

BEAVER SLOUGH DRAINAGE DISTRICT
DISTRICT WATER MANAGEMENT PLAN (DWMP)
APPENDIX G_8.7– BIOLOGICAL EFFECTS

INTRODUCTION

For the past six years, landowners in the Beaver Slough Drainage District (BSDD) have been collaborating with The Nature Conservancy, Oregon Department of Fish and Wildlife (ODFW), Ducks Unlimited, the Coquille Indian Tribe and other conservation organizations to develop a comprehensive management plan for the China Camp Creek drainage, near Coquille, OR between river miles 20-23 of the Coquille River, also known locally as Winter Lake. Their primary focus is the balance the needs for winter habitat and critical off-channel rearing habitat for Endangered Oregon Coast Coho salmon, wintering waterfowl and migrating shorebirds with agricultural interests.

Due to the area's dependence on agriculture, it is recognized that a working landscapes approach will be the most effective conservation strategy in the region and the privately owned lands within the District provide unique opportunities to improve habitat while keeping lands largely in private ownership and managed for agriculture. In addition to the BSDD's urgent need to replace the failing tide gate infrastructure, conservation and agricultural partners identified an opportunity to further improve the habitat values of the lands within the Drainage District by replacing existing tide gate structures in a manner that also provides tremendous benefits to aquatic resources in the Coquille Valley. While multiple stakeholder goals will be met as a result of the project, and benefits realized for numerous aquatic species, improving habitat for Oregon Coast Coho salmon is the focus of the project proposal. Proposed actions directly align with recovery actions identified in the Coquille River Sub-basin Plan developed by the Coquille Indian Tribe for National Oceanic and Atmospheric Administration (NOAA) in 2007 and the Oregon Coast Conservation Plan developed by Oregon Department of Fish and Wildlife (ODFW), also completed in 2007.

The Coquille Valley is an extensive alluvial floodplain that extends from the mouth of the Coquille River near Bandon upstream to the limit of tidal influence at river mile 42. The Coquille Valley historically supported an estimated 17,500 acres (Scranton 2004 and Benner 1992) of tidally influenced freshwater and salt marsh wetlands. Historic Coho salmon populations have been estimated at over 450,000 returning adults annually. Many factors have led to the decline of Coho salmon populations in the Coquille Watershed over the past century including over fishing, loss of spawning habitat, hatchery influence, predation, removal of large wood, water quality, and loss of habitat connectivity, increased

sedimentation, increased water temperatures and more. The Coquille Sub-basin Plan, however, identifies lack of access to and loss of off-channel over winter habitat as the key limiting factor preventing the recovery of Coho salmon populations in the Coquille River watershed.

In addition, the Coquille Valley has long been recognized as one of the most important coastal sites in the Pacific flyway for winter waterfowl. The Pacific Coast Joint Venture (PCJV) identifies the Coquille River Valley as the most important waterfowl area between San Francisco Bay and the Columbia River. Comprised largely of flooded pasturelands, the valley is critically important to numerous species of waterfowl and shorebirds during migration and wintering periods, Taylor (1994)

OBJECTIVES AND APPROACH

Currently, two projects within the BSDD are in development, including the China Camp Creek Project (C3P) and the Winter Lake Restoration Project (WLRP) are moving from the conceptual to the design/engineering phase with permitting submitted and under consideration/approval to be followed by construction in the summers of 2015 and 2016. The C3P encompasses the entire 1,700 acres of the Drainage District and is broken into 3 management units, with Units 1 and 3 (1,300 acres) remaining in private ownership and maintained as agricultural pasture ground while improving fish passage and providing habitat benefits, and Unit 2, owned by the Oregon Department of Fish and Wildlife and the China Creek Gun Club both forming the 400 acre WLRP site. Unit 2 (WLRP) is to be restored to include tidally influenced freshwater wetlands and enhanced upland habitats. While differing management objectives exist for the multiple Units, the overarching goal is to improve agricultural conditions in Units 1 and 3, while re-establishing tidal influence processes to all three management Units in the Winter months, thus improving river-floodplain connectivity on the entire 1,700 acre site, as well as augmenting the restoration work that is being accomplished on the WLRP site. The ability to manage water independently within the three different management units and at different times of the year to meet various management objectives is made possible by the use of Muted Tidal Regulators (MTR's) which are described in Appendix E and F. The infrastructure upgrade will significantly improve river-floodplain connectivity on 1,700 acres of historic floodplain with the Coquille River. The result will improve access to and quality of critical over-wintering habitat for Coho parr and smolts seeking off-channel refugia as well as providing migration and wintering habitat for numerous species of waterfowl and shorebirds.

