Puyallup-White and Chambers-Clover Creek Watersheds (WRIAs 10 & 12)

2011 Three Year Work Program Update
Narrative to Three-Year Project List

Introduction

This narrative is a complement to the attached spreadsheet that contains capital projects and programs that can be initiated in the next three years, if funding were to become available. The 2011 3-year watershed implementation priorities list was updated from the 2010 3-year list, with input from project sponsors and the Technical Advisory Group (TAG) and the Citizens Advisory Committee (CAC) of the Pierce County Lead Entity (WRIAs 10 and 12).

The 2011 3-year project list contains 40 habitat capital projects and 3 hatchery capital projects for a total of 43 capital projects. In addition, there are 23 non-capital programs (e.g., future project development, monitoring, education/ outreach, stewardship, etc.).

Three-Year Work Program Questions

Consistency

1. **What are the actions and/or suites of actions needed for the next three years to implement your salmon recovery chapter as part of the regional recovery effort?**

   Details about the actions required to recover Chinook in the Puyallup-White River and Chambers-Clover Creek Watersheds are provided below in the section *Recovery Plan Overview and Watershed Priority Summary*. Briefly, the implementation priorities in our recovery plan and lead entity strategy include: (1) setback levees, floodplain reconnection, and creation of off-channel habitat on the mainstem rivers (Puyallup, White, Carbon, including the estuary); (2) preservation and restoration of high productivity tributaries, including South Prairie Creek, Boise Creek, Greenwater and Clearwater rivers, and Huckleberry Creek; (3) restoration of Puyallup estuary and marine nearshore; and (4) fish screening at the Electron Dam bypass. Our current Three-Year Work Program includes actions that address each of these priorities.

Pace/Status

2. **What is the status of actions underway per your recovery plan chapter? Is this on pace with the goals of your recovery plan?**

   We are continuing to implement projects on the 3-year list. The completed, funded, and new projects on the 3-year list are shown below. Unfortunately, the

pace of implementation is limited by funding availability. The WRIA 10 and WRIA 12 combined allocation of both SRFB and PSAR funding has been between $2.0-3.0 million annually. Unfortunately, the 2011-13 State biennial budget includes PSAR funding at less than half the 2009-11 funding level. The 10-year project list with twenty projects throughout the watershed had an estimated cost of $66.5 million (which did not include acquisition costs). Clearly the average annual funding available is not sufficient to implement the project list within a 10-year timeframe.

Despite the challenges of funding salmon recovery projects, the WRIA10/12 watershed has made great progress over the last year implementing high priority recovery actions:

Projects Completed in 2010-11:
- Boise Creek Fish Passage & Channel Relocation (Design)
- South Prairie Creek IV- Reach Level Acquisition
- Greenwater R. ELJs and Rd Decommission

Projects Funded in 2010:
- South Prairie Creek Floodplain Acquisition
- Calistoga Setback Levee – Construction
- Middle Boise Creek Restoration
- Linden Golf Course Oxbow Setback Levee (Design)

New Projects on 2011 3-Year List:
- Fish Passage, Ponce de Leon Creek
- White River Knotweed Control Project Phase 1
- Matlock Farms Development Rights Purchase and In Stream Restoration

Updated (Active) Projects on 2011 3-Year List:
- Boise Creek fish passage project (above golf course) - Design
- Installation of fish screens at Electron Dam Diversion
- Titlow Estuary Restoration
- Sequalitchew Creek Beach and Riparian Restoration
- East Hylebos Ravine Habitat Restoration
- Boise Creek Restoration (RM 1-3)
- White River Corridor (Pacific) Phase 1: Abernethy
- White River Corridor (Pacific) Phase 2: Setback Berm
- Chambers Bay Estuarine and Riparian Enhancement
- Sequalitchew Estuary Reconnection
- South Prairie Creek Acquisition (RM 0-8)

In addition to capital projects, programmatic actions are underway. Pierce County is currently developing a Pierce County Rivers Flood Hazard Management Plan. The purpose of the plan is to recommend regional policies, programs, and projects that reduce the risks to public health and safety, reduce

property damage from flooding and channel migration, and to maintain or improve habitat conditions in major rivers of Pierce County.

