Tucannon River Programmatic Habitat Annual Report

Project #: 2010-077-00

Annual Progress Report

(Reporting Period January 2015 to December 2015)

Contractor:

Snake River Salmon Recovery Board

Contract: #68810

Steve Martin, Director
Kris Buelow, Project Manager

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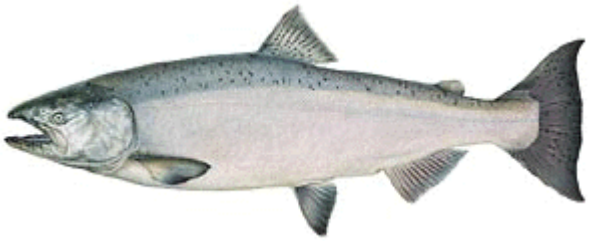
Contact Information:
SRSRB Office,
410B E Main St.
Dayton, WA 99328
509-382-4115
steve@snakeriverboard.org
kris@snakeriverboard.org



Abstract:

The Tucannon River Programmatic Habitat project 2010-007-00 is a restoration "Umbrella" supported by the Bonneville Power Administration to improve Spring Chinook survival in the Tucannon River near Dayton, WA through improvements in habitat. The Programmatic is administered through the Snake River Salmon Recovery Board and is striving to improve instream habitat by >/= 17% through 2018. The Programmatic has completed seven restoration projects through 2015 and plans on six more through 2018. The primary restoration goals are (but not limited to) to improve riparian condition (4.1), instream structural complexity (5.2), floodplain connectivity (6.1) and reduce temperature (8.1). The restoration objectives have focused on increasing floodplain connectivity reducing channel confinement and increasing in channel complexity. Many of the complexity actions have been coupled with floodplain connectivity actions leading to the development of side channels and increases in channel length. Habitat limiting factors are responding in the Tucannon lead by improvements in base flows and reductions in summer high stream temperatures.

Contents:

Introduction:

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 Tucannon River, near Dayton, WA (Figure 1), through habitat restoration actions focused on the limiting factors (Table 1). The Snake River Salmon Recovery Board (SRSRB) works with its' partners, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Columbia Conservation District (CCD), Nez Peirce Tribe (NPT), 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 SRSRB serves as the Regional Organization and the Lead Entity for salmon recovery in the Washington State portion of the Snake River, its tributaries and the WA state portion of the Walla Walla River, implementing the Salmon Recovery Plan for SE Washington (SRSRB 2011) and guiding funding for the Salmon Recovery Funding Board (SRFB). Beginning in 2011, the SRSRB was awarded the Tucannon Programmatic Habitat (Programmatic) a project (# 2010-077-00) supported by Bonneville Power Administration (BPA). The goal of this "Umbrella" Programmatic is to guide funding in support of improving spring Chinook habitat in the Tucannon River, leading to improved habitat condition and survival. The Programmatic restoration goals are to improve riparian condition (4.1), instream structural complexity (5.2), floodplain connectivity (6.1) and reduce temperature (8.1). The objectives include the implementation of the actions identified in the 28 conceptual restoration projects (RM 20-50) outlined by the Conceptual Restoration Plan, Reaches 6 to 10 Tucannon River Phase II (Anchor November 2011). The detailed objectives have focused on increasing floodplain connectivity reducing channel confinement and increasing in channel complexity at a level needed to reset natural process and impact condition instream at a watershed scale. The SRSRB manages the Programmatic by working with its local partners developed through the SRFB supported Regional Organization (SRSRB), 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 through the Programmatic. Within this report details will be provided on all project either funded through the Programmatic or supported through the Programmatic through technical support in 2015. In 2015, the Programmatic tried to prepare an update on the project completed in the spring Chinook priority area since 2008 indifferent to who funded them initially.

The Programmatic habitat implementation approach targets the priorities (limiting factors) identified for restoration action under the Tucannon Geomorphic Assessment and Conceptual Restoration Plan (Anchor 2011 April & November). The priority restoration reach is based on the known (historic and current) spawning and rearing areas of Tucannon River spring Chinook approximately RM 20 to RM 50 (Figure 3). Restoration actions focusing on limiting factors identified in the Salmon Recovery Plan for South East Washington (2011) (Table 1), improving bed and channel form (6.1), increasing channel complexity (6.2), side channel and wetland condition (5.1) and floodplain connectivity (5.2) within the priority reach (Figure 2 &3) receives highest priority for implementation funding under the

Programmatic. During project design review our technical team works with the project advocates to ensure design elements are at the scale and impact level appropriate to drive ecosystem change, for example improve floodplain connectivity and riparian health or drive the development of side channel habitat and reduce main channel velocities during floods.

The Programmatic was managed in 2015, under the BPA contract #68810 by the SRSRB with the purpose of providing support in completing the objectives and achieving the goals of the Programmatic during the 5th year of implementation. The Programmatic was successful in maintaining partnerships built by the collaborative and transparent process established in the basin, and will work to the continue the relationships between restoration practitioners and land owners throughout program. The SRSRB maintains two committees in support of its process (Tucannon Implementer Committee (TIC) and the Regional Technical Committee (RTT)) which prioritize habitat restoration actions/projects funded or supported under the Programmatic. The Programmatic supports project sponsors in the development of project design, permitting, sourcing materials (LDW) conducting pre-project field visits, contract development, budgeting, implementation support, as-built documentation, final reporting and various other technical functions. In 2015, the Programmatic supported, two habitat project assessments, three habitat designs and three habitat restoration implementation projects.

The Programmatic also supported WDFW in the development of two SRFB applications one to populate a spring Chinook Life Cycle Mortality Modeling effort in the Tucannon and one to match with the WDFW implementation of PA-6-9 in 2017. The Programmatic will coordinate with the partners and pursue matching grants for implementation of PA-17 & 18 and PA-28 in 2016.

The Programmatic managed two sub contracts in 2015 including project effectiveness/change detection data through the implementation of CHaMP, the completion of an EDT model development and limiting factor analysis and a project feasibility analysis joint project between the SRSRB, USFS and CTUIR.

The Programmatic and 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.

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 miles upstream from Lower Monumental Dam. Several major tributaries drain into the main stem including, Pataha Creek, Tumalum 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 2011, April,).

