance for boaters: http://www.coastal.ca.gov/ccbn/bmp-boaters.pdf -- Aquatic Nuisance Species newsletter: http://www.aquaticnuisance.org/newsletters -- Washington State Aquatic Invasive Species Management Plan: http://www.wdfw.wa.gov/publications/pub.php?id=00105
F. Inspect and, if necessary, wash vehicles and equipment infested with terrestrial invasive species	3/1/2014	2/28/2016	Active	Prevent spread of invasive species

Milestone Title	Start Date	End Date	Status	Milestone Description
G. Complete and document public involvement activities and provide to EC Lead	3/1/2014	3/1/2014	Completed	Public involvement is any outreach to the public or landowners about specific actions that are proposed. This could be public letters, meetings, newspaper notices, posted notices at local facilities, or information booths at local events.
H. Participate in ESA Consultation	3/1/2014	3/1/2014	Completed	Work may include drafting BA, completing HIP III BO Project Notification Form, submitting high risk project designs to Restoration Review Team (RRT), providing copy of Section 10, 4(d), or 6 permit, etc., or submitting Hatchery Genetic Management Plan to BPA for ESA consultation initiation, and providing input for the ensuing consultation.
I. Participate in Cultural/Historic Resource Consultation	3/1/2014	3/1/2014	Completed	Examples include providing maps and detailed project descriptions, contracting for an archaeological survey, etc.
J. Obtain/Renew applicable local, state, federal and tribal environmental permits	3/1/2014	3/1/2014	Completed	Work done to obtain permits such as Sec. 401 or 404 (including RGP process), shoreline, NPDES, or any other required federal, state, or local permits.
Deliverable: K. Applicable permits and other environmental clearances received		2/28/2016	Active	*See the Deliverable Specification above*

C: 156. Develop RM&E Methods and Designs

Title: Publish OBMEP protocols as needed

Description: Since the Okanogan Basin Monitoring and Evaluation Program began, the Colville Tribes recognized the importance of developing written protocols related to every aspect of data collection. Once developed, these protocols are used to standardize data collection by all personnel throughout the Okanogan River Basin using similar equipment. Good science needs to be repeatable and this is especially true when monitoring fish and environmental parameters over time. To keep up with methodological, technical, and intellectual changes, protocols need to be periodically updated. OBMEP protocols and methods have been entered into monitoring methods.org. However, considerable consolidation and revisions will be necessary to finalize or publish these data. Over the last year, considerable progress has been made to consolidate, revise and publish our protocols used for OBMEP with an expectation that these revisions will remain static for a period of at least 4 years once completed. This process will continue until protocols 5,6,7,8,9,192 and 194 are published in monitoringmethods.org.

Level of Effort: 0.2 FTEs/year.

Deliverable Specification: Published protocols will include sections for;

Purpose
Site selection
Sampling duration
Equipment list including details regarding mobilization and demobilization
Permitting
Detailed methodology and definitions
QA/QC
Data management
Data analysis
Literature cited

Protocol: Okanogan Basin Monitoring & Evaluation Program - Juvenile Abundance - Mark-Recapture v1.0

Protocol Owner: John Arterburn **Protocol State:** Draft

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental compliance requirements complete	3/1/2014	3/31/2014	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Review, revise, and Publish protocol, study design, and methods in monitoringmethods.org	3/1/2014	2/28/2016	Active	The Protocol (including temporal and spatial design) and Methods for this work element are stored at monitoringmethods.org and need to be finalized (i.e., "Published" through monitoringmethods.org), preferably prior to data collection. Preparations for contract renewals must include reviewing any previously published Protocols/Methods to ensure that they are consistent with how work will be done in any subsequent contract.
Deliverable: C. Published protocols		2/28/2016	Active	*See the Deliverable Specification above*

D: 157. Collect/Generate/Validate Field and Lab Data

Title: Juvenile steelhead population estimates, fish densities, and watershed health indicators.

Description: Collect data on juvenile summer steelhead relative abundance and invertebrate community at EMAP sites located in the United States and Canada. Snorkeling surveys will all be done following established OBMEP protocols (monitoring methods ID#'s 7 and 194). Invertebrate data will be collected following OBMEP protocol (monitoring methods ID#'s 9). The primary use of these data will be as a response variable that relates to physical habitat changes monitored at these same sites. We hope to show correlation with EDT habitat modeling outputs and ultimately to be able to establish carrying capacity estimates for the habitat contained within each diagnostic unit. The best method for conducting this work involves electrofishing and using these data to develop population estimates along with the deployment of PIT-tags. However, this approach is novel and as of yet untested, therefore, continued collection of snorkel data and invertebrate data is needed to maintain a high level of coordination with planners and other data collection agencies that currently are utilizing these relative abundance estimates until the new methodologies can be aligned with past data collection. Snorkel surveys will continue to provide juvenile salmonid presence and absence data although the frequency and number of sites needed to collect these data would be far less in the future if invertebrate data show a closer link to habitat changes or the new population estimates appear to be more accurate.

Sub-contract with ONA for sites in Canada and professional services used to pick, enumerate, and identify invertebrate samples.

Estimated Level of Effort: 0.86 FTEs/year.

Deliverable Specification: Snorkel counts provide an indicator of relative abundance, distribution, and size of juvenile summer steelhead throughout the Okanogan River Basin, A more statistically robust analysis can be developed using electrofishing and mark recapture methods once NOAA permits are approved for select diagnostic units. Where overlap between electrofishing and snorkel surveys exist a cross walk for combining historic data will be developed to the extent possible. Invertebrate standing crop and community structure is used to evaluate watershed health indicators at all tributary EMAP sampling locations. Yearly juvenile fish and invertebrate data will be summarized into the annual report.

Planned Metrics:
* Primary R, M, and E Focal Strategy : Population Status
* Primary R, M, and E Type : Status and Trend Monitoring
* Secondary R, M, and E Type : Action Effectiveness Monitoring
* Secondary R, M, and E Focal Strategy : Tributary Habitat

Locations: 75

Primary Focal Species: Steelhead - Upper Columbia River DPS

Country:	Multiple	**NPCC Subbasin:**	OKANOGAN
State:	Multiple	**HUC5 Watershed:**	Multiple
County:	OKANOGAN	**HUC6 Name:**	LOWER SALMON CREEK

Salmonid ESUs Present: Outside legal CKUCS (Upper Columbia River Spring-run Chinook Salmon ESU) boundary (<multiple>) | Outside legal STUCR (Upper Columbia River Steelhead DPS) boundary (<multiple>) | Upper Columbia River Steelhead DPS (<multiple>)

Data Repositories: Okanogan Basin Monitoring & Evaluation Program (OBMEP) website (http://www.colvilletribes.com/obmep_project_data.php)

Protocol: Okanogan Basin Monitoring & Evaluation Program - Juvenile Abundance - Snorkel Surveys v1.0

Protocol Owner:	John Arterburn	**Protocol State:**	Draft

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental compliance requirements complete	3/1/2014	7/1/2014	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Review, revise, and Publish protocol, study design, and methods in monitoringmethods.org	3/1/2014	2/28/2015	Active	The Protocol (including temporal and spatial design) and Methods for this work element are stored at monitoringmethods.org and need to be finalized (i.e., "Published" through monitoringmethods.org), preferably prior to data collection. Preparations for contract renewals must include reviewing any previously published Protocols/Methods to ensure that they are consistent with how work will be done in any subsequent contract.
C. Mobilize equipment, snorkel and invertebrate training	3/1/2014	7/15/2014	Completed	Purchase, prepare equipment, and train field staff on specific protocol applications
D. Snorkeling all EMAP sites	7/15/2014	10/31/2014	Completed	Snorkeling at 50 EMAP sites (25 annual, 25 rotating panel) looking for adult and juvenile anadromous fish.
E. Conduct pilot electrofishing validation of snorkel surveys on Omak Creek and Salmon Creeks	7/15/2014	10/31/2014	Completed	Conduct mark recapture estimates at snorkel sites on Salmon, Omak and other streams as time and resources allow.
F. Collect invertebrate samples at all EMAP sites	7/15/2014	10/31/2014	Completed	Invertebrate sampling at 50 EMAP sites (25 annual, 25 rotating panel) looking for adult and juvenile anadromous fish.
G. QA/QC data and enter into the OBMEP database	7/15/2014	2/28/2015	Active	Enter data into the OBMEP database and apply appropriate QA/QC routines.
H. Process lab samples	7/15/2014	2/28/2015	Active	Send off samples for processing at a qualified laboratory
I. Demobilize, repair, and securely store all invertebrate sampling and snorkeling equipment	11/1/2014	2/28/2015	Active	Demobilize, repair, and store all sampling equipment.
J. Mobilize equipment, snorkel and invertebrate training	3/1/2015	7/15/2015	Active	Purchase, prepare equipment, and train field staff on specific protocol applications
K. Snorkel all EMAP sites	7/15/2015	10/31/2015	Active	Snorkeling at 50 EMAP sites (25 annual, 25 rotating panel) looking for adult and juvenile anadromous fish.
L. Collect invertebrate samples at all EMAP sites	7/15/2015	10/31/2015	Active	Invertebrate sampling at 50 EMAP sites (25 annual, 25 rotating panel) looking for adult and juvenile anadromous fish.
M. Conduct electrofishing validation study at all tributary EMAP sites	7/15/2015	10/31/2015	Active	Conduct mark recapture estimates at snorkel sites on all anadromous bearing tributaries in the United States.
N. QA/QC data and enter into the OBMEP database	7/15/2015	2/28/2016	Active	Enter data into the OBMEP database and apply appropriate QA/QC routines.
O. Process lab samples	7/15/2015	2/28/2016	Active	Send off samples for processing at a qualified laboratory
P. Demobilize, repair, and securely store all invertebrate sampling and snorkeling equipment	10/1/2015	2/28/2016	Active	Demobilize, repair, and store all sampling equipment.
Deliverable: Q. Juvenile steelhead population estimates, fish densities, and watershed health indicators.		2/28/2016	Active	*See the Deliverable Specification above*

