EPA Puget Sound Financial and Ecosystem Accounting Tracking System (FEATS)

v. September 2012 for Lead Organization Subawardees

Photo by Rebecca Pirtle, Editor, Kingston Community News (Doe-Kag-Wats Estuary of the Suquamish Tribe)

PROJECT INFORMATION

1. Federal Grant Number	PA-00J912-01	***2a. Reporting Period Start Date:**	4/1/2018	***2b. Reporting Period End Date:**	9/30/2018

3. Subaward Organization (Name and complete address including zip code) Name: Sauk-Suiattle Indian Tribe Address 1: 5318 Chief Brown Lane Address 2: City: Darrington State: WA Zip Code: 98241-	**4. Subaward Project Manager Contact Information** Name: Scott Morris Phone: (360) 436-347 Ext: Fax: (360) 436-647 Email: smorris@sauk-suiattle.com

5a. EPA Program **LO - Tribal**	**5b. Subaward Project Title and Contract No.** Sauk-Suiattle Knotweed Eradication and Sediment Research / 14EPA PSP426	***6. Collaborating Organizations/Partners** Washington Conservation Corps U.S. Geological Survey Skagit Climate Science Consortium

<u>Subawardee Submission Instructions</u>: LO fills in the white boxes. Subawardee fills in the yellow boxes (boxes with asterisks). Refer to guidance document for how to fill out the boxes. After filling out the yellow boxes, save and e-mail it to your LO Project Manager for approval. LO will roll up the information and submit to EPA for approval.	**LO Project Manager:** Dani Madrone **LO:** Northwest Indian Fisheries Commission **Phone:** 360.528.4318 **email:** dmadrone@nwifc.org **LO Program Coordinator:** **LO:** **Phone:** **email:** **EPA Project Officer:** Lisa Chang	***7a. Name/Title of Person Submitting Report**	Scott Morris Water Quality Coordinator
		***7b. Date Report Submitted**	10/31/2018

FUNDING/COST ANALYSIS

8a. Total Assistance Amount Awarded:	$112,450.00	**8b. Funding Year (Federal Fiscal Year Funds Appropriated)**	FY 2014 ---------- ---------- ----------	***9. Amount Spent To-Date:**	$112,450.00	***10. Amount Reimbursed To-Date:**	$112,450.00
11. Match Amount Required	$0.00	***12. Total Match Amount Spent and Documented To-Date:**		***13. Have you experienced any cost overruns or high unit costs?**	No.		
***14. What issues or questions do you need the LO Project Manager to respond to?**	No issues.						

BUDGET UPDATE

	15a. APPROVED BUDGET			***15b. SPENT TO-DATE**		
	LO (EPA) Funds	MATCH	TOTAL	LO (EPA) Funds	MATCH	TOTAL
Personnel	$0.00	$0.00	$ 0.00			$ 0.00
Fringe Benefits	$0.00	$0.00	$ 0.00			$ 0.00
Travel	$0.00	$0.00	$ 0.00			$ 0.00
Equipment	$0.00	$0.00	$ 0.00			$ 0.00
Supplies	$0.00	$0.00	$ 0.00			$ 0.00
Contracts	$112,450.00	$0.00	$112,450.00	$112,450.00		$112,450.00
Other	$0.00	$0.00	$ 0.00			$ 0.00
TOTAL DIRECT CHARGES	$112,450.00	$0.00	$112,450.00	$112,450.00		$112,450.00
Indirect Charges	$0.00	$0.00	$ 0.00			$ 0.00
TOTAL	$112,450.00	$0.00	$112,450.00	$112,450.00		$112,450.00
***Explain Any Discrepancies:**						

ECOSYSTEM GOALS ADDRESSED

16a. Primary Goal	Healthy Habitat
16b. Additional Goals	Healthy Species ---------- ---------- ---------- ---------- ----------

DIRECT THREATS ADDRESSED

17a. Primary Threat	Invasive Species - Terrestrial
17b. Secondary Threat(s)	Climate Change ---------- ----------

LINKAGES TO PUGET SOUND ACTION AGENDA (Version Adopted August 2012)