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 (WDFW Communication 2015). The current know distribution for spawning and rearing spring Chinook in the Tucannon is from RM 20 upstream to RM 58 based on available information (Figure 3). 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 4) the technical opinion, supported by spawning data (RTT 2013 Communication), is that habitat availability has been extended to at least RM 20 and potentially further downstream in favorable years.

Improving Habitat Conditions

Over the period of habitat restoration (~1999-present) in South East Washington, improvements in the habitat factors limiting spring Chinook (Table 1) production have been increasing, for example fine sediments and stream bed embeddedness have improved and are not currently considered to pose a significant impact to salmonids in the Upper Tucannon assessment unit (CHaMP, RTT communication 2014, 2015 Expert Panel Discussion, Grout 2008). Water temperatures have also begun to respond in the Tucannon with summer daily mean high water temperature declining (Figure 4) from what was

experiences in the 1980' and 90's. Summer high water temperature in the Tucannon at the Marengo Stream Gage in the late 1980's and early 1990's regularly reaches 80°F (WSU 2001, HDR 2006). These conditions were caused by low stream flow, poor with to depth ration and impacted (absent) riparian habitat (SRSRB 2005, HDR 2006). Over the period of record at the WDOE Marengo stream gage, the mean daily maximum temperature has been declining with exceptions in 2014 and 2015, two exceptionally dry and hot summers. In 2015, daily mean ambient air temperature measured at the Marengo stream gage (WDOE data) showed a significant increase > than the period of record (Figure 5) likely leading to elevated 2015 stream temperatures (Figure 4). In 2015, June mean air temperatures were >15°C above average lengthening the duration of the hot season beyond that previously experienced in the Tucannon. It is also noteworthy that he 2015 work window was one of the higher fire risks observed in recent times.

Over the period of record significant work has been completed to address high water temperature including the planting of riparian (for example that completed in relation project and CREP) and river bed form modification (improvements in width/depth ratios) all contributing to improving stream temperatures. Water temperatures should continue to improvement as riparian matures, channel complexity improves bed form and floodplain connectivity increases. The effect will set off a feedback loop where increased channel complexity drives improved bed form, increasing hyporheic exchange, and reconnecting floodplains. Reconnected floodplain will extend riparian margins extents increase the development of side channels and off channel habitat, slowing water down increasing water residency time within basin.

We hypothesize wetter riparian/floodplains caused by floodplain connectivity, and slower release of spring flow from channel complexity/channel length, is increasing watershed storage in the Tucannon basin, "a 10,000 small reservoirs concept." Wetter floodplains will grow better riparian bring channel migration back into equilibrium where LWD recruitment and sediment transport are balanced resulting in a temperature resilient river system.

Over the same time period (2003-present) summer stream flows have shown improvement at the WDOE Tucannon Marengo stream gage. This is particularly of interest because flows have increase to an extent that it would seem cannot be explained by the environmental conditions alone (Figure 6, 7 & 8). Even during the 2015 drought, the second driest in the period of record (Figure 7), flows in the Tucannon remained relatively high in comparison to other regional streams (Figure 8) and historical Tucannon conditions (Figure 6). The North Fork Touchet River, a generally wetter watershed (Figure 7) had one of its lowest flows of record in 2015, while the Tucannon remained above average. Additional, Asotin Creek had its lowest flow on record while Alpowa Creek a spring source stream, remained relatively average (Figure 8).

Two very provocative observations were made in 2015; firstly, even with record high air temperatures the Tucannon did not experience significantly above average water temperatures and secondly significantly lower than average precipitation did not lead to the lowest flows for the period of record.

We hypothesized that conditions in the Tucannon are being propped up by improved stream channel LWD complexity and floodplain complexity leading to increased water retention time. Where log jams placed in stream over long reaches physically slow stream flow down, forcing more water into the hyporheic zone, onto the floodplain and into side channels and off channel habitats. A 2014 study, conducted by WSU found a ~30% increase in flow retention immediately following construction of log jams on the Tucannon River in project area 14 (Parzych 2014). A 2015, study in the in the Tucannon show increased hyporheic flow following the implementation of project area 11 while a upstream control site did not experience the increase of the same time period (SRSRB 2015 unpublished data).

Projects completed to date (2011-2015) using Programmatic funding, are illustrated in a Google Map (Figure 9), with the seven completed projects highlighted in blue. Since the initiation of the Programmatic over ~10 stream miles have been treated for complexity by the Programmatic placing 3,244 key LWD pieces (>6m long& 0.3m dia) into ~ 524 log configurations (390 multi log type jams & 134 single logs) (Table 2 & 3). All stream reaches treated for wood complexity under the Programmatic now meet the minimum restoration goal of >2 key logs/ bank full width (>6m long & 0.3m dia). Additionally, stream reaches were treated for floodplain connectivity through the removal of confining features (1,877' levee removed) and reversal of incision through wood placement, totaling >6.36 miles reconnecting ~36 acers of low lying floodplain and creating and reconnecting/enhancing 5.8 miles of side channels (Table 2 & 3).

It will take a number of years for restoration projects in place to fully mature and their intended benefits to be realized. High stream flows > 1,000 cfs over a sustained duration will interact with many of the restoration actions particularly the connectivity actions like levee removal and incision reversal. Once flows a large enough to mobilize bed load and initiate the intended scour and deposition we would expect to see further gains in hyporheic flow, floodplain connectivity and improvements in bed shape complexity.

Project Fiscal Performance:

The Programmatic currently operates with the support of 1.15 FTE which includes a program coordinator (1 FTE) and the SRSRB director (0.15 FTE). In 2015, the program spent ~10% of its Programmatic budget on administration, 10% on monitoring and feasibility subcontracts and 80% on habitat implementation (Figure 10, Table 5). The coordinator works with the project sponsors, land owners and partners to streamline progress toward the Programmatic objectives. One of the primary goals of the coordinator is to ensure project efficiency and to seek and support the project sponsors in

pursuing matching funds. As a result of this effort the Programmatic is able to show significant finical match toward its project implementation (Figure 11), and in 2015 was able to match 24% of the overall program. When considering matching funds, the overall administrative percentage drops to ~9% of the 2015 fiscal year (Figure 12). In 2015, the Programmatic work with its partners to secure ~$400k to match with Programmatic restoration and ~$80k to conduct needed monitoring in the Tucannon for use in FY16 &17. The Programmatic plans to continue seeking matching funds to meet funding needs in the basin. When looking at the FY11-FY16 performance period the Programmatic has stayed very close to the 10% bench mark for program administration with ~5% for monitoring gaps (Figure 13). The break down over the same period of performance indicates that the Programmatic partners have matched implementation projects at 22% of total program. One note about the match reflected in the Programmatic is that we are showing matching grants and donated materials primarily from the SRFB and USFS (Table 6).