E: 157. Collect/Generate/Validate Field and Lab Data

Title: Enumerate adult returns to the Okanogan River basin

Description: Prior to this project, adult spawning surveys for sockeye and summer Chinook were already occurring, although the sockeye data had major discrepancies between these estimates and dam counts and the Chinook surveys were limited to the United States portion of the basin. Also, no data on summer steelhead was being collected with the exception of in Omak Creek. To fill the remaining data gaps and allow for more accurate and precise population estimates to be calculated required considerable additional data collection. To fill these gaps, we use various methodologies including redd surveys for summer steelhead, picket weir traps, video counters, and PIT-tags depending on: 1) the fish being enumerated, 2) information needs, 3) size of the subwatershed, 4) season when data are collected, 5) water clarity, and 6) other environmental and logistical considerations. Once these data are collected, we are able to determine annually the number of summer steelhead spawners entering each subwatershed, origin, and their spatial distribution. Annual adult summer steelhead spawner abundance estimates are compiled along with information related to origin and spatial structure through four specific activities: 1) video data collected at Zosel Dam, Salmon Creek and Antoine Creek, 2) picket Weir data shared but collected in Omak and Bonaparte creeks under hatchery broodstock collection efforts, 3) summer steelhead redd surveys conducted in all remaining areas, and 4) PIT-tag data incorporated where possible as antenna arrays are installed under this project in conjunction with project # 201003400, although PIT-tag antenna array O&M will be funded outside of this specific project. We will continuously evaluate new technology and methodologies to collect the most scientifically defensible data possible for summer steelhead adult abundance estimates yet still allow comparisons with past results in order to maintain a viable long-term data set. A new approach for collecting adult summer steelhead data in Canada using PIT-tag technology will begin in 2014 as the adult picket weir trap and redd surveys have been found to be only marginally successful over the last several years.

Estimated Level of Effort: 2.99 FTEs /year.
Subcontract with ONA for PIT-tag array installation and maintenance in Canada.

Deliverable Specification: The following data will be collected;

1) Year round video enumeration of all adult anadromous fish passing Zosel Dam.
2) Seasonal data collected at video counting stations located on Salmon and Antoine creeks. Primarily for steelhead, secondarily for Chinook and sockeye.
3) Summer steelhead redd surveys conducted throughout the rest for the United States portion of the watershed.
4) PIT-tag data collected at Zosel Dam, VDS-3, Inkaneep, McIntyre, and Shuttleworth creeks to enumerate summer steelhead returns to Canada.

Numeric data related but not limited to species, origin, sex, marks, tags, and age will be collected opportunistically and archived on the OBMEP server. These data will be compiled with additional data collected under different projects and work elements to produce an annual spring spawner report and annual population estimates for summer steelhead.

Planned Metrics:
* Primary R, M, and E Focal Strategy : Population Status
* Primary R, M, and E Type : Status and Trend Monitoring
* Secondary R, M, and E Type : Action Effectiveness Monitoring
* Secondary R, M, and E Focal Strategy : Tributary Habitat

Locations: 14

Primary Focal Species: Steelhead - Upper Columbia River DPS | Sockeye - Okanogan River ESU | Chinook - Upper Columbia River Summer/Fall ESU

Country: Multiple
NPCC Subbasin: OKANOGAN
State: Multiple
HUC5 Watershed: Multiple
County: OKANOGAN
HUC6 Name: Multiple

Salmonid ESUs Present: Outside legal CKUCS (Upper Columbia River Spring-run Chinook Salmon ESU) boundary (<multiple>) | Outside legal STUCR (Upper Columbia River Steelhead DPS) boundary (<multiple>) | Upper Columbia River Steelhead DPS (<multiple>)

Data Repositories: Okanogan Basin Monitoring & Evaluation Program (OBMEP) website (http://www.colvilletribes.com/obmep_project_data.php)

Protocol: Okanogan Basin Monitoring & Evaluation Program - Adult Abundance - Redd Surveys v1.0

Protocol Owner: John Arterburn
Protocol State: Draft

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental compliance requirements complete	3/1/2014	3/2/2014	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Review, revise, and Publish protocol, study design, and methods in monitoringmethods.org	3/1/2014	3/2/2014	Completed	The Protocol (including temporal and spatial design) and Methods for this work element are stored at monitoringmethods.org and need to be finalized (i.e., "Published" through monitoringmethods.org), preferably prior to data collection. Preparations for contract renewals must include reviewing any previously published Protocols/Methods to ensure that they are consistent with how work will be done in any subsequent contract.

Milestone Title	Start Date	End Date	Status	Milestone Description
C. Collect and review video data from Zosel dam	3/1/2014	2/28/2016	Active	Clean, maintain, monitor, and repair video equipment at Zosel Dam video counting station and review data that is archived to ensure a complete and accurate count of all summer steelhead using the Zosel Dam fishways is completed in 2014 and 2015.
D. Review tributary video data collected at tributary video weirs	3/1/2014	7/1/2015	Active	Tributary video monitoring equipment will begin being installed by March 1st in the hopes that all equipment is operational no later than March 15, as long as weather allows. It is anticipated that the months of April and May will be when most summer steelhead will be observed passing through the video chamber.
E. Install, operate and maintain PIT tag array in Inkneep, Shuttleworth and McIntyre creeks	3/1/2014	2/28/2016	Active	This interrogation site will be used to enumerate O. mykiss entering these tributaries to spawn. Data collected at these sites will include date and time the tag was detected and recapture information uploaded to PTAGIS.
F. Mobilize equipment and conduct first pass main-stem Steelhead redd counts	3/15/2014	4/1/2014	Completed	Conduct first round of main-stem Upper Columbia summer steelhead redd surveys. Dates for surveys established from redd survey efforts conducted in previous years as part of this project.
G. Conduct second pass main-stem redd counts	4/1/2014	4/15/2014	Completed	Conduct second round of main-stem Upper Columbia summer steelhead redd surveys. Dates for surveys established from redd survey efforts conducted in previous years as part of this project.
H. Conduct third pass main-stem redd counts	4/15/2014	4/30/2014	Completed	Conduct third round of main-stem Upper Columbia summer steelhead redd surveys. Dates for surveys established from redd survey efforts conducted in previous years as part of this project.
I. Conduct tributary redd surveys and demobilize equipment	5/1/2014	7/15/2014	Completed	Conduct tributary redd surveys for Upper Columbia summer steelhead. Dates for surveys established from redd survey efforts conducted in previous years as part of this project. Remove temporary equipment for video and PIT-tag monitoring designed for adults only.
J. Store temporary PIT-tag equipments and tributary video arrays	7/15/2014	2/28/2015	Active	Temporary PIT tag arrays and tributary video monitors will be removed once flow conditions require or the date of July 15 occurs as these devices are not intended to attempt to collect data during periods of uncontrolled spill. Equipment will be moved back to the Omak Fish and Wildlife office, repaired as needed, and secured in a safe place until needed next spring.
K. Review tributary video data collected at tributary video weirs	3/1/2015	7/1/2015	Active	Tributary video monitoring equipment will begin being installed by March 1st in the hopes that all equipment is operational no later than March 15, as long as weather allows. It is anticipated that the months of April and May will be when most summer steelhead will be observed passing through the video chambers.
L. Mobilize equipment and conduct first pass main-stem redd counts	3/15/2015	4/1/2015	Active	Conduct first round of main-stem Upper Columbia summer steelhead redd surveys. Dates for surveys established from redd survey efforts conducted in previous years as part of this project.
M. Conduct second pass main-stem redd counts	4/1/2015	4/15/2015	Active	Conduct second round of main-stem Upper Columbia summer steelhead redd surveys. Dates for surveys established from redd survey efforts conducted in previous years as part of this project.
N. Conduct third pass main-stem redd counts	4/15/2015	4/30/2015	Active	Conduct third round of main-stem Upper Columbia summer steelhead redd surveys. Dates for surveys established from redd survey efforts conducted in previous years as part of this project.
O. Conduct tributary redd surveys and demobilize equipment	5/1/2015	7/15/2015	Active	Conduct tributary redd surveys for Upper Columbia summer steelhead. Dates for surveys established from redd survey efforts conducted in previous years as part of this project. Remove temporary equipment for video and PIT-tag monitoring designed for adults only.
P. Store temporary PIT-tag equipments and tributary video arrays	7/15/2015	2/28/2016	Active	Temporary PIT tag arrays and tributary video monitors will be removed once flow conditions require or the date of July 15 occurs as these devices are not intended to attempt to collect data during periods of uncontrolled spill. Equipment will be moved back to the Omak Fish and Wildlife office, repaired as needed, and secured in a safe place until needed next spring.
Deliverable: Q. Data on adult anadromous fish		2/28/2016	Active	*See the Deliverable Specification above*

F: 157. Collect/Generate/Validate Field and Lab Data

Title: Monitor threats to salmonid habitats at up to 50 sites annually

Description: Physical habitat data will be collected under pre-established protocols at 25 annual and 25 rotating randomly selected sampling sites that follow an EMAP rotating panel design. All panel sites will have hard point monuments that allow these site to be precisely replicated with rotating panel. Information will be collected pertaining to presence and composition of large woody debris, riparian vegetation structure, canopy cover, human disturbance, substrate composition, embeddedness, side channel habitat, stream channel habitat types (pool, riffle, glide, etc.), and channel widths and depths. All work is completed following the protocol ID#9 in monitoringmotheds.org.

