

Tucannon River Programmatic Habitat

Project #: 2010-077-00

Contract #: 65249

Annual Progress Report

(Reporting Period January 2014 to December 2014)

Contractor:

Snake River Salmon Recovery Board

Contract Number 65249

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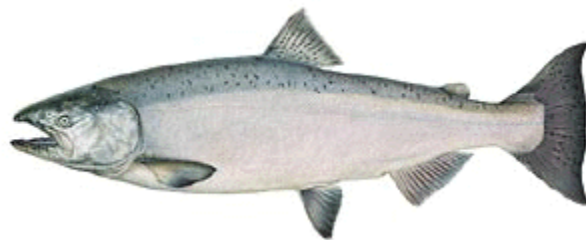
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Abstract:

The Tucannon River Programmatic Habitat project 2010-007-00 (Programmatic) is a restoration “Umbrella” project focusing on improving Snake River spring Chinook habitat in the upper 30 miles of Tucannon River through reducing stream channel confinement and increasing channel complexity. The Snake River Salmon Recovery Board (SRSRB) works with its’ partners, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Columbia Conservation District (CCD), US National Forest (USNF) and the Washington Department of Fish and Wildlife (WDFW) to implement the Tucannon River Habitat Restoration Plan (Anchor Nov, 2011).

The Programmatic was managed in 2014, under the BPA contract 65249 by the SRSRB with the purpose of providing support in completing the goals and objectives of the Programmatic during the 4th year of implementation. The SRSRB maintained and convened two committees (Tucannon Implementer Committee (TIC) and the Regional Technical Committee (RTT)) which prioritize habitat restoration actions and projects under the Programmatic. Within the Programmatic, seven design and restoration contracts were active during the reporting period in addition to the administrative and technical support contract, which all will be discussed in this Annual Report. New in 2014, the Programmatic will coordinate with project sponsors conduction restoration in the Tucannon to report on the projects completed within the calendar year. In 2014, the Programmatic worked with the Columbia Conservation District in the completion of PA-22 and PA-40.

In addition to performing the 2014 Programmatic management tasks, SRSRB staff worked with the RTT and TIC committees to update and prioritize a long term and sort term work plan, provided partner technical support, conducted public outreach, field tours, project and habitat data compilation and project database management. The Programmatic provided project sponsor support in both technical and project related attributes of project development, permitting, contractor solicitation, securing matching grants, and implementation.

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Introduction: Tucannon River Programmatic Habitat

The Snake River Salmon Recovery Board (SRSRB) serves as the Regional Organization and the Lead Entity for salmon recovery in the Washington State portion of the Snake River and its tributaries, guiding funding for the Salmon Recovery Funding Board (SRFB). Beginning in 2011, the SRSRB was awarded the Tucannon Habitat Programmatic (programmatic) a project (# 2010-077-00) from Bonneville Power Administration (BPA). The purpose of this “Umbrella” Programmatic is to guide funding and support the implementation of the 28 conceptual restoration project outlined in Conceptual Restoration Plan, Reaches 6 to 10 Tucannon River Phase II (Anchor November 2011). To support this purpose the SRSRB receives an administrative contract to manage the Programmatic in the Tucannon. The objectives of the programmatic are to identify, prioritize and implement habitat restoration actions in the Tucannon River which would improve spring Chinook habitat by 17% over the time of the 2008 FCRPS Biological Opinion. The SRSRB manages the programmatic by working with its local partners developed through the SRFB supported Regional Organization including; the Columbia Conservation District (CCD), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Ecological Research INC (ELR), Nez Perce Tribe (NPT), Pomeroy Conservation District (PCD), Tri-State Steelheaders (TSS), Umatilla National Forest Pomeroy District (USFS), Washington Department of Fish and Wildlife (WDFW), Washington State Parks Wooten State Park. The partners provide technical support in the development of restoration priorities, identify restoration projects that best meet the priorities and prioritize those projects for the 1.3 million dollars annually available to the Programmatic. This report covers work completed under contract #60562 and the six habitat design and implementation contracts active during the reporting period between January 1, 2014 and December 31st 2014. The purpose of this annual report has been expanded in 2013-14 to describe all the work completed under the Programmatic footprint, including that completed by CTUIR, WDFW and CCD. In 2014, one project funded by the CCD (PA-22) will be discussed within the Programmatic annual report.

In 2014, the Programmatic supported the project sponsors in the development of project design, permitting, sourcing materials (LDW) conducting pre-project field visits, developing contracting and budgeting. The Programmatic provided support to CTUIR in the implementation of Project Area 1&3 (#63605, & #62642), with the completion of instream portion of those projects in August 2014. With support from the Programmatic, WDFW completed a construction design, permitting, and initiated mobilization for PA-11 (#64003), implementation is scheduled for the 2015 work window. Project Area 14 (#58777) managed by WDFW was initiated in 2013, with material acquisition, mobilization and the development of side channels. The Programmatic supported WDFW during the full implementation in 2014. The SRSRB supported the CCD in the implementation of Project Area 15 - Phase I (#62573) completed in August 2014. Project Area 15 Phase II is set for implementation in 2015 with a permitting update in progress. The SRSRB managed the completion of the PA-24 final design (#64018) and helped the CCD in the development of the implementation contract (#66844) for the 2015 instream window.

During the performance period, the SRSRB coordinated the monthly meetings of the Regional Technical Team (RTT), the quarterly Tucannon Implementers Committee (TIC), and provided updates to the SRSRB governing body. The RTT and the TIC are the technical group responsible for project prioritization and technical review providing the technical support for the SRSRB. It is through these technical groups the SRSRB reviewed and approved the Tucannon Geomorphic Assessment (Anchor April, 2011) and the Conceptual Restoration Plan, Reaches 6 to 10 Tucannon River Phase II (Anchor November 2011). These documents were developed to be used as a guide in the prioritization of restoration projects into the Tucannon Work Plan.

The SRSRB manages a sub contract with ELR to collect project effectiveness/change detection data through the implementation of CHaMP. The sample sites are coordinated with ELR, the firm conducting the CHaMP monitoring pilot in the Tucannon. Though the Programmatic doesn't collect or analyze data we are active in the prioritization of monitoring in order to best sequence monitoring efforts with restoration efforts. In 2014, the SRSRB worked with the CHaMP and AEM monitoring groups to best sequence monitoring with active and future restoration projects. The Programmatic/SRSRB also supported and participated in the Adult Fish Bypass Symposium held at WWCC, initiated the Tucannon Adult Mortality Meeting in Dayton, and supports the WDFW Life Cycle Mortality Modeling effort on the Tucannon. The Programmatic works with existing stream and flow data to inform the adaptive management loop and beginning in 2014 initiated the collection of pre-post restoration reach conditions to develop accurate as-built conditions and produced a photo record of the completed work in the basin.

In support of the upcoming Expert Panel process in 2016 the Programmatic has considered a rerun of the EDT model, considering that it would be beneficial to inform and prepare for the Expert Panel Process. The model could be valuable considering the amount of data being generated in the Tucannon alongside the level of restoration completed and planned.

The SRSRB conducts annual tours of restoration projects in the basin and offers technical guidance in the pursuit of matching funding for restoration in the Tucannon. Beginning in 2014 the SRSRB began an outreach program geared toward elementary education which has had great success.

Area of Primary Focus:

The Tucannon River is a Snake River tributary originating in the Blue Mountains of southeast Washington (Figure 1) and is located in Columbia and Garfield Counties. The main channel is approximately 58 miles long and drains about 503 square miles before entering the Snake River approximately 3 mile upstream from Lower Monumental Dam. Several major tributaries drain into the mainstem including, Pataha Creek, Tumul Creek, Cummins Creek, Little Tucannon, and Panjab Creek. A full description of the basin has been provided in the Tucannon River Geomorphic Assessment and Habitat Restoration Study (Anchor April, 2011).

Focal Species

The Tucannon supports populations of four threatened species including the Snake River ESU spring Chinook, Snake River fall Chinook, Snake River ESU summer steelhead, and the Columbia River bull trout. All reaches of the Tucannon River are utilized by all species during one or more life stage annually with fall Chinook being the exception using only the lower river. The lower Snake River spring Chinook is currently only found in the Tucannon River, having been extirpated from Asotin Creek (Figure 2).

The Tucannon River spring Chinook is a sub-population of the Snake River spring Chinook ESU which has been listed as threatened under the Endangered Species Act since 1996, and is the primary focus of the Programmatic restoration project. The Tucannon River is the lowest downstream tributary population in the Snake River and is also the lowest elevation drainage where Snake River spring Chinook exist. The population was in decline throughout the 80's, but reached a critical low in the mid 90's when the number of wild adults dipped to as few as three naturally produced individuals. More recently, adult returns to the Tucannon have been steadily increasing as overall habitat conditions improve (Figure 3). The current known distribution for spawning and rearing spring Chinook in the Tucannon is from RM 20 upstream to RM 58 based on available information (Figure 4). It is anticipated that as conditions improve this boundary would be expanded downstream. At the drafting of the Snake River Salmon Recovery Plan in 2005, spawning and rearing habitat for Chinook or steelhead was not available below RM 30, but through improving stream temperatures (Figure 5) the technical opinion, supported by red data (Figure 6), is that habitat availability has been extended to at least RM 20 and potentially further downstream.

Implementation Approach:

The project reach identified for restoration action under the Programmatic is based on the known (historic and current) spawning and rearing areas of Tucannon River spring Chinook illustrated in Figure 6. Restoration focusing on increasing channel complexity and floodplain connectivity from RM 20-50 (Figure 4) will receive first priority for implementation funding under the Programmatic through 2018, however projects focusing on Chinook, steelhead, bull trout and fall Chinook habitat restoration will also remain a high priority under the Salmon Recovery Plan for South East Washington drainage wide when it comes to other funding opportunities with broader restoration priorities.

The SRSRB and its partners have been working to improve Tucannon River spring Chinook productivity and survival in the Tucannon River by focusing on habitat restoration actions which directly or indirectly impact habitat factors identified as limiting spring Chinook productivity and survival. Limiting factors were identified through EDT analysis conducted in the development of the Salmon Recovery Plan for South East Washington and the 2008 FCRPS Biological Opinion, listed in Table 1.

Salmon habitat restoration began in the Tucannon as early as 1999 and considerable progress has been made in addressing imminent threats (Figure 7) (fish passage, irrigation screening, fine sediment & low flow), restoring and protecting riparian habitat and implementing upland BMPs like no-till agriculture (Table 2). Through the implementation of the restoration actions, improvements in summer temperature (Figure 5), reduced fine sediment and substrate embeddedness (Figure 8) and increasing woody debris are being realized, though it will take decades before full benefits of some actions are fully realized, i.e. maturation of riparian and natural LWD recruitment.

The RTT has considered the restoration achievements in imminent threats, riparian planting, reductions in stream temperature and upland BMPs and through adaptive management has narrowed the restoration focus to restoring rearing habitat as the primary objective for Chinook recovery in the Tucannon. Rearing habitat and particularly winter rearing habitat was a major factor in the development of the Tucannon River Geomorphic Assessment and Habitat Restoration Study (Anchor April, 2011) which lead to the project objectives in the Conceptual Restoration Plan, Reaches 6 to 10 Tucannon River Phase II (Anchor November, 2011). Considering the tiered project list produced in Anchor November, 2011 the SRSRB TIC and RTT worked with project sponsors to prioritize implementation funding to restoration projects in a long term work plan spanning the life of the Programmatic (Attached in Pisces to Contract # 52633). The RTT and TIC continue to review and revise the work plan as actions are completed and in 2014 developed an updated work-plan with detail through 2018 (Table 3).

The restoration objectives outlined in Anchor November 2012 focus on reducing channel confinement, increasing floodplain connectivity and increasing channel complexity by placing large wood debris (Table 4&5) on 28 project in the upper 30 miles of the Tucannon. By targeting river function over large reaches the SRSRB anticipates the river to express itself in the development of new channels, side channels and other critical off channel habitats limiting Chinook rearing survival. As channel shape changes from the existing (over straightened incised forced riffle) single thread channel to a longer more complex system, hyporheic exchange is expected to improve, increasing groundwater influence, increasing and cooling summer base flows and warming winter base flows. Improvements in floodplain connectivity will enhance riparian forests by depositing fines on the floodplain, reducing embeddedness, increasing water retention and overtime leading to increased forest sustainability and LWD recruitment.

Data collected by our partners including flow, water temperature, snowpack, fish in fish out, CHaMP, RME and AME is being used to gage the effectiveness of the restoration actions and inform adaptive management, the NOAA 5yr Stock Status Update and the BPA Expert Panel Process. The Programmatic works closely with the partners to coordinate restorations projects with monitoring efforts within the basin by making landowner access contacts, scheduling field seasons and coordinating monitoring sites to synchronize with restoration. This approach of working as a single entity in the basin acting as a coordinator for restoration has helped to bring a wide range of disciplines into focus and moving towards one goal. The Programmatic in 2014 has coordinated with ELR to develop a data

collection method for providing as-built packages which provide detail as built condition that can be used by CHaMP directly.

Data gaps exist in the Tucannon including spring Chinook pre-smolt migration timing and survival, adult fish by pass, and pre-spawn adult mortality occurring within the Tucannon. The SRSRB has been working with the regional partners to support and conduct the necessary monitoring to fill the data gaps. It is currently unknown the extent at which the middle and lower reaches of the Tucannon River (below RM 20 to mouth) may play in the winter mortality on pre-smolts, or when fish use these habitats beyond migration. The SRSRB has been working with WDFW to develop a Tucannon life cycle model similar to what WDFW is doing in the Wenatchee Basin to try to answer that very question. It has been determined from PIT tag data that Tucannon origin adult Chinook returning to the Snake above Lower Monumental Dam are passing the Tucannon going through Little Goose and Lower Granite Dams and not returning to the Tucannon. The mechanisms causing this behavior are not currently know, however through PIT tag data collected at the dams and in the Tucannon, we do know there is a very low return rate to the Tucannon, for Chinook and steelhead exhibiting this behavior (2013 WDFW personnel communication). Poor adult survival (pre-spawn mortality) was observed in 2013 by WDFW, with a very high number of spawners per redd (Bumgarner 2015) or fewer than expected redds per number of adults handled and passed at the Tucannon Hatchery trap (Figure 9). It is not known what caused the apparent high mortality in 2013, and no evidence of predation or disease was noticed during red counts that season. In 2014, efforts were made to determine the cause of mortality through the placement of trail cameras, increased enforcement patrols by WDFW and periodic foot surveys of holding areas. A fish behavior/movement (radio tag) study was also conducted in 2014, by WDFW (Bumgarner 2015), with the purpose of determining fish movement within the system and potentially to understand where these fish were before mortality occurred.

The SRSRB and Programmatic are coordinating an EDT exercise in the Tucannon. EDT was completed in 2005, as part of the initial restoration planning and prioritization determining the limiting factors which would best improve habitat for spring Chinook and steelhead. The objective will be to validate the models initial predictions using the restoration and monitoring data collected over the last 10 years. If the model validation aligns with what we know is actually occurring in nature, we could expect to use the model to make predictions about what we are doing in restoration.

Tucannon River Programmatic Parent Contract #65249

The following sections of this report will provide a detailed description of activities conducted in support of the Programmatic, under the work elements outlined in the scope of work (contract number 65249). When applicable, methods, results and progress on deliverables are described for the time period from January 1, 2014 through December 31, 2014.

Programmatic Implementation:

Program Implementation

Work Element 119, 185, 132: Manage and Administer Project, Produce Status Reports & Annual Report:

Deliverables: 2015 SOW development, property inventory, submitted in Pisces. Coordinate the Tucannon River Programmatic and identify project matching funds. Complete periodic status reports and annual report.

During the time period January 1, 2014 through December 31, 2014 the SRSRB managed the implementation of the Programmatic (contract: 65249) and was the point of contact from its office at 410 B East Main Street, Dayton, Washington 99328. The SRSRB coordinated monthly RTT meetings on the 3rd Tuesday of each month for the purpose of prioritizing restoration actions, set restoration goals and objectives and reviewing restoration designs. In 2014, the Tucannon Implementers Committee (TIC), a group of project sponsors and resource experts and land managers locally involved in Tucannon River habitat restoration continued to meet on quarterly basis. The TIC is a subcommittee of the RTT with the purpose of identifying restoration activities which best meet the restoration objectives (Table 1) and coordinating those activities over the duration of the Programmatic. The TIC works to streamline restoration, sharing information, coordinating with monitoring efforts determine the pursuit of matching grants and discussing project progression. The participants of the TIC included representation from the, USFS, CTUIR, NPT, WDFW, CCD, PCD, TSS and SRSRB.

The Programmatic coordinated with the implementers to conduct status, annual and completion reporting. In 2014, the Programmatic coordinated with the implementers to conduct pre/post rapid surveys of the project areas for the purpose of measuring the project as-built condition at a reach scale following restoration. The data collected on the projects includes pre-existing wood, side channel and pools, post construction wood, and side channels as well as an extensive photo record. Metrics collected are directly comparable to CHaMP metrics so the as-built data is applicable to CHaMP monitoring in the basin. All 2014 data (as-built) was provided to the Tucannon CHaMP program staff, and in 2015 we will coordinate surveys to capture implementation. Information collected will also be very helpful in the upcoming expert panel process beginning in 2015. During the 2014 field season surveys were completed on PA-1, PA-3, PA-14, PA-15a, PA-22, and PA-40.

In 2013, the Programmatic adopted an implementation approach which affords implementers more time to move a project from concept to implementation (Table 6). This approach involves using the first season to develop the concept complete field surveys and initiate preliminary designs, followed by permitting and design finalization and initiating site preparation. In the final year the sponsor would begin the implementation. This approach has helped the Programmatic with moving projects through permitting and allocating funding, and we anticipate continuing to use this approach moving forward.

The Programmatic also pursues and tracks project and program matching funds (Table 7) provided or received by the partners and sponsors. Match comes to the Programmatic in the form of in-kind support,

material donations and restoration grants. Materials donations have been coordinated with the USFS and project sponsors to identify secure and track the distribution/placement of materials. The Programmatic coordinates and supported the pursuit of restoration grants by assisting and supporting the application process. In FY14, the program was successful in securing Salmon Recovery Funding Board Grants totaling \$431,000 for the implementation of PA-11 (CR#283994) and PA-24 (#66844) both funded under Programmatic for implementation in 2015. The Programmatic also supported the Columbia Conservation District in securing an Washington Department of Ecology grant (RCO #13-1391) totaling \$551,000 to fund PA-40 matched to the CCDs BPA Project (1994-018-06) contract #64596. The Programmatic is already beginning the process of acquiring matching grants for the 2016/17 work windows.

The Programmatic and the SRSRB are very sensitive to the level of funding going to Programmatic administration compared to implementation, which prior to 2014 was very low (<0.15 FTE). In 2014, the SRSRB supported the expansion of the Tucannon Coordinator from a 0.1 FTE to a full FTE which is reflected in the ratio of funds going to administration in 2015 (Table 8). The Programmatic is expecting this to remain static in the upcoming years.

The Programmatic also prepared a program summary report for the ISRP's review of the Umbrella projects supported by BPA in 2014. The summary report was prepared in November and finalized in January, it is attached to this contract in Pisces (#65249)

Program Guidance and Create/Prioritize Project List

Work Element 114: Identify and Select Projects:

Deliverable: Conduct project solicitation and prioritize projects based on their merit and benefit to salmon recovery. Submit recommended projects to BPA. Provide technical support to project sponsors throughout implementation.

The SRSRB developed an approach to project selection and prioritization that differs from the conventional approach where organizations solicit projects and then review, revise, score, and rank them. Project selection within the Programmatic is a targeted approach, where the projects are pre-identified/prioritized based on a basin-scale geomorphic study (Anchor November, 2011), watershed restoration strategy and project prioritization framework. The geomorphic assessment, restoration strategy and project prioritization efforts were conducted by Anchor QEA (Anchor April, 2011 and November 2011). The November 2011 study developed the process and criteria that has been used since the 2012 project solicitation and will be used to prioritize future projects as outlined in the comprehensive restoration strategy. A full description of the project solicitation process is described in the 2013 Programmatic report (Buelow 2014).

In 2014, project sponsorship was agreed to by TIC members at the conceptual project phase, i.e., SRSRB staff provided the list of priority projects and then TIC members assess their interest in

sponsoring a project based on a member's interest, history, knowledge and/or capacity. A conceptual project at that point has a "likely lead" and is added to the work plan. The work plan (Table 3) identifies the projects, likely lead, draft budget and anticipated implementation year. The work plan allows the TIC and others to understand project sequencing, know who the point of contact is, what the anticipated annual budget will be, which projects have or will seek cost share and allow for tracking and reporting of completed projects. In 2014, the work plan (Table 3) was updated to track design and implementation of projects proposed in the Tucannon, through 2018 and indicates the fiscal year in which they would be funded.

Community Involvement and Education'

Work Element 99: Outreach and Education

Deliverable: Conduct one project tour, present program accomplishments to regional agency personnel and LE Board. Develop outreach materials.

The SRSRB and the Programmatic conducted outreach activities in 2014 by attending public habitat restoration meetings, coordinating and hosting public tours, and posting it's completed and planned projects on the Washington State Habitat Work Schedule (<http://hws.ekosystem.us/>). Additionally, SRSRB staff attends local public meetings where they lead discussions on the restoration and protection of salmon habitat in the Tucannon. The SRSRB operates highly visible office in downtown Dayton which is highly accessible to the public, providing opportunity for individuals to meet with the SRSRB Director and staff.

The Programmatic participates in a number of public forms and boards during the scoping and design of project in the Tucannon including SRSRB, the Tucannon River Citizens Work Group and the Lead Entity SRFB review. It is through this process restoration projects proposed under the Programmatic are vetted by landowners and stakeholders of the watershed. All projects funded through the Programmatic have been supported through the SRSRB Lead Entity beginning in the design –process through implementation. Using this approach ensures a wide cross-section of landowner, agency, tribes, residents, and County officials with at least a peripheral knowledge of a project, if not more prior during design.

In 2014, the Programmatic collected extensive photo and video records of implementation throughout the entire implementation season. The result has been a number of outreach video materials prepared by the SRSRB for CTUIR, WDFW and the CCD. We anticipate continuing this effort in 2015.

The Programmatic participated in and conducted a number of field tours during 2014, including a WSU student tour in October, which was attended by more than 40 students and supporting faculty. In 2014, the SRSRB (Debbie Seney) initiated a youth education program working with 4th graders in the three counties, with the priority of teaching restoration of natural systems and salmon natural history. In total, > than 500 students participated in the 2014 program.

Conduct Environmental Compliance

Work Element 165: Produce Environmental Compliance Documentation

In 2014, the Programmatic worked to initiate and assist project sponsors in the development of project permits for PA-15 and 24. Permitting support included assisting in the development and finalization of the JARPA, SEPA, Forest Practices, 401&404, and Cultural Resource documents. The Programmatic also coordinated with the BPA EC Lead in the development of variance requests for PA-15 and 24 from standards in the HIPP III process. The variance requested a deviation from the HIPP III conservation measures, which state chain will not be used to stabilize or secure logs or attach ballast. The Programmatic has pursued the variance where the sponsor and engineer felt additional stability was needed and the Programmatic sought the variance to minimize the amount of rock ballast required to provide the stability. We generally feel that our approach is biologically justified in that it enables us to use less rock, for example: when the rock is configured in a bolo configuration, with two rocks linked by a chain and looped over what needs ballast, with the rock at or below grade. Alternative methods use more rock, piled above high water mark to buttress wood from floating down stream. Also, rock will be piled over wood or balanced on top of logs leading to an alternate unnatural condition. In 2015, the Programmatic will attempt to identify funds to test a pile driving machine attached to an excavator which may help to alleviate the need for rock or chain in future design. This has not been tested in the Tucannon due to the lack of belief that the method would work.

Tucannon Programmatic Habitat Restoration Project Implementation: 2014

PA-1,3,11,14,15 & 24

The 2014 field season was highlighted by the implementation of Project Areas 1, 3, 14, and 15 Phase I and the completion of PA-11 & 24 final designs under Programmatic funding (Figure 10). In total, four large restoration projects were completed adding >1,477 key pieces of large wood (whole trees to logs >6 m long & 30cm dia) constructed into 184 complex wood structures and 50 single log placements (Table 9). In 2014 the sum of main stem restoration, totaled 3.95 miles of LWD complexity, reconnected and enhance (LWD) over 1.46 miles of side channel habitat and reconnected 21.1 acres of low floodplain (Table 9).

The CCD completed two additional projects in the Tucannon outside Programmatic funding but within the spring Chinook priority area above RM 20, including PA-22 and PA-26. PA-22 was a LWD project which added 36 key pieces in 8 structures (Table 10), and PA-26 conducted maintenance on an existing reach by adding several structures. The CCD also worked to complete a construction design at PA-23 which would place 12 structures in channel and remove several sections of river levee created in the 60's.

Adhering to the approach outlined in Table 6, two design projects were completed for 2015 construction. The primary objective of the projects will be to increase in channel complexity with a secondary focus on increasing floodplain connectivity. PA-6-9 a group of conceptual projects outline in Anchor (2011 Nov) was surveyed by WDFW to develop implementation concepts, and from that initial assessment the types of project actions were determined; a follow up surveys and designs will be completed in 2015.

During 2014 implementation, the Programmatic supported project sponsors in a number of actions including but not limited to; drafting solicitation documents, securing pre and post project aerial imagery, reach mapping, document production, onsite support, conducting fish salvage, material sourcing, material verification/inventory, conducting rapid surveys, and photo documentation. In the completion of PA-1 the Programmatic assisted in the development of solicitation documents, participated in the contractor pre-bid tour, aided in documenting materials, produced maps, provided fish salvage, collected aerial video for pre/post project condition, prepared a documentation video and collected photo documentation of condition on site. The USFS provide traffic control, aided in fish salvage and provided materials toward the completion of the project. In the completion of PA-3 the Programmatic assisted in the development of solicitation documents, attended the pre-bid tour, aided in documenting materials, produced maps, provided fish salvage, was on site during the duration of implementation, collected aerial video for pre/post project condition, prepared a documentation video and collected photo documentation of pre/post project. The USFS provide traffic control, aid in fish salvage and provided materials toward the completion of the project. The Programmatic supported WDFW in the implementation of PA-14 through the development of maps and documents, SRFB application support, securing materials, fish salvage, field support, photo documentation, obtaining pre and post project aerial imagery, post project outreach material development and the completion of as-built documents for SRFB grant. The Programmatic supported the CCD on PA-15 implementation by aiding in the finalization of project design, development of maps, permitting, contractor solicitation, conducting fish salvage, field support, securing materials, photo documentation, obtaining pre and post project aerial imagery, post project outreach material development and the completion of as-built documents.