Tucannon Programmatic Habitat Restoration Project Implementation: 2015

Construction, Designs, and Assessment Projects

The 2015 field season was highlighted by the advancement of project designs by WDFW (PA-6, 8 & 9), CTUIR (PA-17 & 18), and the CCD (PA-28), assessment/designs by the USFS & CTUIR (PA- 4, 5 & 7), and WDFW (PA-13) and construction by WDFW (PA-11) and the CCD (PA-15, & PA-24) (Figure 9 &15). In total, assessments were initiated/completed on two project areas (1.96-mile reach length), designs were initiated/completed for three projects (6.75-mile reach length) and three significant construction restoration projects were completed (2.73-mile reach) (Table 4). Restoration projects completed in 2015 focused on designing and implementing actions which would directly/indirectly improve the limiting habitat factors (Table 1) identified in the Recovery Plan (SRSRB 2005) and prioritized in the Tucannon Geomorphic Assessment (Anchor 2011 April) and Conceptual Restoration Plan (Anchor 2011 November).

The three implementation projects directly supported by the Programmatic in 2015 are described in the following sections with the action metrics described in Table 3. Additionally, a brief project description, history, outcomes, photos and illustrations are further provided in Appendices 1-8. In addition to implementation of projects funded directly under the Programmatic in 2015 staff supported the Columbia Conservation District in the development, design and implementation of PA-23, PA-28 and 26 which are covered in Appendices 6, 13 & 15.

The Programmatic collects pre/post project reach data (for the entire project length) in the form of an adapted rapid habitat survey focusing on setting photo points, delineating existing channel, pools and LWD key pieces (>6m long and 0.3m dia). The purpose of this effort is to help in developing clear and concise restoration goals and objective, as-built conditions, and to aid in the development of the data and

maps in this report (Table 2 &3 and Appendix 1-15). To maximize the value of this data set we have coordinated with CHaMP to ensure our data and protocol are compatible for measuring change detection within CHaMP. The rapid habitat data entails a pre and post project total LWD quantity georeferenced with associated photos that can be shared as a kmz or shape file with data being stored at the SRSRB.

The following sections describe the work completed by the project sponsors working on Programmatic project in the Tucannon during 2015.

2015 Habitat Restoration Implementation

PA-11: Habitat Restoration: (#68874)

The PA-11 design was finalized in 2014 for the river reach between ~RM 40.45 and ~RM 42.8 by WDFW, and was implemented in 2015 by the same party. The project area was largely impacted by the School Fire (2005) which destroyed most of the riparian trees within the 1.56-mile reach. At the time of restoration, the river channel was not overly incised and was characterized as anabranch - braided channel form, illustrated in the pre-project channel delineation (Appendix 1 – Slide 1). The main goal of the project was to increase channel complexity and maintain/improve floodplain connectivity through the placement of LWD structure (Appendix 1 – Slide 2, 4, 7 & 8). The objectives were to place a combination of mobile and stabile LWD in channel and in high flow paths, to interact with flows, sort gravels, create pools and improve floodplain riparian conditions (Appendix 1 – Slide 4 & 7). In total, 582 key LWD pieces were added in the form of ~96 multiple log structures (Appendix 1- Slide 4 & 5) bring the reach total key pieces to 657 key pieces, increasing the reach total key pieces per bank full width to >3.5. The rapid habitat survey pre-implementation was conducted on March 6th 2015 followed by the post construction survey on September 30th, 2015. The survey identified 75 key pieces of LWD prior to construction and 657 pieces in the post construction survey (Appendix 1 slide 5) a nearly 9-fold increase in pieces > 6m long and 0.3m dia (Table 2).

The project also placed LWD structure in 19 locations on the floodplain in high flow paths, anticipating that the instream channel roughness placed would increase the frequency of bank full events, increasing over land flow. The project enhanced > 1.1 mile of side channel, created or reconnected another 0.29 miles a 21% increase (Table 2) and created 0.25 acres of perennially inundated wetlands (Table 3).

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. It is anticipated changes in habitat conditions brought about by the restoration actions will be detected and describe by CHaMP monitoring. In 2015, the treatment site was implemented; results from past and future sampling events are available through the Tucannon River CHaMP monitoring lead or through champmonitoring.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 2015, a before after treatment control piezometer study design was conducted in association with the upper 1000' of this implementation project. The study attempted to determine the magnitude of change in hyporheic exchange resulting from the construction of log jams. Approximately 40 piezometers were placed at 20m intervals continually with half of them above the treatment area down through the treatment (Appendix 1- Slide 8 & 9). Samples were collected seven times three prior to construction and four after. The final salmon was take following the first freshet of the fall in November 2015. At the time of this report data analysis was preliminary, but indications in significant increase in hyporheic exchange in the treatment sites over the control occurred. It is anticipated that in 2016 this effort will be repeated on PA-11.

PA-15 Phase II: Instream Habitat Phase II Contracts #65148

The PA-15 design was the result of a combined effort between SRFB matching funds and the Programmatic. The project area is located between RM 37.2 and 36.4 and is situated mostly on WDFW properties but involves private lands on each end of the project (Appendix 2 – Slide 1). 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, completed 2013. The CCD became the project sponsor with a near final design finished in December 2013. Final Designs are attached to the project contract #58975 in Pisces. Project implementation was funded 100% by Programmatic funding with materials match from the USFS (native grass seed). The implementation of this project was completed in two phases (Appendix 2 – Slide 2) to accommodate a short fall in FY14 Programmatic budget and limited work window, Phase I was completed in 2014, followed by Phase II in 2015.