To complete the population of the EDT model for the Okanogan River subbasin, an additional 35 sites per year are visited to collect habitat data for all EDT reaches that are not currently being monitored through OBMEP's randomized monitoring approach. Rapid assessment of these reaches can be achieved with a minimum of additional effort. The design will be to combine the level 2 EDT attributes with experts in the field to subjectively assign values that will directly feed the current gaps in our EDT model as opposed to using data from an adjacent reach we know is not similar. All work is completed following the protocol ID#8 in monitoringmethods.org.

Subcontract with ONA for 16 sites located in Canada.
Estimated Level of Effort: 1.51 FTEs/year.

Deliverable Specification: Physical habitat data will be collected annually at 50 sites (25 annual panel, 25 rotating panel, 75 for the 2-year contract period) including 34 sites in the United States and 16 sites in Canada using Trimble GPS data loggers. All physical habitat data collected at each sampling site will follow established OBMEP protocols. Information will be collected pertaining to presence and composition of large woody debris, riparian vegetation structure, canopy cover, human disturbance, substrate composition, embeddedness, side channel habitat, stream channel habitat types (pool, riffle, glide, etc.), and channel widths and depths. Physical habitat data from all 50 sampling sites will be archived on the OBMEP server located at the Colville Tribe's Fish and Wildlife office in Omak, WA, and shared upon request. EDT analyses and technical reports will be completed in late 2014 or early 2015 and thereafter for each four years of data using EDT models to synthesize these data. Once finalized, these technical reports will be posted to BPA and OBMEP web sites. Additional efforts to share this information among habitat practitioners will be conducted as part of our watershed coordination work element.

Planned Metrics:
* Primary R, M, and E Focal Strategy : Population Status
* Primary R, M, and E Type : Status and Trend Monitoring
* Secondary R, M, and E Type : Action Effectiveness Monitoring
* Secondary R, M, and E Focal Strategy : Tributary Habitat

Locations: 75

Primary Focal Species: Steelhead - Upper Columbia River DPS

Country:	Multiple	**NPCC Subbasin:**	OKANOGAN
State:	Multiple	**HUC5 Watershed:**	Multiple
County:	OKANOGAN	**HUC6 Name:**	Multiple

Salmonid ESUs Present: Outside legal CKUCS (Upper Columbia River Spring-run Chinook Salmon ESU) boundary (<multiple>) | Outside legal STUCR (Upper Columbia River Steelhead DPS) boundary (<multiple>) | Upper Columbia River Steelhead DPS (<multiple>)

Data Repositories: Okanogan Basin Monitoring & Evaluation Program (OBMEP) website (http://www.colvilletribes.com/obmep_project_data.php)

Protocol: Okanogan Basin Monitoring & Evaluation Program - Habitat Monitoring v1.0

Protocol Owner:	John Arterburn	**Protocol State:**	Published

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental compliance requirements complete	3/1/2014	3/2/2014	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Review, revise, and Publish protocol, study design, and methods in monitoringmethods.org	3/1/2014	3/2/2014	Completed	The Protocol (including temporal and spatial design) and Methods for this work element are stored at monitoringmethods.org and need to be finalized (i.e., "Published" through monitoringmethods.org), preferably prior to data collection. Preparations for contract renewals must include reviewing any previously published Protocols/Methods to ensure that they are consistent with how work will be done in any subsequent contract.
C. Finalize rapid assessment data collection tools for EDT reaches not covered by random sites	3/1/2014	6/1/2014	Completed	To complete the population of the EDT model for the Okanogan River subbasin requires some additional habitat data to be collected in EDT reaches that are not currently being monitored through OBMEP's randomized monitoring approach. Rapid assessment of these reaches can be achieved with a minimum of additional effort. This effort combines the level 2 EDT attributes with experts in the field to subjectively assign values that will directly feed the current gaps in our EDT model as opposed to using data from an adjacent reach we know is not similar.
D. Conduct annual training and group rapid assessment calibration	6/1/2014	7/15/2014	Completed	Training will involve providing the data collection tools to a group of local experts and assessing a few sites in order to make sure that the consensus ratings are within 1-2 tenths on the 0-4 scoring criteria used to populate the EDT model. Experts from monitoring and habitat subdivisions of the Colville Tribes, IFCI consultants, ONA biologists, and others experts knowledgeable about Okanogan River aquatic and terrestrial habitats will be involved in this training and only trained individuals will be allowed to conduct further assessments. This effort is expected to take one week and involve extensive debate in order to calibrate all data collectors and get regional buy-in from local experts.
E. Physical Habitat Surveys of about 20 sites	7/1/2014	7/31/2014	Completed	Collection of physical habitat data under published protocols at sites 1-20.
F. Conduct annual rapid assessment work	7/15/2014	9/30/2014	Completed	Conduct rapid assessment at 35 EDT reaches that do not contain any existing OBMEP habitat sites, or EDT reaches that are poorly characterized by the randomly selected OBMEP habitat site. These sites will be revisited every 4 -years to update the EDT model prior to each subsequent model run.
G. Physical Habitat Surveys of about 20 sites	8/1/2014	8/31/2014	Completed	Collection of physical habitat data under published protocols at sites 21-40.
H. Physical Habitat Surveys of about 10 sites	9/1/2014	10/30/2014	Completed	Collection of physical habitat data under published protocols at sites 41-50.
I. Conduct annual training and group rapid assessment calibration	6/1/2015	7/15/2015	Active	Training will involve providing the data collection tools to a group of local experts and assessing a few sites in order to make sure that the consensus ratings are within 1-2 tenths on the 0-4 scoring criteria used to populate the EDT model. Experts from monitoring and habitat subdivisions of the Colville Tribes, IFCI consultants, ONA biologists, and others experts knowledgeable about Okanogan River aquatic and terrestrial habitats will be involved in this training and only trained individuals will be allowed to conduct further assessments. This effort is expected to take one week and involve extensive debate in order to calibrate all data collectors and get regional buy in from local experts.
J. Physical Habitat Surveys of about 20 sites	7/1/2015	7/31/2015	Active	Collection of physical habitat data under published protocols at sites 1-20
K. Conduct annual rapid assessment work	7/15/2015	9/30/2015	Active	Conduct rapid assessment at 35 EDT reaches that do not contain any existing OBMEP habitat sites or EDT reaches that are poorly characterized by the randomly selected OBMEP habitat site. These sites will be revisited every 4 -years to update the EDT model prior to each subsequent model run.
L. Physical Habitat Surveys of about 20 sites	8/1/2015	8/31/2015	Active	Collection of physical habitat data under published protocols at sites 21-40.
M. Physical Habitat Surveys of about 10 sites	9/1/2015	10/30/2015	Active	Collection of physical habitat data under published protocols at sites 41-50.
Deliverable: N. Physical habitat data from 50 sites annually		2/28/2016	Active	*See the Deliverable Specification above*

G: 157. Collect/Generate/Validate Field and Lab Data

Title: Water quality and quantity data needed to evaluate salmonid habitat status and trends

Description: Water quality data will be collected at one site in each of the subwatersheds plus areas of the main-stem that support anadromous fish throughout the Okanogan River Basin. Most of these locations already have some form of data collection and our effort is designed to enhance existing efforts to make sure no duplication of effort occurs. We will focus on coordinating the efforts of WDOE, USGS, and the Colville Tribes as the primary players that collect this information, and work with others as needed. Over the last few years, WDOE has reduced water monitoring to a single gauge on Bonaparte Creek. USGS collects real-time discharge at several locations along the mainstem Okanogan River and through cooperative agreements and several funding sources the ColvilleTribes expanded the USGS discharge monitoring effort to include or replace lost gauges on Loup Luop, Salmon, Omak, Antonie, and Johnson Creeks and maintained our existing efforts on to collect real-time water temperature at all mainstem Okanogan River USGS gauging sites and discharge on Nine-mile Creek. After our supplemental outside funding agreements end we will collaborate to collect discharge data in house and publishing these data at the USGS web page. Training for this transition will occur in 2014 and 2015. Temperature data loggers will be deployed and retrieved from all EMAP sites within the tributaries to account for longitudinal changes within each subwatershed. Water quality data will be collected at least one location and include dissolved oxygen, turbidity, ph, conductivity, and alkalinity. The frequency of this data collection will be determined as time and resources allows but it is hoped this will occur at least once every 6 weeks at a minimum. To meet needs for discharge data in Canada, piezometers that can detect pressure will be used to establish stage data at all subwatersheds where anadromous fish exist but discharge is not currently being collected, and a temperature data logger will be placed at these same sites thus linking discharge and temperature data.