The four implementation projects supported by the Programmatic in 2014 are described in the following sections with full detail of the BPA metrics described in Table 10. Additionally, a brief project description, history, outcomes (Metrics) and the number of structures and pieces of LWD placed are further provided in Appendix A.. Since the onset of the Programmatic we have not experience an instantaneous flows greater than 1390 cfs or a daily mean > 1150 cfs, which is just greater than a 2 yr event (Table 11) (Anchor 2011 April). It is important to note that the restoration actions implemented in many of the projects to date require some level of high flow to interact with structural components of the projects creating the channel shaping desired in the Tucannon.

The following sections describe the work completed by the project sponsors working in the Tucannon in 2014 with the project lead for PA-1-3 being Eric Hoverson of CTUIR, Dave Karl of WDFW for PA-14 and Terry Bruegman of CCD with PA-15 Phase I & PA-22. It is their efforts that ultimately make the restoration actions successful ensuring progress continues in the Tucannon.

PA-1: Instream Habitat, Contract #63605

In 2013, CTUIR initiated a field assessment and design of the upper portion of PA-1 RM 49.4 to RM 50, the portion of the project located on WDFW and USFS properties, using CTUIR funding. The lower ½ mile, a private section of the project downstream of RM 49.4 to RM 48.9 (described in Anchor 2011 Nov), in accordance with the landowner's wishes was not included in the 2014 design or implementation. The lower reach was surveyed as part of the Anchor Nov 2011 Restoration Plan and was found to be LWD deficient and has potential for a side channel reconnection. The lower section of this project may be considered in the future if the landowner becomes a willing participant in the Programmatic and would likely be designed and implemented in conjunction with PA-2. The overall project objectives were to increase channel complexity, off channel and side channel habitat and floodplain connectivity, through the placement of LWD.

The implementation of the PA-1 (Figure 10) designed instream portion was completed in August 2014 with riparian planting following in Nov/Dec 2014 by CTUIR (additional implementation detail provided in Appendix A. Wood was placed using both conventional construction techniques and a Vertol 107 piloted by Columbia Helicopters. The project added channel complexity and floodplain connectivity to approximately 0.64 miles of the main channel (Table 10). The project placed approximately 231 LWD key pieces (>6m long & 0.3m dia) (Figure 11 & 12), 37 logs (>6m long & 0.15m > 0.3m dia), created 0.36 miles of side channel and enhance 0.06 miles (Table 10) of existing side channel (Figure 13&14). In total, the project increased channel complexity (LWD Key pieces) by 468% from a pre-construction total of 44 pieces (>6m long & >0.3m dia) to 250 pieces post project (Table 12). The post project side channel length increased from 0.19 miles to 0.55 miles (Table 12) a 65% increase, with an overall channel length (including primary and perennial side channels) increased from 0.78 miles to 1.14 miles an increase of 32%.

The project also developed a structure downstream from the Panjab Bridge at RM 50.1 which will back water an existing rock weir with an excessive drop, which failed WDFW fish passage criteria at low flow. In addition to the designed project, the WDFW Wildlife Area Manager in coordination with CTUIR reconfigured the camping area on river right, so that it is no longer in the low lying floodplain and will accommodate the development of the project floodplain.

PA-3: Instream Habitat, Contract # 62642

In 2012, CTUIR initiated the design and development of PA-3 between RM 46.75 & RM 48.1 located on the WDFW Wildlife Area and USFS properties using a combination of CTUIR and Programmatic funding. A small section of the upper project, above the confluence of the Little Tucannon was excluded from the project design to avoid an existing habitat monitoring control site identified under the Tucannon CHaMP. The project design was completed and reviewed by the Programmatic and landowners in 2013, and implementation took place in July 2014. The project objectives were to increase channel complexity, off channel, side channel habitat and floodplain connectivity, through the placement of LWD. The project was designed to place large wood instream using a Vertol 107 helicopter in single and multiple tree configurations (Figure 15 & 16). This method was selected due to limited site access and the proximity of whole trees to the project area, which were donated by the USNF. The use of whole unanchored trees allows for a more natural habitat design and we believe a more natural river process. To provide downstream security below the unanchored wood, 5 engineered structures ballasted with large rock, were built to provide overall project stability and act as a backstop preventing mass movement of wood from the project area into high use areas (Figure 17).

The project placed 324 whole trees key pieces (>6m long & 0.3m dia), 21 logs (>6m long & 0.15 > 0.3m dia) via helicopter and conventional equipment in numerous configurations at 42 locations over the 1.36 mile project reach (Appendix A). The project increased the total number of LWD key pieces (>6m long & 0.3m dia) from 101 pre-project to 393 post project, an increase of 289% (Table 12). To provide stability to the five lower structures 106 boulders were used to ballast the five structures (Figure 17). Predicted project restoration metrics were provided by Anchor 2011 Nov (Table 3), and final implementation metric are provided in Table 10 produced from rapid surveys.

The Programmatic worked to pair the project implementation with a pre-project CHaMP monitoring site (Figure 16) and AME fish monitoring, post project surveys will be completed in upcoming years. Data is available at monitoringdata.org or through coordination with the Tucannon CHaMP monitoring program.

PA-14: Instream Habitat, Contract #58777

The Project Area 14 design was the result of the CCD BPA Project, a matching grant from SRFB, and the WDFW environmental engineer. The 30 % Design Report was produced by the CCD, was identified in 2012 for implementation in 2013/14 and through a matching grant obtained by SRSRB, was completed to a final design in January 2013. In 2013, WDFW assumed sponsorship of the project, finalized the design and initiated implementation, beginning at RM 37.6 upstream to RM 39.2. The project reach downstream from RM 37.6 to 37.2 identified in the original concept (Anchor 2011 Nov) has been excluded from this project to maintain the existing CHaMP monitoring control site. The omitted project reach would also be best restored using whole trees placed using a helicopter to protect existing riparian condition, and it will be reconsidered once materials near the site can be identified. The design focused on the construction of engineered log jams and placed single logs, for the purpose of

reducing channel incision, increase complexity, increase floodplain connectivity and increase off channel habitat. Final project designs are attached to the contract numbered 58777.

The objectives of this project were to use LWD placements in engineered and un-engineered structures to increase channel complexity, sinuosity, off channel habitat including side channels and connect floodplain. A secondary objective of construction was to reduce channel velocities and back water incised reaches improving floodplain connectivity (Appendix A).

Implementation was completed in 2014 by WDFW, and involved the placement of > 712 key pieces (>6m long & 0.3m dia) and an additional 65 logs (>6m long & 0.15m >0.3m dia) into the channel and side channels. The project constructed 71 separate multiple log structures and place >17 individual habitat trees (Figure 18 & 19). In the 2013 work window, WDFW conducted site preparation and develop construction access routes. In several places side channels were excavated above the base flow elevation so that elevated winter flows would enter those channels and initiate channel shaping. In total, 1.22 miles of new side channel were created in a combination of perennial (0.76miles) and ephemeral (high flow 0.61 miles) channels. Additionally, 0.16 miles of existing side channel were enhanced by increasing flows during high flow and increasing LWD complexity, with an additional 0.17 miles reconnected (Figure 20 & 21). As a direct result of implementation in 2014, LWD complexity for key pieces (>6m long & 0.3m dia) had an order of magnitude increase of 1105% from the pre-project measurement of 64 pieces to 771 pieces (Table 12). Side channels increased 86 % by length throughout the project reach from 0.23 miles pre-project to over 1.61 miles (Table 12). The overall wetted length of the project reach increased from 1.87 miles (including 1.64 miles main channel & 0.23 miles perennial side channel) to 2.64 miles (when including only new perennial side channels 0.76 miles) an increase of >29% (Table 12).

PA-14 is paired with a matched treatment and control CHaMP habitat monitoring sites which has had two years pre-treatment monitoring (Figure 19). The results from those sampling events are available through the Tucannon River CHaMP monitoring lead or through CHaMP monitoringdata.org. A full habitat analysis of the CHaMP data will be conducted by the Ecological Research Inc. the firm conducting the CHaMP program in the Tucannon for BPA. In the 2015 project report we will provide a summary of results from our sampling efforts conducted under CHaMP.

PA-15: Instream Habitat Phase I Contracts #62573

The PA-15 design was the result of a combined effort between SRFB matching funds and the Programmatic. In 2012, the SRSRB utilized a SRFB grant to develop the conceptual design prepared for Project Area 15 by Anchor QEA (Anchor November 2012) into a 30% preliminary design. The project was selected for preliminary design because it was identified as a Tier 1 project (Anchor November 2012). The preliminary design process was completed in July 2012, and in August 2013, the CCD became the project sponsor with a near final design finished in December 2013. During the design

process the total project length was reduced to exclude the section above RM 36.96 from the final design. The purpose was to avoid risk to three small private parcels on river right. Final Designs are attached to the project contract #58975 in Pisces. The project was recommended for implementation in 2014 using 100% Programmatic funding with materials match from the USFS.

The implementation of this project was modified into two separate phases to accommodate a short fall in budgets brought on first by fixed fiscal budgets and secondly by a high construction bid. The CCD was able to negotiate a construction contract to complete work under Phase 1 in 2014. It is anticipated that Phase II will be built in 2015 by the WDFW construction crew under direction of CCD. The project area is mostly on WDFW properties but involves two private landowners, one on the down river end and one on the up river end. The focus of the design was to increase complexity, floodplain connectivity and off channel habitat through placement of wood while maintaining the existing private infrastructure.

The construction of Phase I placed 210 LWD key pieces (>6m long & 0.3m dia) in 0.36 miles of the main stem (Figure 22 & 23) and in the 0.26 mile perennial side channel (Table 10) constructed during the project (Figure 24 & Appendix A). Within the project area LWD structures were placed in 0.62 miles of perennial channel, including both main channel and perennial side channel. A total of 33 complex wood structures were constructed and 16 single habitat logs were placed. In total, 0.26 miles of side channel were created and 0.2 miles were enhanced through wood placement and increased flow frequency (Table 10), an overall 57% increase in side channels (Table 12). The project increased wetted perennial channel by 42% including both main channel and perennial side channels.

PA-15 is paired with a matched treatment and control CHaMP habitat monitoring sample site which has had three years pre-treatment monitoring (Figure 23). The results from the sampling events are available through the Tucannon River CHaMP monitoring lead or through CHaMP monitoringdata.org. A full habitat analysis of CHaMP data will be conducted by the Ecological Research Inc., the firm conducting the CHaMP program in the Tucannon for BPA. A summary of CHaMP monitoring results will be provided in next year's report following project implementation.

PA-11: Design, Permit and Mobilization, PA-6-9 Concept Development Contract #64003

The PA-11 design was finalized in 2014 for the river reach between RM 40.57 and RM 41.8 by WDFW, with implementation in 2015. The project area was largely impacted by the School Fire (2005) which destroyed most of the riparian trees within the 1.23 mile reach. Currently, the channel is not incised and the reach is characterized as an anabranch - braided channel form. The main objective for the project design is to increase channel complexity through LWD placement, stabilize some of the existing side channels and increase complexity within them (Appendix B).

PA-11 is paired with a matched treatment and control CHaMP habitat monitoring sample site which has had pre-treatment monitoring as part of the CHaMP program. The results from those sampling events

are available through the Tucannon River CHaMP monitoring lead or through monitoringdata.org. A full habitat analysis of the CHaMP data will be conducted by the Ecological Research Inc. the firm conducting the CHaMP program in the Tucannon for BPA.

The Programmatic will work with WDFW to conduct a pre/post rapid survey in 2015 for the PA-11 to ensure accurate description of project implementation. The post survey will be developed into an as-built package with can be used to monitor project effectiveness over time.

PA-6-9 concept development and design was initiated in 2014 with the intent of investigating project areas 6-9 for future project development. During initial surveys it was determined that the project areas would greatly benefit from a wood augmentation and side channel development project. Several infrastructure attributes are located in the floodplain particularly in PA-7 and PA-8 which will require specific design consideration. The reach within PA-7 located adjacent to the USFS roadway will not be included in this initial project awaiting assessment by the USFS in 2015. It is anticipated that the road may be relocated out of the floodplain increasing restoration potential and habitat value at the site. The existence of the Curl Lake impoundment currently constricts floodplain and channel meander width through PA-8, though it is unlikely the lake will be modified, WDFW will design some habitat roughness through the reach to improve habitat from existing condition. The implementation of this project is anticipated for 2017 and would largely be completed using a helicopter to place logs in unanchored configurations.

PA-24: Design & Permit, Contract #64018

The PA- 24 design was developed to a 30% designs under a matching SRFB grant from the Conceptual Restoration Plan prepared by Anchor November, 2011. The project final design was sponsored by the SRSRB in coordination with the CCD who will sponsor the implementation of the project. The project design was completed in December of 2014 for implementation in 2015. The restoration objectives are to remove river confining structure and place channel complexity. The project is located on private properties from RM 27.5 to RM 28.25 and in total would place LWD structures along the entire 0.75 mile reach. An additional feature of the preliminary design is to remove river confine features to reconnect 1.32 acres of low lying floodplain. The final 100% project designs are attached to contract 64018 in Pisces.

Non-Tucannon Programmatic Funded Project Implementation:

During the 2014 season the Programmatic provided technical support to the CCD in the design and implementation of two additional restoration projects within the basin. PA-22 was located on private property within the priority Chinook restoration reach, and was identified in the Anchor QEA (2011 Nov) as a high priority for increasing LWD complexity and floodplain connectivity. In 2014, the CCD treated 0.63 mile of the 1.01 mile of the main channel with LWD placement (Table 10). In total, 8 log

jams were created using 36 key pieces (>6m long & 0.30cm dia), bring the total number of key pieces for the treated reach from 10 to 46.

The Programmatic also provided technical support in the design and implementation of PA-40 located on private property above RM 2 on the Tucannon Ranch. The project is not located in the prioritized spring Chinook restoration and rearing reach (Figure 4) but it is within the spring Chinook winter migration route to the Snake River and there is beginning to be evidence that the lower and middle reaches of the Tucannon are winter rearing habitats for spring Chinook. The project funding was through a RCO WDOE grant supported through the SRSRB Lead Entity (SRFB) with the objective of improving Fall Chinook spawning and rearing habitat in the lower river. In summary, the project removed 1,251 ft of river levee and opened 22.88 acre of low lying floodplain, and planted 1.69 acres with new riparian trees. Within the floodplain 0.45 miles of high flow side channel were augmented (increased access and wood added) and 0.22 miles of perennial side channel were created and treated with wood. The project reach (main channel and new side channels) pre project contained 17 natural and 11 previously placed key pieces of LWD (>6m long & 0.30cm dia) and 51 smaller debris logs (>6m long and 0.15-0.30cm dia). Following implementation 86 key pieces and 82 debris pieces were identified by the rapid habitat assessment.

2015 Restoration Project Implementation: PA-11, PA-15 b (Phase II), PA-24

In 2014, the Programmatic supported the development and preparation for implementation of three projects including PA-11, PA-15b and PA-24. The projects have been described in detail a part of the design contracts above and more information on project detail can be found in Appendix B. All three projects will focus on increasing channel complexity and improving floodplain connectivity. Other projects which are further out in the work plan (Table 3) are outlined as follows. Project areas 17&18 will be developed to final design over the next year in by CTUIR in cooperation with the Programmatic and WDFW, for implementation in 2016. The Programmatic will work with the CCD to develop a project in PA-28 for implementation in upcoming years. The USFS will initiate feasibility assessment on PA-5 and 7, for concept development and design in 2015-16.

Change Detection & Effectiveness Monitoring

Work Element 157: Collect/Generate/Validate Field and Lab Data

During the reporting period, the SRSRB coordinated and supported its partners in the collection of habitat data including stream temperature, stream flow, and channel complexity. The SRSRB adopted the CHaMP method and protocol for implementation monitoring in 2012, so the habitat changes made through restoration could be directly compared to the watershed wide scale changes. In 2014, the annual monitoring of the 4 supplemental CHaMP sites was completed at the implementation projects (PA 03, 14, 15 and 24) for the purpose of developing pre/post-project implementation data set. The data was collected by ELR, the CHaMP contractor conducting the Tucannon CHaMP project. As part of sub-

contract with ELR, they process, analyze and develop the data and meta-data in www.champmonitoring.org. It is anticipated these monitoring activities will continue for several years following implementation, and a summary of changes will be reported by ELR. An initial report was completed for the Programmatic in 2014 describing the pretreatment conditions and the initial post treatment condition at PA-26 and PA-10 following implementation (2014 Hill & Bennett). A more detailed interpretation of project effectiveness will be conducted in upcoming years once sufficient flows have interacted with the structural components of the projects.

The SRSRB worked with its partners to ensure the long term datasets on stream flow and temperature were continued in 2014 (Figure 25), primarily through coordination with WDOE to maintain the stream flow and temperature gage at Marengo. Gages all over the region continue to be at risk of discontinuation under WDOE funding and the SRSRB will need to remain proactive to ensure this data set continues. In 2014, stream flow (Figure 26) and temperature was monitored continuously at the DOE Marengo gage October 2013 through September 2014.

Stream flow and temperature have been improving in the Tucannon (over the period of record 2003 to present) measured at the WDOE Marengo gage. Although it is difficult to attribute the causes it would appear that minimum flows are increasing over the ten year period (Figure 27), while precipitation (measured at the NRCS Touchet gage) remains relatively flat (Figure 28). It is hypothesized that watershed storage capacity has and continues to improve, increasing retention potential (ie. Slowing water down) and elevating base flows. The 2015 water year is shaping up to be a very low precipitation year, hovering in the 40% with very little snow pack at the time of this report, and will be a good test of the hypothesis, in that if Tucannon flows hold up, while other watersheds continue to drop it may hint at change in the environment.

Water temperature has also shown large improvements with a steady decline in instantaneous maximum temperatures since the late 80's where stream temperatures exceeded 80 degrees Fahrenheit (Figure 29). The decline in maximum temperature is likely influenced by increases in base flow (Figure 27) and may also be impacted by localized reduction in ambient air temperature caused by an increase in shading from developing CREP plantings. Air temperature measured at the WDOE Marengo gage is highly variable over the time period but shows no sign in trending downward like stream temperature (Figure 30). It is also hypothesized as restoration projects increase and channel length increases the Tucannon will experience cooler temperatures, through increased hyporheic exchange.

WDFW has conducted a preliminary assessment in 2013, tagging pre-smolt chinook throughout the upper Tucannon followed by a similar effort in 2014 for the purpose of identifying pre-smolt over winter survival within the Tucannon. Understanding pre-smolt survival is of interest to the Programmatic in that we are working to improve survival of that very life stage and providing us feedback as to our restoration effectiveness quicker than waiting for adults to return from the ocean 2-3years later. This method also helps filter other forms of mortality we have no control over. During the preliminary study

these fish were detected in the Tucannon at the Pitt tag detection stations supported under other WDFW projects as pre-smolt and smolt in the winter spring of 2013&14. The fish provided preliminary migration timing and survival but data is very preliminary and to better describe survival in the middle and lower river more years will be required. That caution provided, preliminary results (2013 data only with 2014 not completed at the time of this report) indicate a high rate of mortality during the late fall and early winter at rate higher than is observed in other watersheds (Personnel communication WDFW 2014). This is a serious concern to the Programmatic given the investment in the upper watershed to improve spawning and rearing habitat. If it is determined pre-smolts are utilizing the middle and lower reaches of the river below RM 20 at a high rate previously known, and having a high rate of mortality there, the Programmatic may need to consider restoration actions recommended in those reaches. It is anticipated the data produced by WDFW will be taken into consideration in determining Programmatic focus areas in upcoming years.

It may be possible to have a great impact to adult to adult survival by creating a small increase in winter survival. It also may be possible to see large gains in adult survival from increase parr to smolt survival. An exercise conducted by SRSRB staff indicated that a 5% increase in survival from fall parr to spring smolt within the Tucannon could improve adult returns by 2-20% (Martin 2014, personnel communication based on preliminary calculation). This topic will remain at the top of the 2015 priorities for monitoring for the SRSRB.

Pre-spawn mortality of adult Chinook in the Tucannon was observed at an elevated rate in 2013 by WDFW staff and brought to the attention of managers in 2013. A meeting was held in Dayton in 2014 to determine potential causal mechanisms and to find a road forward. In 2013, > 4.5 females per red were calculated up from a more moderate 2 females per red previous years (Figure 9, Bumgarner 2015). This is an indication of high pre-spawn mortality or pre-spawn emigration from the river. Though in 2014, it would appear that the mortality rate has stabilized at 2 females per redd, WDFW will continue to investigate the potential causes of pre-spawn mortality in 2015.

In 2014, an effort to better understand the cause/causes of pre-spawn mortality conducted by WDFW spent a year investigating potential losses of fish which is cover extensively in (Bumgarner 2015) the Tucannon River Spring Chinook Salmon Pre-Spawn Mortality Investigation for 2014. The report investigates potentials for poaching, predation, disease, impacts from trap operations, radio tagging and restoration activities. The overall take home message from the report is that no single cause for mortality was identified. It was hypothesized that restoration activities may have had cumulative impacts at a watershed scale on spawning adults in 2013 and 2014. Though there may be sort term impacts to historic spawning locations caused by back watering or other disturbance, no adults were observed or handled during restoration activities in 2012 or in 2014. Additionally it is important to note that in 2010 and 2013 when the highest mortalities were observed (Figure 9) no in water restoration was conducted.

The SRSRB worked with the partners in 2014 to support research conducted by the USACE to better understand the issue of adult Chinook and steelhead (of known Tucannon origin) passing the Tucannon through Little Goose and Lower Granit hydro systems and the mortality associated with that behavior. In 2014, the WWCC hosted a Symposium to better understand the causal mechanisms that may be responsible for this behavior. With the wide utilization of Pitt tags and increased distribution of arrays within the Columbia Basin, it has been discovered that adult fish of known origin continue to pass the Tucannon River to above Lower Granite Dam with a very low rate of returning to the Tucannon (personnel communication Glen Mendel WDFW). This phenomenon is apparently higher for steelhead (as high as 50%) than Chinook which is closer to 25%. This information was provided by WDFW at the USACE meeting of the Mid-Columbia Steelhead review. The general findings of the meeting were that by pass is occurring at a wide scale and different levels of mortality or impacts to populations are occurring across the Columbia Basin. One of the results of the meeting was the formation of a work group to compile findings and interoperate impacts of by-pass/over shoot. The SRSRB will continue to follow finding of this work group through time and work with the USACE to determine if causal mechanisms can be identified and corrections are possible in the Tucannon.

One of the largest data gaps present at the initiation of the Programmatic was instream channel habitat complexity, including channel shape, off channel habitat, and LWD abundance. The assessment work completed under Anchor (April 2011, November 2011) provides information as to available off channel habitat and LWD deficiency (without enumeration of key pieces) which has been used to characterize existing condition (Table 4). The CHaMP monitoring group is working to improve the available data for existing condition and trends throughout the watershed related to wood key piece abundance. In addition to this the rapid surveys conducted on the restoration project will also quantify the pre-project compared to the post project condition. These data will be invaluable in conducting an EDT update and the Expert Panel exercise in 2015.

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Tucannon River Programmatic

Project #: 2010-077-00

Contract #: 65249

Annual Progress Report

(Reporting Period January 2014 to December 2014)

Tables 1-12

Table 1: Habitat restoration objectives as they are list in the Salmon Recovery Plan for South Eastern Washington for the Tucannon River from the mouth of Pataha Creek upstream above Panjab Cr. The objectives are listed by level of priority as identified in the 2012 plan. Imminent threats are always considered the highest priority when identified in project rounds.

Upper Tucannon River MSA (from Pataha Creek upstream to Tucannon headwaters)	
Imminent Threats: Fish Screens, Low Stream Flows	
I.	Riparian: > 40 to 75% of maximum
II.	Large Woody Debris: >1 key piece per channel width
III.	Channel Confinement: < 25 to 50% of stream bank length
IV.	Temperature: < 4 days > 72°F

Table 2: The Tucannon River habitat restoration objectives for salmon and steelhead as identified in the 2012 Salmon Recovery Plan for SE Washington. Each objective has several habitat metrics being used to measure progress towards meeting the restoration objective. The table lists the total available/current know habitat, the restoration goal of the objective and the current status toward meeting the goal.

Restoration Objective	Metric Description	Metric	Units	Notes
Riparian Restoration Objective – Restore to >40 to 75% of maximum	Reach Length	51	miles	Panjab Cr to Confluence
	Length Public Lands (24%)	12.34	miles	Public Lands are considered protected varied levels of riparian recovery.
	Restoration Goal Length	29-54	miles	The goal is a bench mark
	Current Status	33.85	miles	The current status include miles of restoration in main stem and tributaries.
	Total Reach Area at 180 ft Buffer	2618	acres	
	Area Planted Goal	1963.5	acres	Bench Mark
	Restoration Status	1008.6	acres	
Remove All Imminent Threats (Migration Barriers, Unscreened Diversions)	Screen Estimated Total	54	count	
	Screen Status	54	count	
	Barrier Estimated Total	5	count	The Tucannon Hatchery Weir is being evaluated for its apparent effect on fish passage
	Barrier Status	5	count	
Large Woody Debris Restore to > 2 Key Piece per Channel Width	Reach Length (reach 6-10)	30	miles	RM 20-50
	LWD Restoration Goal	21	miles	Identified in Anchor Nov 2011
	LWD Restoration Status	8.53	miles	Treated
	LWD Goal # of Key Pieces (45 ft average channel width)	4928	count	Bench Mark for the upper 30 miles, based on the number of key pieces/bank width for the 21 miles identified in the Anchor (Nov 2011)
	LWD Status # of Key Pieces	1891	count	Placed In Stream (LWD Key Piece as defined in CHaMP Monitoring Protocol)
Channel Confinement: Restore to < 25 to 50% of Bank Length	Reach 6-10 Total Length	30	miles	RM 20-50
	Reach 6-10 Goal Length	18	miles	Based on Anchor Nov 2011
	Reach 6-10 Miles Treated for Confinement Status	8.35	miles	Goal based on combination of Levee Setback and Incision Reduction through LWD Placements
	Reach 2-5 Total Length	20	miles	
	Reach 2-5 Goal Length	5	miles	

Table 4: This table is reproduced from Anchor 2011 November, Conceptual Restoration Plan and lists the approximate habitat quantities for restoration projects produced during the conceptual restoration plan. The table lists the restoration actions for reaches 6-10 of the restoration.