The goal of the design was to increase channel complexity and floodplain connectivity, including the creation and development of off channel habitat. The pre-project channel condition was described (Anchor 2011 Nov) as a forced plain bed rifle with incised and confined reaches. The main objectives were to increase floodplain connectivity and channel complexity through the placement of LWD structures and side channel development (Appendix 2 – Slide 3, 5, 9, 10).

The construction of Phase I placed 297 LWD key pieces (>6m long & 0.3m dia) over 0.36 miles of the main stem and in the 0.26-mile perennial side channel (Table 3) constructed during Phase I (Appendix 2 – Slide 2, 5, 7 & 8). 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 40 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 (Appendix 2 – Slide 3), an overall 57% increase in side channels (Table 2). The project increased wetted perennial channel by ~42%, including both main channel and perennial side channels.

Phase II was completed in 2015, with the placement of 6 structures and 21 single logs within the 0.27-mile project reach. In total, 300 key pieces were added in 2015 bring the overall project reach total for both reaches to 597 placed (Table 3). The rapid habitat survey identified 472 key pieces visible at or above grade an increase from 55 pre-project key pieces, an approximate 7-fold increase (Table 2 & 3). The reach now has exceeded the desired 2 key pieces per bank full width ~5 pieces (Table 3).

PA-15 is paired with a matched treatment and control CHaMP habitat monitoring sample site which has had three years' pre-treatment monitoring. It is anticipated changes in habitat condition caused by the restoration actions will be captures over time as they develop by CHaMP. The results from the sampling events are available through the Tucannon River CHaMP monitoring lead or through CHaMP monitoring.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.

PA-24: Implementation, Contract #66844

The PA- 24 design was developed to a 30% design under a matching SRFB grant from the Conceptual Restoration Plan (Anchor November, 2011). The project final design was sponsored by the WWCC (64018) in coordination with the CCD who sponsored the implementation of the project in 2015. The restoration goals were to reduce channel/floodplain confinement and increase channel complexity. The primary objectives were to remove river confining structure, develop off channel and side channel habitats by placing ELJs and place LWD for complexity. The project was located on private properties from ~RM 27.5 to ~RM 28.25 and prior to implementation contained only 16% of the key LWD (Appendix 3 – Slide 1) pieces (>6m long & 0.3m dia) identified for recovery (>2 key pieces per bank full width) at ~0.33 pieces per bank full width (Table 2).

Construction began in 2015, and included removal/breaching of existing levees and spoil piles (Appendix 3 – Slide 2), and the placement of ELJ and single log configurations. In total, LWD structures were placed along the entire 0.86-mile reach placing an additional 498 key pieces, increasing the number of key pieces (6m long & 0.3 m dia) visible above grade from 43 to 377. The total number of key pieces' increase form pre-project 0.33 to > 3.9 pieces per bank full width (Table 2). During construction the 498 key pieces were used in 28 multi log structures and 33 single logs placements (Appendix 3 – Slide 4). During the post project rapid habitat survey identified 377 key pieces (Table 3) at or above grade, indicating that more than 120 were buried in the stream bed to anchor structures or were located in pools too deep (>1m) to see them.

The project also called for the removal of river confining features including the removal of 380' (Appendix 3 – Slide 2) of river levee, to reconnect ~5 acres of low lying floodplain and reconnect 0.32 miles of side channels and off channel habitats (Table 3, Appendix 3 – Slide 3). The creation of new side channel increase side channel length over the reach by >80% and increased overall perennial stream

length by >23% (Table 2). River levees were removed down to elevations which would promote perennial flow (Appendix 3 – Slide 8) and were matched with apex jams to split and maintain flows.

The magnitude of this project is notable in that it occurred on private property. At the time of this report the project reach has the highest LWD densities and pool frequency observed in the Tucannon private lands.

2015 Project Area Designs

PA-6, 8, & 9: Preliminary Design

In 2015, WDFW completed a field assessment and design for the project areas PA-6, 8 & 9 RM 43.9 to RM 44.9 and RM 45.3 to RM 45.9 (Figure 9 & 15). It was initially determined that PA-7 would be included in this design but during the site assessment it was determined to have higher risk restoration elements and would require additional review and assessment. At that point the project was added to the USFS feasibility assessment for PA-4 & 5, now named PA-4, 5 &7 and is not included in this design project. The overall project goal is to improve channel shape and increase complexity. The objective will be to place LWD in configurations to increase off channel and side channel habitat and increase floodplain connectivity (Appendix 4 – Slide 1&2). The project will place approximately 82 LWD structures using > 600 logs and trees, placed using a helicopter to minimize impacts to existing high quality riparian areas during construction. In total, the project would place wood structure in 1.8 miles of the Tucannon, increasing LWD key piece (>6m long & 0.3m dia) densities from the existing 0.6 key pieces per bank full width to a minimum of 2 pieces. Additionally, from the removal of small spoil berm running adjacent to the river in the upper most end of the project (Appendix 4 – Slide 2), the project will reconnect >1,000' of existing side channel and floodplain. During the project large volumes of racking and slash will be incorporated in the project construction with the intended purpose of shorting the time to structure interaction with the typical flows.

In 2015, WDFW applied for a Salmon Recovery Funding Board grant and was awarded $400k through the Snake River Salmon Recovery Board Lead Entity, to match against the Habitat Programmatic funds. These funds would be used to purchase materials and helicopter time on the ground. It is anticipated the project will receive funds from the Programmatic in FY16 and 17.