SUMMARY OF ECOLOGICAL BENEFITS

These projects will improve resiliency/response to expected climate change and sea level change. Restoration and creation of wetlands is a science-recommended action toward anticipated environmental changes in the years/decades to come. Pro-active planning and development of habitats

that will replace lost habitats due to climate change and sea level rise is recommended. The WLRP and C3P should be responsive to these anticipated changes.

Habitat Complexity

Re-establishment of more consistent tidal exchange on the floodplain will restore more functionality and connectivity to remnant tidal channels existing in Unit 2. The MTR-equipped tide gate is necessary to fully achieve complexity restoration objectives for over winter habitat, while maintaining private lands that are a critical piece of the restoration project.

Floodplain Connectivity

The MTR structure will significantly improve river-floodplain connectivity to the full 1,700 acres by allowing for the partial re-establishment of tidal influence (i.e. a muted tidal prism) to affect the site on a consistent basis throughout much of the year, compared to the current conditions which only allow for broad connectivity when the floodplain levees are overtopped by flood events during the winter. These flood events are variable, occurring as little as once per year to multiple times, but only occur during the winter/early spring months. The MTR technology allows tide gates to remain open at a wider range of flow rates and water elevations, providing fish access during a greater portion of the year.

Species Diversity

Re-establishment of more consistent tidal exchange on the floodplain will significantly increase overwintering opportunities for juvenile salmonid species, especially Coho salmon, to access off-channel rearing habitat. In addition, these improvements will allow resident Cutthroat Trout to access re-connected channels and China Camp Creek during the late spring and summer months providing rearing habitat as well as access to upstream spawning habitat. Juvenile Chinook salmon will also use the improved access and reconnected channels on smolt out migration as an area to feed and rest while migrating through the estuary to the ocean. Restoring 285 acres of Unit 2 (ODFW property) to forested wetlands under tidal influence will provide improved habitat over time for native fish species, neo-tropical bird species and aquatic furbearing mammals. Finally, this project will increase and improve foraging/nesting opportunities for shorebirds and waterfowl during the spring, summer and fall compared to current conditions where the majority of fish and wildlife species use occurs during the winter/spring months and is dependent upon high water events to overtop the site's levee system.

Species Migration Patterns

Re-establishment of more consistent tidal exchange on the floodplain will significantly increase opportunities for juvenile salmonid species, especially Coho salmon, to access off channel rearing habitat, in turn increasing floodplain residence time and growth of individuals. This translates to higher survival rates, ensuring the preservation of Oregon Coast Coho and other salmonid populations.

Similarly, spring and fall floodplain inundation patterns, post implementation will continue to support the maintenance of historically important migration corridor for shorebirds and waterfowl.

Sediment Transport

Re-establishment of more consistent tidal exchange on the floodplain will improve sediment transport processes eventually resulting in floodplain aggradation and tidal channel development in Unit 2. The current outdated tide gates were designed to preclude tidal exchange and flooding. As a result, the entire 1,700 acre site has experienced significant subsidence, which in turn has led to problems for agricultural and residential landowners in the drainage district.

Water Quality

Re-establishment of more consistent tidal exchange on the floodplain will improve water circulation in the existing ditches and newly created restoration tidal channels. Currently the water within the Drainage District is poor during the late spring, summer and early fall months due to low Dissolved Oxygen (DO) levels and high temperatures. By improving the circulation and connection with the Coquille River will improve DO, lower temperatures and limit the concentrations of Nitrogen (N) and Phosphorus (P) that accumulates in the warmer summer months. Also, planting 130,000 trees in Unit 2 will provide much needed shade to reduce water temperatures, when mature.

Wetland Conservation

The Coquille Valley is located along the lower 42 miles of the Coquille River in the estuary tidal zone where freshwater meets saltwater. The valley historically had an estimated 17,425 acres of tidally influenced wetlands (Benner, 1992 and Scranton, 2004). Maps of the valley from the late 1800's identify nearly 70 percent of the valley as timbered swamp or wooded bottom lands wetlands (estuary intertidal forested wetlands and palustrine forested and scrub-shrub wetlands).

Between 1870 and 1900, wetlands in this area were converted to agricultural through clearing, ditching, installation of tide gates, diking and pumping that occurred up until 1950 (Benner, 1950). Today only about 300 acres of these forested and scrub wetlands remain. The remaining acres are largely dominated by pasture grasses.