The Pierce County Shoreline Master Program update is ongoing. The County has completed a shoreline inventory and analysis report, identified draft Shoreline Environmental Designations, and developed draft policies and regulations. The Shoreline Restoration Plan and cumulative impacts report is still under development.

3. **What is the general status of implementation towards your habitat restoration, habitat protection, harvest management, and hatchery management goals? Progress can be tracked in terms of 'not started, little progress, some progress, or complete' or in more detail if you choose.**

   As described in the previous section, some progress is being made in restoring and protecting habitat in the WRIAs 10 & 12. However the pace of restoration and protection is slow. Harvest and hatchery management goals are described in the following section *Recovery Plan Overview and Watershed Priority Summary*. The Pierce County Lead Entity has allocated a portion of it PSAR capacity funds toward Adaptive Management and Monitoring, including examination of H-Integration efforts in the Puyallup-White watershed.

Sequence/Timing

4. **What are the top implementation priorities in your recovery plan in terms of specific actions or theme/suites of actions? How are these top priorities being sequenced in the next three years? What do you need to be successful in implementing these priorities?**

   The top implementation priorities in our recovery plan and lead entity strategy are listed in Tables 3 and 4 of the WRIA 10/12 Salmon Habitat Protection and Restoration Strategy, including: (1) setback levees, floodplain reconnection, and creation of off-channel habitat on the mainstem rivers (Puyallup, White, Carbon, including the estuary); (2) preservation and restoration of high productivity tributaries, including South Prairie Creek, Boise Creek, Greenwater and Clearwater rivers, and Huckleberry Creek; (3) restoration of the marine nearshore and Puyallup estuary; and (4) fish screening at the Electron Dam bypass.

   Six setback levee projects are in some stage of development (feasibility, design, permitting): (1) two on the White River, one at the King/Pierce Countyline (Countyline) and one in the City of Sumner (24th Street setback), (2) three on the Puyallup River (South Fork, Calistoga area, and Fennel Creek setback), and (3) one on the Carbon (Alward Rd). These projects are multi-year, multi-million dollar projects and are moving forward as quickly as funding allows.

Preservation and restoration projects are ongoing in South Prairie Creek, Boise Creek, Clearwater River, and Greenwater River. The WRIA 11/12 nearshore assessment has been completed, and the final report is in progress. Seven restoration projects along the WRIA 12 shoreline are on the 3-year project list. Through the Army Corps of Engineers PSNERP process, Chambers Bay and Sequalitchew Creek Estuary projects were designed to the 10% level. Five restoration projects in the Puyallup estuary and Commencement Bay are on the 3-year project list. A white paper entitled "Electron Dam Downstream Fish Passage Improvement Concepts" was completed for the Puyallup Tribe of Indians in December 2008. Discussions are also ongoing on the development of a Habitat Conservation Plan (HCP) for the Electron Dam project. Finally, WDFW has been funded to study fish passage at the Electron dam and make recommendations on improvements.

Funding is the biggest need to be successful in project implementation. As noted above, the levee setback projects are multi-year, multi-million dollar projects; there is extensive interest in moving forward on these projects based on the results of the 2008 levee setback feasibility study that identified 32 potential projects on the Puyallup, White and Carbon Rivers. The biggest constraint to WRIA 12 marine nearshore projects remains the Burlington Northern railroad and the constraints on beach feeder bluffs. Finally, ongoing support is needed to ensure that juvenile mortality during outmigration is addressed at the Electron Dam diversion operated by Puget Sound Energy. More attention has been focused on this topic during the past few years.

Next Big Challenge

5. **Do these top priorities reflect a change in any way from the previous three-year work program? Have there been any significant changes in the strategy or approach for salmon recovery in your watershed? If so, how and why?**

   The WRIA 10/12 Lead Entity has not changed its top priority actions from the previous three-year work program. The greatest change in the approach for salmon recovery over the past year has been the launch of the Pierce County Rivers Flood Hazard Management Plan process, and the continued progress on the Pierce County Shoreline Master Program update. Both efforts promise to improve habitat protection efforts and identify potential restoration actions along the major rivers in Pierce County.

6. **What is the status or trends of habitat and salmon populations in your watershed?**

   In general, we do not have a well developed monitoring program to assess habitat and salmon population status and trends. The Buckley fish trap on the White River provides excellent estimates of adult White River Spring Chinook returns, which have increased substantially over the last decade and are

routinely above 1000 returning adults per year. Spawner surveys on South Prairie Creek provide rough escapement estimates for the Puyallup River. Estimates do not show substantial changes in escapement trends since ESA listing of Puyallup Fall Chinook.