Reach	Project Area	RM		Project Actions (in ft)								Reconnected Low Floodplain (in acres)	Riparian Enhancement (in acres)	Protection Area (RM)
				LWD Addition	Levees/Riprap		Side Channels			Roads				
		From	To		Removal	Set Back	Enhance	New	Reconnect	Remove	Realign			
10	1	50.0	48.9	6714	-	-	-	-	-	-	-	-	-	-
	2	49.1	48.7	1097	-	-	1412	203	-	-	-	-	-	-
	3	48.7	46.8	6908	377	-	-	-	-	-	-	0.59	-	-
	4	46.8	46.4	2386	1191	1028.47*	1969	256	822	-	-	1.63	-	-
	5	46.4	46.0	2460	988	95	-	-	-	2327	-	10.73	-	-
	6	46.0	45.3	1134	145	-	-	-	-	-	-	-	-	45.3-45.7
	7	45.3	44.9	2443	337	-	-	-	-	2706	2468	-	-	-
	8	44.9	44.4	1504	684	329	445	-	546	-	-	1.01	-	-
	9	44.4	44.0	2970	2563	-	-	-	-	-	-	-	-	-
9	10	44.0	42.4	8174	1305	-	-	-	-	-	5.83	39.37	-	
	11	42.3	40.7	9716	1108	-	-	-	-	1540	652	1.43	39.79	-
	12	40.7	40.0	1965	-	-	-	-	-	-	-	-	17.81	40.0-40.7
8	13	40.0	39.2	3556	3192	759	-	-	-	-	3.91	-	-	
	14	39.2	37.2	10309	162	-	-	-	-	-	17.77	-	-	
	15	37.2	36.4	4027	865	-	-	-	-	-	-	-	-	
	16	36.4	34.9	1708	524	-	-	1118	-	-	-	4.59	-	-
	17	34.9	34.3	2936	706	-	1614	-	-	664	724	2.25	17.26	-
	18	34.3	32.1	3558	-	-	-	-	-	-	-	-	-	33.65-34.3, 32.1-33.1
7	19	32.1	31.8	1432	639	-	-	-	-	-	-	-	-	-
	20	31.8	31.5	-	-	-	-	-	-	-	-	-	-	31.5-31.8
	21	31.5	30.3	5977	1743	2551	-	-	-	-	-	0.59	-	-
	22	30.3	29.3	5338	2945	193	-	-	-	-	-	2.45	-	-
	23	29.3	28.3	5059	2159	889	-	-	-	-	-	9.48	-	-
	24	28.3	27.5	3972	2532	2924	-	-	-	-	-	1.32	-	-
6	25	27.5	26.9	1177	-	-	-	-	-	-	-	-	-	27.15-27.5
	26	26.9	23.7	9578	8305	12218	-	-	-	-	-	29.26	-	-
	27	23.7	22.9	1257	266	2820	-	-	-	-	-	-	-	-
	28	22.9	20.0	1037	657	-	-	-	-	-	-	22.12	-	20.5-21.7, 22.1-22.8

Table 5. The following table lists the data on channel confinement produce from the LIDAR information and is reproduced from the Geomorphic Assessment (Anchor 2011 April). The table lists the proportion of river channel confinement by river reach.

Reach	River Mile		Length (mi)	Degree of Confinement, Length (miles)			Degree of Confinement, (%)		
	Begin	End		Confined	Moderate	Unconfined	Confined	Moderate	Unconfined
10	50.2	44.0	6.2	1.5	4.7	0	24.2%	75.8%	0.0%
9	44.0	40.0	4.0	0	2	2	0.0%	50.0%	50.0%
8	40.0	32.1	7.9	0.9	6.4	0.6	11.4%	81.0%	7.6%
7	32.1	27.5	4.6	2.4	2.2	0	52.2%	47.8%	0.0%
6	27.5	20.0	7.5	0.4	5.1	2.1	5.3%	67.1%	27.6%
5	20.0	13.2	6.8	3.7	1.8	1.3	54.4%	26.5%	19.1%
4	13.2	8.9	4.3	0.6	1.9	1.8	14.0%	44.2%	41.9%
3	8.9	4.5	4.4	4.3	0	0.1	97.7%	0.0%	2.3%
2	4.5	0.7	3.8	0.5	1.6	1.7	13.2%	42.1%	44.7%
1	0.7	0.0	0.7	0.7	0	0	100.0%	0.0%	0.0%
			Sums	15	25.7	9.6	29.8%	51.1%	19.1%

Table 6: Approximate project implementation schedule developed for managing the time required to complete the necessary steps for implementing large projects under the Programmatic. Note the sort period where the project construction must take place. It is the narrow work window in the Tucannon which requires much perpetration a staging outside the in stream work window.

Year	project #	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	A												
2012	A				Design							Permits	
2013	A							Wood and Materials Acquisition/Staging					
2014	A	Construction Bids/Contracts			Monitoring		Construction			Reclamation			
2015	A												

Table 7: The Programmatic matching funds provided through grants, donated materials and project partners directly to the Programmatic 2011 through 2015. The SRSRB and Programmatic work with project sponsor to secure grants and material matches.

Source	FY 11	FY 12	FY 13	FY 14	FY 15 (Anticipated)
Office Admin	\$1,812		\$1,812	\$1,812	\$1,812
Meeting	\$2,280	\$8,231	\$8,231	\$8,231	\$8,231
PCSRP SRFB Grant 10-1831 & 9-1595		\$113,734		\$145,400	
PCSRP SRFB Grant 10-1832		\$400,000			
PCSRP SRFB Grant 12-1643				\$311,000	
PCSRF SRFB Grant 14-1900 & 14-1899					\$431,000
USFS Donated Trees		\$100,000	\$320,000		
USFS Donated Labor				\$9,600	
USFS Native Grass Seed				\$50,000	
FY Totals	\$4,092	\$613,734	\$320,000	\$516,000	\$441,043

Table 8: Programmatic and matching funds allocated by fiscal year identifying funds going to implementation and administration. The annual parent contract is separated into administration and a small chunk for monitoring.

Fiscal Year	Program Funds			Matching Funds			Projects Implemented
	Parent	Admin Contract	Implementation	Admin Contract	Implementation	Source	
2011	\$70,217	\$54,000	\$542,063	\$4,092			Design PA-10
2012	\$137,720	\$51,990	\$1,216,570	\$8,231	\$613,734	RCO Grant 09-1595 10-1832 & 10-1831 and 300 trees from USFS	PA-10, PA-14 & PA-15 Design
2013	\$168,522	\$41,860	\$1,242,543	\$10,043	\$320,000	Estimated cost of donate trees (USFS)	PA-15&PA-3
2014	\$160,206	\$120,334	\$1,343,925	\$10,043	\$516,000	RCO Grant 10-1831, 12-1643	PA-1, PA-15, PA-11 site prep and PA-24 design
2015	\$175,000	\$135,000	\$1,200,800	\$10,043	\$431,000	RCO Grant 14-1899 &14-1900	PA-11&24 implementation

Table 9: The table below provides a restoration summary of metrics collected by the Programmatic using Rapid Habitat Survey Techniques to report progress in the Tucannon in relation to the Spring Chinook priority area RM 20-50. The table provides three columns left being 2014 projects completed under the programmatic, the center column are the projects completed under the programmatic since 2011 and the far right reflect all the project completed both programmatic and other funding sources within the Chinook priority area.

	Programmatic 2014	Programmatic 2011-2014	SpCH Reach 2010-2014
Main Channel restored (mile)	3.95	5.51	9.72
Placed LWD (mile)	4.43	6.46	8.53
LWD Key Pieces added (>6m long & 0.3m dia)	1477	1777	1891
Med LWD Debris Added (>6m long & 0.15-0.3m dia)	152	623	652
# Structures added	184	253	278
# of single logs added (>6m long & 0.3m dia)	50	45	61
Natural Key Pieces (>6m long & 0.3m dia)	227	-	-
Natural Medium (>6m long & 0.15-0.3m dia)	95	-	-
Rapid Hab/Post Survey (#of key pieces) (dd)	1704	-	-
Levee Removed (ft)	-	1305	9876
Levee Set Back (ft)	-	-	15037
Side Channel Enhance (mile)	0.42	0.42	-
Side Channel Created (mile)	1.46	1.92	-
Side Channel Reconnect (mile)	-	0.47	-
New Floodplain (ac)	21.1	26.93	156.93

bb - # of Key LWD Pieces >6m long & > 30cm dia
cc - # of multiple log structure added
dd - total number of post project wood in reach >6m long & >30cm dia
ee - # of medium LWD >6m long & 15-30cm dia

Table 10: Tucannon Programmatic Habitat restoration metrics collected using the rapid habitat survey method in 2014, by project area. Metrics are provided for all projects collected in the priority spring Chinook area identified in 2011. As projects are completed the table will be up dated. The Programmatic works with project sponsor who complete projects not funded by the programmatic to collect data on projects to track progress toward recovery in the Tucannon. The data provide in the table represents actual data collected post construction and not proposed actions.

Tucannon Habitat Programmatic 2011-2014

Project Area	Year Implemented	Tier	River Mile		Main Channel (mile)	Placed LWD (mile)	LWD Key Pieces added (bb)	Med LWD Debris Added (ee)	# Structures added (cc)	# of single logs added (bb)	Natural Key Pieces (bb)	Natural Medium (ee)	Rapid Hab/Post Survey (#of key pieces) (dd)	Debris Added (CY)	Levees/Riprap (ft)		Side Channels (mile)			New Floodplain (ac)	Notes
			From	To											Remove	Set Back	Enhance	New	Reconnect		
1	2014	2	50.1	49.5	0.59	0.81	231	37	38	13	17	9	248	0	0	0	0.06	0.36	0.00	1.5	Rapid Habitat Data
3	2014	2	48.1	46.8	1.36	1.36	324	21	42	4	117	50	441	?	0	-	-	-	-	0.59	Rapid Habitat Data
5	2017-2018	2	46.4	46.0																	
6	2017	3	46.0	45.3																	
7	2017	2	45.3	44.9																	
8	2017	2	44.9	44.4																	
9	2017	3	44.4	44.0																	
10	2012	1	44.0	42.4	1.56	2.03	300	500	69	11				170	1305	0	0.00	0.46	0.47	5.83	-
11	2015	1	42.3	40.7												-	-	-	-	0	-
13	2018	1	40.0	39.2																	
14	2014	1	39.2	37.2	1.64	1.64	712	65	71	17	50	28	762	200	0	0	0.15	1.22	0.17	17.77	Rapid Habitat Data
15	2014	1	37.2	36.4	0.36	0.62	210	29	33	16	43	8	253	100	0	-	0.20	0.26	0.00	1.24	Rapid Habitat Data
17	2016	1	34.9	34.3																	
18	2016	2	34.3	32.1																	
22	2014	1	30.3	29.3	1.01	0.63	36		8	0	10	42	46	0			-	-	-	0	Rapid Habitat Data
23	2015	1	29.3	28.3																	-
24	2015	1	28.3	27.5																	-
26	2011-2014	1	26.9	23.7	3.20	1.44	78		17						8305	12217.7	-	-	-	130	-
27	Set back done	2	23.7	22.9											266	2819.5	-	-	-	-	-
28	2016	3	22.9	20.0																	

bb - # of Key LWD Pieces >6m long & > 30cm dia
 cc - # of multiple log structure added
 dd - total number of post project wood in reach >6m long & >30cm dia
 ee - # of medium LWD >6m long & 15-30cm dia

Completed
 Concept In Design
 Implementation
 Partially Completed

Table 11: Peek stream flow for the 1-100 yr return flow estimated in the Tucannon Geomorphic Assessment (Anchor 2011 April).

**Table 2-1
Higher Range Flood Discharges Values (cfs)**

Flow Change (RM)	Tributary/Location Name	Return Period (years)						
		1	2	5	10	25	50	100
4.8	Kellogg Creek	522	1,275	2,845	4,373	6,969	9,458	12,485
8.6	Smith Hollow ¹	484	1,183	2,640	4,057	6,465	8,775	11,583
12.3	Pataha Creek	479	1,171	2,613	4,016	6,401	8,687	11,467
14.8	Willow Creek	426	1,041	2,323	3,570	5,689	7,722	10,193
28.4	Marengo Gage ²	421	1,029	2,296	3,529	5,625	7,634	10,077
35.6	Tumalum Creek	386	943	2,103	3,232	5,151	6,991	9,228
37.9	Cummings Creek	352	861	1,920	2,951	4,704	6,384	8,427
48.2	Little Tucannon R.	272	664	1,481	2,276	3,627	4,923	6,498
50.2	Panjab Creek	245	598	1,334	2,050	3,267	4,433	5,852
55.2	Above Panjab	181	443	988	1,518	2,420	3,284	4,335

Notes:

1. For the purposes of modeling, the discharge downstream of Smith Hollow was assumed to be equivalent to the discharge at the Starbuck gage.
2. The Marengo gage is located at approximately RM 26.9. The flow change location was moved upstream to RM 28.4 to better represent locations of tributary inputs.
3. The upper and lower flood discharges values are identical downstream of Pataha Creek (see Appendix A).
cfs = cubic feet per second

Table 12: Calculated changes in habitat condition from pre implementation to post construction in 2014 for LWD key pieces (>6m long & 0.3cm dia), new perennial or ephemeral side channels and overall increase in channel length (considering all perennial channels main and side). Values are calculated from Rapid Habitat Surveys and represent on site condition in 2014 as built condition.

Project Area	# of Key Pieces			Miles of Side Channel			Increase in Perennial Reach Length Miles		
	Pre Project	Post Project	% Increase	Pre Project	Post Project	% Increase	Pre Project	Post Project	% Increase
1	44	250	468%	0.19	0.55	65%	0.78	1.14	32%
3	101	393	289%	0.4	0	0%	1.76	1.76	0%
14	64	771	1105%	0.23	1.61	86%	1.87	2.64	29%
15	26	271	942%	0.2	0.46	57%	0.36	0.62	42%

Tucannon River Programmatic

Project #: 2010-077-00

Contract #: 65249

Annual Progress Report

(Reporting Period January 2014 to December 2014)

Figures 1 - 30

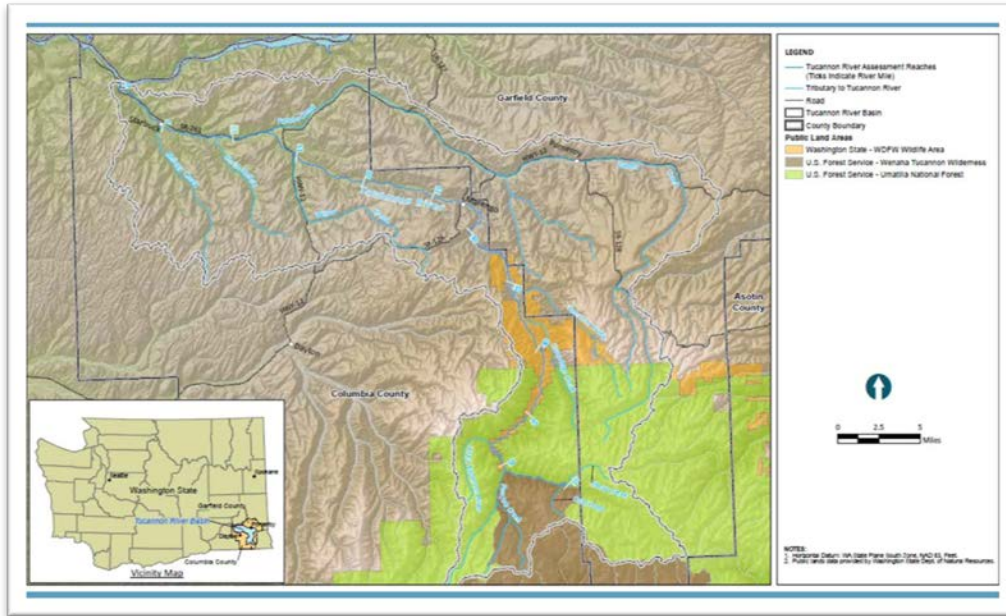


Figure 1. Tucannon River Watershed vicinity map (Anchor Nov, 2011). The gold shaded areas indicate the Wooten Wildlife Area, the green areas the Umatilla National Forest, the darker brown headwaters of the Tucannon indicate the wilderness area and the remainder of the watershed in private ownership.

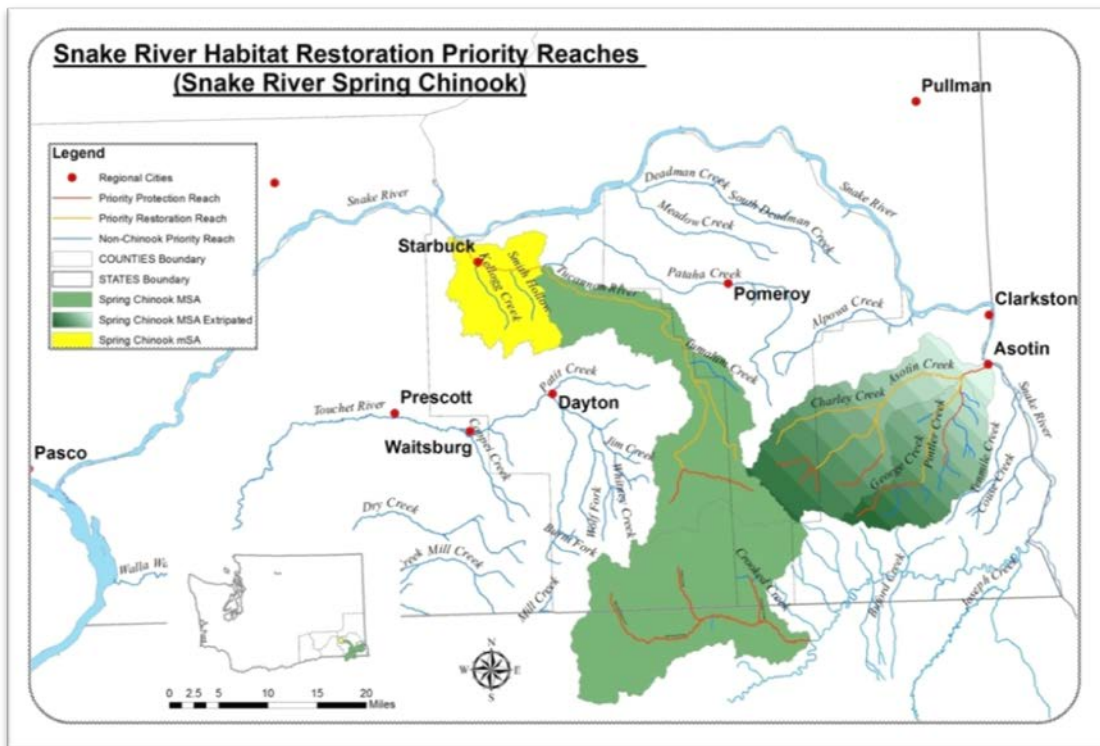


Figure 2. Snake River Salmon Recovery Plan priority areas for Snake River ESU spring Chinook. The map highlights the Tucannon, Asotin and Wenaha River basins. The green shaded areas are the major spawning areas (MSA) and the yellow area is a minor spawning area (mSA). The stream reach highlighted orange indicate the river reach where the SRSRB RTT supports stream channel restoration activities and the red reaches protection project types. The Asotin population is currently believed to have been extirpated.

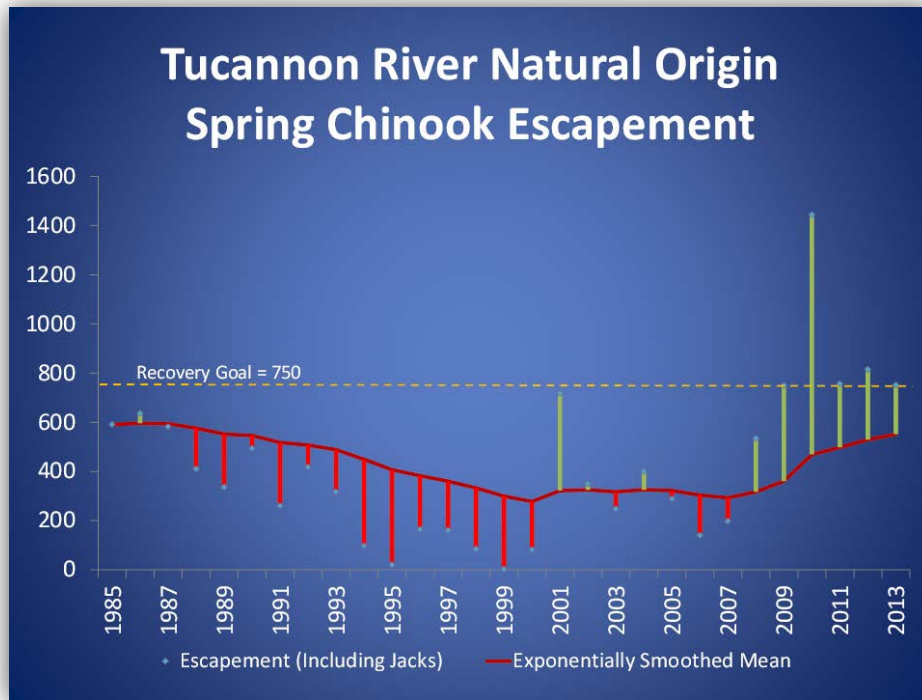


Figure 3. Mean natural origins spring Chinook escapement for the Tucannon River in relation to the recovery goal and the geometric mean, based on data collected by the WDFW Snake River Lab Dayton WA. The blue dots indicate the population estimate, the red curve indicates the geometric mean and the dashed line the recovery goal of 750 adults. The bars indicate divergence from the geometric mean. This table is for illustration purpose and is used by the SRSRB for informational purpose only.

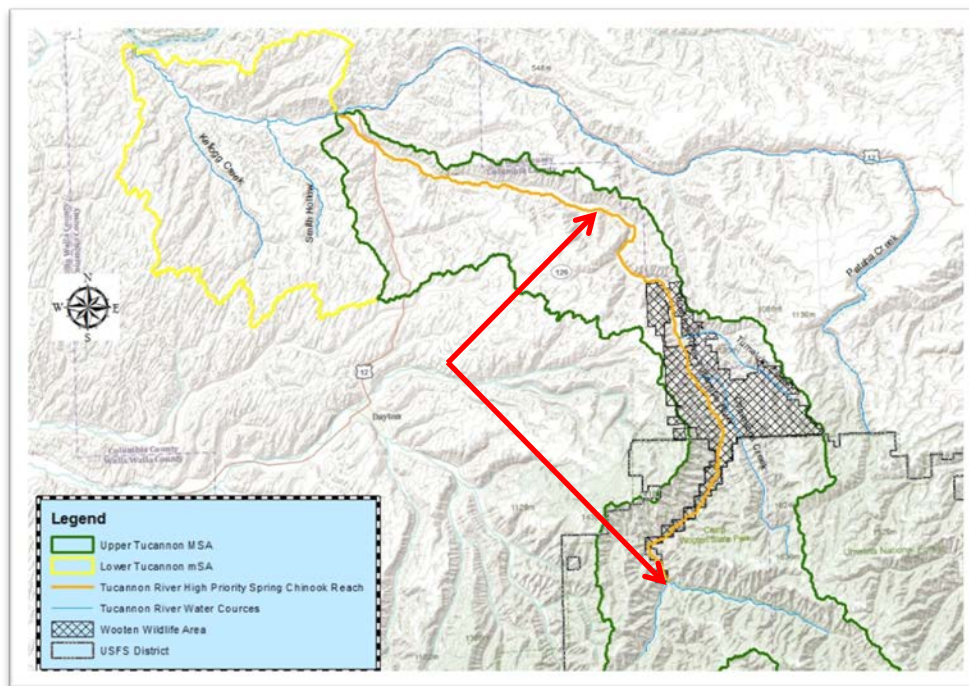


Figure 4. The Tucannon River spring Chinook priority restoration reach is highlighted in orange and indicated by the red arrows. The Tucannon major spawning area is represented by the green polygon and the minor spawning area by the yellow polygon. See legend for additional map detail.

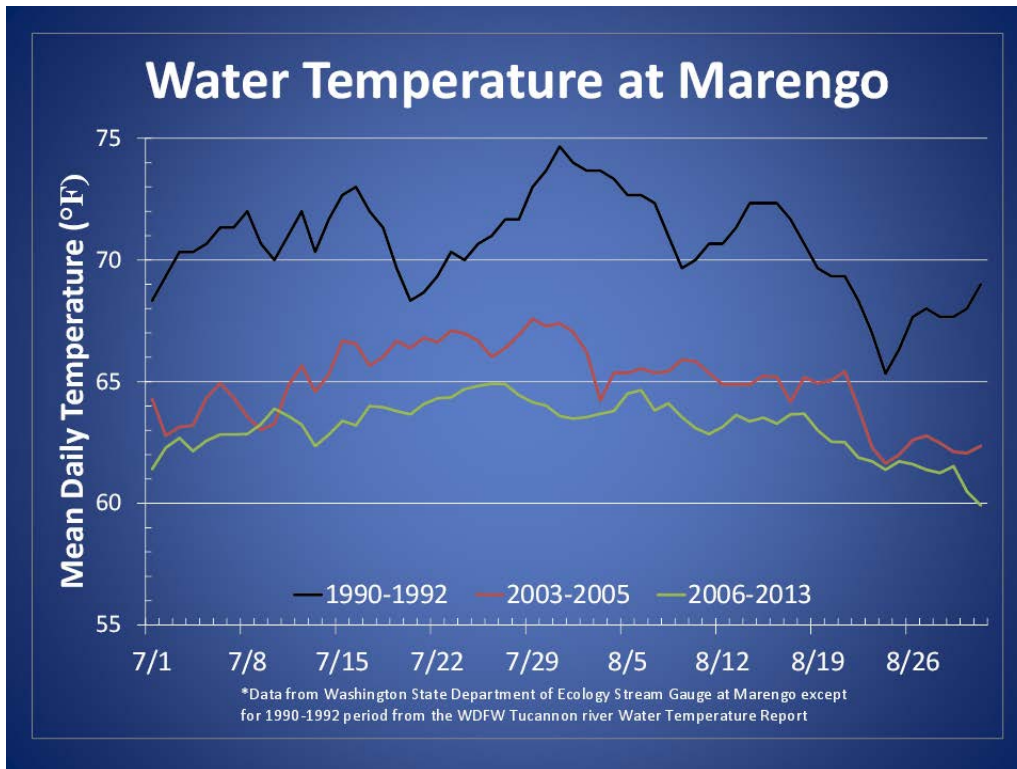


Figure 5: Mean daily stream temperature measured at the Tucannon River Washington Department of Ecology Marengo gage between 2003 to present. The 1990-92 data set was collected near Marengo by WDFW..