Estimated level of effort: 1.21 FTEs/year
Subcontract with USGS and water survey Canada for stream gauging of temperature and discharge.

Deliverable Specification: Collect, verify, and post discharge and temperature data at WDOE, USGS, and Environment Canada real-time gauging stations throughout the Okanogan Basin using satellite up links. This project provides support for both real time discharge and water temperature data through Environment Canada at Inkaneep Creek and real-time water temperature data at USGS stations located along the Okanogan River mainstem at Oroville, Tonasket, and Malott, WA. The USGS gauging station located on Nine Mile Creek is solely funded through this effort.

These data are accessible through the following web-sites;

USGS: http://waterdata.usgs.gov/wa/nwis/rt
Environment Canada: http://scitech.pyr.ec.gc.ca/waterweb/selectProvince.asp
WDOE: http://fortress.wa.gov/ecy/wrx/wrx/flows/station.asp?sta=498070

Water quality data collected by the Colville Tribes will be archived and used for EDT model runs every 4 years. These data will be combined with other habitat data to populate the EDT model and produce a technical report in 2013, then again in 2015, and every four years thereafter. Temperature data is being archived and a specific temperature reporting tool is being developed for the web. We hope to complete this effort in late 2014 or early 2015. Temperature data will be collected continuously (once per hour) from October 1 to September 30 of a given water year at annual and rotating panel, tributary EMAP locations, at stage monitoring sties, and at USGS sites along the Okanogan River main-stem. Beginning in October, data loggers will be moved to the next year's rotating panel sites. Data loggers will be monitored and downloaded 3-times per year (after winter ice is gone, after the spring freshet, and at the end of the water year). The original 50 EMAP sites were reduced to between 33 and 37 per panel (60 over the 2-year contract period) after reviewing long-term data sets collected along the Okanogan River main-stem (2004 annual report). These data showed that little additional information would be gained by collecting this data at multiple sites along the main-stem beyond what has been collected at already established monitoring sites.

Planned Metrics:
* Primary R, M, and E Focal Strategy : Tributary Habitat
* Primary R, M, and E Type : Status and Trend Monitoring
* Secondary R, M, and E Type : Uncertainty Research

Locations: 60

Primary Focal Species: Steelhead - Upper Columbia River DPS

Country:	Multiple	**NPCC Subbasin:**	OKANOGAN
State:	Multiple	**HUC5 Watershed:**	Multiple
County:	OKANOGAN	**HUC6 Name:**	Multiple

Salmonid ESUs Present: Outside legal CKUCS (Upper Columbia River Spring-run Chinook Salmon ESU) boundary (<multiple>) | Outside legal STUCR (Upper Columbia River Steelhead DPS) boundary (<multiple>) | Upper Columbia River Steelhead DPS (<multiple>)

Data Repositories: Okanogan Basin Monitoring & Evaluation Program (OBMEP) website (http://www.colvilletribes.com/obmep_project_data.php)

Protocol: Okanogan Basin Monitoring & Evaluation Program - Water Quality Sampling v1.0

Protocol Owner:	John Arterburn	**Protocol State:**	Published

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Environmental compliance requirements complete	3/1/2014	3/2/2014	Completed	On-the-ground work associated with this work element cannot proceed until this milestone is complete. Milestone is complete when final documentation is received from BPA environmental compliance staff (completion can be based on pre-existing environmental documentation from BPA).
B. Review, revise, and Publish protocol, study design, and methods in monitoringmethods.org	3/1/2014	3/2/2014	Completed	The Protocol (including temporal and spatial design) and Methods for this work element are stored at monitoringmethods.org and need to be finalized (i.e., "Published" through monitoringmethods.org), preferably prior to data collection. Preparations for contract renewals must include reviewing any previously published Protocols/Methods to ensure that they are consistent with how work will be done in any subsequent contract.
C. Develop agreements with Environment Canada and USGS to operate and maintain gauging stations	3/1/2014	6/28/2014	Completed	Develop the contract or agreements to operate, maintain, and post water quality gauging data for both temperature and discharge in the Okanogan drainage.
D. Collect and post data collected at WDOE, Environment Canada and USGS gauging stations	3/1/2014	2/28/2016	Active	All data collected by DOE, Environment Canada, and USGS gauging stations with cost share from this program will be posted to the world wide web as part of the cost share.
E. Collect data, and calculate discharge for multiple tributaries in the Okanogan River Basin	3/1/2014	2/28/2016	Active	The Colville Tribes have found cost share dollars to take over data collection efforts at historic WDOE discharge sites (abandoned due to budget cuts) on Omak, Antoine, and Johnson creek subwatersheds plus installed additional sites on Salmon and Loup Loup creeks within the Okanogan River Basin. The Colville Tribes have partnered with USGS to bring multiple users these data though the web and in near real time. In future contracts, much of this contracted work will be carried out by OBMEP staff while still providing data of a high enough standard to be published by USGS and hosting on the web for all to use.
F. Ensure each anadromous fish-bearing subwatershed has baseline stage and temperature data	3/1/2014	2/28/2016	Active	Continuous baseline stage height and temperature sites along with water quality data (collected on average once every 6 weeks) related to alkalinity, turbidity, conductivity, Ph, and dissolved oxygen will be collected at least one site per anadromous fish-bearing subwatershed throughout the Okanogan River Basin, as resources allow.
G. Download temperature data collected from deployment to spring thaw	3/1/2014	4/30/2014	Completed	Data will be downloaded from electronic data logger after ice is completely gone in the spring to protect against data lost from equipment malfunction or loss.
H. Download temperature data after discharge returns to post freshet levels	5/1/2014	8/30/2014	Completed	Data will be downloaded from electronic data logger after spring freshet discharges approximates return to a typical low flow pattern.
I. Deploy, Download, and calibrate temperature data loggers	9/1/2014	10/1/2014	Completed	Data will be downloaded from electronic data logger at the end of each water year and loggers will be tested for accuracy before being redeployed at new panel sites or for another year at continuous sites.
J. Download temperature data collected from deployment to spring thaw	2/1/2015	4/30/2015	Active	Data will be downloaded from electronic data logger after ice is completely gone in the spring to protect against data lost from equipment malfunction or loss.
K. Download temperature data after discharge returns to post freshet levels	5/1/2015	8/30/2015	Active	Data will be downloaded from electronic data logger after spring freshet discharges approximates return to a typical low flow pattern.
L. Deploy, Download, and calibrate temperature data loggers	9/1/2015	10/31/2015	Active	Data will be downloaded from electronic data logger at the end of each water year and loggers will be tested for accuracy before being redeployed at new panel sites or for another year at continuous sites.
Deliverable: M. Water quality and quantity data		2/28/2016	Active	*See the Deliverable Specification above*

H: 119. Manage and Administer Projects

Title: Manage Projects: produce necessary documents, estimates, and personnel managment

Description:

Manage Projects: produce invoices, accrual estimates, develop contracts, etc.

This task will be an on-going necessary expense related to project management that includes time for staff to hire and administer subordinate employees, to better track progress of individual tasks, products, and expenses and to help facilitate numerous subcontracts that help produce deliverables for the scope of work. Costs include only the direct expenditures by project staff and office expenses directly related to this project and needed for the execution of this SOW.

In addition, development of reporting documents such as invoices, budgets, SOW documents, office space expenses, and O&M of facilities and equipment is also included to cover the needs of this project and the people that it supports. There are also costs related to utilities and communications essential to the needs of this project.

Estimated Level of Effort: 0.43 FTE's/year

Deliverable Specification:

BPA project administration requirements (includes contract package (SOW, budget, and property inventory), metrics and locations report, financial income report, and accrual reports. All of the above components need to be completed by their due dates.

Invoices, accrual estimates, SOW package, purchase orders, employee records etc. - Maintain files to include copies of sub-contracts, hours by staff, purchase orders for necessary items. Complete processing of accounts payable, invoices, employee hiring packets, and subcontracts as needed to complete tasks identified in this scope of work.