18a. Primary Strategic Initiative	**Tribal Habitat Priorities**

18b. Sub-Strategies Employed	**A.1 A.5 A.6 C.4 B.5 D.5**

18c. Near-Term Actions Supported	

LINKAGES TO EPA PUGET SOUND PERFORMANCE MEASURES

19. Measure(s)	Habitat Restored/Protected ---------- ----------

LINKAGES TO PUGET SOUND DASHBOARD INDICATORS

20a. Primary Indicator	Floodplains
20b. Secondary Indicators	Freshwater Quality Wild Chinook Salmon ----------

PROJECT LOCATION

21a. Latitude	48.311740	**21b. Longitude**	-121.544620
21c. Hydrologic Unit Code	17110006 - Sauk	----------	----------
21d. Action Area	Whidbey	----------	----------

MEASURES OF SUCCESS (Key Outputs)

*22a. Description (e.g., "shellfish beds reopened")	*22b. Unit (e.g., "acres")	*22c. Project Target ("number")	*22d. Project Measure To-Date ("number")
Area surveyed for knotweed in Sauk and Suiattle watersheds (knotweed summer only)	acres	4500	4000
Percentage of knotweed patches in survey area determined "dead" (ie: no resurgence)	percent	65	74
Suspended sediment concentrations (SSC) elaborated at three Sauk River sites	SSC concentrations	5	3
Total area of land cleared of knotweed since beginning of project	square feet	200000	215784
Total area of floodplain reconnected in the Barnaby Reach of the Skagit River	square miles	2	0

PROJECT MILESTONES

Instructions: In the tables below, please explain your progress toward meeting agreed outputs for the period, **reasons for slippages**, and any additional information including **reflections, lessons learned, and/or thoughtful analysis**. When appropriate, include analysis and information of **cost overruns or high unit costs**, and changes to work plan or budget not requiring prior approval from EPA. We encourage photo documentation - please attach to the report as a separate document.

23a. Subaward Work Plan Component/Task: Sauk-Suiattle Knotweed Eradication

23b. 2012 Action Agenda Near-Term Action(s) Supported:

***23c. Estimated Costs:**
Actual Costs to Date:
(If required to report – contact your Project Manager)

23d. Sub-Task No.	23e. Sub-Task Description (include due date)	*23f. Date of Status	*23g. Status	23h. Outputs/Deliverables	*23i. Remarks
1.1	GPS survey knotweed in the Sauk River floodplain, by raft	8/30/15	COMPLETED	7 days of knotweed surveyed from RM 15 to RM 0; field data	Washington Conservation Corps crew covered all riparian habitat along the mainstem Sauk and some infested tributaries.
1.2	Complete additional knotweed surveys	8/30/15	COMPLETED	3 days of additional knotweed surveys; field data	see above.

1.3	Spray knotweed in the Sauk River floodplain, by raft	8/30/15	COMPLETED	4 days spent spraying knotweed from RM 15 to RM 0; field data	WCC crew sprayed all knotweed found in the survey area.
1.4	Conduct landowner outreach and spray knotweed in and near the Town of Darrington, by vehicle and foot	9/15/15	COMPLETED	10 days spent spraying and conducting outreach in Darrington; field data	WCC crew was redirected to fire suppression before Darrington sites could be treated. The major patches were treated instead by a Snohomish County crew. This task is as complete as it is going to be for this season, because of the personnel shortfall.
1.5	Conduct landowner outreach, GPS survey, and spray knotweed in the Sauk Prairie area, by vehicle and foot	9/30/15	CANCELLED	10 days spent spraying, conducting GPS survey, and conducting outreach in Sauk prairie area; field data	Forest fires cut short the time we had with our WCC crew, so none of the patches on Sauk Prairie were treated this summer. Priorities remained on the mainstem Sauk and Suiattle Rivers, where knotweed is more easily transported downstream and more damaging to salmon habitat than upland sites. Personnel shortfall caused us to cancel this task for the 2015 season, to resume next year.
1.6	Collaborate with SFEG, WCC, Snohomish County, and Skagit CWMA to review and assess previous field season and data	9/30/15	COMPLETED	Annual Skagit CWMA report detailing results (# of knotweed patches identified, # of acres sprayed, pesticide used, GIS data); Meeting minutes; field photos; data summaries	Colin Wahl, the SSIT Field Coordinator, reviewed and assessed the 2015 data for the end of season Skagit Coordinated Weed Management Area working group's meeting Oct. 29 in Padilla Bay.