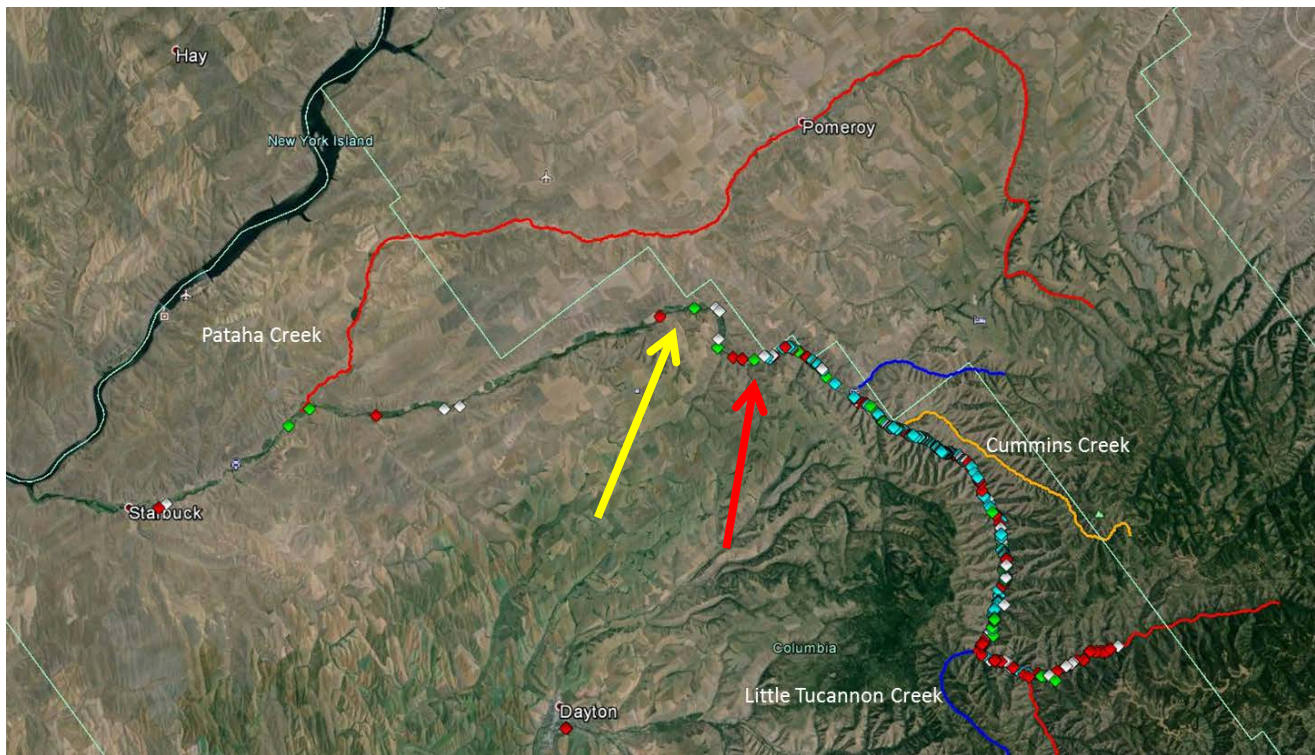


Figure 6: Spring Chinook redds plotted in Goggle Earth map for the spawning year 2011-2014 (WDFW data). The red arrow indicates RM 30 and the yellow arrow RM 20. From the time period of restoration spawning condition in the 10 mile reach between RM 30 & 20 have improved allowing Chinook spawning.

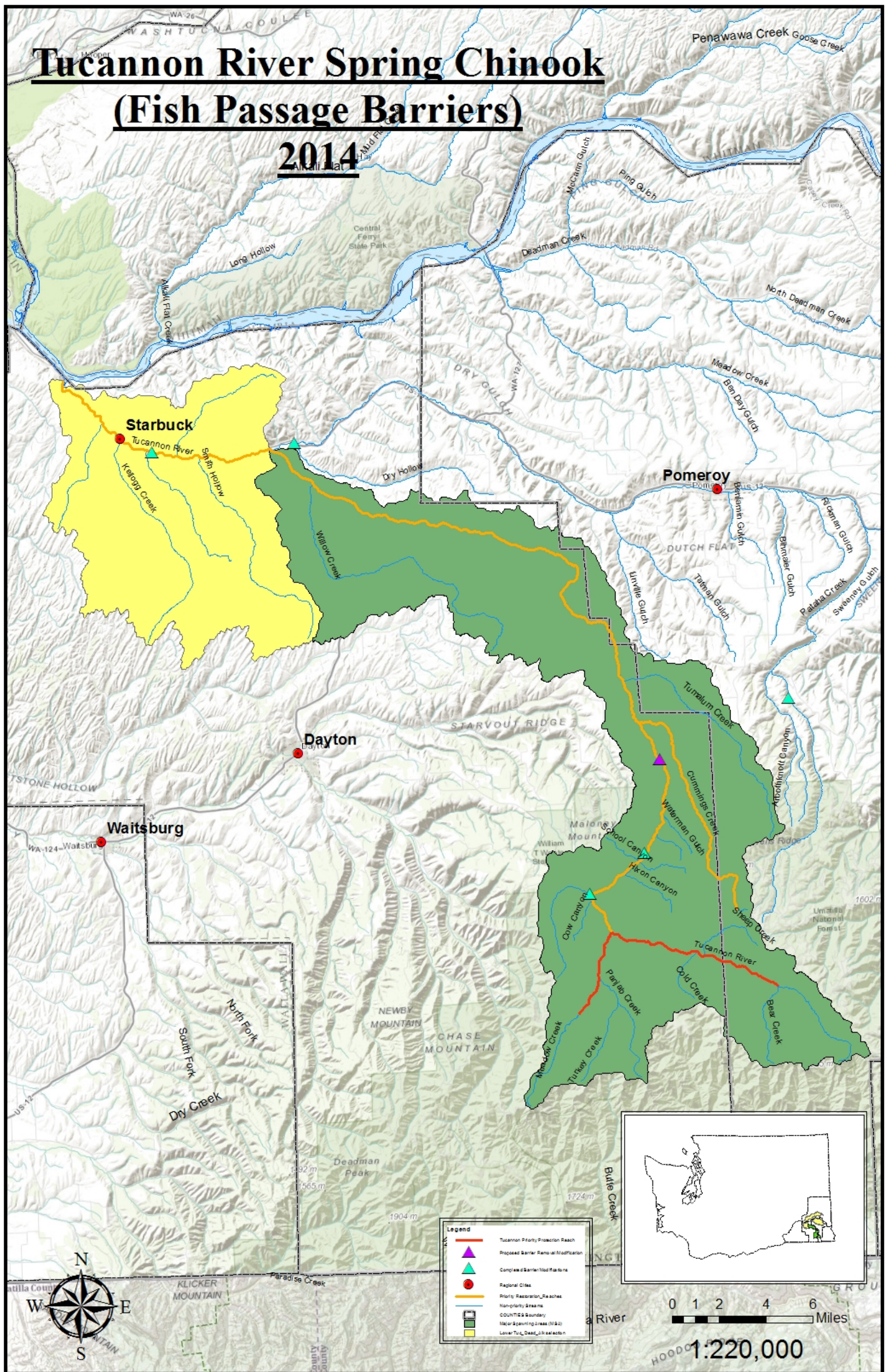
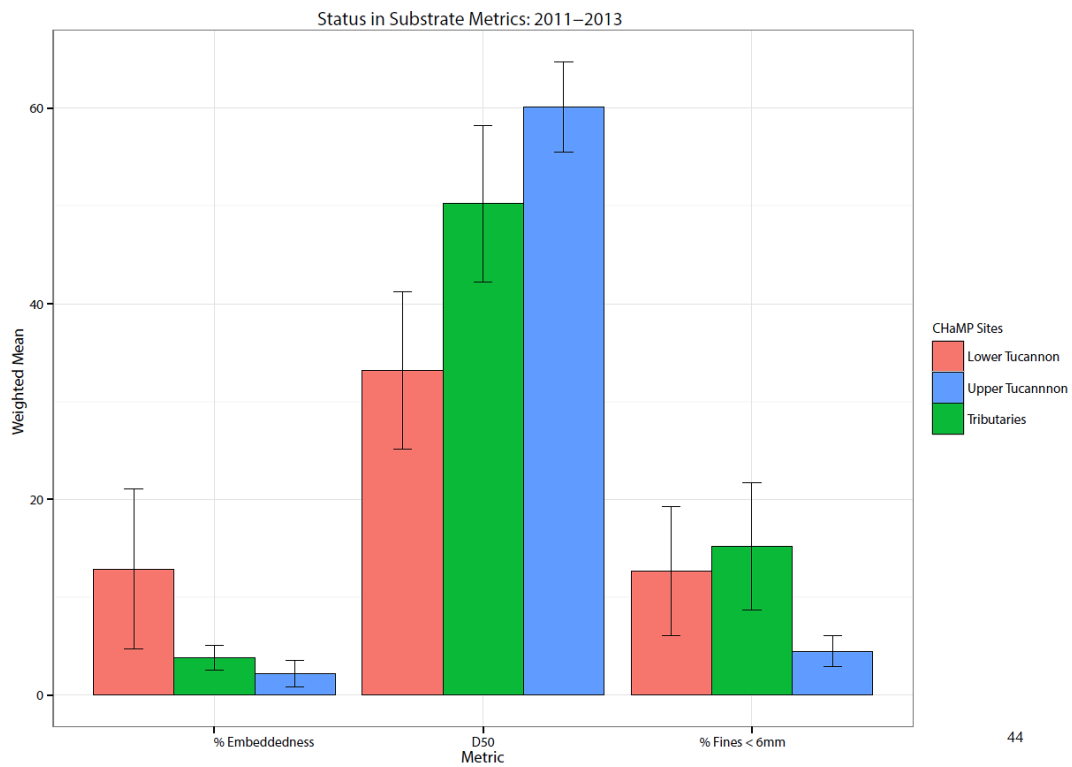


Figure 7: Tucannon past and present barrier to spring Chinook passage (2014 HWS SRSRB data). The purple triangle indicates the Tucannon Hatchery Diversion which in 2014 was identified as a partial barrier to migrating Chinook salmon. WDFW implanted short range actions to improve conditions and is working on a long range plan to correct passage.



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Figure 8: Substrate metric as reported in (Hill, Bennett 2014) preliminary results from the Tucannon River CHaMP. Data are represented in the weighted mean over the 3 years (2011-2013) of CHaMP monitoring in the Tucannon Error bars are 95% CI. Means and CI are plotted for the lower (below Pataha) upper (above Pataha) and Tributaries combined. The recovery goal for fines in the Tucannon is < 20%, which is being met at all site in the Tucannon mainstem.

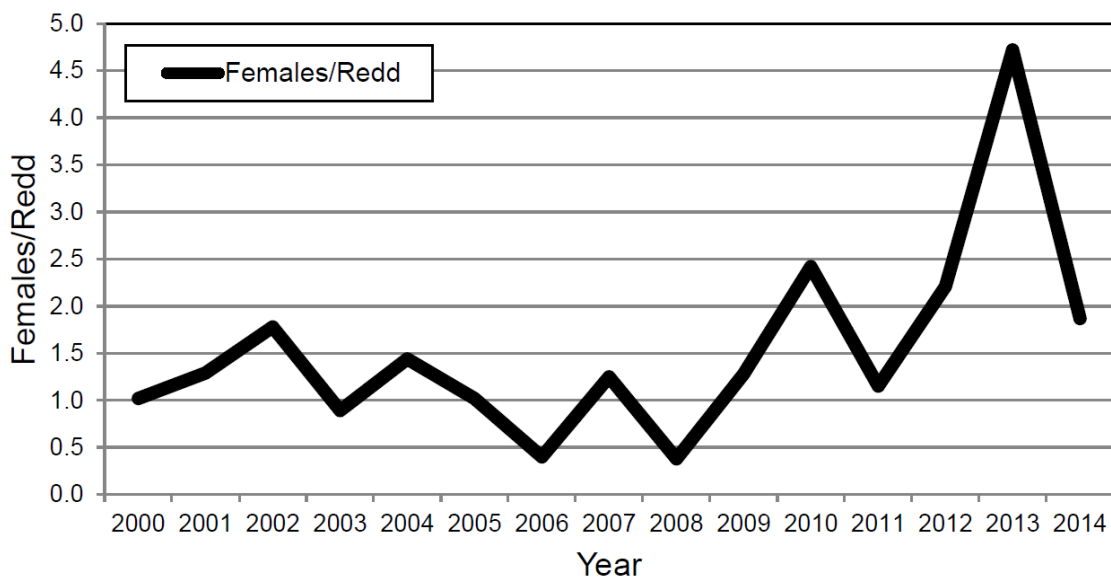


Figure 9: Female per red ratio for the Tucannon River spring Chinook salmon above the Tucannon Fish Hatchery Diversion, adult trap (Bumgarner 2015). The numbers of females per redd is determined from the known number of fish passed, minus the number fish moving down river below the trap, divided by the final number of redds counted above the trap.

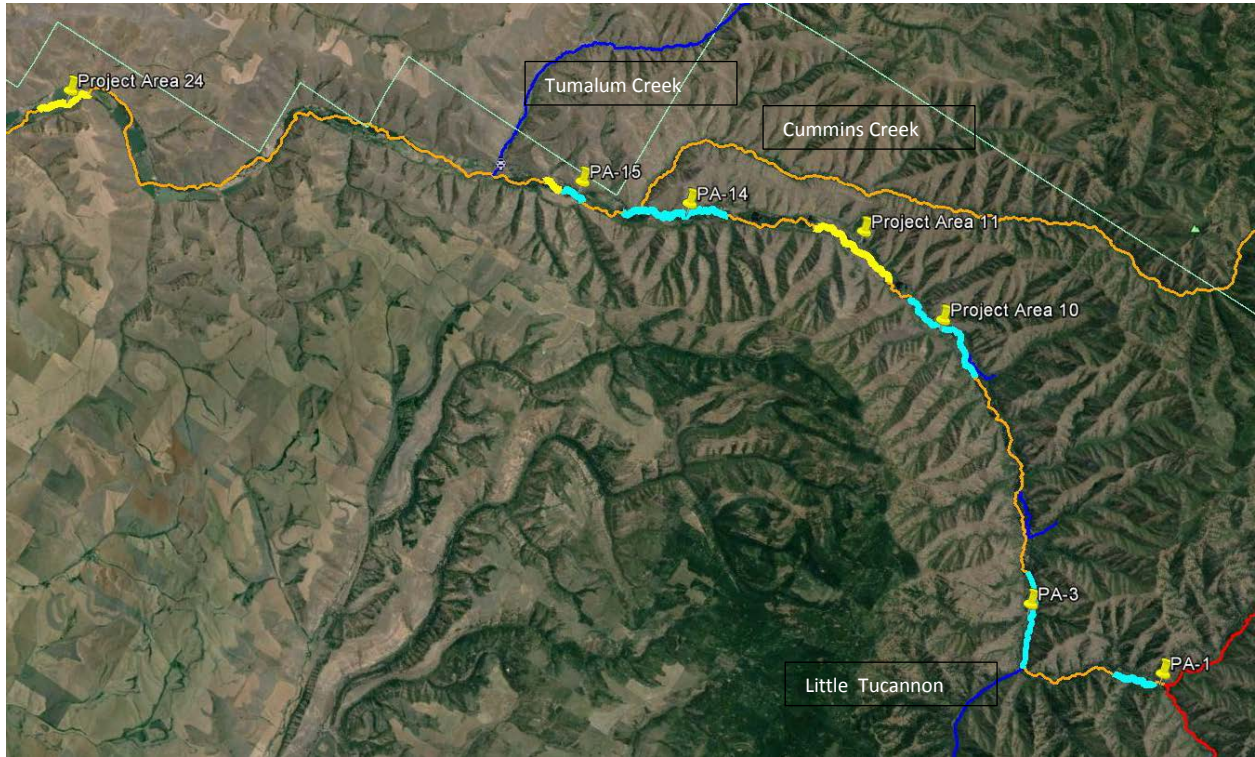


Figure 10: Upper Tucannon River Watershed illustrating the 2014 projects designed and implemented. Light blue indicates a completed project reach, and yellow indicates project designed in 2014 for the 2015 construction work window.



Figure 11: Project Area 1, Tucannon River channel complexity placed using Vertol helicopter July 2014 by the Confederated Tribes of the Umatilla Indian Reservation Tucannon Program. Upper left, preplacement of channel spanning structure, (Upper right) post project placement of channel spanner. Lower left, the placement of channel meander jam in progress, (lower right) completed channel meander jam. All photos are representative of structures placed by helicopter.

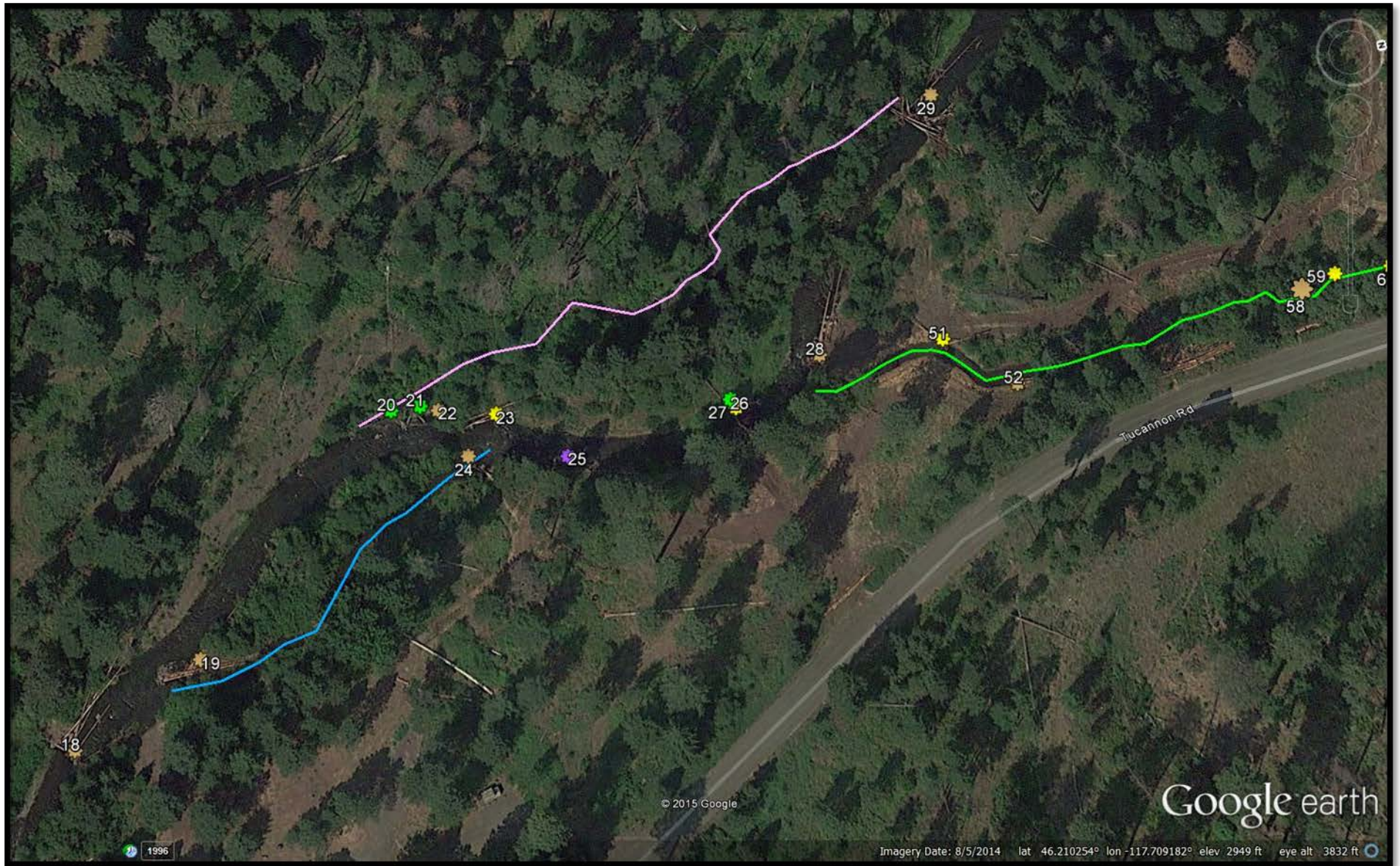


Figure 12: Project Area 1, Tucannon River channel complexity placed using Vertol helicopter July 2014 by the Confederated Tribes of the Umatilla Indian Reservation Tucannon Program. A Google Earth image with rapid habitat survey points showing natural and placed anchored and unanchored wood structures. The Google image was captured following construction in August 2014. The green shape indicate natural wood, the yellow unanchored place wood and the brown place anchored wood. The lines indicate side channels.



Figure 13: Project Area 1, Tucannon River channel complexity placed using Vertol helicopter and side channels created, July 2014 by the Confederated Tribes of the Umatilla Indian Reservation Tucannon Program. The project objective was to increase channel complexity and to reconnect side channel and off channel habitats. Upper right, channel structure placed to force complexity and connectivity (2014 peak flow), (upper left) wood placed at the apex of a created side channel cut. (Lower left & right) Side channel habitat created by reconnection during base flow in September 2014.

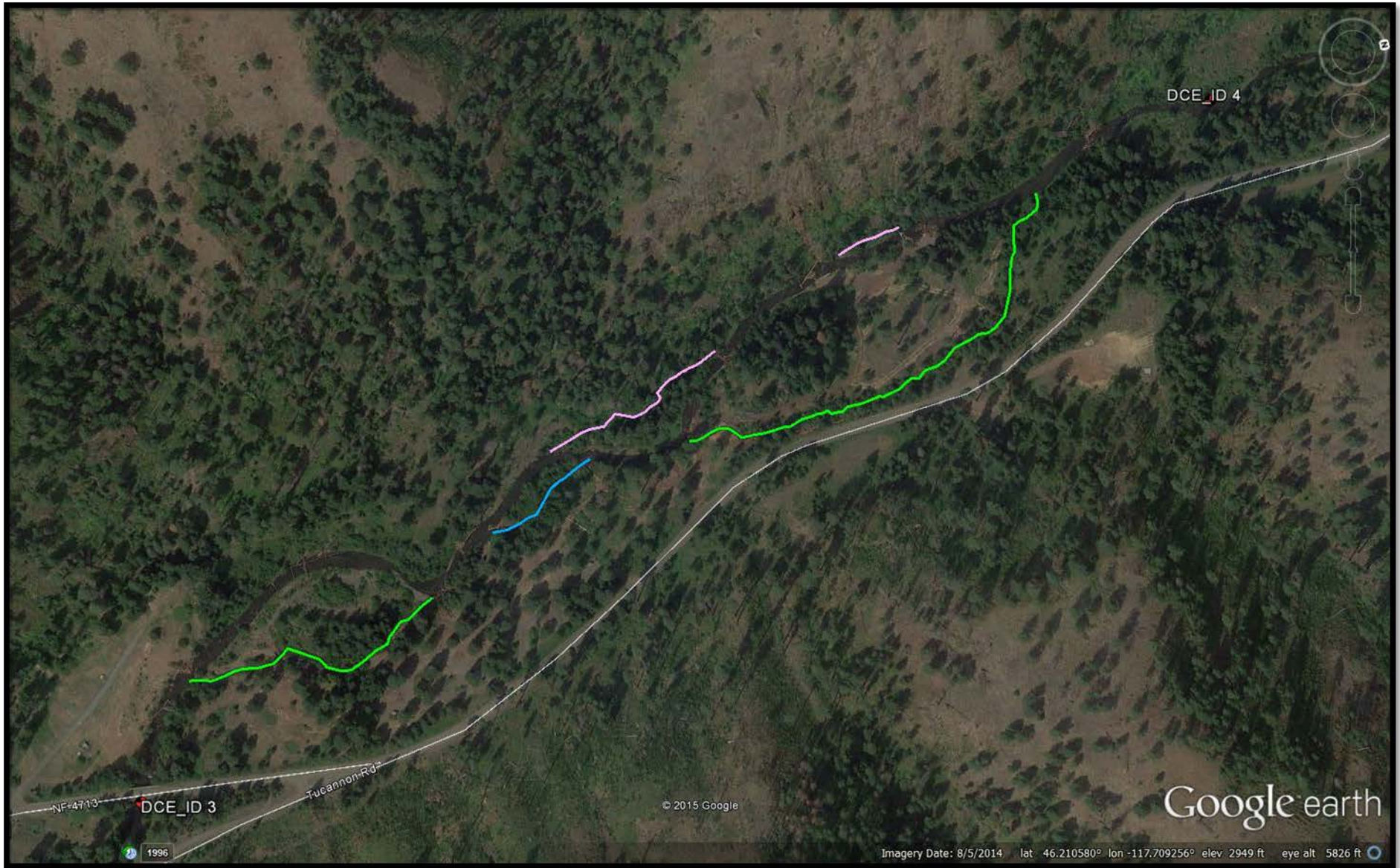


Figure 14: Project Area 1, Tucannon River channel complexity and side channels created, July 2014 by the Confederated Tribes of the Umatilla Indian Reservation Tucannon Program. This Google Earth image shows rapid habitat delineation of side channel on the project reach prior to restoration and the post project condition. The green lines indicate position of newly created and reconnected channels. Blue and pink lines are channels which were present but were augmented as part of the project, either with wood or additional flow.