PA-17&18: Instream Habitat Design,

In 2015, CTUIR initiated the design and development of PA-17 & 18 between RM 32.1 & RM 35.15 located on the WDFW Wildlife Area and private properties (Appendix 5 - Slide 1) using a combination of CTUIR Tucannon Program funding and Habitat Programmatic support. The design efforts propose a two phased approach where initial work will begin in 2016/17 on WDFW properties followed by phase

II on interested private landowners in PA-17. This will allow CTUIR to develop contacts and build landowner support before designing the projects allowing for the coordination needed to match design to landowner comfort levels. PA-18 preliminary designs were being advanced during the drafting of this report but during a 2015 field survey on the WDFW portion (PA-18) conducted by CTUIR and Programmatic partners, several restoration actions were identified for further consideration including wood augmentation, channel re-meander in the lower section and floodplain connectivity levee removal (Appendix 5 – Slide 3). River channel condition in the lower 2/3 of PA-18 exhibit poor channel condition (Appendix 5 – Slide 4) with long reaches of plain bed channel with little cover. In addition to increasing LWD key piece densities to the desired levels, side channels would be created increasing perennial channel length. Overall, it is anticipated this project could increase channel complexity over ~2 miles of river length while maintaining and increasing off channel and side channel habitat

PA-28 Instream Habitat Design

In 2015, the Columbia Conservation District completed preliminary designs on PA-28 using funds through their Columbia County BPA project (#68607). The project is located on private property from ~ RM 21.5 – 19.4 and would be implemented by the CCD in 2016-17 and maybe 2018 based on available funding. The project is anticipated to be at least a two phased project beginning in 2016, and focusing on increase channel LWD key pieces and floodplain connectivity. The project design was supported by the Habitat Programmatic and it is anticipated restoration dollars from Programmatic FY16 and FY17 will be used to implement both phases matched to the CCD project 1994-018-06. The project goal is to improve floodplain connectivity and channel complexity. The main objectives are to wood load and reconnect existing side channels, and increase floodplain connectivity to support the recruitment of cottonwoods as the maturing riparian Red Alder groves recede.

The overall project reach is ~ 2 miles in length beginning at RM 19.5 to RM 21.5 (Appendix 6 slide 1). The project will place LWD in 2.6 miles of perennial river channel including main and side channels (Appendix 6 Slide 3 & 5). The project will create and reconnect 0.93 miles of perennial side channel and augment 0.2 miles of high flow channels (Appendix 6 slide 2). An example of the project design action is illustrated in Appendix 6 – Slide 2-5. The completion of this project will significantly reconnect floodplain and allow for the development of important winter rearing habitat in a reach where this habitat type is rare.

2015 Project Area Assessments

PA-4, 5 & 7 Project Assessment & Feasibility

Project areas 4, 5 and 7 are projects with significant infrastructure considerations requiring an extra level of assessment/feasibility study to identify the preferred restoration alternatives to be considered. The projects are located on a combination of WA state and USFS lands between RM 44.85 and RM 46.5 (Appendix 7 - slide 1). The Tucannon Geomorphic Assessment (Anchor April 2011) and Conceptual Restoration Plan (Anchor Nov 2011) identifies a number of restoration actions that could be entertained including some infrastructure removal and LWD placement (Appendix 7 - slide 2-4). Currently, the only preferred restoration action identified in PA-4 is restoration of the off channel creek connecting Donnie Lake and Hixion Creek (Appendix 7 - slide 2). The Programmatic will work closely with the Wooten State Park in expanding habitat in or near the park. There is existing potential to increase LWD densities to meet the recommended minimum of >2 pieces per bank full width, remove road and levee infrastructure below Camp Wooten State Park and connect side channels and floodplain. The USFS is currently conducting the feasibility and concepts will be presented in the 2016 report.

PA-13 Project Assessment and Concept Development

The Project Area 13 assessment/feasibility was conducted in 2015 by WDFW, in preparation for design development in 2016. The project is located between RM 39.2 and RM 40 (Figure 15) on the WDFW Wooten Wildlife Area and would be designed by WDFW staff environmental engineer. The project site is currently confined by river levees and the Rainbow Lake impoundment on the east bank, and by the upstream Tucannon Hatchery Weir and the Tucannon Hatchery Rd on the downstream end (Appendix 8 - slide 1). River complexity and floodplain connectivity through the entire reach are impacted providing an excellent opportunity to increase salmon habitat (Appendix 8 - slide 2).

The Tucannon Floodplain Management Plan Workgroup received capital funding ($2 million) in the 2016 biennium to redesign and minimize impacts on the Tucannon floodplain. Rainbow Lake was selected for early implementation, and initial concepts call for making the lake footprint smaller in the floodplain (Appendix 8 - slide 3 & 4) removing most of the support levees increase available space for increase channel complexity and increased floodplain. The primary channel and floodplain design objectives would be to increase floodplain connectivity and channel complexity. The channel design would be closely coordinated with the Floodplain Management Plan to ensure maximum habitat benefit.

Completed Project 2010-2014

In 2011, the Geomorphic Assessment (Anchor QEA April 2011) and Conceptual Restoration Plan (Anchor QEA Nov 2011) were completed for the Tucannon identifying priority restoration actions and 28 distinct restoration projects for the priority 30-mile spring Chinook spawning and rearing reach (RM 20-50). The Programmatic and its partners have been using its resources to complete the highest priority project identified in the restoration plan (Anchor QEA 2011). To date, 7 of the 28 project identified

have been completed by the Programmatic and its partners (3 covered above and the 4 to follow), and an additional 3 by the CCD using their own project funding in combination with SRFB and other grant funding. The following sections will attempt to provide an update for new information on those completed project when available.

Programmatic Funded

PA-10 Construction 2012 (WDFW)
PA-3 Construction 2014 (CTUIR)
PA-1 Construction 2014 (CTUIR)
PA-14 Construction 2014 (WDFW)

Columbia Conservation District Funded

PA-26 Construction 2010, 13, 14 (CCD)
PA-22 Construction 2014 (CCD)
PA-23 Construction 2015 (CCD)

PA-10 Construction 2012 WDFW

Project (PA-10) was completed in 2012 and was the first project funded under the Programmatic in 2011 (Appendix 9). The project had two goals, to increase floodplain connectivity and channel complexity. Two restoration action types were completed to achieve the for mentioned goals, including breaching river levees/creation of pilot side channels and the placement of LWD in configurations to create flows into opened areas and on to the floodplain. The project breached ~1,305' of levee, placed 300 key log pieces (>6m long & 0.3m dia), and dispersed 17 bundles (N=500) of smaller mobile trees <4m long & 0.3m dia) using a Sikorsky Sky crane. The objectives were to open the floodplain and place LWD to drive river bed aggradation in key places to increase flood frequency while also increasing channel complexity. The smaller trees would redistribute and become racking materials improving the effectiveness of this approach. Peak spring flows are a big component of this design approach and since 2012 the Tucannon has not experienced the significant bed mobilizing flows needed to engage the size of material placed in this project leading to a minimum development of channel units (CHaMP 2014) compared to potential. That being said in 2015 a rapid habitat survey was completed for the entire project reach (Appendix 9- Slide 2-5) and it would appear great changes are being realized within the project reach benefiting spring Chinook, including a 368% increase in LWD key pieces since implementation (Table 2). The project reach has experienced a 66% increase in side channels (Table 2) and a ~19% increase in overall perennial channel length. The Programmatic & WDFW will continue to work in coordination with Ecologic Inc. in the collection of both CHaMP and rapid habitat surveys to monitor changes in habitat condition on this project.