Maintain and improve the working environment for all employees working under this contract, pay direct costs such as telephone and utilities, office rent, and maintenance; provide office furniture, telephones, and computers needed to complete specific tasks identified in the SOW but not specifically identified under another deliverable.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Begin drafting contract renewal documents and conduct internal review as needed	9/1/2015	10/1/2015	Active	Your statement of work, line-item budget, and (if required) property inventory for your next contract are due to BPA at least 5 months prior to the contract start date (longer if your internal processes require more time to get the contract signed and in place prior to the start date).
B. Submit contract renewal package (SOW, Excel budget, property inventory) to BPA COTR	10/1/2015	10/30/2015	Active	Once your statement of work (SOW) in Pisces is complete, and you have attached your line-item budget (LIB) and property inventory (PI) (if required), click the “Submit” button on the SOW tab to notify your COTR the package is ready for review.
C. Address comments and revise SOW, LIB, and PI as needed to get BPA manager approval	11/1/2015	12/31/2015	Active	Once your COTR and his or her BPA manager have reviewed your contract renewal package and returned any comments to you, you will need to provide responses and changes as needed to achieve approval from the BPA manager, who will then forward the package to the Contracting Officer. This should be completed at least two months prior to the next contract start date, but may need to be 3 or 4 months depending on your internal processing time for contract signatures. If you have subcontracts that need to be signed prior to the contract start, it should be a minimum of 4 months.
D. Return signed contract to BPA’s Contracting Officer within 30 days	1/1/2016	2/28/2016	Active	Respond to the CO and COTR indicating any problems with the contract within 20 days, or return the signed contract to the BPA Contracting Officer (CO) within 30 days.
E. Submit final invoice for prior contract within 90 days to facilitate contract closeout	3/1/2014	6/1/2014	Completed	Within 90 days of the last day of the PRIOR contract, the contractor shall issue a final invoice. In instances where more than 90 days is needed (e.g., because subcontractors have not invoiced), the contractor shall: 1. review records, 2. estimate all outstanding costs, and 3. provide BPA with a single, cumulative estimate of all completed, but uninvoiced work. This amount shall be emailed to FWinvoices@bpa.gov and the COTR.
F. Accrual - Submit September estimate to BPA	8/10/2014	9/10/2014	Completed	Provide BPA with an estimate of contract work that will occur prior to September 30 but will not be billed until October 1 or later. Data must be input in to Pisces by September 10 (begins Aug 10, ends Sep 10).
G. Facilitate inputting Cost Share information into Pisces at the Project level	11/1/2014	11/15/2014	Completed	Enter previous federal FY’s Cost Share information on the Project’s Cost Share tab by Nov 15.
H. Keep acurate reccords and support of data aquistion work elements	3/1/2014	2/28/2016	Active	Administrative and clerical support for this project.
I. Accrual - Submit September estimate to BPA	8/10/2015	9/10/2015	Active	Provide BPA with an estimate of contract work that will occur prior to September 30 but will not be billed until October 1 or later. Generally, this should be done by September 10.
Deliverable: J. A properly administered project and other deliverables as stipulated by BPA		2/28/2016	Active	*See the Deliverable Specification above*

I: 191. Watershed Coordination

Title: Project coordination/public outreach

Description:

OBMEP was developed under a regional Monitoring and Evaluation scheme involving coordination with multiple entities to ensure that all M&E efforts are compatible throughout the Columbia Basin and the region. The Okanogan subbasin is a trans-boundary watershed and therefore coordination with Canadian entities will be necessary. Coordination with multiple entities will be necessary as region-wide M&E efforts continue to evolve.

The experimental design for OBMEP requires 125 sampling sites (85 U.S., 40 Canadian), randomly selected throughout the Okanogan watershed. As many of these sites fall within areas of private ownership, landowners must be contacted (public outreach) and access granted before field crews can conduct surveys. In prior years, landowners were contacted and permission granted as necessary to access the annual sites surveyed. Landowners will be contacted annually to secure access to each year's panel sites or any replacement sites necessitated by changes in landowner or permission status on other sites.

Support of OBMEP web site and workshop/conference attendance
Workshops and conferences are periodically held by the Upper Columbia Salmon Recovery Board, American Fisheries Society, EPA, PNAMP, and other entities within the Columbia Basin. These workshops and conferences offer an important forum for information exchange between fisheries scientists. OBMEP biologists will attend these events only when requested to give formal presentations about OBMEP in an attempt to disseminate data collected. The dissemination of data to interested parties will primarily be done through the use of web based efforts. However, OBMEP biologists will provide presentations related to our data as requested.

Subcontract with ONA to provide support as needed in Canada
Estimated Level of Effort: 0.35 FTEs/year

Deliverable Specification:

OBMEP biologists will contact and coordinate directly with other entities performing M&E related activities within the region to ensure compatibility with other regional M&E and salmon recovery efforts. Private landowners will also be contacted under this task so that OBMEP field personnel may gain access to sampling sites. Landowner contacts and other coordination activities will be documented as part of the annual reporting WE. Additionally, OBMEP biologists will prepare and post material to our web-site and make professional presentations and disseminate summarized data to interested parties as requested.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Attend local and regional meetings to conduct watershed coordination	3/1/2014	2/28/2016	Active	Conduct coordination with regional M&E entities. We anticipate at least two meetings per month. Regular attendance at Upper Columbia Regional Technical Team and Upper Columbia Annual Pre-season Field Coordination meetings. Occasional travel to attend meetings of the Pacific Northwest Aquatic Monitoring Partnership (most meetings will be monitored via conference call). Within-basin coordination meeting with Okanogan Nation Alliance and other agencies as needed but at least quarterly.
B. Contact landowners for rotating panel to be sampled in 2014	3/1/2014	6/30/2014	Completed	Contact private landowners to secure or maintain permission for OBMEP sampling sites.
C. Contact landowners for rotating panel to be sampled in 2015	3/1/2015	6/30/2015	Active	Contact private landowners to secure or maintain permission for OBMEP sampling sites.
D. Update and maintain web page and content	3/1/2014	2/28/2016	Active	This is an ongoing effort to make sure that the OBMEP web page remains updated and relevant.
E. Attend practitioner's workshops and other meetings	3/1/2014	2/28/2016	Active	OBMEP biologists are requested to be part of various workshops held throughout the year and we try to attend when requested. Other meetings include regular regional efforts that are supported by BPA such as PNAMP and the Coordinated Assessment, etc.
F. Attend RTT, Bilateral Okanogan workshop, and other regional RM&E meetings	3/1/2014	2/28/2016	Active	More locally driven meetings and workshops include but are not limited to Upper Columbia Regional Technical Team, Bilateral Okanogan Basin Technical Working Group, and Osoyoos Board of Control Fisheries Advisory Group, etc.
Deliverable: G. Coordination efforts described in annual report, conferences attended, and web site maintained		2/28/2016	Active	*See the Deliverable Specification above*

J: 160. Create/Manage/Maintain Database

Title: Manage, maintain, and expand the OBMEP database

Description:

To summarize data management activities to date, a database for this project has been in development since late 2005 to support ongoing collection of field data in the Okanogan basin and conduct limited status and trend analysis. The sampling protocols have mostly been defined but data analysis questions remain for future development. Input routines have been improving at a steady rate and continue to evolve and many output queries have been built but more work is needed especially in regards to automating of reports.

From 2005-2010, we have been building a tool that has served to mainly archive our existing data. Beginning in 2011 we began to move the database to the forefront of our monitoring efforts. As the data system evolves, we hope that users can spend more time conducting analysis and less time collecting and managing these data. In the future, we hope these tools will have evolved to the point of greatly eliminating the need for paper reports by providing web accessible reporting tools.

Data auditing is an important step in our QA/QC efforts and should occur annually as part of the maintenance of a database system. Our efforts are closely linked to the Upper Columbia Salmon Recovery Board and NOAA Fisheries regarding data roll-up to larger scales. Migration of data to larger scales will mostly occur through the regional data steward and coordinated assessment efforts underway at the regional scale.

Subcontracts will provide specialized technical resources for hosting and maintaining access by multiple entities, constructing software solutions, and database development; the Colville Tribes are responsible for data auditing and inclusion from data collection work elements as well as needed data reporting and analysis.

Estimated Level of Effort: 0.47 FTEs/year with considerable subcontracting effort.

Deliverable Specification:

Input and manipulation of OBMEP data from 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, and 2015 field collection and critical historical data from other sources identified by the Colville Tribes and other agencies working in the Okanogan sub-basin into the developed database. In addition, the primary OBMEP database will require hosting, connectivity solutions, modifications, updating, and auditing to maintain the integrity of the database and effectively assimilate collected data and make these data available to outside interests.

On-going operational maintenance is required because most computer systems and technology evolve and so must this database to keep pace. Enhanced web-accessible reporting tools and security interfaces will help to fulfill technical reporting needs into the future.

Copies of the OBMEP database are currently secured at four locations: one being held at Sitka Technologies in Portland Oregon; one at Summit Environmental in Vernon, BC; one held with the Upper Columbia Salmon Recovery Board located in Wenatchee, WA; and one held onsite at the OBMEP office located near Omak, WA.

Data Repositories:

Okanogan Basin Monitoring & Evaluation Program (OBMEP) website (http://www.colvilletribes.com/obmep_project_data.php)

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Refine OBMEP data read/write requirements and workflows	3/1/2014	5/30/2014	Completed	Define all the data inputs (writes) and data outputs (reads) required by Colville staff and their partners such as the Okanogan Nation Alliance, Summit Environmental, and Quantitative Consultants Inc. This work element ensures there is time up-front in this contract dedicated to delineating and documenting these needs, and identifying any constraints or obstacles before working on the next few work elements. Sitka will start with the requirements documentation already done by Jennifer Miller.
B. Develop general query access to OBMEP data	3/1/2014	6/30/2014	Completed	Using a development copy of the OBMEP database, provide a set of web pages (e.g. a small web application) that gives people the ability to query, view, and download OBMEP monitoring data. This work will likely involve leveraging the work already done to create the Habitat Desktop Program, a windows-based application (Microsoft .NET Clickonce application that uses Entity Framework 5 and a third party library called DevExpress). The goal of this work element is to provide similar or improved functionality, but via a set of web pages that can be run from anywhere via any web browser. During earlier requirements and workflow analysis (see earlier work element), Sitka will better understand current needs for such querying and viewing. Sitka also anticipates identifying ways to improve upon the current functionality, including ways to leverage functionality already provided in other applications and tools that Sitka has developed such as champmonitoring.org and monitoringresources.