Figure 15: Project Area 3, Tucannon River channel complexity placed using Vertol helicopter, July 2014 by the Confederated Tribes of the Umatilla Indian Reservation Tucannon Program. (Upper) Pre-project condition of the meander jam and channel spanning structure built below Little Tucannon confluence, ground photo left and aerial image right. (Lower left) Logs being placed by the helicopter, (lower right) final product captured in September 2014. Note the natural jam in the lower right of the lower right photo, it has been used as a reference for channel spanning structures in the Tucannon.

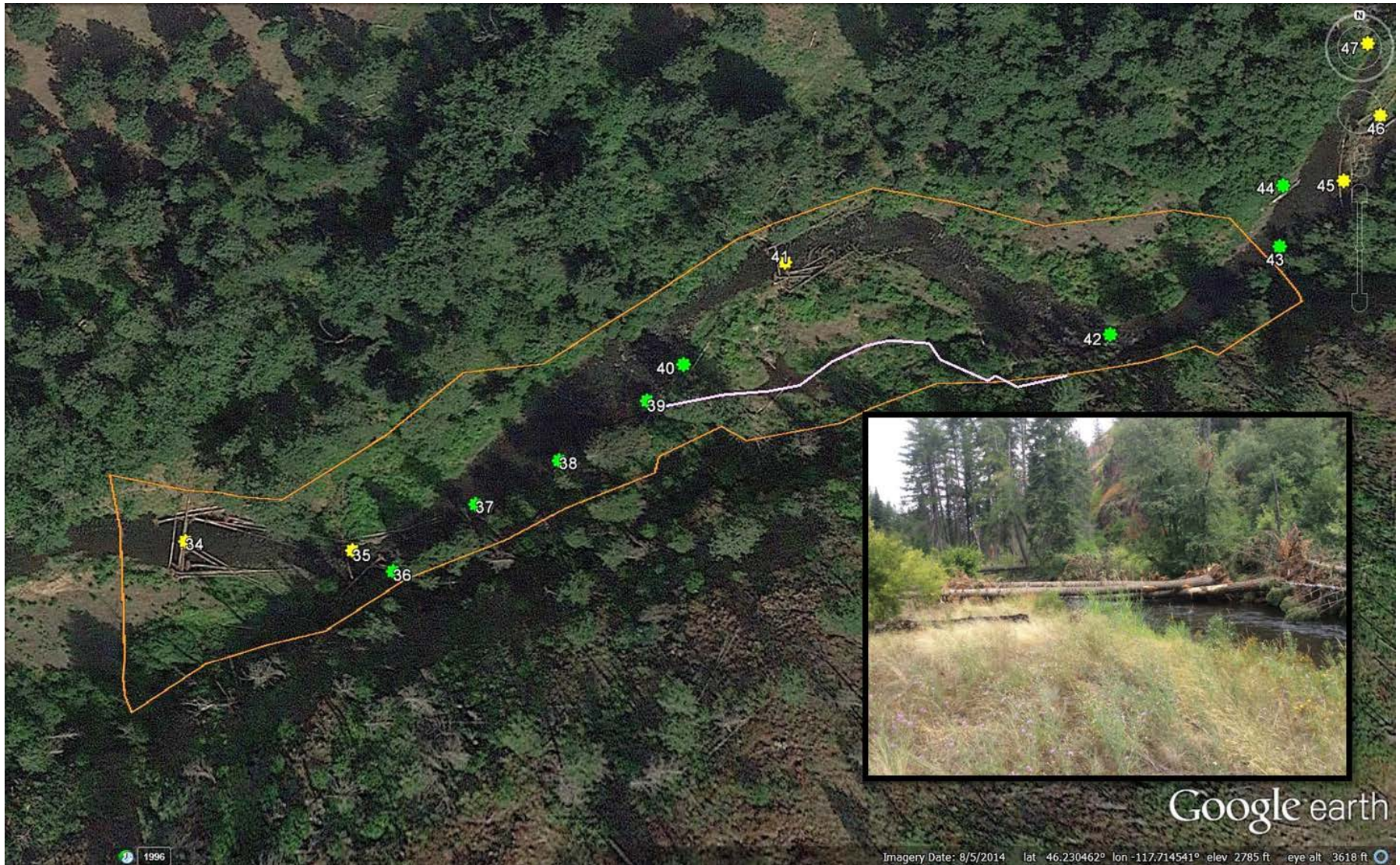


Figure 16: Project Area 3, Tucannon River channel complexity placed using Vertol helicopter, July 2014 by the Confederated Tribes of the Umatilla Indian Reservation Tucannon Program. The Google image take August 2014 illustrates the helicopter placed structure overlain with the rapid habitat surveys collected for as built in September 2014. The yellow icons indicate the positions of placed unanchored wood and the green indicate natural wood. The inset shows structure 34 located on the left side of the image. The light orange polygon indicates the supplemental CHaMP monitoring site extent for the site supported under the Programmatic.



Figure 17: Project Area 3, Tucannon River channel complexity placed using Vertol helicopter and conventional methods, July 2014 by the Confederated Tribes of the Umatilla Indian Reservation Tucannon Program. Upper left, log channel spanner placed using conventional excavator for the purpose of providing structural stability near the bottom of the project reach. Note the large rock placed on top of the wood elements to provide ballast to the structure during high flow. Lower left is a pre-structure view of the right upper and lower images in post project.



Figure 18: Project Area 14, Tucannon River channel complexity and floodplain connectivity using conventional methods, July/August 2014 by Washington Department of Wildlife Habitat Program. (Upper) The left image is an aerial pre-project of an incised plan bed to be treated, the right is the ground view of the same section. The lower left is the post project view in September 2014, and the right is the same ground view at 250 cfs in February 2015.

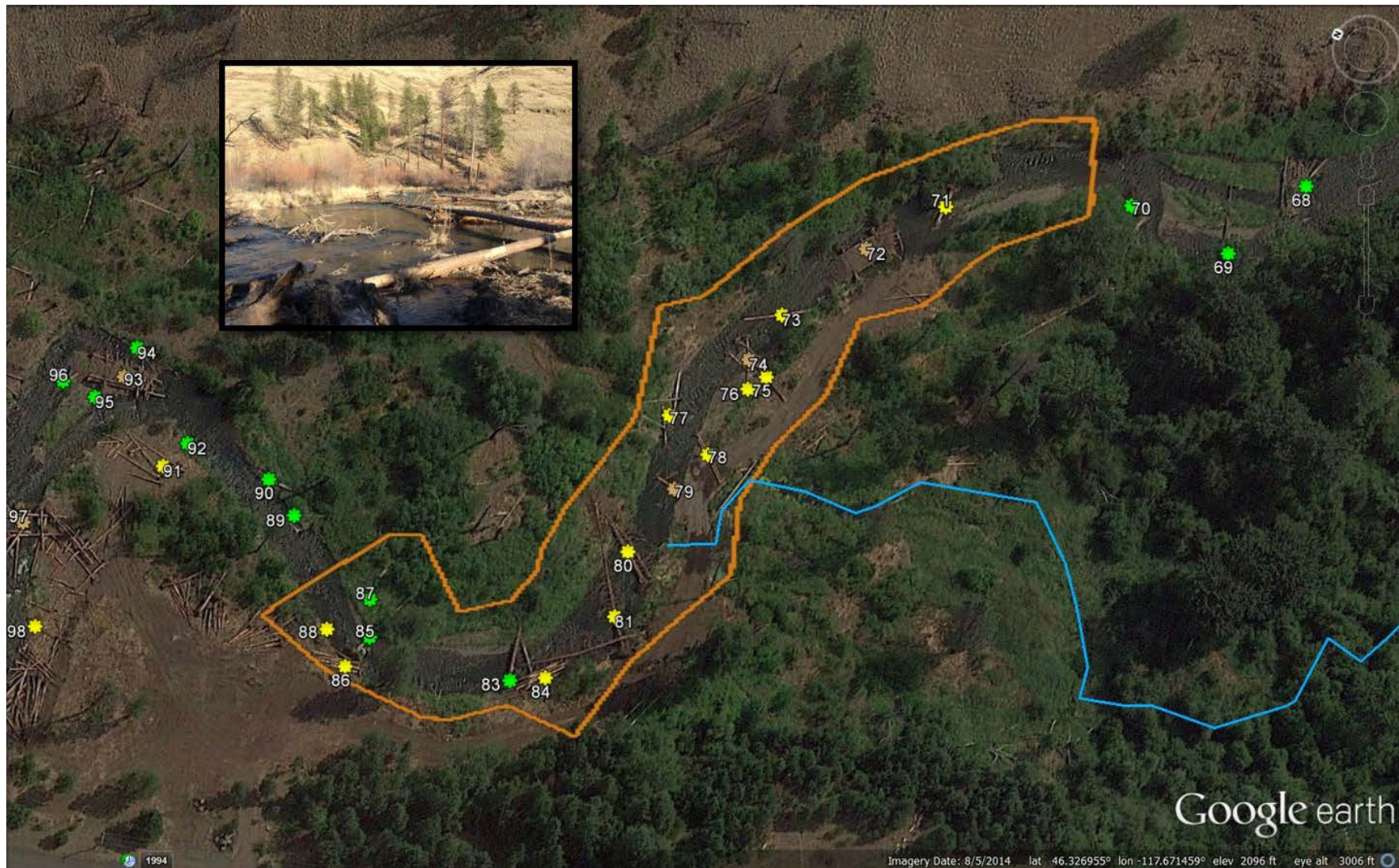


Figure 19: Project Area 14, Tucannon River channel complexity and floodplain connectivity using conventional methods, July/August 2014 by Washington Department of Wildlife Habitat Program. The Google Earth image was captured in August 2014, just days following construction at this site (same corner as Figure 19 with different orientation). The icons indicate the as built condition collected using rapid habitat survey with green showing natural wood, yellow unanchored placed wood and brown the anchored wood structures. The inset shows structure number 79 at 250 cfs. The orange polygon illustrates the supplemental CHaMP treatment site extent supported by the Programmatic.



Figure 20: Project Area 14, Tucannon River channel complexity and floodplain connectivity using conventional methods, July/August 2014 by Washington Department of Wildlife Habitat Program. The floodplain connectivity objective of this project was meet using wood placement in channel to connect existing high flow channels and the excavation of pilot starter channels to capture flows. In 2014, flows had been captured in a number of channels which will likely remain perennial. (Upper left and right) Perennial side channels created by the project viewed in the winter of 2014 at 130 cfs prior to peak flow. (Lower left and right) The spring out fall of Blue Lake, which was augmented by a high flow channel and better connection at its confluence with the Tucannon.

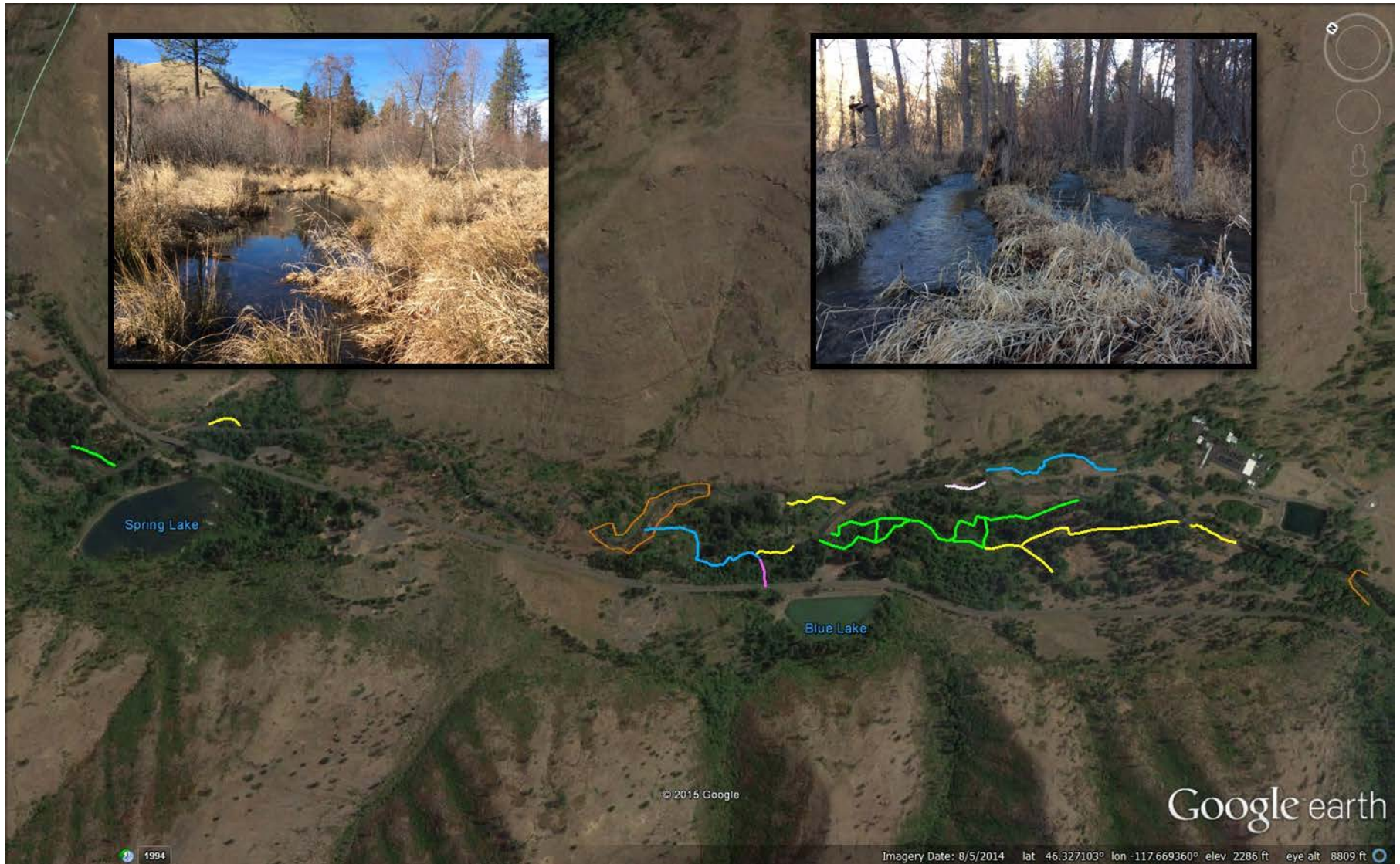


Figure 21: Project Area 14, Tucannon River channel complexity and floodplain connectivity using conventional methods, July/August 2014 by Washington Department of Wildlife Habitat Program. Floodplain connectivity is illustrated on the Google Map above with the colored lines indicating side channels. The blue lines are the channels that existed pre project and were augmented with flow connectivity and wood, where the pink lines are existing channels which were not modified. The green (perennial) and yellow (ephemeral) channels are new or reconnected channels. The insets are the photos taken in December 2014 of perennial side channels typical of PA-14.



Figure 22: Project Area 15, Tucannon River channel complexity and connectivity project completed by the Columbia Conservation District in August 2014. (Upper) The left and right photos are of the same location at different perspectives. Note the left image has the temporary bridge placed at the existing ford during construction. (Lower) Left image is of the channel spanner placed to aggrade the stream bed and capture wood during elevated flow in December 2014. Right image shows the backwatered pool and confluence of the two channels.



Figure 23: Project Area 15, Tucannon River channel complexity and connectivity project completed by the Columbia Conservation District in August 2014. The Google Map illustrates the placement point for structures natural and placed measured in the rapid habitat survey. The green icons show natural wood, yellow placed unanchored wood and the brown anchored placed wood. The green line indicates the new channel delineation and the yellow side channel is an existing high flow channel modified during the project. The inset shows the lower end of the new channels during 130 cfs event.



Figure 24: Figure 23: Project Area 15, Tucannon River channel complexity and connectivity project completed by the Columbia Conservation District in August 2014. The Google Map illustrates the position of the side channels created (green) or augmented (yellow) under this project. The two insets were taken in the created side channel during 250 cfs event in February 2015.

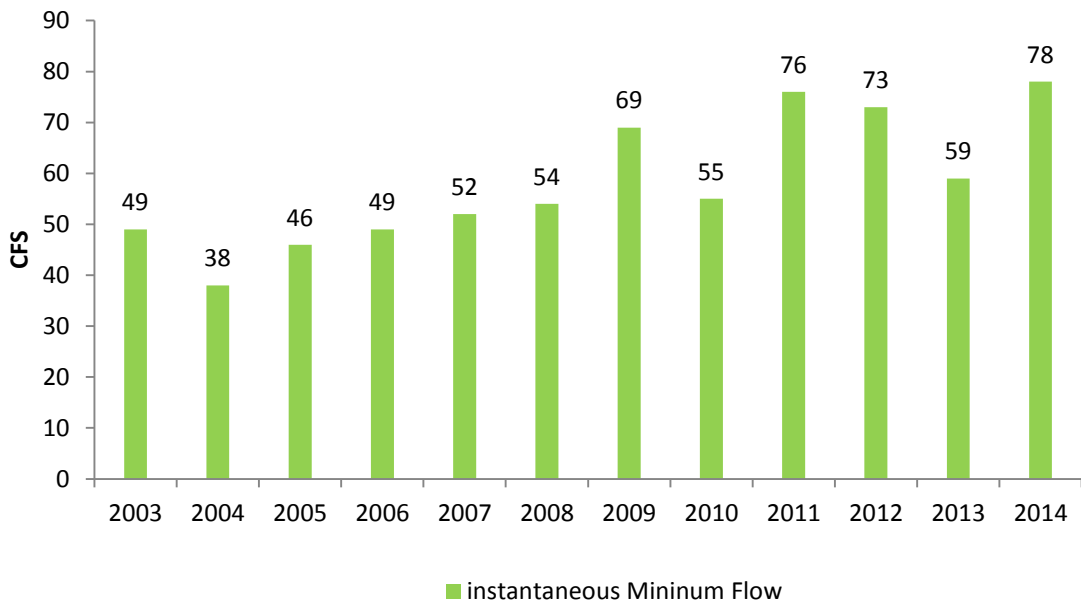
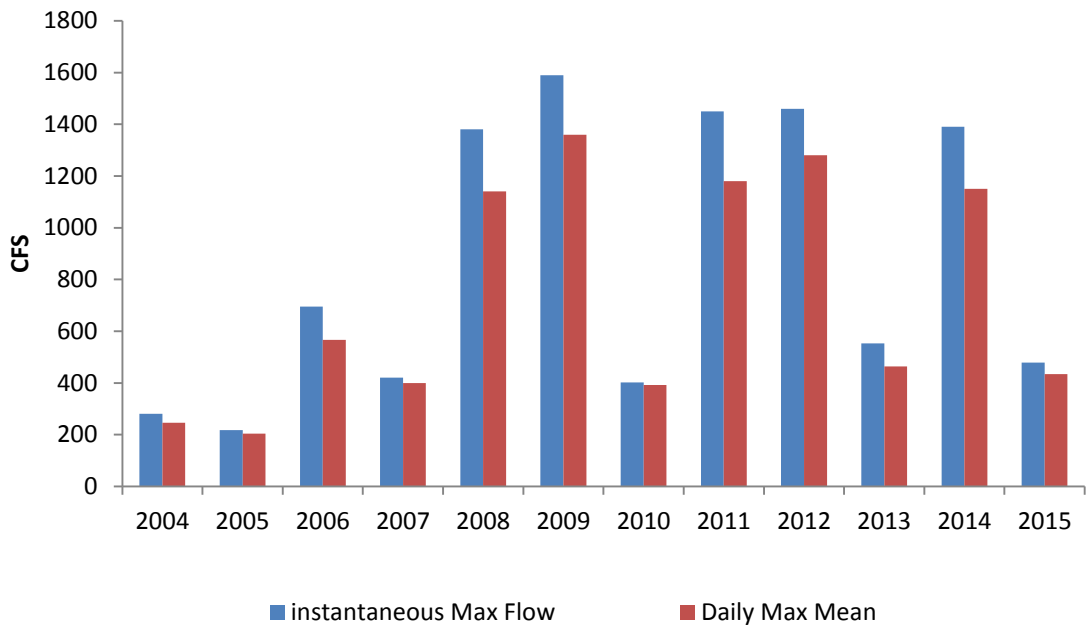
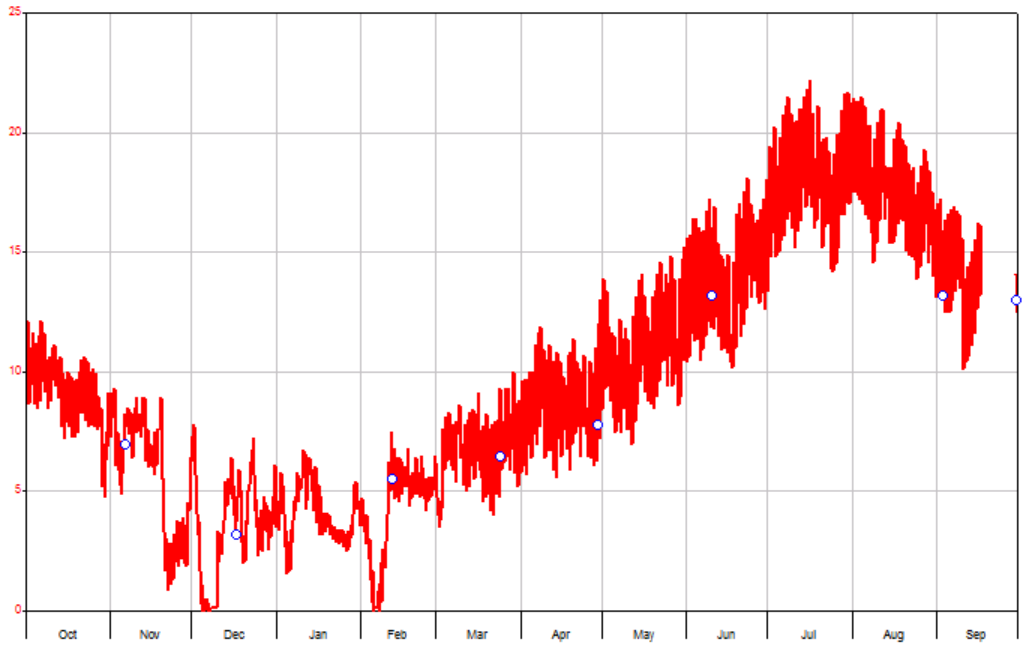


Figure 25: Stream flows measured at the Washington Department of Ecology Marengo stream gage for the entire period of record. The upper graph illustrates maximum annual instantaneous flow and maximum mean daily flow. The lower figure graphs the instantaneous flow for the period of record at the time of this report.