23a. Subaward Work Plan Component/Task: Research How Sediment is Impacting Sauk and Suiattle Fish Runs

23b. 2012 Action Agenda Near-Term Action(s) Supported:

***23c. Estimated Costs:**
Actual Costs to Date:
(If required to report – contact your Project Manager)

23d. Sub-Task No.	23e. Sub-Task Description (include due date)	*23f. Date of Status	*23g. Status	23h. Outputs/Deliverables	*23i. Remarks

2.1	Develop a QAPP Addendum to update management, personnel, timelines, goals and protocols, as necessary.	4/30/15	COMPLETED	Updated QAPP, if applicable	QAPP only needed minor adjustments; daily Isco sampling was changed to storm-event triggered sampling, but the handling and analysis of samples has not changed from a quality assurance standpoint. We simply changed the Isco program to trigger sampling at 300 NTU instead of regularly sampling every 6 hours.
2.2	USGS and SSIT crews will maintain sensors measuring turbidity and temperature at three USGS river gages on the Sauk, including the new site established by this project, located at the Sauk Prairie Road bridge over the Sauk in Darrington. Continuous turbidity and temperature measurements will also be taken from the Suiattle River, near the Boundary Bridge on USFS 25 Road and from the White Chuck River at a bridge 5.7 miles up the USFS 23 Road. An automated sediment sampler will continue to be installed at the upstream-most gage on the Sauk River, as well as additional samplers at the Suiattle and White Chuck sites.	9/30/15	COMPLETED	Continuous turbidity and temperature data; Automated sediment samplers on all three rivers will provide laboratory results from the USGS Cascades Volcano Observatory to facilitate statistical correlation with daily turbidity data as well as periodic EDI/EWI samples.	Data was collected at the three Sauk River gages from fall of 2011 through Sept. 2016. Daily composite samples were sent to the CVO lab for each site, for the first few years, then the automatic sampler was changed to only sample during storm events (once a statistical correlation was established). Cross-sectional EWI samples were also sent to the CVO.
2.3	SSIT and USGS crews will conduct weekly field inspections to verify sensor measurements, calibrate and maintain the field sensors, with technical support from USGS.	9/30/15	COMPLETED	Field notes, audit logs.	Weekly visits were made .
2.4	SSIT crews will use portable instruments to collect samples and discrete measurements of various water quality parameters complementary to the fixed station sensors, as determined by USGS.	9/30/15	COMPLETED	Field notes, data, lab reports.	Weekly sonde measurements also were completed as scheduled.
2.5	Sauk-Suiattle and USGS crews will continue to collect six to eight suspended-sediment samples	9/30/15	COMPLETED	Channel cross-section samples; all suspended sediment samples	A few more samples were collected this winter as the storm season produced several good swells.

	per year at all five sites using either the Equal-Discharge Increment (EDI) or Equal-Width Increment (EWI) methods.			analyzed for concentration and the 'percent fines' at the USGS Cascade Volcano Observatory sediment lab; Subset of samples analyzed for density at the CVO and an additional subset of samples used for mineralogical analysis using X-ray diffraction or similar methods; GIS landslide inventory to assess sediment methods; Daily record of suspended-sediment load at each gage.	
2.6	USGS will prepare a more detailed “Scientific Investigations Report” (SIR) by the end of the five-year work plan.	9/30/15	COMPLETED	SIR, written by the USGS Hydrologist(s) and SSIT technical staff, reviewed by the USGS Hydrologist – Surface Water Specialist and then developed into an online report by the USGS in-house publishing office.	The SIR was completed and can be found at this link: https://pubs.er.usgs.gov/publication/sir20175113
2.7	Distribute and discuss the study results with SC2 and other appropriate entities.	9/30/15	COMPLETED	Minutes and/or meeting notes	We are in regular contact with SC2 and plan to continue doing so, particularly with this report. The link to the web-based publication for the first two years of data was sent to SC2.