Milestone Title	Start Date	End Date	Status	Milestone Description
C. Provide role-based access to monitoring data via web services	3/1/2014	9/30/2014	Completed	Using a development copy of the OBMEP database, write and maintain web services that allow multiple organizations to read and/or write data to the OBMEP database. This data access approach will replace the current mechanism whereby external systems or "clients" must have VPN access to Colville's network in order to send or receive data to/from the OBMEP database. These web services will subsequently be implemented/exercised by remote/external applications and other systems so that data access is provided over standard internet protocols (e.g. HTTP, HTTPS), resulting in a more open and scalable architecture. Sitka understands that Colville OBMEP staff and Okanagan Nation Alliance need write access; whereas other partners such as Summit Environmental Consultants and Quantitative Consultants only need read access. The needs of partners working on Coordinated Assessments are yet to be determined.
D. Set up automated backup/restore job	3/1/2014	10/31/2014	Completed	Sitka will work with Colville staff to set up an automated backup and restore of the OBMEP database such that Colville staff can query a local copy of the database that runs within their network. This automated job will run on a frequency defined by Colville staff (e.g. daily, weekly, etc.). Sitka understands that something similar might already be in place that Sitka would review and potentially leverage (there's a database running at Chief Joseph Hatchery that is provided to Summit Environmental via a backup/restore job). Colville staff may treat this local database as a test environment where they can modify the schema, add new data, and create new test reports and analyses. If Colville staff determines such modifications are necessary and good, Sitka will deploy those modifications on the production server (this tentative work to be handled under different work elements). Set up a periodic backup job for the production OBMEP database running at Sitka and make it available via a secure mechanism for external consumers (e.g. via secure FTP or the like).
E. Training and support	3/1/2014	2/28/2016	Active	Training and support of CCT staff in the proper application of OBMEP field protocols, use of database tools, hand-held data collectors (Trimble), and data migration from web sites and to data archives.
F. Modify and update database as needed	3/1/2014	2/28/2016	Active	Databases are not simply created; they evolve, and over time we need to adjust and change our database to meet constantly changing needs. During 2014 and 2015, this work will primarily focus on external connectivity and web hosting to increase the accessibility of our data by outside interests and expanding our dashboard interface to improve ease of navigation and security of the OBMEP database.
G. Develop customized output routines	3/1/2014	2/28/2016	Active	Queries need to be written before useful data can be extracted from the database. Additionally databases have the ability of automating reports but these will need to be developed to ensure they meet the needs of a wide variety of users. During 2014 and 2015, we will continue building a dynamic reporting tool to improve access to our data by more people.

Milestone Title	Start Date	End Date	Status	Milestone Description
H. Modify field device software to use new web service calls	4/1/2014	10/31/2014	Completed	Work with appropriate people to modify the software currently running on Trimble Yuma devices to use the newly provided web services to read/write data to the OBMEP database. BACKGROUND: Sitka understands this application is a .NET Clickonce application that relies on Entity Framework and SQL Server Express running on the Yuma itself. Sitka further understands that this application uses the SQL deployment package (Microsoft DAC) to create a local “Habitat” database and also maintains a connection to a SQL server that is expected to be on the same logical network as the Yuma device (i.e., requires a VPN connection to the Colville network if the Yuma device is not physically connected to the Colville network already). It appears that the software running on the Yuma synchronizes (using Microsoft’s SQL Synchronization libraries) with the OBMEP database before being deployed to the field. It also appears that this synchronization can be initiated by the user when returning from the field (after having collected data that needs to be sent back to the OBMEP database). Authentication services will be required to protect data stored in the OBMEP database from unauthorized destruction or disclosure via these public web services. Sitka maintains and operates an identity provider named Keystone that provides secure, single signon capabilities among monitoringmethods.org, monitoringresources.org, and champmonitoring.org to name a few. Our recommendation is to integrate Keystone Identity Provider services into the Yuma application when access to protected data in the web services are required. This same authentication mechanism could be used for the web site described in work element B. Sitka normally charges clients $175 / month for access to Keystone, but is willing to waive these charges for the first year of development. This work element covers the effort required to modify the application code running on the Yuma devices by removing the current mechanism for sending and receiving data and replacing it with web service method calls. Currently it is not clear if it would be more cost effective to have Sitka developers make these code modifications, or to ask the developers (Summit Environmental) who wrote the application to do it. If the latter, Colville staff could coordinate the effort, or Sitka is open to being the "general contractor" and sub-contracting with Summit, assuming they are open to that type of arrangement.
I. Manage and host OBMEP database	10/1/2014	2/28/2016	Active	Complete application hosting, monitoring, managment, and Tier I support desk support for Colville's OBMEP database from 10/1/14 - 2/28/15 and then from 3/1/15 - 2/28/16. Budget is based on standard Sitka Application Management & Hosting Service of $495 per month. The October start date coincides with Sitka-hosted database becoming the system of record, but we'll start hosting a development copy of OBMEP by April. Sitka will waive the $175/mo fee for Keystone authentication and identity management service for the first year, but add it starting 3/1/15.
J. Integrate monitoring location metadata into Monitoring Explorer	11/1/2014	2/28/2015	Active	The BPA RM&E data management strategy recommends integrating regional monitoring data systems into the Monitoring Explorer, which is a free tool in Monitoring Resources that allows monitoring location metadata from multiple agencies and over all time to be queried, visualized, and downloaded. Sitka is contracted to build the infrastructure necessary to accept monitoring location data from multiple programs via the monitoring metadata exchange standard (MMX) and integrate this data into the Monitoring Explorer. Since under this SOW, the OBMEP database will be co-located with the Monitoring Resource system, this work element covers the nominal work required to develop automated data feeds of OBMEP location data into the Monitoring Explorer.
K. Recommend QA process	11/25/2014	2/28/2015	Active	Sitka will evaluate Colville's QA tools including the desktop app Summit has provided to view raw data, review their existing QA rules, scope effort to integrate CHAMP's QA tools (including TrueTemp), and make final recommendation for improving OBMEP's QA processes.

Milestone Title	Start Date	End Date	Status	Milestone Description
L. Implement and support Coordinated Assessment Data Exchange	1/1/2015	2/28/2016	Active	Since the OBMEP database will reside at Sitka, the technical aspects of integrating OBMEP's data into the Coordinated Assessment exchange will be convenient and direct. This estimate assumes a modest level of analysis/database analyst support to map fields from the exchange standard to fields in the OBMEP database and resolve any uncertainties. The timing of this effort is uncertain since work continues on refinement of the Coordinated Assessment data exchange standard, which is a prerequisite work effort.
M. Implement QA process recommendations	3/1/2015	2/28/2016	Active	Sitka will leverage CHAMP's QA tools wherever possible (including TrueTemp) to improve OBMEP's QA processes.
N. Enhance query access to OBMEP data	3/1/2015	2/28/2016	Active	An iterative process between Sitka and OBMEP staff will be used to develop new database capacity and web pages collectively by development of a prioritized list of enhancements and new functionality that will be implemented. Sitka anticipates this list will include adding capabilities: * to review additional types of measurement data, * to directly update measurement values (while maintaining an audit trail of changes), * to provide views or displays for visualizing measurement data, * to automatically calculate metrics from raw measurements, * to routines/logic that help human reviewers find potential data issues or anomalies. Sitka will execute the opportunities identified to improve upon the current functionality. This could include functionality from champmonitoring.org and monitoringresources.org -- applications and tools Sitka has or will develop.
Deliverable: O. Input this year's data, plus hosting, modification and auditing of our database		2/28/2016	Active	*See the Deliverable Specification above*

K: 162. Analyze/Interpret Data

Title: Analyze collected and historical data

Description:

Data gathered by the Colville Confederated Tribe and other agencies and individuals working in the Okanogan Basin will be synthesized and interpreted to confirm that all crucial data is being collected and that we will be able to draw conclusions from these data once a long-term data set is established. Additional analysis will occur as part of the various technical reports written as time and resources allow. Automation work on database functions will be coupled to analytical routines wherever possible in order to minimize calculation errors and increase efficiencies when calculating repetitive values.

Habitat data will be analyzed collectively using the EDT model to incorporate multivariate data analysis into our reporting structure every 4 years, or more often if needed to inform management needs such as the BiOp or expert panel process. In addition, important individual indicators will be analyzed when they are considered locally important. For example, when it comes to analyzing temperature data we will consider the biological needs of the specific species of salmonid and life history stage involved. Because the needs of a fall spawner and spring spawner are temporally different, they experience temperature issues differently. Summer steelhead for example are more likely to be affected by water temperatures in the spring and early summer resulting in losses to eggs or juveniles. Trend data will be identified based on the species and life history involved, along with status temperature at a given site in order to determine thresholds (e.g., LC50 for summer steelhead during incubation is 18 degrees and below Zosel Dam, this threshold is violated regularly so trends will look at the number of days in May and June that this threshold is violated each year plotted and a linear regression fitted to determine if this trend is improving or getting worse, and if so, at what rate). This is only one example but each data type will be considered in a similar context to apply biologically meaningful trends to each data set that provide important information for how environmental changes are affecting salmonids over time.