Washington State Dept. of Ecology

HYPLOT V133 Output 02/25/2015

Period 1 Year Plot Start 00:00_10/01/2013 2013/14
Interval 12 Hour Plot End 00:00_10/01/2014
— 35B150 Tucannon nr Marengo 450.00 Max & Min Water Temp. (Deg.C) AT
○ 35B150 Tucannon nr Marengo 450.10 Point Water Temp. (Deg.C) Manual Temp. Reading SG



Washington State Dept. of Ecology

HYPLOT V133 Output 02/25/2015

Period 1 Year Plot Start 00:00_10/01/2013 2013/14
Interval 12 Hour Plot End 00:00_10/01/2014
— 35B150 Tucannon nr Marengo 262.00 Max & Min Discharge (cfs) AT
○ 35B150 Tucannon nr Marengo 262.00 Point Discharge (cfs) Measured flow GF

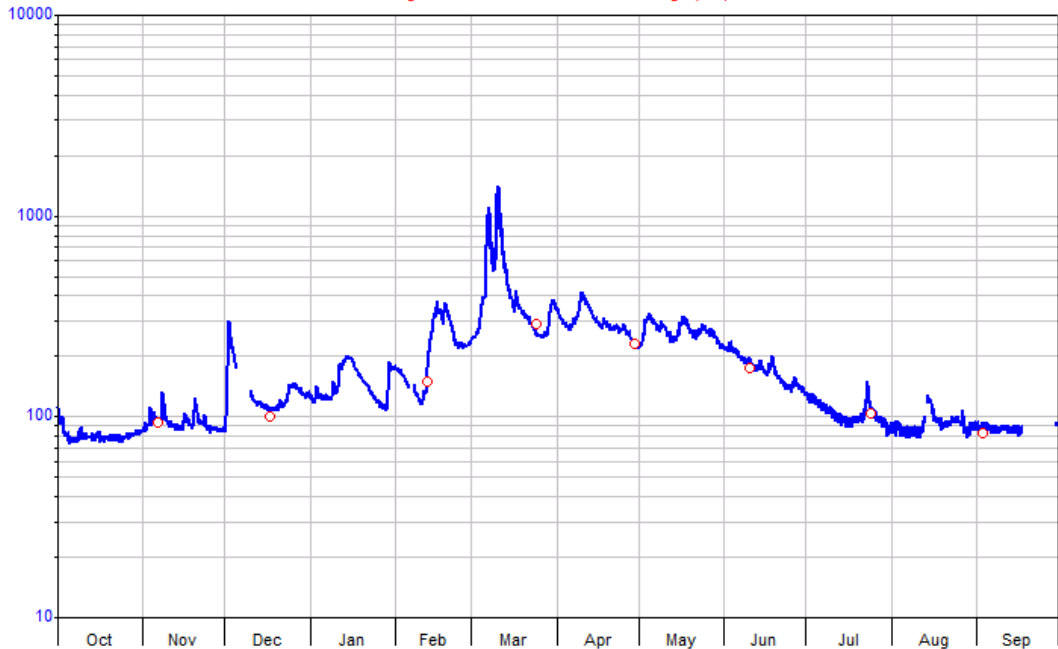


Figure 26: Washington Department of Ecology Stream Gage data from the Marengo gage on the Tucannon -2014 water year. The upper graph is the 2014 mean daily temperature with the lower mean daily. (Curtsey of the WDOE flow monitoring website)

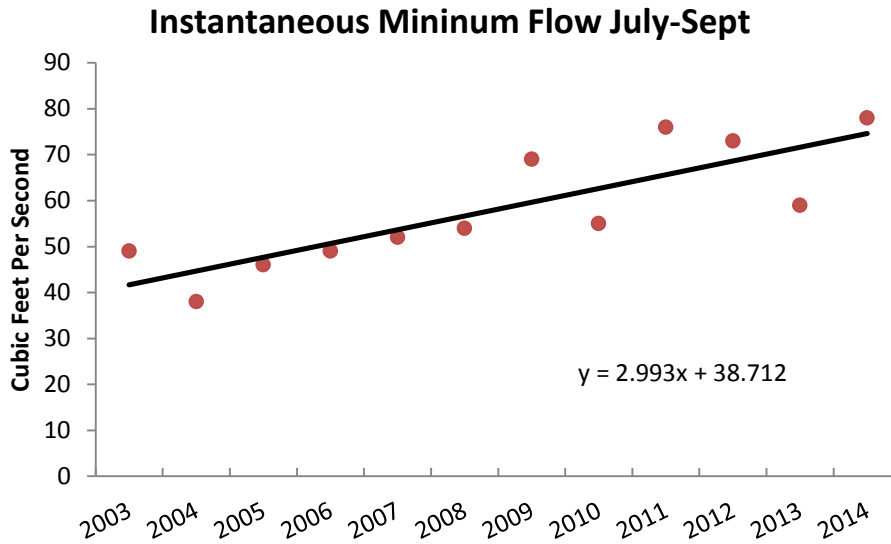


Figure 27: Instantaneous minimum flows for the period of record 2003 -2014 water years at the WDEO stream gage Marengo (Data courtesy of the WDOE flow monitoring website 2015)

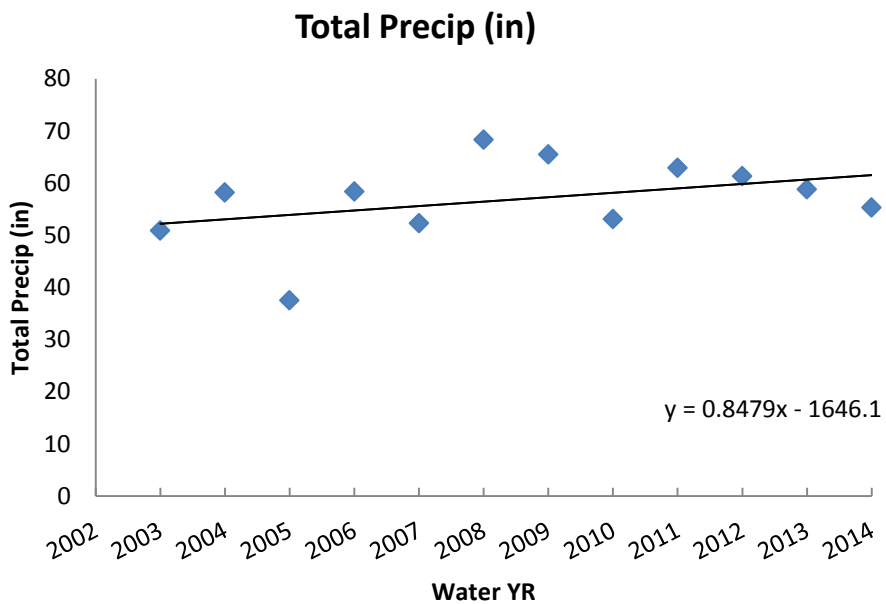


Figure 28: Total precipitation (in) at the Touchet SNOTEL station located in the Blue Mountains near the Tucannon River. The gage is used as a indicator for moisture in the upper basin by the SRSRB, and is operated by NRCS. (Data courtesy of the NRCS SNOTEL monitoring website 2015)

Instantaneous Maxium Water Temperature

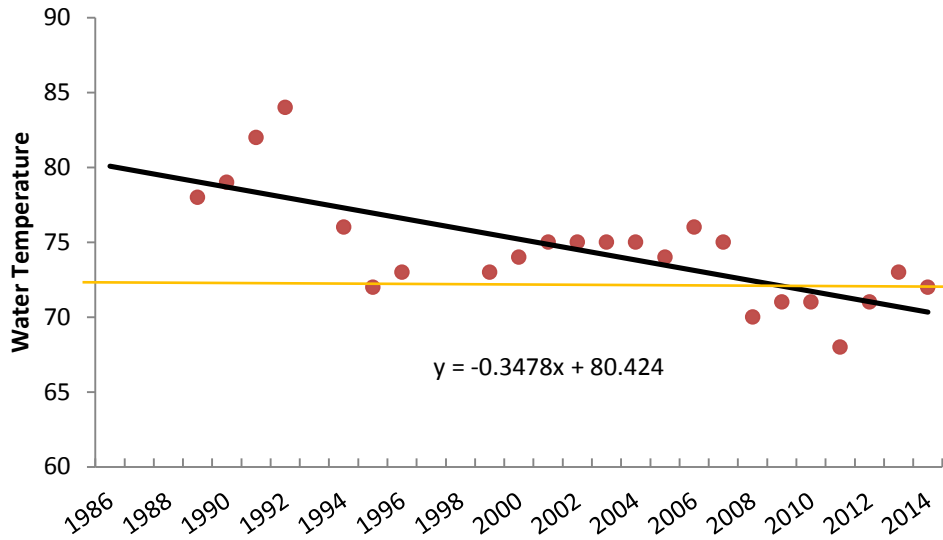


Figure 29: Instantaneous maximum water temperature observed at Marengo 1990 through 2014. The yellow line is the temperature restoration objective of <72°F set in the Snake River Salmon Recovery Plan. The overall trend in maximum water temperature has been a negative trending to cooler temperatures, since the 90’s. (Data provided by DOE and WDFW)

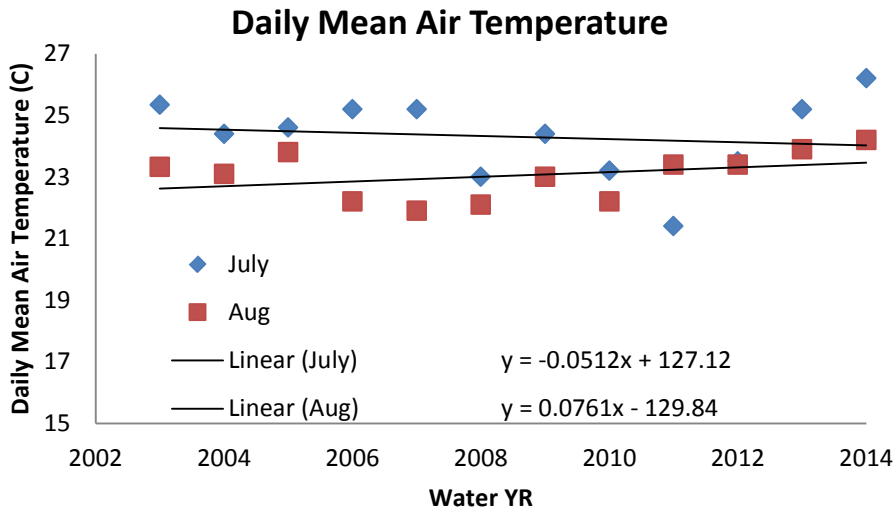


Figure 30: Daily ambient mean air temperature take at the WDOE stream gage in Marengo for the period of record. Temperatures are plotted for July and August separately. No detectable trend in temperatures is noticed in temperatures.

Tucannon River Programmatic

Project #: 2010-077-00

Contract #: 65249

Annual Progress Report

(Reporting Period January 2014 to December 2014)

Overview of Up Coming Implementation 2015

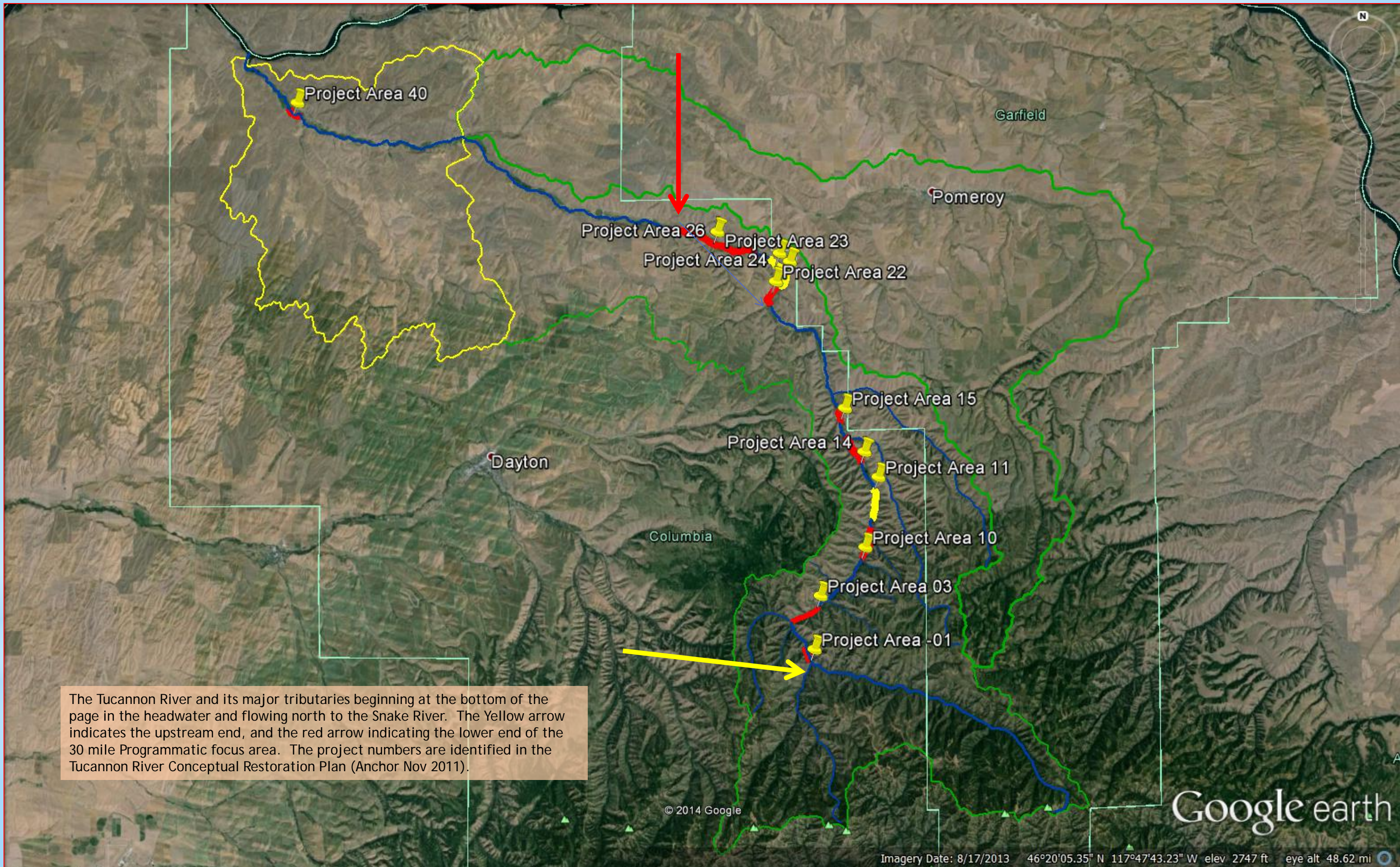
Appendix A, & B

Appendix A
Overview 2014 Implementation Season
Tucannon River Programmatic Habitat Project (2010-077-00)

Programmatic Summary 2014 Implementation

The Tucannon River Programmatic Habitat (#2010-077-00) is coordinated by the Snake River Salmon Recovery Board (SRSRB) and supported by the implementation partners in the Tucannon including; the Columbia Conservation District (CCD), the Confederated Tribes of the Umatilla (CTUIR), Umatilla National Forest (USFS), and Washington Department of Fish and Wildlife (WDFW). In 2010, the CCD and SRSRB completed the Tucannon Geomorphic Assessment (Anchor April 2010) followed by the Tucannon River Conceptual Restoration Plan (Anchor Nov 2010). The assessment identified habitat limiting factors needing restoration and where restoration would provide largest impact to the Tucannon spring Chinook. The restoration plan then developed 28 individual projects prioritized on fish benefit and feasibility of implementation. It has been from this prioritized list of project the programmatic has been applying its funding since 2011.

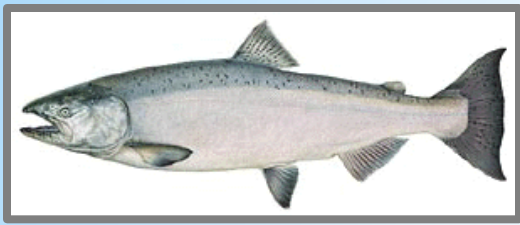
The following summary lays out the projects completed to date under the Programmatic Umbrella Project. The project areas are covered in the order they were completed being in the 2012 implementation year. The projects are as follows: PA-10 completed by WDFW, PA-03 completed by CTUIR, PA-01 by CTUIR, PA-14 by WDFW, and PA-15 by CCD.



The Tucannon River and its major tributaries beginning at the bottom of the page in the headwater and flowing north to the Snake River. The Yellow arrow indicates the upstream end, and the red arrow indicating the lower end of the 30 mile Programmatic focus area. The project numbers are identified in the Tucannon River Conceptual Restoration Plan (Anchor Nov 2011).

- * 6.46 miles of channel treated with > 2 Key Piece/Channel width
- * 3.09 miles of Side Channel Created/Reconnected
- * 208 LWD Structures Placed Instream
- * 1,755 Key Piece Logs Placed in Stream
- * 4.16 river miles treated for floodplain connectivity
- * 25.1 acres of low floodplain connected

* 2011-2014 Completed Implementation Metrics



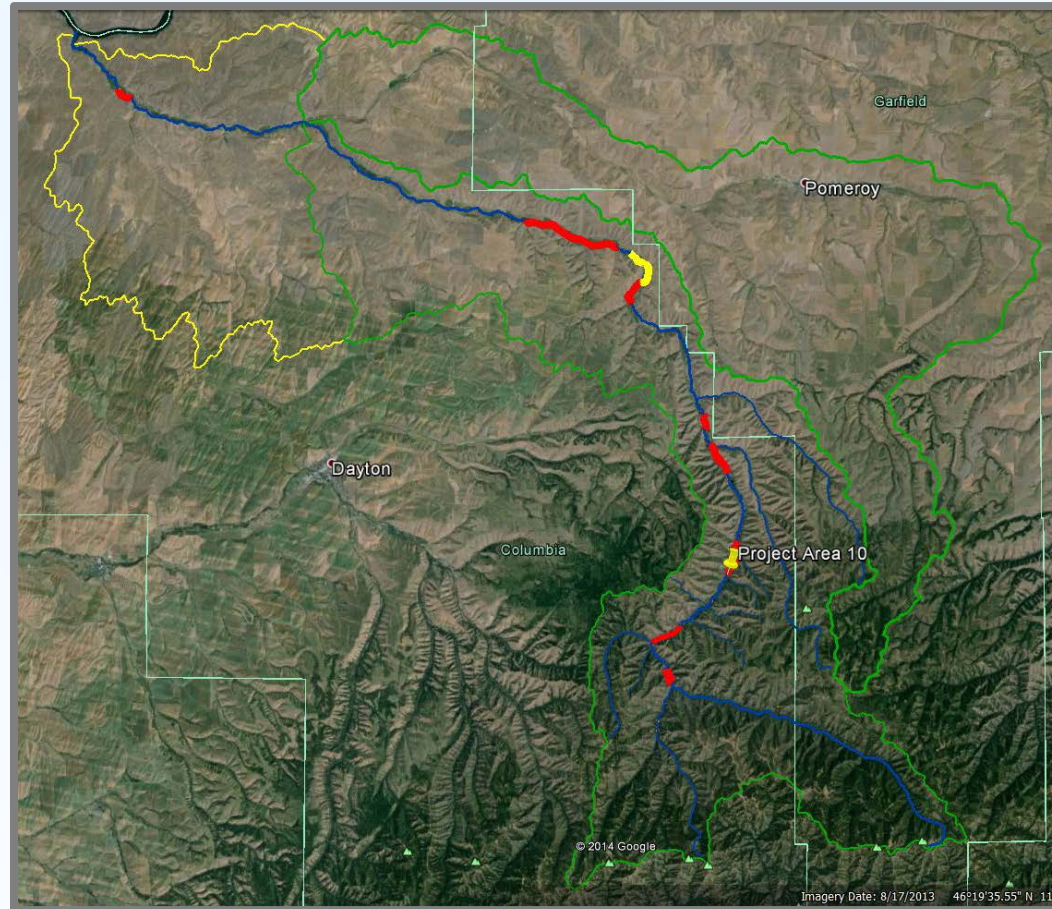
* Tucannon River Project Area - 10



Project Reach: Project Area 10 is located in the upper Tucannon River Watershed (RM 43.8 - 42.3) near Dayton WA. The 1.56 mile long project reach was identified in the Conceptual Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased floodplain connectivity and large wood driven channel complexity.



Above Image: Pre-project photo of typical channel form within the project reach.



Preliminary Results: The project was designed to replenish LWD in the project reach and let high flows do all the channel shaping, the 2012/13 water year had a very low ~500 cfs flow which had some but minimum impact. In 2013/14 flows were significant >1,300 cfs in which channel shaping began. Following flows in 2013/14 over 0.89 miles of new side channel was created and to date very few of the unanchored trees have moved. Below: a mile long reach of the project where new side channel have developed, the blue lines indicating new channel. River channel form and net gains in channel units are being measured by CHaMP.

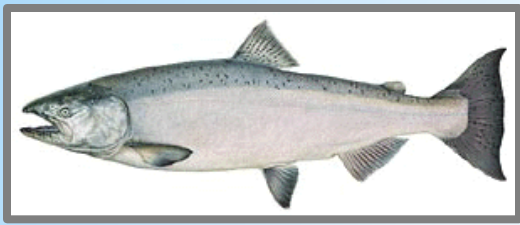
Project: Dave Karl (WDFW) initiated development of PA-10 in 2010 after receiving a SRFB grant to conduct a reach assessment/ design & implement a reach sized project. In 2011, the USFS identified approximately 300 whole trees in relative proximity to PA-10 which prompted the development of a helicopter supported, 1.6 mile long wood replenishment project. Implementation funds were provided from the Tucannon Habitat Programmatic and the SRFB in 2010-11. In total, 5 engineered log jams (65 trees) were placed for the purpose of improving hydraulic complexity and increasing stability on the down stream end of the project. Using a S64 Sky Crane 300 trees were placed in configurations which would increase channel complexity and floodplain complexity. Additionally, 500 small whole trees were added as debris intended to provide fish cover and mobile wood. At 2 locations side channels were encouraged by wood placement and pilot channels.



Implementation: Was completed in July 2012, using a combination of helicopter placed whole trees and excavator placed partial trees.



Dave Karl, Washington Department of Fish & Wildlife (Project Sponsor, Design, and Construction Management); Bruce Heiner, WDFW (Design and Engineering); Snake River Salmon Recovery Board - Tucannon Habitat Programmatic (Coordination Support and Funding); US Forest Service Pomeroy Ranger District (Partner & Materials); Confederated Tribes of the Umatilla (Partner); Bonneville Power Administration (Funding) **Appendix A-1**



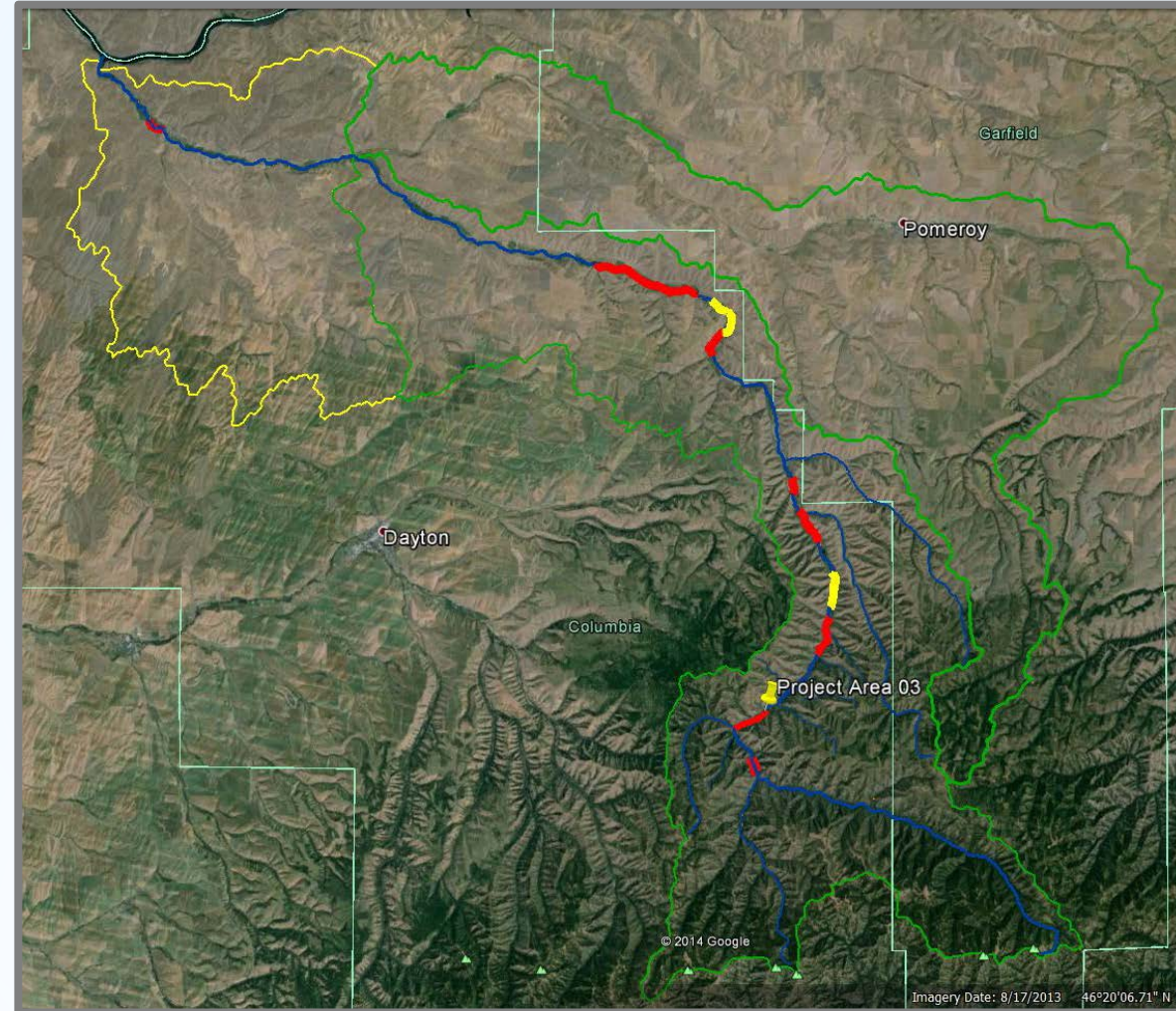
* Tucannon River Project Area - 03



Project Reach: Project Area 03 is located in the upper Tucannon River Watershed (RM 46.6 - 48.1) near Dayton WA. The 1.5 mile long project reach was identified in the Tucannon Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased large wood driven channel complexity.



Above Image: Pre-project photo of typical channel form within the project reach.



Preliminary Results: Helicopter placed whole trees and excavator placed partial trees and ballast boulders created complexity and back water effects. Above: Yellow arrow illustrated pre-project condition. Below: Yellow arrow indicated post treatment at same location. Log jam in lower right is a natural jam used as an example for natural condition.

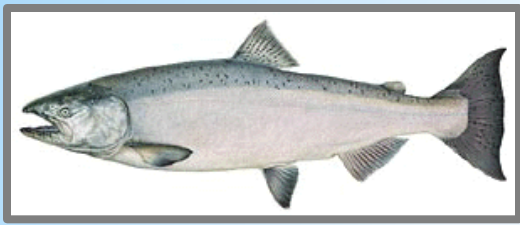
Project: Eric Hoverson of CTUIR sponsored PA-03 in 2012 and began design and permitting using CTUIR funds from the CTUIR Tucannon Habitat Project. In 2013, implementation funds were provided from the Tucannon Habitat Programmatic. The project design involved the construction of 5 engineered log jams at the downstream of the project, for the purpose of providing channel stability near existing infrastructure. The 5 structures are anchored with rock to increase stability. A helicopter was used to place 47 additional structures which are unanchored and are configured for the purpose of improving hydraulic complexity and increasing floodplain connectivity. Project used 268 whole trees placed into 52 single or multiple log configurations over 1.35 miles of the project reach.



Implementation: Was completed on July 13, 2014, using a combination of Helicopter placed whole trees and excavator placed partial trees and ballast boulders.