23a. Subaward Work Plan Component/Task: Sauk Stream Habitat and Fish Assemblage Assessment
23b. 2012 Action Agenda Near-Term Action(s) Supported:
***23c. Estimated Costs:** **Actual Costs to Date:** **(If required to report – contact your Project Manager)**

23d. Sub-Task No.	23e. Sub-Task Description (include due date)	*23f. Date of Status	*23g. Status	23h. Outputs/Deliverables	*23i. Remarks
3.1	Lower Skagit Gridded Climate Data Corrected, DHSVM model setup, and historic analysis	9/30/15	COMPLETED	Gridded climate data corrected to drive DHSMV; Model setup and historic model analysis; A paper submitted to a peer-reviewed journal.	During the previous reporting period, the DHSVM-glacier model was set up with preliminary model outputs at eight selected streamgauge locations in the Sauk-Suiattle basin (North Fork Sauk, White Chuck River, South Fork Sauk, Sauk River above White Chuck, Sauk River above Clear Creek, Sauk River near Sauk, Big Creek, and Sauk River at Darrington). We have identified and processed 301 climate forcing grid cells (5 x 6 km) over the Skagit Basin extent, inclusive of the Sauk sites, for the time period 1950-2005, which were used for the historical analysis. A draft report "Hydrologic Impacts of Climate Change in the Skagit River Basin" was completed by Sept. 30 and the final report was completed and is accessible now on the Skagit Climate Science Consortium's website.
3.2	Future Streamflow Projections for the Skagit Basin with DHSVM	9/30/15	COMPLETED	Routed bias-corrected modeled streamflows at selected locations in the Skagit with daily resolution and aggregated to monthly values; Data as tables for each location and temporal resolution (e.g. daily, bi-monthly, and monthly) with streamflow (cfs) values for each individual climate model and a multi-model ensemble. The multiple climate model scenarios will be used to represent a	The report assesses predicted streamflow and glacier distribution for the eight Sauk sites, as well as 12 other sites (supported by Swinomish Indian Tribe and Seattle City Light). Future climate data from 10 global climate models and two scenarios (RCP 4.5 and 8.5) have been selected for model simulations for the time period 2006-2099. RCP 4.5 assumes global carbon emissions begin to decline by 2040, while RCP 8.5 assumes emissions continue at current levels until 2080. The report finds that under RCP 4.5 assumptions, high-elevation glaciers would continue

				range of potential future streamflow conditions; An oral presentation of results to SITC staff.	to store ice and provide snowmelt for the summer months, while RCP 8.5 emissions levels would lead to the disappearance of most Skagit glaciers by the end of the century.

23a. Subaward Work Plan Component/Task: Barnaby Reach Habitat Study

23b. 2012 Action Agenda Near-Term Action(s) Supported:

***23c. Estimated Costs:**
Actual Costs to Date:
(If required to report – contact your Project Manager)

23d. Sub-Task No.	23e. Sub-Task Description (include due date)	*23f. Date of Status	*23g. Status	23h. Outputs/Deliverables	*23i. Remarks
3.1	Develop a geomorphic map to characterize floodplain topography and landforms in the Barnaby reach, including an evaluation of the age of selected meander and landslide features.	5/30/2018	COMPLETED	Map and description of geomorphic features.	Jon Riedel, glaciologist for North Cascades National Park, developed a PowerPoint with slides identifying the age of landslides, meanders, terraces, slough channels in the Barnaby Reach.
3.2	Integrate results from an existing hydraulic model with sediment grain size information to evaluate sediment mobility at a range of flows and evaluate patterns of aggradation or degradation in the project reach.	5/30/2018	COMPLETED	Map product and written technical description of these patterns.	Maps were developed by Natural Systems Design to illustrate the expected shear stresses in lbs/sq. ft. along the Barnaby Reach before and after restoration, as well as the average minimum stable particle size (mm) before and after restoration.
3.3	Evaluate patterns and causes of channel migration using historic photos and quantitative bank stability metrics.	5/30/2018	COMPLETED	Series of maps that include historic photos and channel locations, plus a technical evaluation of bank stability.	Kate Ramsden of the Skagit River Systems Cooperative (SRSC) produced historic maps of the Barnaby Reach from 1884, 1898, 1915, 1944, 1956, 1963, 1972, 1979, 1983, 1991, 1998, 2001, 2007, 2010, 2013. Natural Systems Design developed a series of zoomed-in GIS maps from those historic photos showing the patterns of channel