Adult abundance data are collected from the multiple sources using multiple methods. Once collected, these data must be combined with additional biological data to calculate total escapement into each subwatershed, origin portions, distribution, run timing, and cohort strength and how each of these change over time. These data will also be used to compare with adult PIT tag return data collected throughout the basin to determine if PIT tagged adults represent a comparably accurate and less expensive approach to determining abundance, origin, sex ratio, and cohort age at the subwatershed scale.

Data analysis frameworks for evaluating juvenile production estimates are currently under consideration. Most of these data will be collected using standing crop methods while inserting PIT tags into these fish for estimations of emigration upon subsequent recaptures. Various data analysis approaches will be considered as these data are collected and results can begin to be evaluated.

Estimated Level of Effort: 0.60 FTEs/year.

Deliverable Specification: Synthesize collected data over time to evaluate trend characteristics for inclusion in future technical reports or manuscripts.

Planned Metrics:

* Primary R, M, and E Focal Strategy : Population Status
* Primary R, M, and E Type : Status and Trend Monitoring
* Secondary R, M, and E Type : Action Effectiveness Monitoring
* Secondary R, M, and E Focal Strategy : Tributary Habitat

Locations:

Primary Focal Species: Steelhead - Upper Columbia River DPS

Country:
State:
County:
Salmonid ESUs Present:
NPCC Subbasin:
HUC5 Watershed:
HUC6 Name:

Data Repositories: Okanogan Basin Monitoring & Evaluation Program (OBMEP) website (http://www.colvilletribes.com/obmep_project_data.php)

Protocol: Okanogan Basin Monitoring & Evaluation Program - Juvenile Abundance - Mark-Recapture v1.0

Protocol Owner: John Arterburn **Protocol State:** Draft

Area of Inference: Error: Subreport could not be shown.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Review, revise, and Publish protocol, study design, and methods in monitoringmethods.org	3/1/2014	3/2/2014	Completed	The Protocol (including temporal and spatial design) and Methods for this work element are stored at monitoringmethods.org and need to be finalized (i.e., "Published" through monitoringmethods.org), preferably prior to data collection. Preparations for contract renewals must include reviewing any previously published Protocols/Methods to ensure that they are consistent with how work will be done in any subsequent contract.
B. Analyze habitat monitoring data using EDT for the period from 2009-2013	3/1/2014	2/28/2015	Active	Water quality, water quantity, and Habitat data collected from the Okanogan basin will be analyzed through the Ecosystem Diagnostic and Treatment (EDT) model. The EDT model provides a means to examine potential salmonid productivity and capacity of a given system. Analysis is made at different scales, from reach to tributary and total watershed. With multiple years of data collected at annual and panel habitat sites, we are able to examine changes in habitat and examine which factors are limiting recovery of salmonids at specific life stages. Following the model run, a technical report will be completed in early 2013 and another in early 2015, thereafter for each four years of data using EDT models to synthesize these data. Once finalized, these technical reports will be posted to BPA and OBMEP web sites.
C. Analyze data on returning adult steelhead 2014	6/1/2014	2/28/2015	Active	Data taken from underwater video stations, redd surveys, PIT tag detections, and weir traps will be analyzed in conjunction to create a yearly (2014) steelhead escapement estimation for the basin as a whole. Individual sub-watersheds within the Okanogan basin will be analyzed independently, where appropriate data exists to do so. After the data has been analyzed, it will be compiled into an escapement and spawning distribution report as well as included in the progress (annual) report. The data is kept in a multi-year excel spreadsheet for continuing analysis dating back to 2005.
D. Analyze data on returning adult steelhead 2015	6/1/2015	2/28/2016	Active	Data taken from underwater video stations, redd surveys, PIT tag detections, and weir traps will be analyzed in conjunction to create a yearly (2015) steelhead escapement estimation for the basin as a whole. Individual sub-watersheds within the Okanogan basin will be analyzed independently, where appropriate data exists to do so. After the data has been analyzed, it will be compiled into an escapement and spawning distribution report as well as included in the progress (annual) report. The data is kept in a multi-year excel spreadsheet for continuing analysis dating back to 2005.
E. Look into data analysis techniques for analyzing PIT tag data from both juveniles and adults	3/1/2014	2/28/2015	Active	Evaluate multiple techniques for evaluation of PIT tag data.
F. Determine the feasibility of calculating tributary-specific out-migrant estimates using PIT tags	3/1/2014	2/28/2016	Active	Beginning in 2012, OBMEP crews began PIT-tagging age 1+ steelhead in tributaries to the Okanogan River with permanent PIT-tag interrogation sites. We will test if a viable population estimate of out-migrating steelhead can be estimated based upon recaptures of PIT-tags. Testing of array efficiency and tag retention will also be a part of these tests. The desire here is to be able to estimate smolt production of natural origin steelhead in a more efficient manner than using rotary screw traps.
Deliverable: G. Summaries of collected data will be provided in annual and technical reports		2/28/2016	Active	*See the Deliverable Specification above*

L: 141. Produce Other Report

Title: BiOp RPA and other technical reports

Description:

The data collected by this project are placed in a database and made public to other users upon request. However, most people find technical reports that summarize and interpret these data to be of more use than the raw data. Therefore, taking the time to compile and write reports of use to management agencies is a natural product of data collection. With our reports, we hope to help inform both biologists and policy professionals involved with salmon mitigation, restoration, and recovery. To that end, we will produce reports designed to help inform the federal BiOp for the Columbia River and more specifically the Upper Columbia summer steelhead ESU related to the "expert panel process."

Our reports will also focus on informing local agencies involved with implementation of salmon recovery and habitat restoration actions specifically in the Okanogan River subbasin. We will attempt to help inform agencies as to what limiting factors to address for each life stage and where to locate these actions. Our data will also be useful in evaluating or prioritizing these actions and provide retrospective information linking locations where habitat changes occur with in fish population data.

Submit BiOp RM&E Report in Taurus for Calendar Year 2014 and 2015. Projects that have claimed that they support one or more RM&E RPAs (i.e., RPAs 50-73) under the FCRPS BiOp are required to report their results. To facilitate the summary of these results across the entire Columbia River Basin, and to provide more clarity as to the format required under the BiOp, separate BiOp reports are now required to be completed online. If desired, the required information can be prepared in MS Word, and be pasted into Taurus.

The online BiOp RPA report in Taurus (www.cbfish.org) should include the data, analyses, and data management completed by your project by December 31st. Any activity after the last day of the Calendar Year should be included in a subsequent BiOp report. For example, if you have completed redd surveys, but have not completed the analyses, you will report the preliminary data (# of redds). You do not need to rush your analyses; they may be reported in the subsequent RPA report.

For each RPA, follow the directions in Taurus for each of the three sections and, as appropriate, input graphical or tabular data, accompanied by explanatory text. These are cumulative summary reports and should show relevant results for the life of your project. Each year, note trends and whether they are changing from one year (or groups of years) to the next.

Estimated level of Effort: 0.37 FTEs/year.

Deliverable Specification:

In FY2014 we plan to work on completing the the following reports;

2014 Annual Summer steelhead adult abundance report
BiOP RPA reporting through Taurus

In FY2015 we plan to work on completing the the following reports;

2015 Annual Summer steelhead adult abundance report
EDT habitat status and trend report for the period from 2009 through 2013.
BiOP RPA reporting through Taurus

Other report may be produced as time and resources allow.