PA-3 Construction 2014 CTUIR (#62573)

Project area 3 (PA-3) was the 2rd project completed under the Programmatic (FY13) and completed in 2014 by CTUIR with the primary goal of increasing in channel complexity based on the recommendations made in the Conceptual Restoration (Anchor QEA 2011 Nov). The project goal was to increase LWD key pieces (>6m long and 0.3m dia) from the pre-project 0.6 pieces per bank full width to > 2 key pieces (Table 2, Appendix 10). A rapid habitat survey was not conducted on this project reach in 2015 so data provide in this section refers to the 2014 post construction survey (Table 3). The project reach treated ran from RM 48.1 to 46.8 and was 1.36 miles in total length. Within that reach 324 key LWD pieces were added, an increase of 289% (Table 2) from 0.6 pieces'/bank full width to 2.62 pieces. A distribution map for wood placement is provided in (Appendix 10 – slide 1-2). As in PA-10 this project will benefit greatly from high bed mobilizing stream flows, increasing the interaction between the river and placed LWD. One potential outcome from the restoration actions on this site following 5-10-year flow event may be increased stream bed elevations caused by aggradation of river cobble and gravel as has occurred naturally upstream which could lead to increased floodplain connectivity opportunities in the future (Personnel observation upstream log jam). The Programmatic will conduct a rapid habitat survey in 2016-17 to capture changes in habitat condition and continue to work with CHaMP and AEM to better understand the effect of restoration on habitat units and fish abundance.

PA-01 Construction 2014 CTUIR (#63605)

Project area 1 (PA-1) was the 4th project funded under the Programmatic FY14 and completed in August 2014 by CTUIR with the primary goals of increasing floodplain connectivity and in channel complexity based on the recommendations made in the Conceptual Restoration (Anchor QEA 2011 Nov). The project objectives were to increase LWD key pieces (>6m long and 0.3m dia) from the pre-project 0.6 pieces per bank full width to > 2 key pieces (Appendix 11) for the purpose of decreasing flood frequency and reconnecting floodplains. The project reach treated ran from RM 50.1 to 49.45 and was 0.59 miles in total length. Within that reach 231 key LWD pieces were added, an increase of 486% (Table 2) from 0.6 pieces'/bank full width to 3.42 pieces. A distribution map for wood placement is provided in Appendix 11 – (slide 3-4). As in PA-10 and PA-3 this project will benefit greatly from high flow provoked bed mobilization, increasing the interaction between the river and placed LWD. During construction ~0.42 miles of side channel were reconnected through the excavation of pilot channels and placement of wood structure (Appendix 11 Slide 4). In total, the project lead to a 65% in side channels and ~32% increase in perennial channel length within the project area (Table 2). A rapid habitat survey was not conducted on this project reach in 2015 so data provide in this section refers to the 2014 post construction survey (Table 3). The Programmatic will conduct a rapid habitat survey in 2016-17 to capture changes in habitat condition at this site where there are is no CHaMP or AEM coverage.

PA-14 Construction 2014 (WDFW) (#58777)

Project (PA-14) was completed in 2014 by WDFW and was the 2nd project funded under the Programmatic in FY12 (Appendix 12). The project had two goals, to increase floodplain connectivity and channel complexity. The restoration objectives were to place LWD in channel forming structures creating complexity and supporting the creation of side channels. LWD was placed in configurations to encourage flows into side channel areas and on to the floodplain. The project placed 71 log jams using 712 key log pieces (>6m long & 0.3m dia), and 17 single key logs in addition to 65 smaller mobile trees <6m long & 0.3m dia) (Appendix 12 Slide2, 3, 4, 6). The objectives were to open the floodplain and place LWD to drive river bed aggradation in key places to increase flood frequency while also increasing channel complexity. The smaller trees will redistribute and become racking materials improving the effectiveness of this approach. Peak spring flows are a big component of this design approach and since 2014 the Tucannon has not experienced the significant bed mobilizing flows needed to engage the size of material placed in this project leading to a minimum development of channel units (CHaMP 2014) compared to anticipated over the life of the project. That being said in 2016 a rapid habitat survey will be completed for the entire project reach to measure change from the post construction condition and compared to the results of CHaMP surveys completed within the project reach. At the time of the post construction survey LWD key pieces had increased nearly 10 fold (Table 2) and the project reach has experienced an 86% increase in side channels (Table 2). An increase in overall perennial channel length was estimated at 29%, using both new side channels and main channels. One thing notable in this project is the number of habitat units present immediately present following construction compared to the projects relying solely on river flows to create those units. This has led to a more considerate approach in design projects and the use of slash and racking materials.

In 2016, the Programmatic will work with the CTUIR, WDFW and Natural Systems (AEM Project) to better understand the use of side channels in the Tucannon during the fall winter time periods. The Programmatic & WDFW will continue to work in coordination with Ecologic in the collection of both CHaMP and rapid habitat surveys to monitor changes in habitat condition on this project.

Columbia Conservation District Funded

The Tucannon Programmatic works with the CCD in the design, implementation and documentation of projects in the Tucannon. This relationship extends back to prior to the development of the Programmatic, but has been further developed during the development of the Geomorphic Assessment and Conceptual Restoration Plan. The Programmatic is involved with CCD in the pursuit of matching grants and permit development as well as contractor selection. During the time period between 2010 to present the Programmatic aided the CCD in the completion of four projects in the Tucannon through providing technical support field assistance and rapid habitat surveys to complete chance detection and as-built analysis as well as design development.