					migration, locations of riprap, and relative elevations
, 3.4	Synthesize existing hydraulic model results and geomorphic analysis to characterize existing flood and erosion risks and describe potential geomorphic changes over future decades.	5/30/2018	COMPLETED	Maps detailing flood and erosion risks and a description of potential future geomorphic changes.	Maps were developed by Natural Systems Design to illustrate flood depths at 2-year and 100-year flood depths and velocities for both existing conditions and modeled conditions after restoration. Maps were also produced with 16 expected changes in the river channels after restoration, with text describing each numbered item, including probable directions of channel avulsions, bank erosion, channel migrations, inflows, inundations, channel enlargements and reductions, sites for gravel bar growth and large woody debris accumulation. Maps also show expected results of no action or less complete restoration alternatives. Two animated GIS maps were created to show how flows would fill the valley as flows fluctuate on the Skagit River from 25,000 cfs to 125,000 cfs (a Q100 flood)
3.5	Develop presentations, participate in meetings, and write a technical memo describing the geomorphic work.	5/30/2018	COMPLETED	Technical memo, presentations, participation of technical consultants in community meetings.	Jon Riedel worked with Shawn Higgins, Tim Abbe, and Leif Embertson of Natural Systems Design to prepare a PowerPoint for the Stakeholders Committee on May 30, 2018 about the geomorphic characterization of the Barnaby Reach. Slides showed the geomorphic features, erosion hazards, and channel migration history near Illabot Creek, the middle Barnaby Reach and the Sauk River confluence, as well as conclusions for how restoration to historic channels could increase connectivity to the

					floodpain and off-channel habitat while also reducing flood impacts near Martin Road properties.
3.6	Conduct community outreach so restoration project planning can proceed with community support.	6/30/2018	COMPLETED	Facilitation of 2 to 4 community meetings, meetings and discussion with individual community members, and a synthesis of comments.	SRSC staff met each month with a small group of residents who live along the Barnaby Reach to discuss the project's findings and progress. All PowerPoints mentioned earlier were presented to the Stakeholder Committee, which includes community members. Hydraulic summary of expected flood effects in the Barnaby Reach was presented to the Stakeholder Committee as well. A professional facilitator, Cynthia Carlstad, was hired and facilitated the larger meetings and provided overall guidance on outreach strategy.

CHALLENGES AND SOLUTIONS (specific to reporting period)

*24a. Task No., Sub-Task No.	*24b. Challenge	*24c. Solution
3.1-3.6	Getting the grant extension and contracts approved in a short time.	We found a shovel-ready project that allowed us to plug and play quickly once agreements were in place.

HIGHLIGHTS/LESSONS LEARNED/REFLECTIONS

***25.**
The deliverable for Subtask 2.6, a five-year suspended sediment study, was published as the USGS Scientific Investigations Report "Suspended sediment, turbidity, and stream water temperature in the Sauk River Basin, western Washington, water years 2012-1016." The report found substantial interannual variability in suspended sediment loads, with 21 percent of the total 5-year sediment load attributed to fall storms that triggered an outburst flood on the flank of Glacier Peak in 2015. A mass-balance analysis indicated that the Suiattle River accounts for about 80 percent of the total suspended-sediment load in the lower

Sauk River, where Chinook redds have long been presumed to be impaired by embeddedness of fines. About 60 percent of the load in the Suiattle River is attributed to sediment production from the glacial and pro-glacial regions of Chocolate and Dusty Glaciers on the eastern flank of Glacier Peak. Quantifying and chacterizing the suspended sediment load from the Sauk River is expected to be useful to floodplain restoration efforts downstream as far as the estuary. Results will be shared with the Skagit Climate Science Consortium and Floodplains By Design as they model how much sediment is forecast to be necessary to restore the estuary as it faces sea level rise in the coming decades.

Another finding in the report was that water temperature in the Sauk River, while generally correlated with variations in air temperature, was modulated by seasonal snowmelt in the spring and late summer. Years with small snowpacks and low runoff over the May-July time period experienced warmer water temperatures than would have been expected based on air temperatures alone. The snowpack influence generally peaked around mid-July and modulated temperatures by as much as 3 degrees Celsius. This could have significant implications for salmon as global warming reduces snowpacks and melts them earlier. During the 5-year study period, which included the historically warm and dry summer of 2015, an analysis of the data identified periods of concern for elevated water temperature and turbidity values that could impair Chinook salmon at various life stages. Such periods of concern were rare at the three Sauk River streamgages and accounted for less than 1 percent of the study period.