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Okanogan Basin EDT habitat status and trend report 2009-2013	3/1/2014	2/28/2015	Active	This report is the culmination of several years of intensive testing, planning , data collection, and reporting tool development. This report be the first to determine trends compared to the 2009 baseline established in 2013 for the Okanogan River basin.
B. BiOp RM&E Projects: RPA reporting – attend training	3/1/2014	1/15/2015	Active	BiOp reporting requirements are new and somewhat complicated. Review all documentation and training materials in preparation for creating the RPA BiOp report in Taurus: http://www.cbfish.org/Content/tutorials/ Sponsor_Reporting_Procedural_Guidance_Final%202-14.docx.
C. BiOp RM&E Projects: RPA reporting – download your associated 2014 RPA questions from Taurus	6/1/2014	1/15/2015	Active	To prepare for your RPA report, go to Taurus (www.cbfish.org) and find your RPA reporting requirements (those with "Input Needed") so you will know how much time to set aside for this task.
D. Annual steelhead escapement and spawning distribution report 2014	6/1/2014	2/28/2015	Active	This report will contain summary data from the current year's (2014) steelhead escapement numbers as well as trend analysis back to 2005. Incorporated into this document will be underwater video observations, steelhead spawning surveys, PIT tag detections, and adult weir trap data. The final report will be uploaded to the OBMEP and BPA websites. It will also be included in the progress (annual) report.
E. BiOp RM&E Projects: RPA reporting - complete draft 2014 calendar year report in Taurus	9/15/2014	1/15/2015	Active	When you are done, email RMEsupport@bpa.gov and the COTR to send them your working draft in Word or to notify them to review in Taurus.
F. BiOp RM&E Projects: RPA reporting – finalize the calendar year 2014 RPA report in Taurus	1/16/2015	3/15/2015	Active	The final version is due 75 days after the end of the calendar year.
G. BiOp RM&E Projects: RPA reporting – download your associated 2015 RPA questions from Taurus	6/1/2015	8/31/2015	Active	To prepare for your RPA report, go to Taurus (www.cbfish.org) and find your RPA reporting requirements (those with "Input Needed") so you will know how much time to set aside for this task.
H. Annual Steelhead escapement and spawning distribution report 2015	6/1/2015	2/28/2016	Active	This report will contain summary data from the current year's (2015) steelhead escapement numbers as well as trend analysis back to 2005. Incorporated into this document will be underwater video observations, steelhead spawning surveys, PIT tag detections, and adult weir trap data. The final report will be uploaded to the OBMEP and BPA websites. It will also be included in the progress (annual) report.
I. BiOp RM&E Projects: RPA reporting - complete draft 2015 calendar year report in Taurus	9/15/2015	1/15/2016	Active	When you are done, email RMEsupport@bpa.gov and the COTR to send them your working draft in Word or to notify them to review in Taurus.
J. BiOp RM&E Projects: RPA reporting – finalize the calendar year 2015 RPA report in Taurus	1/16/2016	2/28/2016	Active	The final version is due 75 days after the end of the calendar year.
K. Other reports	3/1/2014	2/28/2016	Active	As time and resources allow, we will work to produce other technical reports related to such topics as steelhead juvenile standing crop or productivity, benthic macroinvertebrate composition and densities, or other topics of interest supported by the data collected under this project.
Deliverable: L. BiOp RPA report(s) completed in cbfish.org and other reports posted to web		2/28/2016	Active	*See the Deliverable Specification above*

M: 132. Produce (Annual) Progress Report

Title: Produce annual report based on tasks identified within this scope of work 1/1/2014 - 12/31/2014

Description:

The progress report summarizes the project goal, objectives, hypotheses, completed and uncompleted deliverables, problems encountered, lessons learned, and long-term planning. Examples of long-term planning include future improvements, new directions, or level of effort for contract implementation, including any ramping up or ramping down of contract components or of the project as a whole.

Progress reports must conform to BPA guidelines. See the "formatting guidelines" link at the Technical Reports and Publications page: http://www.efw.bpa.gov/IntegratedFWP/technicalreports.aspx.

If producing a manuscript for a peer-reviewed publication, use work element 183: Produce Journal Article.

Estimated Level of Effort: 0.29 FTEs/year.

Deliverable Specification:

Report will address:
- Primary data collection efforts
- Infrastructure development. deployment, and serviceability (e.g., traps, weirs, video counting systems, handheld data recorders, etc.)
- Data summaries that address the status of fish populations and habitat threats.
- Database development (from data entry through report generation).

Data summaries/presentations should be simple and focus on the items above, like % of OBMEP sites sampled, efficiency of traps and counting stations, etc. Data summaries should also illustrate how the program itself is working or needing improvement. Problems are acknowledged, learned from, and shared.

Data are compiled in a format that is useful and concise and raw-data are archived for future reference and analysis then incorporated into future technical reports.

Planned Metrics:

* Start date of reporting period : 1/1/2014
* End date of reporting period : 12/31/2014

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Confirm BPA has posted last year's progress report	3/15/2014	5/31/2014	Completed	It usually takes BPA 30-45 days to post the final version of a report. This milestone's end date should therefore be 45 days after the Deliverable milestone. You will receive an email from BPA confirming that your report has been finalized and posted to the web.
B. Internal agency/tribal review of draft	10/1/2014	11/1/2014	Completed	Submit for Colville Tribes' internal review of draft 2014 annual report.
C. Draft calendar year 2014 RM&E annual Report and email MS Word version for BPA review	11/1/2014	12/31/2014	Completed	Use to create a template for your technical Annual Progress Report. Building off last year's report, develop a draft report on RM&E and data management actions and discuss relevancy of results to the Fish and Wildlife Program. Your report should include the data, analyses, and data management completed by your project by December 31st. Any activity after the last day of the Calendar Year should be included in a subsequent report. For example, if you have completed redd surveys, but have not completed the analyses, you will report the preliminary data (# of redds). You do not need to rush your analyses; they may be reported in the subsequent report. Upon completion, email a draft to your COTR and RMEsupport@bpa.gov for BPA review of the draft. (Milestone start/end: September 15 - January 15)
D. Submit progress report for external review	11/1/2015	12/31/2015	Active	Use this milestone if the progress report requires external review.
E. Upload MS Word calendar year 2014 RM&E Technical Report	1/1/2015	3/15/2015	Active	Address BPA comments and upload Calendar Year Report into Pisces Attachments tab as an MS Word document as a "Technical, Draft." Upon completion, email draft to COTR and RMEsupport@bpa.gov (Note: This MS Word format is a change in policy. BPA staff will now convert it to a PDF). (Milestone start/end: Jan 16 - Mar 15)
F. Confirm BPA has posted the 2014 progress report	3/15/2015	5/31/2015	Active	It usually takes BPA 30-45 days to post the final version of a report. This milestone's end date should therefore be 45 days after the Deliverable milestone. You will receive an email from BPA confirming that your report has been finalized and posted to the web.
Deliverable: G. Submit Final 2014 Annual Report to BPA COTR for posting		3/15/2015	Active	*See the Deliverable Specification above*

N: 132. Produce (Annual) Progress Report

Title: Submit Progress Report for the period 1/1/2015 to 12/31/2015

Description: The progress report summarizes the project goal, objectives, hypotheses, completed and uncompleted deliverables, problems encountered, lessons learned, and long-term planning. Examples of long-term planning include future improvements, new directions, or level of effort for contract implementation, including any ramping up or ramping down of contract components or of the project as a whole.

Progress reports must conform to BPA guidelines. See the "formatting guidelines" link at the Technical Reports and Publications page: http://www.efw.bpa.gov/IntegratedFWP/technicalreports.aspx.

If producing a manuscript for a peer-reviewed publication, use work element 183: Produce Journal Article.

Estimated Level of Effort: 0.29 FTEs/year.

Deliverable Specification: Use the attachment tab in Pisces to attach your progress report. Progress reports attached in Pisces will be posted on the web.

Planned Metrics:
* Start date of reporting period : 1/1/2015
* End date of reporting period : 12/31/2015

Milestone Title	Start Date	End Date	Status	Milestone Description
A. Draft calendar year 2015 RM&E Technical Report and email MS Word version for BPA review	9/1/2015	12/31/2015	Active	Use to create a template for your technical Annual Progress Report. Building off last year's report, develop a draft report on RM&E and data management actions and discuss relevancy of results to the Fish and Wildlife Program. Your report should include the data, analyses, and data management completed by your project by December 31st. Any activity after the last day of the Calendar Year should be included in a subsequent report. For example, if you have completed redd surveys, but have not completed the analyses, you will report the preliminary data (# of redds). You do not need to rush your analyses; they may be reported in the subsequent report. Upon completion, email a draft to your COTR and RMEsupport@bpa.gov for BPA review of the draft. (Milestone start/end: September 15 - January 15)
B. Internal agency/tribal review of draft	10/1/2015	11/1/2015	Active	Submit for Colville Tribes' internal review of draft annual report.
C. Submit progress report for external review	11/1/2015	12/31/2015	Active	Use this milestone if the progress report requires external review.
D. Upload MS Word calendar year 2015 RM&E Technical Report to Pisces	1/1/2016	2/28/2016	Active	Address BPA comments and upload Calendar Year Report into Pisces Attachments tab as an MS Word document as a "Technical, Draft." Upon completion, email draft to COTR and RMEsupport@bpa.gov (Note: This MS Word format is a change in policy. BPA staff will now convert it to a PDF). (Milestone start/end: Jan 16 - Mar 15)
Deliverable: E. Submit Final 2015 Annual Report to BPA COTR for posting		2/28/2016	Active	*See the Deliverable Specification above*

Inadvertent Discovery Instructions

BPA is required by section 106 of the National Historic Preservation Act (NHPA) to consider the effects of its undertakings on historic properties (16 USC 470). Prior to approving the expenditure of funds or conducting a federal undertaking, BPA must follow the section 106 process as described at 36 CFR 800. Even though BPA has completed this process by the time an undertaking is implemented, if cultural materials are discovered during the implementation of a project, work within the immediate area must stop and the significance of the materials must be evaluated and adverse effects resolved before the project can continue (36 CFR 800.13(b)(3)). The Inadvertent Discovery of Cultural Resources Procedure form outlines the steps to be taken and notifications to be made. If the undertaking takes place on tribal lands (16 USC 470w), BPA must also “comply with applicable tribal regulations and procedures and obtain the concurrence of the Indian tribe on the proposed action” (36 CFR 800.13(d)).

Inadvertent Discovery of Cultural Resources Procedure form:
http://www.efw.bpa.gov/IntegratedFWP/InadvertentDiscoveryProcedure.pdf