We have not focused a lot of effort on the topic of Adaptive Management and Monitoring at the watershed level, due to lack of funding and an interest in nesting within the regional framework being developed by the Puget Sound Partnership. However, the Pierce County Lead Entity has allocated a portion of it PSAR capacity funds toward participating in the RITT-lead Adaptive Management effort. In addition, the three-year list identifies seven monitoring activities that would be important elements of an adaptive management and monitoring plan:

- Improvements at the Buckley fish trap
- Smolt trapping - Puyallup River
- Smolt trapping - White River
- Smolt trapping - South Prairie Creek
- Smolt trapping - Chambers Creek
- Mud Mountain Dam mortality study
- Fish tagging for Chinook Tracking

Once the regional AMM framework is established and approved, and if funding support for monitoring becomes available, WRIA 10/12 can develop watershed specific recommendations on monitoring and adaptive management.

7. Are there new challenges associated with implementing salmon recovery actions that need additional support? If so, what are they?

The greatest challenges are finding levels of funding that achieve an appropriate pace of implementation; accomplishing restoration in the vicinity of railroads on the WRIA 12 marine nearshore; conducting restoration in the Puyallup estuary; and addressing juvenile mortality associated with the Electron Dam diversion.

[Note: The following section was submitted as part of the 2009 three-year list narrative. It continues to provide an excellent overview of salmon recovery in the Puyallup-White and Chambers-Clover Creek watersheds.]

Recovery Plan Overview and Watershed Priority Summary

The habitat protection and restoration plan submitted by Pierce County and the Co-Managers for the Puget Sound Salmon Recovery Plan shows a good understanding of the actions needed to reduce the risk of extinction of the Puyallup River Fall Chinook and White River Spring Chinook populations. The White River Spring Chinook is the only remaining early-run population in the South/Central geographic

region and should achieve low risk status over time to meet ESU recovery goals. The Puyallup River Fall Chinook population should improve from its current high risk status to meet the ESU recovery criteria.

The habitat component of the recovery plan is based on Ecosystem Diagnosis and Treatment (EDT) modeling. However, EDT is not the sole source of information we used to develop the plan. We relied upon information from the WRIA 10 and WRIA 12 limiting factors reports, the 1996 White River Spring Chinook Recovery Plan, TMDL reports for the White River, Puyallup River, and South Prairie Creek, Pierce County basin plans for various sub-watersheds, Pierce Conservation District culvert inventories, Puyallup Tribal fisheries reports, and numerous other studies. We incorporated information from these reports, along with the best professional judgment of scientists familiar with the watershed, into the EDT database. By doing so, we think we have produced a more holistic view of the watersheds, and have produced quantitative estimates of the Viable Salmonid Population (VSP) parameters of productivity, capacity, and life history diversity. A partial list of local watershed references used for developing the EDT analysis is provided at the end of the narrative.

Puyallup River Priorities

EDT modeling was used to provide estimates of VSP parameters for Puyallup River Fall Chinook. The results of our modeling show that productivity for Puyallup River Fall Chinook is 1.3 recruits per spawner, a capacity of about 4100 adults, and an average equilibrium abundance of about 1300 adults. The EDT Life History Diversity Index (DI) is reduced to 30% of the historical potential. If South Prairie Creek, the most productive tributary of the Puyallup River, is excluded from the analysis, the productivity of the mainstem is reduced to about 0.8 recruits per spawner and a capacity of about 3100. Clearly, South Prairie Creek maintains the productivity of Chinook in the system above replacement level, so protection of habitat in South Prairie Creek is a high priority strategy for the Puyallup watershed.