Although the project aims, in part, to ensure the maintenance of agricultural operations, the new MTR's would allow for partial re-establishment of tidal exchange and floodplain inundation patterns across the entire 1,700 acres within the BSDD, greatly improving existing conditions. Because the default position of the existing older tide gates is a closed position, this requires large flood stage events that overtop the levee system to inundate the site and allow juvenile fish to enter the area. While such events occur

annually, the frequency is variable and limited to winter and early spring periods. During below average precipitation years, for example, only one overtopping event may occur. That translates to only one opportunity for juvenile fish to access an expansive area of off-channel over winter habitat and greatly reduce the extent and duration of inundation which limits foraging opportunities for waterfowl in particular. The restoration of partial tidal influences to the 1,700 acre site via the installation of the MTR's will result in significant functional benefits compared to existing conditions. For example, floodplain access for juvenile salmonids seeking over winter refugia and forage opportunities for waterfowl and shorebirds in the fall/winter and spring will increase as compared to current conditions that are reliant on flood stage events to maximize use of the floodplain.

Benefits to Fish

From a fisheries perspective, while our proposed project will benefit a suite of species such as Chinook salmon, cutthroat trout, winter steelhead, western brook lamprey and Pacific lamprey; most importantly, the project directly addresses the key limiting factor to Coho salmon recovery identified in the Coquille River Sub-basin Plan authored by the Coquille Indian Tribe for NOAA Fisheries. This science based plan determined that smolt production and survival is the sole factor preventing population recovery of Oregon Coast Coho and that lack of off-channel winter refugia and access to that habitat was the primary limiting factor affecting smolt survival. Therefore, access to winter rearing habitat is paramount to Coho Salmon recovery. Strategy-1 of the Sub-basin Plan names the Lower Coquille Watershed, where the proposed restoration and tide gate replacement projects are located, as having the highest restoration potential.

The new MTR's would allow for the partial re-establishment of tidal exchange and floodplain inundation patterns that greatly exceed existing conditions, because currently large flood events that overtop the floodplain's levee system are required to bring fish into the system. This re-establishment of tidal exchange will increase the opportunities for Coho parr and smolts to access the floodplain for the overwintering periods fall through spring compared to existing conditions. During the warmer summer months, increased tidal exchange/water circulation will improve water quality in the canals and restored remnant tidal channels benefiting native species such as cutthroat trout.

In addition to establishing tidal exchange, Unit 2 will undergo extensive restoration activities which will not only benefit fish species but also migrating song birds, nesting and early migrating waterfowl, and aquatic furbearers. This will be accomplished by re-connecting 7-10 miles of remnant channels to the Coquille River, planting 130,000 wetland trees and shrubs, removing 3 miles of interior dikes, filling 1.5 miles of interior ditches and possibly placing 75 pieces of large wood on the ODFW property within Unit 2. This will provide high quality off channel, over winter habitat for juvenile Coho salmon. The project site is located in freshwater above any salinity measurements, so all the restoration will be accomplished in freshwater wetlands which adds benefits to over wintering Coho salmon. Based on research conducted by Baker (2008) in functioning floodplain wetland systems along the Columbia River and Coos County, juvenile salmon seek out these off-channel areas and experience significant growth

rates while overwintering in them. Considering the restoration work being planned in Unit 2, coupled with improved access to the floodplain, we fully expect to observe similar results in Unit 2 for Coho. In recent pre-project monitoring, ODFW sampling of the few Coho salmon captured in Unit 2 showed that these juvenile fish were 1.5 to 2.0 times the size of fish found outside the site in the Coquille River. While Units 1 and 3 will remain as pasture/agricultural ground, multiple studies lend support to our premise that agricultural floodplains can also confer benefits to juvenile salmon, provided that fish have access to the system as the MTR's will provide. For example, Katz, et al. (2013), introduced Chinook salmon into flooded rice fields of Northern California, and observed significant growth rates, not unlike the results reported by Baker for intact floodplain wetlands.

Similarly, Colvin et.al., (2009) found the presence of juvenile fish and recently hatched fry in intermittent watercourses of agricultural lands in the Willamette Valley and that such watercourses offered conditions suitable for spawning and juvenile rearing of native fish species. The authors suggest that agricultural conservation programs that have the potential to provide benefits to farmers while maintaining aquatic diversity in these floodplain habitats need to be clearly identified and promoted.

It should be noted that limited Coho Salmon spawning occurs in China Camp Creek, the only tributary to Winter Lake and the project site under current passage and stream habitat conditions. Therefore this project is not anticipated to significantly increase Coho salmon spawner abundance in the absence of upstream, off-site stream improvements. . A number of studies by the Yurok tribe of Northern California document that juvenile Coho salmon from the entire Klamath River basin move to freshwater, off channel sites during the fall and winter to over winter and rear in these habitats. Indeed, we expect that Coho salmon from throughout the entire Coquille River Basin will over-winter in these habitats as they did historically, and will do so again with improved access and habitat restoration.