PA-26 Construction 2011-15 (CCD)

Beginning in 2010 the SRSRB supported the CCD in the development of a SRFB application on PA-26 with the primary goal to reconnect disconnected floodplain (Appendix 13). The project objective was to remove ~8,305' of river levee, reconnecting ~130 acres of low lying floodplain on private property adjacent to active production fields (Table 3 & Appendix 13-Slide 1-2). Working on private property and the opinion that once the levees were removed high flows would work to reshape the river channel lead the CCD and Programmatic to wait until 2013-14 to initiate in channel LWD work. In 2013, the CCD began to place LWD structures in the main channel over ~0.76 miles in sections where the levee had been removed, for the purpose of developing bars and creating channel complexity (Appendix 13 – Slide 3-9). The project LWD objectives were to increase the number of LWD key pieces (>6m long & 0.3m dia) from the estimated 0.17 key pieces'/bank full width to > 1 piece. The project placed 78 logs into 17 log jam configurations bring the post project number of key pieces to 91 for the reach treated. A rapid habitat survey completed following restoration in 2015 indicated that river flows have begun to work with placed log jams forming bars and developing pools (Appendix 13 Slide 5 & 8). Pool densities were highest in wood treatment areas. The development of side channels has begun throughout much of the floodplain where levees have been removed leading to increased channel complexity though flows high enough to bring about the floodplain and channel charges envisioned have not yet occurred (Appendix 13 Slide 5 & 9). It is anticipated the future wood structures will be added to the project reach as landowner comfort increase in the protection provided by the setback levee.

PA-22 Construction 2014 (CCD)

In 2014, the CCD completed a channel complexity project in the PA-22 project reach with the single goal of increasing channel complexity. The project objectives were to increase the number of LWD key pieces (>6m long & 0.3m dia) from the pre-project measurement of 0.16 key pieces'/bank full width to close to 1 piece (Appendix 14 – Slide 1, 2 & 3). The project placed 36 logs into 8 log jam configuration bring the post project number of key pieces to 46 for the reach treated. The post project number of key pieces per channel width is ~0.71 piece/bank full width a value acceptable to land owners in the area at this time. This reach is also confined behind river levee and by rock structures and rip rap. Floodplain actions were not considered at this location to minimize risk to existing infrastructure (Appendix 14 – slide 4). Examples of the wood placement used in this reach are provide in Appendix 14 Slide 6, which illustrates open style of LWD structure placed to constrict flows and create localized scour in places where it would otherwise not occur. Due to the slope within the reach pools are fairly evenly distributed and only occur where created structure cause them (Appendix Slide 5).

PA-23 Construction 2015 (CCD)

In 2015, the CCD completed floodplain and complexity actions on project area 23 identified in the Conceptual Restoration Plan (Anchor 2011). The goals of the project were to remove floodplain confining features and increase channel complexity. To meet these goals two section of river levee were removed (Table 3 & Appendix 15 –Slide 1,2 &4) and 0.75-miles of river length were treated with LWD structure.

Two sections of river levee were removed totaling 520 feet allowing opening accessing ~8.21 ac of low floodplain (Appendix 15 – Slide 1, 2 & 4). The pre-project LWD survey identified 35 key pieces of LWD (6 m long & 0.3m dia) at 0.46 key pieces' /bank full width. The project objective for complexity was to increase the LWD key pieces to >1 piece per bank full width by adding 51 key pieces bring the total # of key pieces / bankful width to 1.14 (Appendix 15 Slide 2 & 3).

Monitoring

To better understand changes in habitat quantity and quality the Programmatic supports and coordinates with those conducting habitat and spp monitoring in the basin. The Tucannon has a broad range of ongoing monitoring actions underway including Columbia Habitat Monitoring Program (CHaMP), Action Effectiveness Monitoring (AEM), WDFW fish in fish out, Life Cycle Modeling, periodic LiDAR (2010 & 2017), Rapid Habitat Assessment, as well as the two stream flow gages (WDOE & USGS) and numerous temperature monitoring points. The Programmatic works with all its partners to summarize analyze and interoperate the information provided by these monitoring projects to better understand restoration action effectiveness and inform adaptive management within the basin.

In 2015, the Tucannon Basin CHaMP project conducted 20 mainstream surveys, 8 of those in coordination with restoration actions implemented in 2015. It is anticipated that the surveys conducted in 2015 prior to implementation (Project Areas 11, 23 & 24) will be followed up in future years to measure changes in habitat condition over time. Post project surveys were completed on 4 completed project (Project Area 3, 14, 15, & 26). In 2016, surveys are planned for PA-3, 14, 15, 22, 23, 24, 26 which are all completed treatment sites. As surveys continue and conditions evolve we anticipate improvement from restoration will be captured. The Programmatic is dependent on the effectiveness and change detection analysis conducted by CHaMP to provide the relative changes in channel shape, floodplain connectivity and habitat units. As projects mature and a number of monitoring years are completed we will conduct a full review of the habitat change over time in treatment areas compared to controls. Outcomes and data summaries and reports can be found for the CHaMP program at www.champmonitoring.org.

AEM supported by BPA and the state of Washington has also been working in the Tucannon to better understand the changes in habitat and fish distribution in relation to restoration actions. AEM and CHaMP have been closely coordinated in the Tucannon to maximize the level of coverage and minimizing effort. AEM where possible has utilized the CHaMP habitat data by overlapping monitoring sites and improving our understanding of fish use within restoration reaches by conducting fish observation surveys (snorkeling).

Chinook and steelhead abundance are monitored by WDFW through the use of 5 pit tag arrays and a screw trap located in the lower Tucannon. Wild juvenile fish are tagged as they emigrate from the system at the screw trap and all endemic hatchery stock are tagged prior to release. Adult Chinook returns are estimated from pit tag returns and validated by spawning round surveys. Steelhead adults are estimated based on pit tag returns without spawning ground surveys, which were discontinued due to lack of efficiency in normal or high water years (WDFW personnel comm). Data and summary reports are available from Joe Bumgarner, WDFW Lab Dayton, WA.

Fish data is also being collected by WDFW to conduct Life Cycle Model for fish in the Tucannon with the project beginning in 2013 and 2014. The model was funded (SRFB) again in 2015 for work in 2016-17, and it is anticipated the model exercise will help pinpoint river reaches where apparent high mortality occurs of smolt and pre-smolt Chinook and steelhead. Data and inquiries into the modeling effort can be directed to Jeremy Cram of the WDFW Research office in Wenatchee, WA.