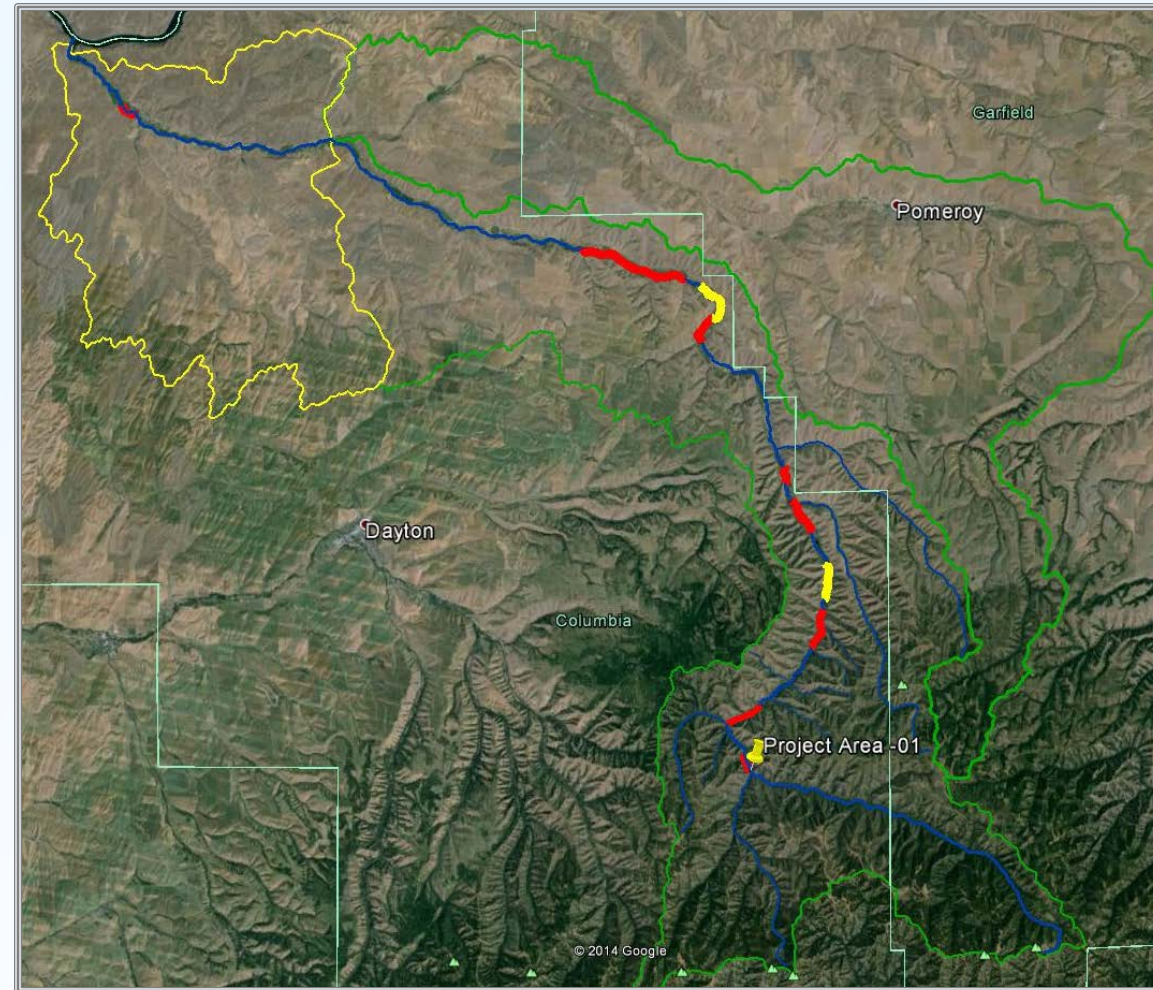
Eric Hoverson, Confederated Tribe of the Umatilla Indian Reservation (Project Sponsor and Construction Management & Funding), Tetra Tech (Design and Engineering), WDFW (Landowner); USFS (Landowners, Partners & Materials); Snake River Salmon Recovery Board - Tucannon Habitat Programmatic (Coordination Support and Funding), Bonneville Power Administration (Funding), **Appendix A-2**



* Tucannon River Project Area - 01



Project Reach: Project Area 01 is located in the upper Tucannon River Watershed (RM 49.45 - 50) near Dayton WA. The 0.55 mile long project reach was identified in the Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased floodplain connectivity and large wood driven channel complexity.



Above Image: Pre-project photo of typical channel form within the project reach.



Preliminary Results: Above: Stream reach typical of the project area prior to restoration. Below log jam placed to encourage channel aggradation and improved connectivity. Post construction condition exhibited the development of new pools and off channel habitat not previous available within the reach.

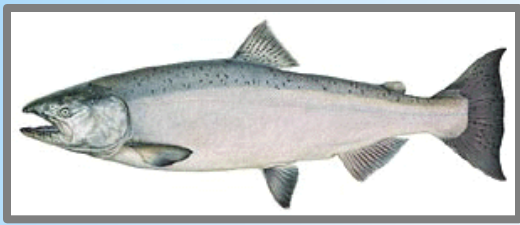
Project: Eric Hoverson of CTUIR assumed sponsorship of PA-01 in 2013 and began design and permitting using CTUIR funds from the Tucannon Habitat Project. In 2013, implementation funds were provided from the Tucannon Habitat Programmatic. The project involved the placement of 250 lwd key pieces into 38 engineered log jams anchored and unanchored. The purpose of the jams is to improving hydraulic complexity and increase floodplain connectivity. Additionally, 0.59 miles of side channels were created and augmented with lwd, for chinook and steelhead rearing.



Implementation: Completed in early August 2014, using a combination of Helicopter placed whole trees and excavator placed partial trees and ballast boulders.



Eric Hoverson, Confederated Tribe of the Umatilla Indian Reservation (Project Sponsor and Construction Management & Funding), Tetra Tech (Design and Engineering), WDFW (Landowner); USFS (Landowners, Partners & Materials); Snake River Salmon Recovery Board - Tucannon Habitat Programmatic (Coordination Support and Funding), Bonneville Power Administration (Funding),



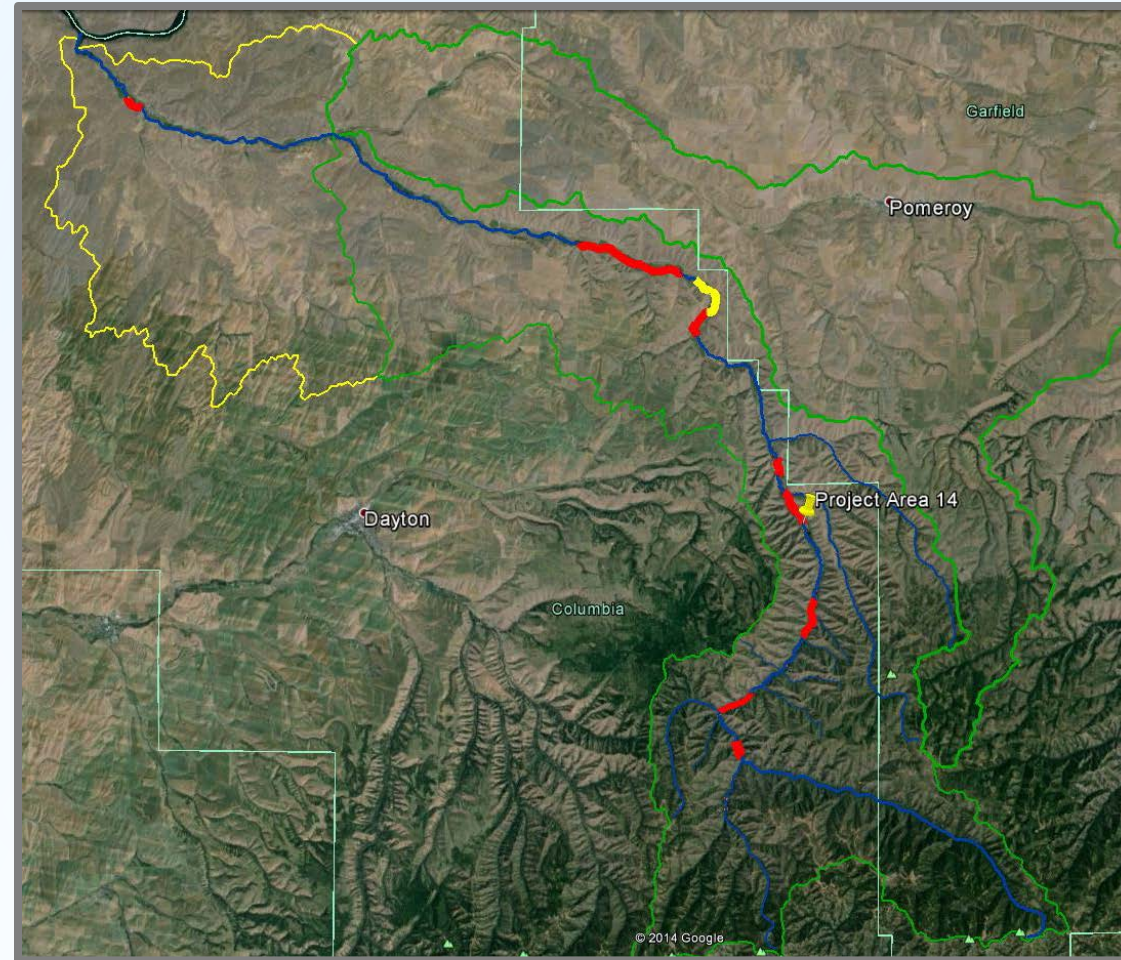
* Tucannon River Project Area - 14



Project Reach: Project Area 14 is located in the upper Tucannon River Watershed (RM 37.7 - 39.2) near Dayton WA. The 1.5 mile long project reach was identified in the Tucannon River Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased floodplain connectivity and large wood driven channel complexity.



Above Image: Pre-project photo of typical channel form within the project reach.



Preliminary Results: The development of complexity and back water pools was immediate in the project area, as was a significant reduction in velocities. Side channels and newly connected floodplain was captured during the fall freshet. Increases in habitat units will be monitored by CHaMP through the end of the program. Above: A combination of anchored ELJ and unanchored complexity.

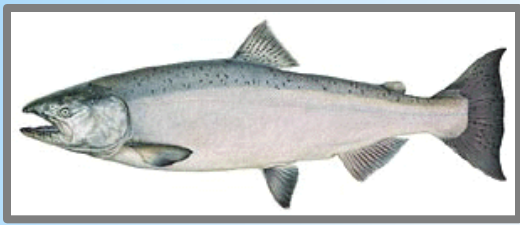
Project: Dave Karl of WDFW assumed sponsorship of PA-14 in 2012 after the design was completed by WWCC using a SRFB grant. Implementation funds were provided from the Tucannon Habitat Programmatic and the SRFB in 2012-13. The project design involved the placement of 79 engineered log jams for the purpose of improving hydraulic complexity and increasing floodplain connectivity and 67 log placements intended to provide fish cover and mobile wood within the reach. Approximately 783 root-wad trees were placed in the reach during construction. Additionally, two new side channels were designed and one high flow channel.



Implementation: Was completed August 2014, using a combination of constructed log jams and placed logs and trees. Wood on this project was both anchored and unanchored. Riparian planting is currently underway.



Dave Karl, Washington Department of Fish & Wildlife (Project Sponsor, and Construction Management); Bruce Heiner, WDFW (Field Engineering); Anchor QEA (Project Design); US Forest Service Pomeroy Ranger District (Partner & Materials); Snake River Salmon Recovery Board - Tucannon Habitat Programmatic (Coordination Support and Funding); Bonneville Power Administration (Funding)



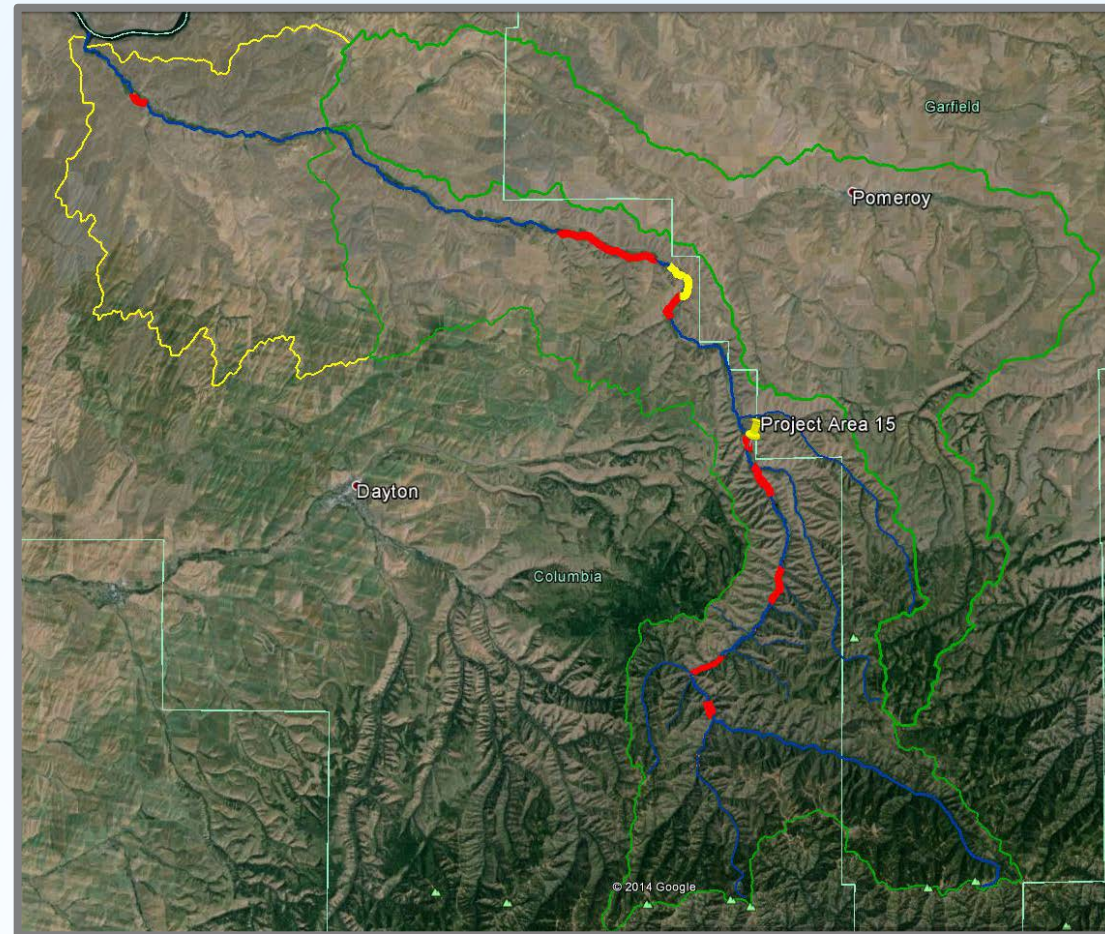
* Tucannon River Project Area - 15a



Project Reach: Project Area 15a is located in the upper Tucannon River Watershed near Dayton WA. The 0.36 mile long project reach was identified in the Tucannon River Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased floodplain connectivity and large wood driven channel complexity.



Above Image: Pre-project photo of approximate location of new side channel.



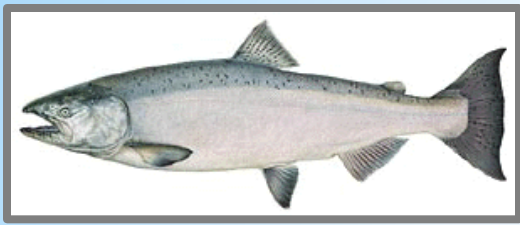
Preliminary Results: Immediate results following construction were increased side channel length and lwd complexity. Changes in habitat units will be determined by CHaMP. Above: illustrates side channel during high flow late 2014. Below: Illustrates example of backwating and reduced velocities during high flow in the new side channel.

Project: Terry Bruegman of Columbia Conservation District assumed sponsorship of PA-15 in 2013 with the design being completed in November 2013. In FY 13, implementation funds were provided from the Tucannon Habitat Programmatic. The project design involved the placement of 47 engineered log jams and simple complexity logs for the purpose of improving hydraulic complexity and increasing floodplain connectivity. Approximately 231 trees were placed in the main and side channel. Approximately 0.47 miles of side channel were created and improved for Chinook and steelhead rearing. In 2015, PA-15b will be implemented to complete the project adding 7 additional structures and 20 single log complexes.



Implementation: The first phase of the project was completed August 2014. Conventional construction methods were used to build engineered log jams and anchored logs.





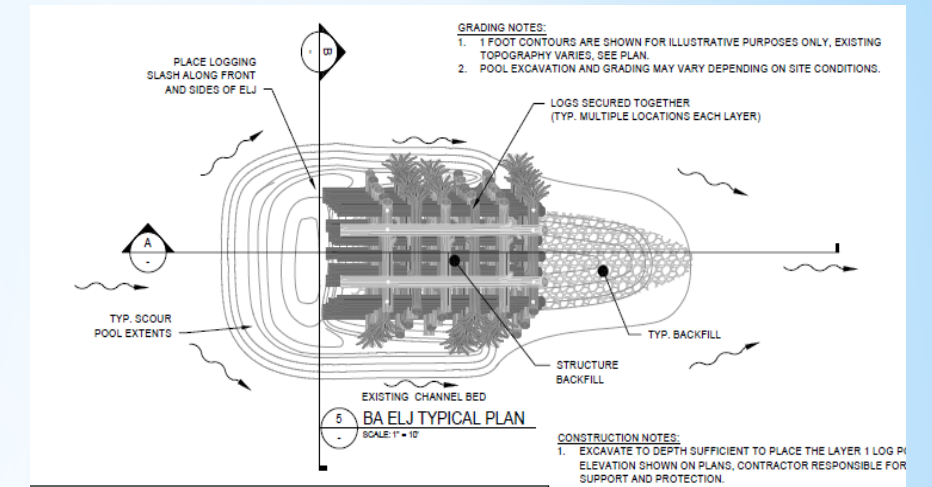
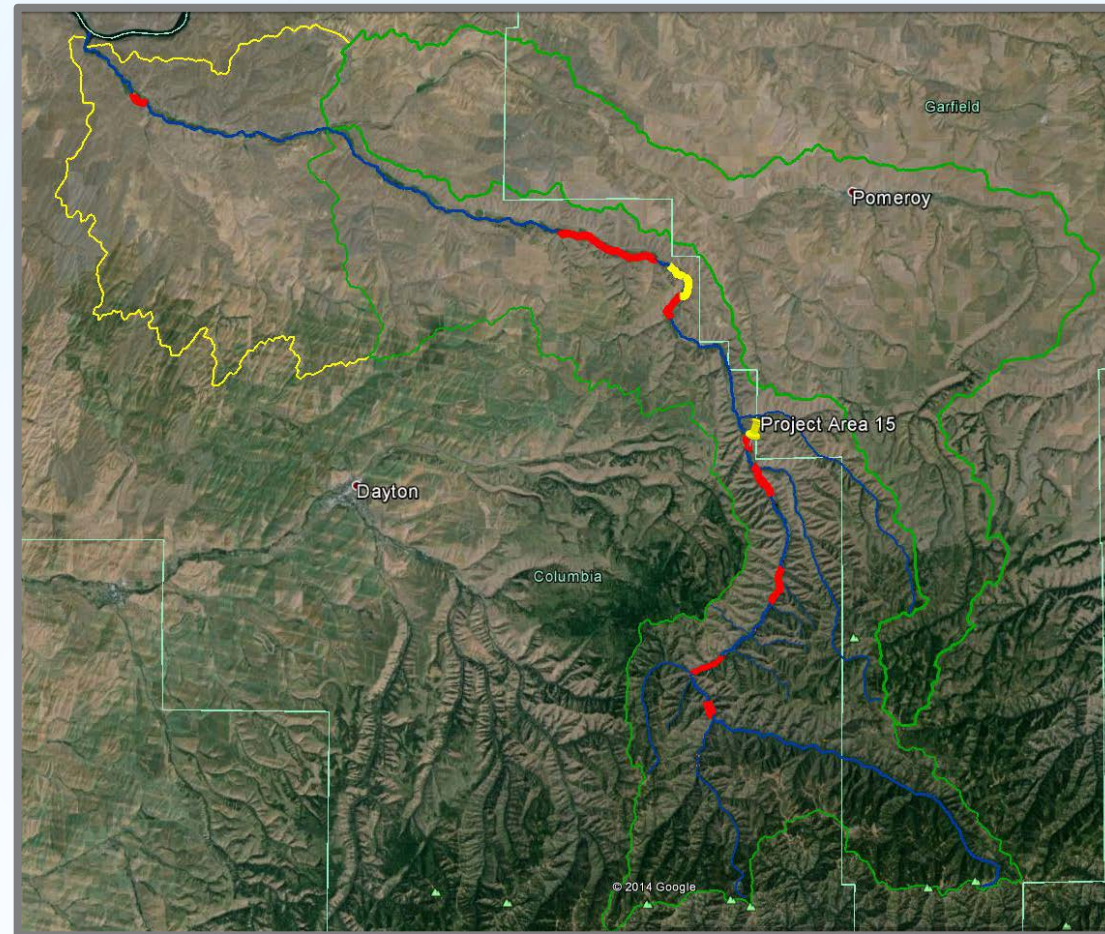
* Tucannon River Project Area - 15b



Project Reach: Project Area 15b is located in the upper Tucannon River Watershed near Dayton WA. The 0.27 mile long project reach was identified in the Tucannon River Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased floodplain connectivity and large wood driven channel complexity.



Above Image: Pre-project photo of approximate location of new side channel.

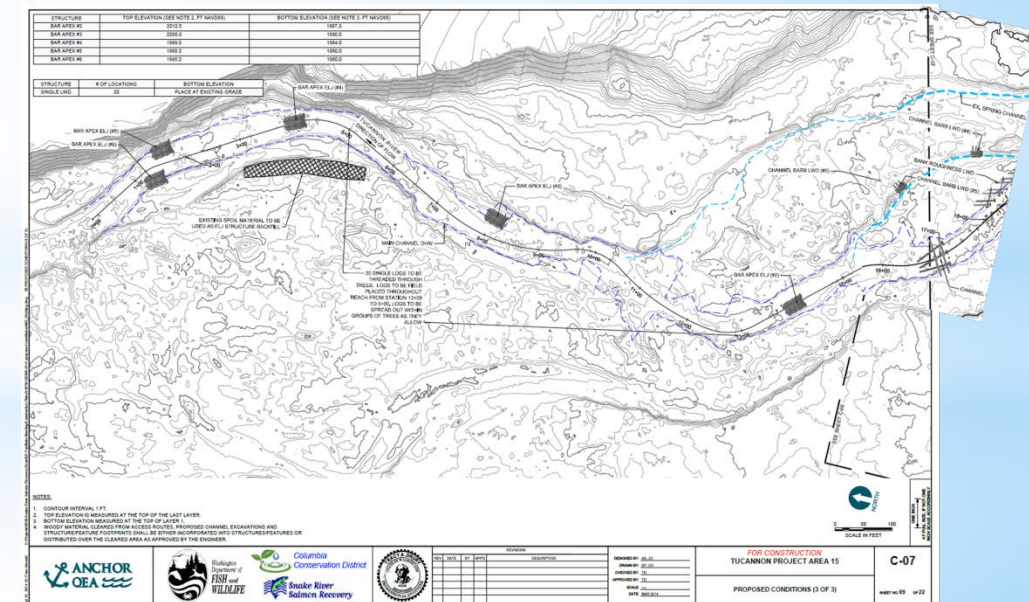


Design: The main design purpose of this reach is to provide channel complexity while maintaining stability. The structures are large bar apex structures anchored in the river bed (above). Structures are placed to encourage deposition and bar development (below). The placement of the lower most three structures will act as a backstop to materials moving out of the reach.

Project: Terry Bruegman of Columbia Conservation District assumed sponsorship of PA-15 in 2013 with the design being completed in November 2013. In FY 14, implementation funds were provided from the Tucannon Habitat Programmatic. The project design involves the placement of 7 engineered log jams and 20 simple complexity logs for the purpose of improving hydraulic complexity and increasing floodplain connectivity. Approximately 231 trees were placed in the main and side channel during the first phase of this project in 2014.



Implementation: The second phase of the project will be completed August 2015. Conventional construction methods will be used to build engineered log jams and anchored logs.



Terry Bruegman, Columbia Conservation District (Project Sponsor and Construction Management & Funding)
 Anchor QEA (Design and Engineering) WDFW (Land Owner and Design Review) CTUIR (Design Review) USFS (Project Partner and Materials Support)
 Snake River Salmon Recovery Board - Tucannon Habitat Programmatic (Coordination Support and Funding)
 Bonneville Power Administration (Funding)

Appendix B

Overview 2015 Implementation Season

Tucannon River Programmatic Habitat Project (2010-077-00)

Project Area 11 Implementation (Project 2010-077-00 -- Contract #CR-283994)

Project Number	PA-11
BPA Contract Number	CR-283994
Project Name	PA-11
River Mile	42.3-40.7
Land Ownership	WDFW
Project Sponsor	Washington Department of Fish & Wildlife
Schedule	Design 2013-14 implement 2015
Project Objective	Improve hydraulic bed form complexity through LWD, maintain floodplain connectivity and side channels
Project Size	1.84 mile
Design Contractor	WDFW Bruce Heiner
Construction Contractor(s)	WDFW Construction Crew
Design Cost Funded by CTUIR Accords	\$20k
Construction Cost Estimate based on 60%	\$625,000
Implementation Funding Source	BPA Tucannon River Habitat Programmatic/SRFB
Quantities	





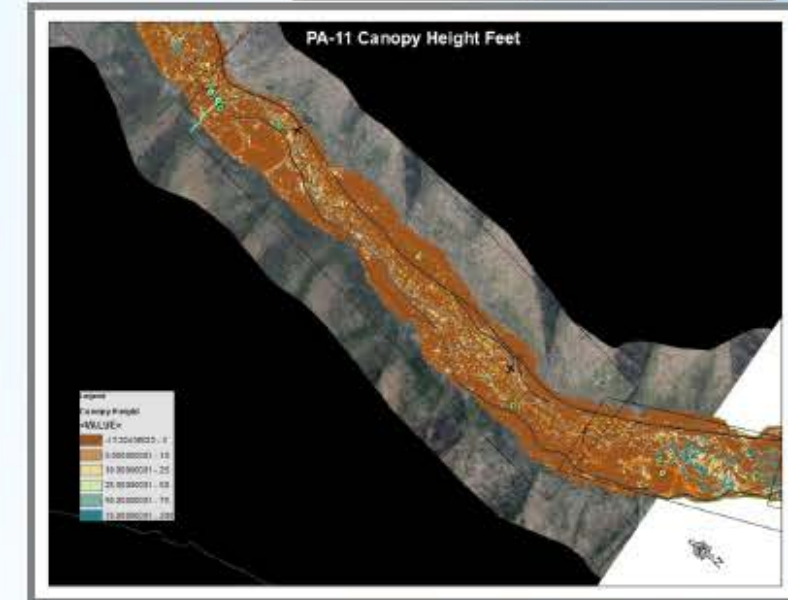
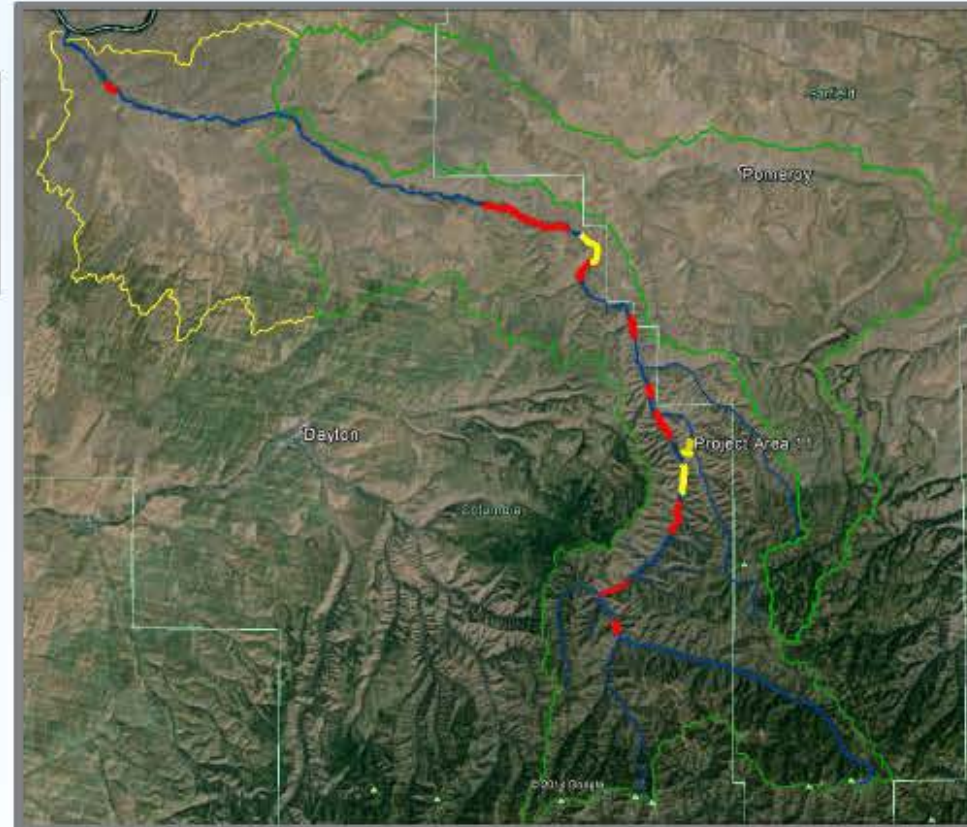
* Tucannon River Project Area - 11



Project Reach: Project Area 11 is located in the upper Tucannon River Watershed (RM 40.55 - 41.8) near Dayton WA. The 1.25 mile long project reach was identified in the Tucannon Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased floodplain connectivity and large wood driven channel complexity.