In addition, increasing productivity in the rest of the Puyallup system is also a high priority strategy. The EDT modeling indicates that the major causes of low productivity and capacity in the Puyallup system are the reduction of channel stability, habitat diversity (e.g., pools and off-channel rearing habitat), and key habitat quantity in the mainstem Puyallup and Carbon Rivers from the City of Orting downstream to the estuary. The Chinook life stages that are most greatly affected are pre-spawning adults, incubating eggs, and emergent fry. The primary environmental attributes that degrade channel stability, habitat diversity, and key habitat quantity for those life stages include increases in the channel gradient due to channel straightening, loss of off-channel habitat, loss of riparian habitat quality, and loss of large woody debris (LWD). These habitat degradations are all associated with levees and other hydromodifications that have reduced the river's access to its floodplain. Pierce County has adopted a strategy of levee setback projects and oxbow reconnections in the Puyallup and Carbon Rivers to reconnect the floodplain

and allow channel sinuosity and reduction of channel gradient, the creation of off-channel habitat, and improved large woody debris recruitment.

EDT scenario modeling corroborates our understanding of the benefits of levee setback projects. The type of actions, taken as a group, that produced the greatest increases in abundance for both Chinook and coho was levee setbacks. The same group produced the greatest increase in productivity for chinook.

Puyallup estuary, Commencement Bay, and marine nearshore habitat improvements will likely have a high benefit for Chinook. The EDT scenario modeling showed estuarine actions (as a group) produced the second highest increase in abundance for Chinook after levee setback projects (as a group).

Improving the diversion screens associated with the Electron Dam is also a high priority action for Puyallup River Fall Chinook. The mortality of smolts at the diversion screens is as much as 40% or higher. The EDT scenario modeling showed that improvement of the Electron Dam diversion screen was the top ranked action for Chinook population performance and second ranking action for combined Chinook and Coho population performance.

White River Priorities

EDT modeling was used to provide estimates of VSP parameters for White River Spring Chinook. The results of our modeling show that productivity for White River Spring Chinook is 1.4 recruits per spawner, a capacity of about 2600 adults, and an average equilibrium abundance of about 700 adults. The EDT Life History DI is reduced to 40% of the historical potential. The tributaries with the highest productivity include Boise Creek, Clearwater Creek, Greenwater River, Huckleberry Creek, and West Fork White River.

The EDT modeling indicates that the major causes of low productivity and capacity in the White River system are the flow modifications, reduction of channel stability, habitat diversity, and key habitat quantity in the mainstem White River from Mud Mountain Dam downstream to the estuary. A high sediment load is also a concern in Clearwater Creek and Greenwater River. The Chinook life stages that are most greatly affected are pre-spawning adults, incubating eggs, and emergent fry. The primary environmental attributes that degrade channel stability, habitat diversity, and key habitat quantity for those life stages include increases in the channel gradient due to channel straightening, loss of off-channel habitat, loss of riparian habitat quality, and loss of large woody debris. Flow modifications are related to the management of Mud Mountain Dam and the diversion of flow to Lake Tapps.

EDT scenario modeling of actions downstream of Mud Mountain Dam indicated that changes in flow management at Mud Mountain Dam and at the PSE diversion to simulate a more natural flow regime would be highly effective in restoring productivity, abundance, and life history diversity. In addition, mainstem levee setback projects, estuary restoration projects, and Boise Creek riparian revegetation

and LWD placement projects would provide substantial improvement in all VSP parameters. Modeled actions upstream of Mud Mountain Dam that showed high benefit to Chinook populations include projects on the Greenwater River and Huckleberry Creek that increase LWD, improve riparian conditions, and address sediment supply sources.

In addition to Chinook benefits, these scenarios showed substantial benefits to coho. Bull Trout and Steelhead were not included in our EDT modeling efforts; however, it is likely that these species would also benefit significantly from these actions.

Chambers-Clover Creek Priorities

The EDT analysis suggests that Chambers/Clover Creek was, and still is, a highly productive watershed for coho. Historical production potential exceeded 12,000 with a productivity of about 36 recruits per spawner, the highest coho productivity of the four watersheds analyzed (Chambers-Clover, Puyallup, White, and Hylebos). EDT model results indicate that the current system would support about 700 adults with a productivity of about 7.8 recruits per spawner. High natural productivity of this system is related to the abundance of groundwater and the number of lakes and ponds able to be used by juvenile coho. However, life history DI has been reduced to 40% of historical levels. Top priorities for restoring environmental factors are habitat diversity and flow conditions in Steilacoom Lake, lower Clover Creek, and the Chambers Creek mainstem (among other reaches). Loss of habitat quantity has been severe in some areas related to flow changes. Furthermore, barriers to fish migration, either for adults or juveniles, exist in several areas. The most significant barriers include Shera's falls on Clover Creek and the dam at Morey Creek pond (which will be corrected in summer 2009). An emerging issue for coho and other salmonids in Clover and Chambers Creek is water quality impacts, resulting primarily from stormwater runoff. Concerns have been raised about potential toxicity from toxic blue-green (cyanobacteria) algal blooms occurring in watershed lakes and moving downstream, and coho pre-spawn mortality, which has recently been documented in many urban watersheds in the Puget Sound region.