In April 2010, the CCD and the SRSRB supported the collection of a LiDAR survey for the lower 55 miles of the Tucannon River floodplain. The data set was used as the geomorphic foundation for the completion of the Geomorphic Assessment (Anchor 2010 April) and the Conceptual Restoration Plan (Anchor 2010 Nov). The survey was coupled with the collection of high resolution georeferenced images used throughout the process. The data sets were used to produce DEM layers for bare Earth, tree canopy/ ground cover and were of great value in project design and planning. This remote sensing effort will be repeated in the spring of 2017 to aid in change detection analysis planned by the Programmatic prior to 2018. It is anticipated we will be able to determine changes in channel length, riparian ground cover, increases in floodplain connectivity and increase in side channels. LiDAR data and summaries are available from the SRSRB office Dayton WA.

The SRSRB and the partners conduct Rapid Habitat Surveys in a before after treatment study design format for the purpose of tracking restoration actions completed for reporting and is the data set used for the development of habitat tables and project maps used in this report. Surveys have been completed on all the restoration project including those completed using non-Programmatic funds since 2014 with only post implementation surveys on projects conducted before 2014 implementation (Appendix 16 – Slide 1). The typical protocol completes a pre-implementation survey to determine channel condition, existing LWD key pieces, pools, side channels and sets photo points followed by a post construction survey. Surveys are conducted over the entire project reach using the same metrics developed for

CHaMP creating synergy for change detection over time. The survey maps provide a georeferenced map of all actions completed during a project as surveyed pre and post project and surveyed in the field (Appendix 16 – Slide 2). Data Summaries are available from the SRSRB Office in Dayton, WA.

The Tucannon monitoring efforts rely heavily on the stream flow gages located at Marengo (WDOE) and Starbuck (USGS). The period of record for the Marengo gage is 2004-present and is the primary management point for monitoring minimum flow and temperature in the basin. The Starbuck gage has a long period of record (1996-present continuous) but doesn't have temperature for that period. With the changes being observed in the basin in relation to improving summer high temperatures and increasing flow these gages will continue to be supported by the Programmatic. Data can be found for the Marengo gage at: https://fortress.wa.gov/ecy/eap/flows/station.asp?sta=35b150 and at the USGS site for Starbuck.

In 2015, the Programmatic work with its partners to conduct a hyporeic exchange study patterned on a study completed in 2014 by WSU in coordination with the Programmatic on PA-14. The study measured changes in hydrolic gradient and conductivity indicating increased variability in areas treated by LWD coupled with increased water residence time (Joe Parzych 2014 presentation to SRSRB RTT). Following up on the WSU study the 2015 study was conducted to make observations over a longer time period into late fall and increasing base flows. The study was completed in conjunction with the WDFW PA-11 implementation in a before after treatment study design, with 20 piezometers in the upstream control and 20 within the treatment (Appendix 16 Slide 3). The treatment was a large scale LWD replenishment action which placed 29 LWD structures in the the treatment reach (Appendix 16 – Slide 4). The number of key LWD members (6m long & 0.3m dia) in the treatment reach measured by the rapid habitat survey totaled 24 in 21 locations and was increase to 135 key pieces in 29 locations (Appendix 16 – Slide 4). The treatment changed velocities and should over time sort bed load from what was typical though out the reach pretreatment (Appendix 16 – Slide 5), where the key pieces were out of the low spring flows. The treatment was constructed with care not to disturb piezometers, an example of the treatment in relation to piezometers is shown ion Appendix 16 – Slide 6. Three samples were completed prior to implementation and 4 following implementation into November 2015 when flows increase to the point samples could not be completed. The results of 2015 findings have been summarized by the SRSRB staff (Foltzs et.al. 2015) and are shown in Appendix 16 – Slide 7. The SRSRB staff is currently work to verify these preliminary results, but finds them very encouraging. The Programmatic partners will follow this study up in 2016 at PA-11, to determine long term changes in treatment areas. The partners are interested in replication this study in PA-18 and potentially PA-28 in 2016-17. Results and data from this study are available from the SRSRB office Dayton, W

Future Direction

The Programmatic has implementation ready projects identified in its current work plan through 2020 which were identified in the 28 project elements identified in the Conceptual Restoration Plan (Anchor QEA 2011). Over the next 2 years FY16 & 17, the Programmatic will focus on the three project reaches highlighted in yellow (Figure 15) representing PA-6- 9, PA-17-18, & PA-28, the Programmatic projects in the process of preliminary/final design for implementation 2016-18. The completion of the projects currently in design stages represent an additional 6.75 miles of channel complexity and floodplain connectivity (Table 3). The Programmatic and its partners will continue to advance assessments currently underway and will advance the preferred actions to design stages in out years.

In 2016-17 the Programmatic will work to support CTUIR and WDFW in the development and design of final designs in PA-4, 5, 7 & 13, which would total ~2 miles of restoration actions identified in the restoration plan. Implementation for these actions may start in 2018 if funding is identified in FY18.

In 2013 & 2014 the WDFW preliminary in basin life history model study for the Tucannon indicated that a disproportionate number of pre-smolt spring Chinook were perishing in the middle to lower reaches of the Tucannon at a significantly > proportion observed in other drainages (Preliminary Data, WDFW RTT communication 2015). The study has been funded through the SRFB for 2016-17 to further investigate and discover the causal mechanism reducing survival in the middle and lower reaches outside of the current Programmatic spring Chinook priority area. The Programmatic may need to adjust its priority and expand the priority area for spring Chinook restoration in upcoming years to the additional project areas identified in the Conceptual Restoration Plans for Reach 3-5 (Anchor QEA 2012), completed by the CCD and SRSRB for the purpose of future use and guiding steelhead habitat restoration in the lower basin. It is the desire of this study will provide information on the importance of habitat survival relationships in the lower river which would intern identify a need for analysis of existing habitat information determine impaired conditions leading to reduced survival. The Programmatic is also conducting a rerunning of the EDT model to which will determine the effects of restoration on survival for in basin fish and may shed light on what is occurring outside the Programmatic footprint. The Programmatic will review the outcomes of these models and adapt restoration actions to best address the updated limiting factors if necessary.

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