Above Image: Pre-project photo of typical channel form within the project reach.

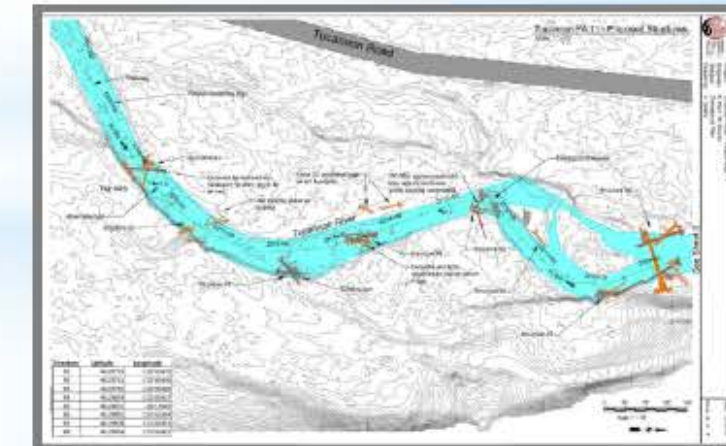


Preliminary Results: A conceptual survey has been completed as part of the Tucannon Assessment (Anchor April 2011) and the Tucannon Restoration Plan (Anchor Nov 2011). The project reach was determined to be limited in pools and LWD complexity. Below: Designs developed for the reach by WDFW to increase LWD complexity and increase pools and bed load sorting.

Project: Dave Karl of WDFW assumed sponsorship of PA-11 in 2013 with the initiation of design and permitting in 2014 using funds provided through the Tucannon Habitat Programmatic. It is anticipated implementation funds will be provided from the a 2014 SRFB grant and the Tucannon Habitat Programmatic (FY-15). The project design involves the placement of a combination of engineered log jams for the purpose of improving hydraulic complexity and maintaining floodplain connectivity and log placements intended to provide fish cover and mobile wood in the reach. The project reach currently exhibits side channel and good floodplain connectivity, though riparian habitat is in poor condition. This project will provided the channel stability to allow riparian recovery while maintaining floodplain connectivity.



Implementation: Design and permitting are completed for the project and funding for construction should be in place for the 2015 work window. Currently, material sourcing is underway and site preparation will begin in the fall winter 2014.



Dave Karl, Washington Department of Fish & Wildlife (Project Sponsor, Design & Construction Management); Bruce Heiner, WDFW (Design & Engineering); Snake River Salmon Recovery Board - Tucannon Habitat Programmatic (Coordination Support and Funding); Bonneville Power Administration (Funding)

Project Area 15b Implementation Phase II (Project 2010-077-00 -- Contract #65148)

Project Number	PA-15
Project Name	Area 15 Phase II Build: Hab Complexity
River Mile	37.15-35.35
Land Ownership	WDFW and private
Project Sponsor	CCD
Schedule	Implement in-2015
Project Objective	Improve hydraulic bed form complexity through LWD, increase floodplain connectivity and develop side channels
Project Size	0.4 mile
Current Design Level	Final
Design Contractor	Anchor
Construction Contractor(s)	TBD
Design Cost	\$90k, BPA & SRFB funded
Construction Cost Estimate based on 100%	\$300k
Implementation Funding Source	BPA Tucannon River Habitat Programmatic & SRFB
Quantities	7 multiple log structures ranging from 2 logs to 30 will be constructed along with 20 single log placements
Comments	This part of the project was delayed in 2014 due to permitting delays and high cost of construction bid





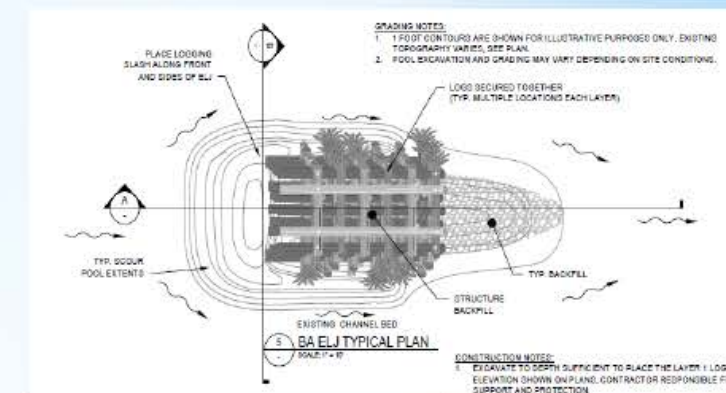
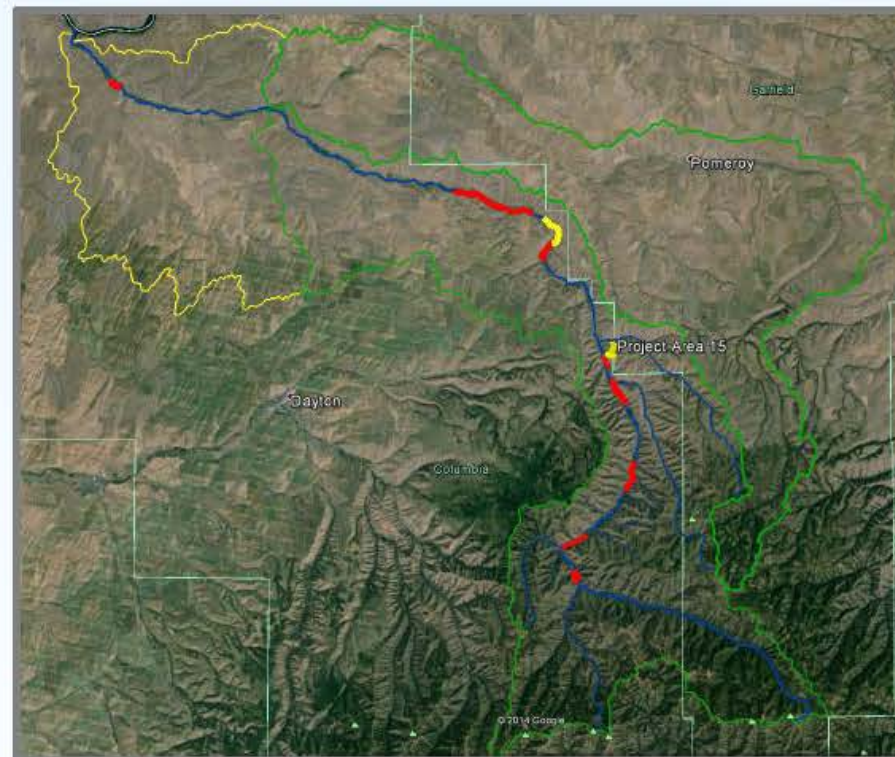
* Tucannon River Project Area - 15b



Project Reach: Project Area 15b is located in the upper Tucannon River Watershed near Dayton WA. The 0.27 mile long project reach was identified in the Tucannon River Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased floodplain connectivity and large wood driven channel complexity.



Above Image: Pre-project photo of approximate location of new side channel.

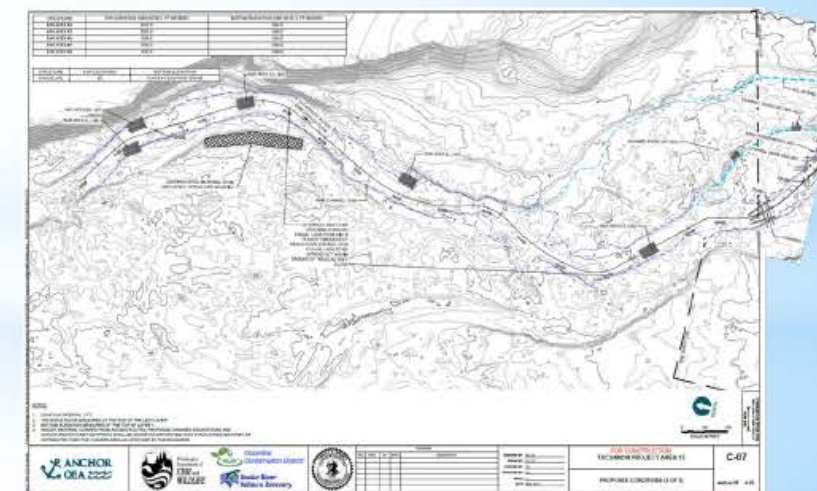


Design: The main design purpose of this reach is to provide channel complexity while maintaining stability. The structures are large bar apex structures anchored in the river bed (above). Structures are placed to encourage deposition and bar development (below). The placement of the lower most three structures will act as a backstop to materials moving out of the reach.

Project: Terry Bruegman of Columbia Conservation District assumed sponsorship of PA-15 in 2013 with the design being completed in November 2013. In FY 14, implementation funds were provided from the Tucannon Habitat Programmatic. The project design involves the placement of 7 engineered log jams and 20 simple complexity logs for the purpose of improving hydraulic complexity and increasing floodplain connectivity. Approximately 231 trees were placed in the main and side channel during the first phase of this project in 2014.



Implementation: The second phase of the project will be completed August 2015. Conventional construction methods will be used to build engineered log jams and anchored logs.

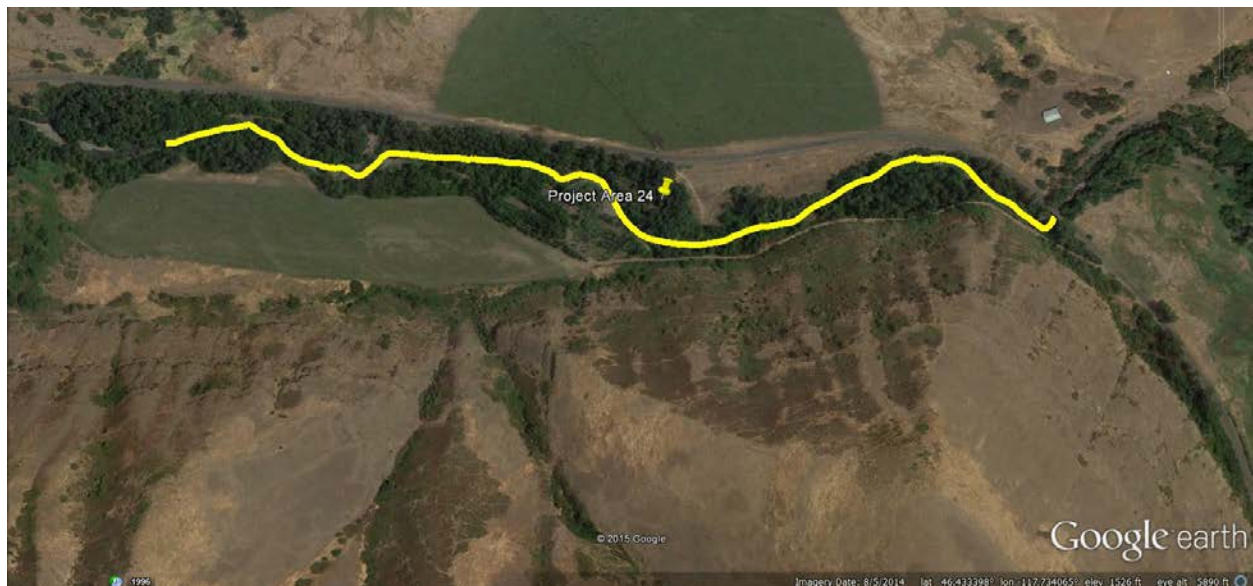


Terry Bruegman, Columbia Conservation District (Project Sponsor and Construction Management & Funding)
 Anchor QEA (Design and Engineering) WDFW (Land Owner and Design Review) CTUIR (Design Review) USFS (Project Partner and Materials Support)
 Snake River Salmon Recovery Board - Tucannon Habitat Programmatic (Coordination Support and Funding)
 Bonneville Power Administration (Funding)

Project Area 24 Implementation (Project 2010-077-00 -- Contract #66844)

Back Ground: Project Area 24 was conceptualized in the Tucannon River Conceptual Restoration Plan. The project was prioritized and designed to a 30% level in 2012 as part of a SRFB grant. The final design was completed in 2014 under a Programmatic contract (64018).

Project Number/Contract Number	PA-24/66844
Project Name	Area 24 Build Function and Complexity
River Mile	28.25 to -27.5
Land Ownership	Private
Project Sponsor	CCD
Schedule	Design complete 2014 implement 2015
Project Objective	Improve hydraulic bed form complexity through LWD and improve floodplain connectivity through removing and modifying river levees
Project Size	0.75 mile
Current Design Level	Final 100%
Design	Anchor QEA
Construction Contractor(s)	TBD
Design Cost	\$86k
Construction Cost Estimate	\$911,071
Funding Source	BPA (Programmatic)/SRFB(SRSRB)
Design Engineer	Tracy Drury
Comments	





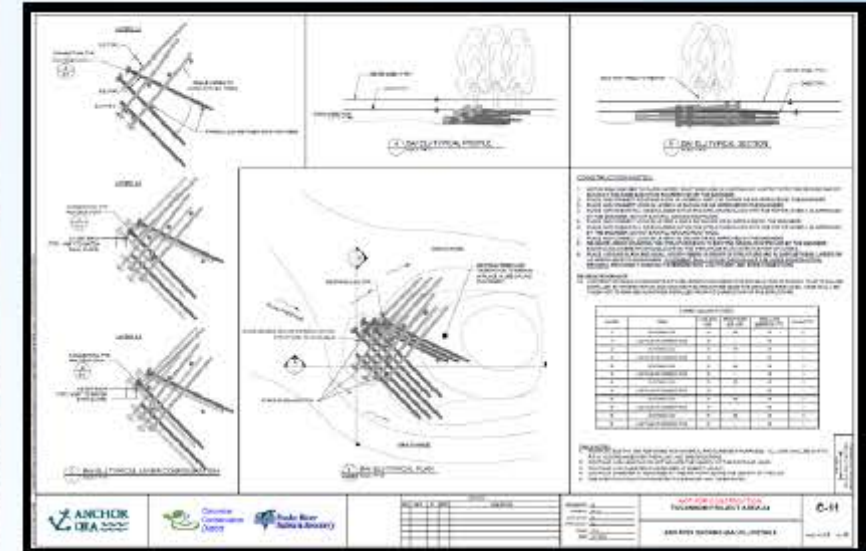
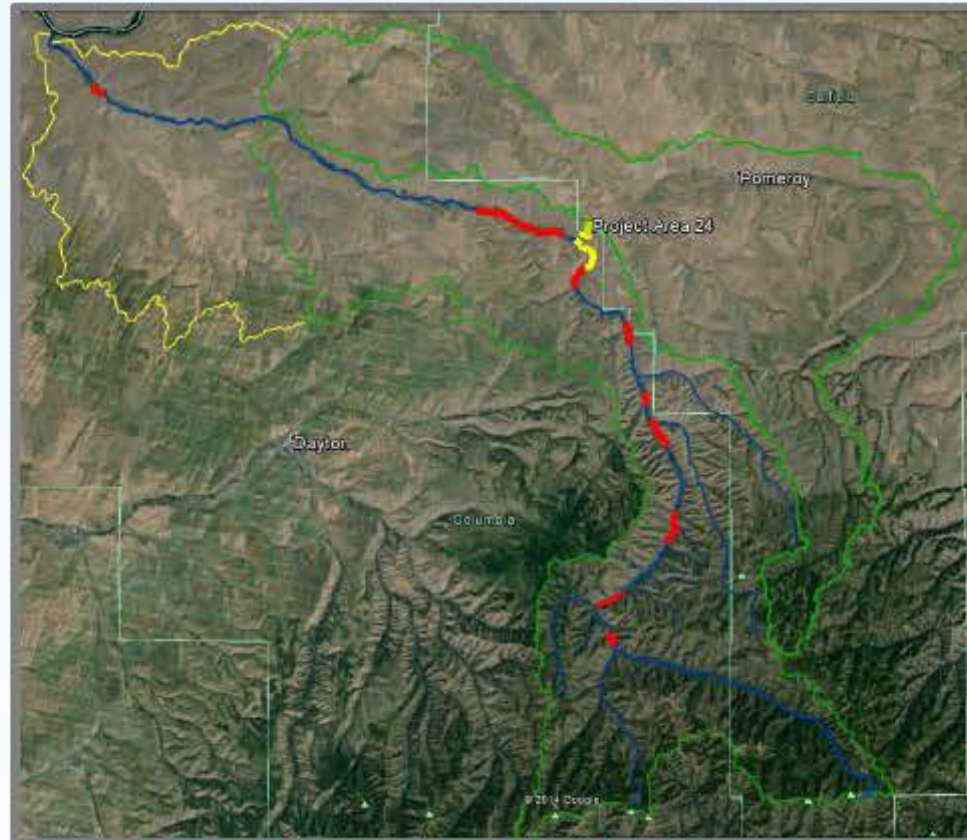
* Tucannon River Project Area - 24



Project Reach: Project Area 24 is located in the upper Tucannon River Watershed (RM 28.25 - 27.5) near Dayton WA. The 3/4 mile long project reach was identified in the Restoration Plan (Anchor Nov 2011) as a high priority identifying potential for increased floodplain connectivity and large wood driven channel complexity.



Above Image: Pre-project photo of typical channel form within the project reach.

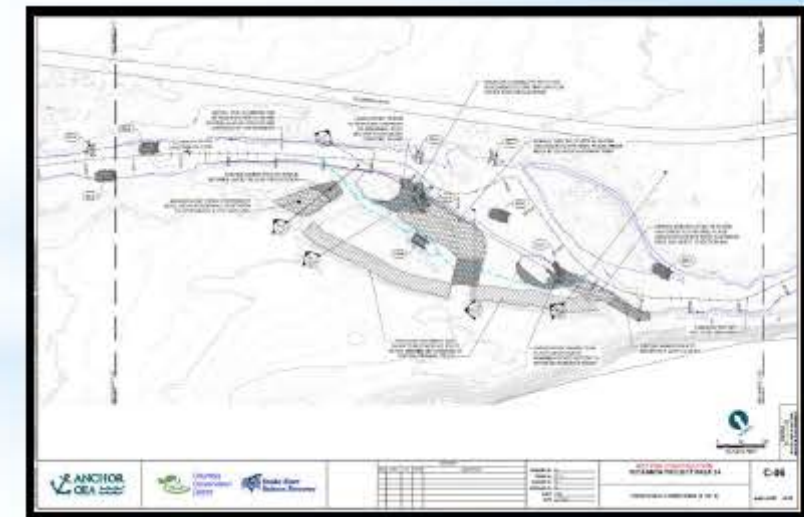


Preliminary Results: The design calls for the placement of ELJs for the purpose of increasing channel complexity and increasing floodplain connectivity.

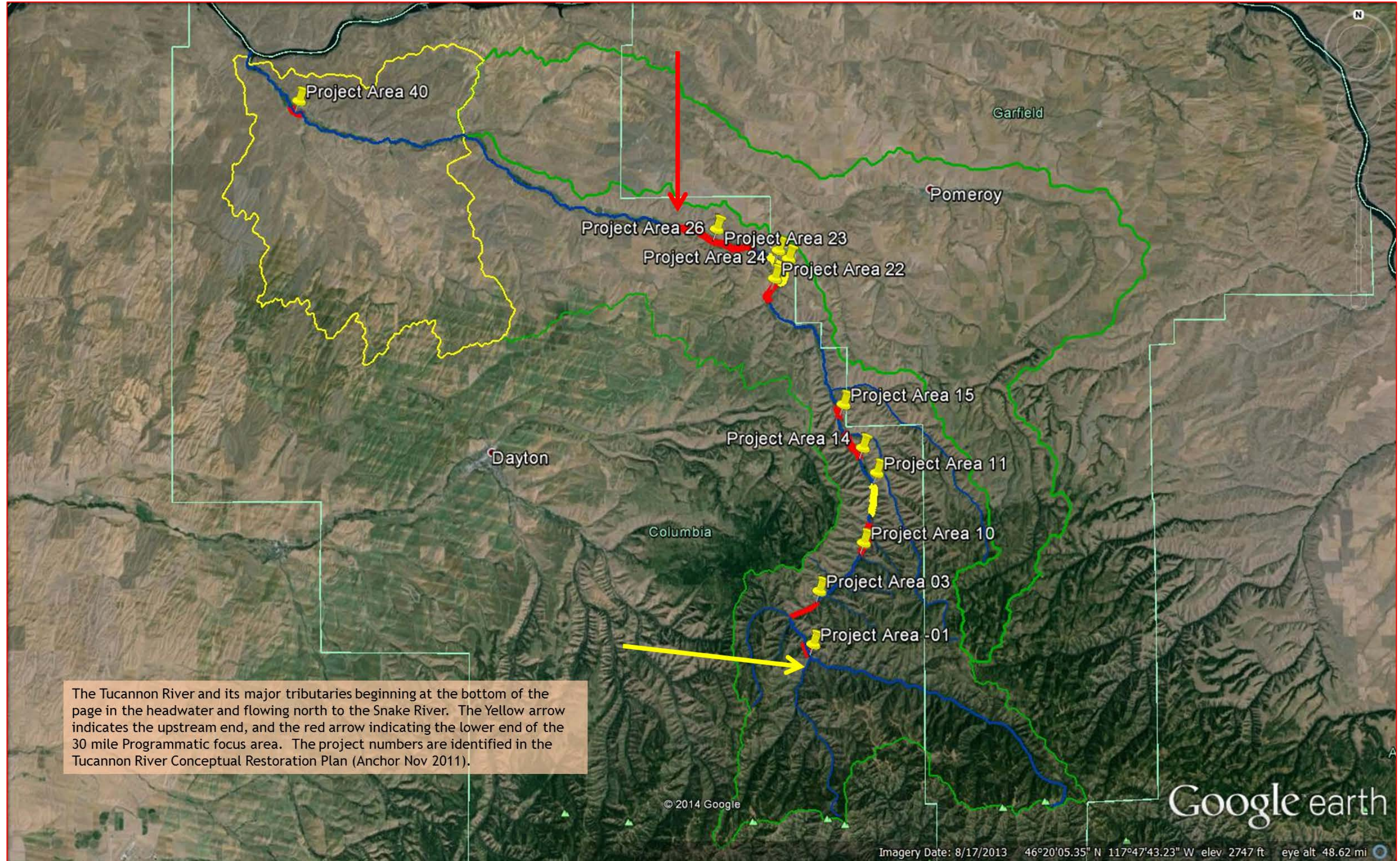
Project: The PA-24 design was completed using a combination of SRFB and BPA Programmatic funds. Implementation funds are being provided from the Tucannon Habitat Programmatic and the SRFB in 2015. The Columbia Conservation District is providing design oversight and will assume implementation in 2015. The project design involves the placement of 26 engineered log jams for the purpose of improving hydraulic complexity and increasing floodplain connectivity, and another 40 single logs to be field fitted for cover and complexity. Two breaches will be made in existing levee features increasing floodplain connectivity and new side channels.



Implementation: The design is completed. Implementation is scheduled for 2015.



Snake River Salmon Recovery Board (Design Sponsor) Terry Bruegman Columbia Conservation District (Design Partner & Implementation)
 Anchor QEA (Design and Engineering)
 Snake River Salmon Recovery Board - Tucannon Habitat Programmatic (Coordination Support and Funding)
 Bonneville Power Administration (Funding)



The Tucannon River and its major tributaries beginning at the bottom of the page in the headwater and flowing north to the Snake River. The Yellow arrow indicates the upstream end, and the red arrow indicating the lower end of the 30 mile Programmatic focus area. The project numbers are identified in the Tucannon River Conceptual Restoration Plan (Anchor Nov 2011).

© 2014 Google

Google earth

Imagery Date: 8/17/2013 46°20'05.35" N 117°47'43.23" W elev 2747 ft eye alt 48.62 mi