Questions exist about whether the Chambers-Clover Creek system historically supported Chinook due to its small size and not being directly associated with a large mainstem river. Based solely on EDT modeling results, VSP parameter values suggest that Chinook might have used the lower portions of the stream historically with a population abundance of over 2000 adults. Furthermore, modeling results indicate that under current conditions it may be able to support a small population of about 350 with a productivity of about 6.3 recruits per spawner. Currently, both marked and unmarked Chinook are trapped in Chambers Bay for use at the Garrison Springs Hatchery facility, and there are no plans to begin allowing Chinook passage above the trap. Other salmonid species are allowed above the Chambers Bay dam, including coho, chum, and steelhead. The top areas with both restoration and protection benefit for Chinook are mainstem Chambers Creek and Chambers Bay. The top ranked factor for restoration is habitat diversity, which relates to low levels of LWD and low riparian quality in some areas.

H-Integration Priorities
In addition to the role of habitat actions in salmon recovery, the EDT modeling results provided us insight into the role of hatcheries in the WRIA 10 system. First, the overall performance of Chinook in the Puyallup-White system appears to be exceptionally poor, primarily due to low productivity. It is likely that hatchery production in the system tends to produce an impression that Chinook performance is better than it actually is due to straying and the natural production that comes from those strays. It has become increasingly evident in recent years that significant straying is occurring within the system by hatchery fish. In the upper White River, supplementation with hatchery fish could be interpreted to mean that the runs back to that area are relatively healthy. Second, for the foreseeable future hatchery production should continue to be given a role in the Puyallup-White basin. This is vitally important in the White River system using supplementation fish from the White River hatchery. On the Puyallup River, it appears that hatchery production will also be important to help maintain natural production until more progress is made in habitat restoration. However, hatchery practices will need to be reformed to more directly address how hatchery fish can be used to effectively supplement na2tural production in this area. And finally, the results demonstrate that use of habitat measures alone, even conducted on a very extensive scale, is unlikely to achieve desired fish production levels in this basin in the near term.

In their critique of the draft Puyallup-White chapter, the TRT identified three primary concerns with the Puyallup-White Chinook Recovery Chapter.

- Failure to identify and adopt recovery goals. (The TRT identified planning targets for the Puyallup, but not for the White).
- Failure to integrate habitat, hatchery, and harvest management.
- Failure to develop an adaptive management plan.

AHA Scenario Modeling
An important element of Chinook recovery in the Puget Sound is the alignment and integration of recovery goals and actions in the management of hatchery, harvest, and habitat restoration programs. To better integrate the H's in the Puyallup/White watershed we have chosen to use the All H Analyzer (AHA) model, which allows managers to explore the implications of alternative ways of balancing the "H's" so that informed decisions can be made. The AHA model input data includes fish productivity, habitat capacity, harvest rate, hatchery brood stock information, and hatchery release numbers. By changing various parameters in different ways, managers are able to create scenarios that examine the interactive effects of hatchery, harvest, and habitat practices on salmon populations.

Puyallup River Fall Chinook: Participants in the H-Integration efforts include the Puyallup Tribe of Indians, WDFW, and Pierce County. So far, we have examined multiple H-integration scenarios using the AHA model. In addition, we have identified potential near-term goals and actions. Future work will include reaching

agreements on both near-term and long-term goals and actions, and assigning responsible parties for the actions. We will also document our assumptions, AHA model results, goals, actions, and presumed outcomes.

A brief description of the AHA modeling results for Puyallup River Fall Chinook is provided below:

- *Current Conditions:*
  - Habitat:
    - Productivity = 1.39
    - Capacity = 4,075
  - Harvest:
    - 50% harvest rate on Hatchery Origin Recruits (HORs)
    - 50% harvest rate on Natural Origin Recruits (NORs)
  - Hatchery:
    - 1110 adult local brood stock
    - 70% of HORs return to hatchery and 30% return to spawning grounds
    - Hatchery brood stock is approximately 4% NORs
    - Hatchery origin spawners is approximately 87%
- *Near-term goals:*
  - Habitat:
    - Productivity = 2.6
    - Capacity = 10,000
  - Harvest:
    - 35% harvest rate on NORs
    - 70% harvest rate on HORs
  - Hatchery:
    - 1470 adult local brood stock
    - 70% of HORs return to hatchery and 30% return to spawning grounds
    - Hatchery brood stock is approximately 20% NORs
    - Hatchery origin spawners is approximately 55%
- *Near-term actions:*
  - Habitat:
    - Conduct habitat improvements to achieve a habitat productivity of 2.6 and capacity of 10,000. Habitat improvements include levee setback projects on the middle and lower Puyallup River, estuary restoration, and protection and restoration of South Prairie Creek and the upper Puyallup River. In addition, fish passage improvements at the Electron Dam would be especially beneficial.
  - Harvest:
    - Implement a selective harvest in the Puyallup River and Commencement Bay to achieve a harvest rate of 35% on NORs and 75% on HORs.
  - Hatchery:
    - Construct fish racks on Voights Creek and South Prairie Creek to allow sorting and separating of HORs and NORs in those tributaries.

- Limit the number of HORs above the Voights Creek Hatchery and South Prairie Creek to achieve the 55% hatchery origin spawners.
- Use adipose-present fish (presumptive NORs) at the Voights Creek Hatchery to achieve the goal of 20% natural-origin brood stock.

As different scenarios were analyzed, it became clear that the currently low natural productivity of the Puyallup system limited near-term recovery options. It was not until productivity was above about 3.0 that the number of NORs increased to the point that the Proportion of Natural Influence (PNI) was above 0.5. The PNI is a function of the proportion of natural spawners that are of hatchery origin (pHOS); as pHOS decreases, PNI increases. Presumably, when the PNI is above 0.5, then natural selection has a greater effect on the population than does domestication of the hatchery environment.

White River Spring Chinook: The H-integration effort for White River Spring Chinook is still in a preliminary stage. Participants have included the Puyallup Tribe of Indians, the Muckleshoot Indian Tribe, WDFW, and Pierce County. Early AHA scenario modeling has shown that, similar to the Puyallup system, the currently low natural productivity of the White River has drastically reduced the number of NORs, and limited near-term recovery options. It is likely that additional scenario modeling will show that actions to increase habitat productivity are critical to achieving a population with a PNI above 0.5. As yet, no near-term or long-term goals or actions have been identified. Future work will include reaching agreements on both near-term and long-term goals and actions, documenting our assumptions and results, and assigning responsible parties for completing identified actions.

A brief description of the AHA modeling results for White River Spring Chinook is provided below:

- *Current Conditions:*
  - Habitat:
    - Productivity = 1.4
    - Capacity = 2600
  - Harvest:
    - 20% harvest rate on Hatchery Origin Recruits (HORs)
    - 20% harvest rate on Natural Origin Recruits (NORs)
  - Hatchery:
    - About 300 adult local brood stock and 500 imported brood stock, (adjusted to achieve a release of about 1,200,000 smolts). Hatchery brood stock is approximately 2% NORs
    - 65% of HORs return to hatchery and 35% return to spawning grounds.
    - Hatchery origin spawners is approximately 62%
  - Population Composition
    - NOR Escapement of about 561, Hatchery origin Spawners (HoS) of about 1137, and a Total Escapement of about 1698.
    - A total harvest of about 582.

- Hatchery broodstock of about 817, and a hatchery surplus of 331.
- An average total runsize of about 2912.
- The Proportion of Natural Influence (PNI) is 0.03, indicating that selection in the hatchery is greater than selection in the natural environment.

The H-integration effort for White River Spring Chinook is still in a preliminary stage and no near-term goals or actions have been identified. Early AHA scenario modeling has shown that, similar to the Puyallup system, the currently low natural productivity of the White River has drastically reduced the number of NORs, and limited near-term recovery options. It is likely that additional scenario modeling will show that actions to increase habitat productivity are critical to achieving a population with a PNI above 0.5.