Finally, results from fish monitoring at a similar project to our proposed work that was completed in 2011 in Skagit County, WA (the Fisher Slough project), where MTR devices were employed to reestablish muted tidal flows to the project site, lend support to our hypothesis that juvenile Coho will benefit tremendously from improved river-floodplain connectivity once MTR's are installed at the project site. Beamer et.al., (2014) concluded that restoration of the connectivity of the Fisher Slough floodplain in conjunction with current operation of the floodgate in sync with tidal cycles has provided clear benefit to juvenile estuary-rearing Chinook smolts. Specifically, increased habitat connectivity has allowed juvenile Chinook salmon to effectively utilize and benefit from the increased habitat complexity associated with the dike setback. Note that Fisher Slough resulted in 60 acres of accessible off-channel habitat while our proposed project will result in 1,700 acres of accessible over winter habitat.

ODFW has been sampling over winter fish assemblages at the C3P and WLRP site and has documented juvenile Coho salmon use, however Coho salmon represent a small fraction of the species composition (approximately 2% of the fish trapped) indicating the inability of juvenile Coho salmon juveniles to readily access the floodplain. Other non-native fishes make up the rest of the sampled population and are better able to survive the poor water quality conditions in late spring, summer and early fall months when low DO and high temperatures prevail. Baseline and post-project monitoring will be an integral component of the project and conducted by ODFW. ODFW will continue to monitor

juvenile Coho salmon in the winter months using marking techniques such as elastomer injections and Passive Integrated Transponder (PIT) tags. The proposed study design includes installing a PIT tag receiver array on or near the new MTR tide gate structures to document juvenile movement throughout the project area in Units 1, 2 and 3. ODFW is attempting to secure funding to make this project a formal research project within their research section but no decision has been made at this time. BSDD and The Nature Conservancy continue to seek funding for biological, agricultural, and economic studies to establish pre- and post-project performance. A unique opportunity exists to measure the impact of different land management programs side by side.

Benefits to Coastal Dependent and Migratory Birds

For wintering waterfowl, the Coquille Valley has long been recognized as one of the most important coastal sites in the Pacific Flyway. The PCJV identifies the Coquille Valley as the most important waterfowl area between San Francisco Bay and the Columbia River. Comprised largely of flooded pasturelands, the valley is critically important to numerous species of waterfowl and shorebirds during migration and wintering periods, Taylor (1994). According to PCJV, the area is rated as “high priority” in the US Fish and Wildlife Service’s ranking of waterfowl habitat protection needs, and is the agency’s top priority for protection in Oregon (1989). Mid-winter waterfowl surveys typically record anywhere from 10,000 to 60,000 ducks in the Coquille Valley, numbers that often represent nearly half the total wintering waterfowl population on the Oregon Coast (Joseph Sands, USFWS, personal communication). The valley also hosts significant populations of wintering geese and swans.

Lovvorn and Baldwin (1996) evaluated dabbling duck use of intertidal areas absent of surrounding agriculture and intertidal areas in proximity to flooded agriculture in Western Washington. They determined that birds appear to shift to agricultural habitats almost exclusively as intertidal resources are depleted, and actually depart areas where intertidal habitats are void of adjacent agricultural lands prior to mid-winter. Our project site possesses similar landscape characteristics (i.e. an agricultural/intertidal habitat mosaic) and we therefore expect that the maintenance of agricultural lands will continue to help support large mid-winter waterfowl numbers, and actually improve fall and spring migration habitat as a result of the project area being inundated on a more regular basis via improved tidal influence.

At least 11 species that are listed as priorities under the North American Waterfowl Management Plan (NAWMP 2004) will benefit from this project. Furthermore, 26 species considered priorities for Partners in Flight will benefit from the project and five species that are listed as priorities.

Unit Operation Description and Benefits

Summer Operations- June to September

Since few anadromous fish are present under current operations, water management objectives are to improve water quality and to prevent habitat conditions conducive to mosquito population increases. In Unit 2, maximum tidal water levels will be managed at 3.5 to 4.0 foot levels which will facilitate bank full conditions in the 7-10 miles of reconnected channels. This level will result in tidal exchange that will raise DO levels, reduce temperatures and reduce N and P levels. As we approach the August to Mid-October time period, when mosquitoes are less an issue and the first fall freshets trigger juvenile Coho salmon to begin searching out off-channel sites and over wintering areas, the water levels will be increased to 4.5 to 5.5 foot levels. During this time period, juvenile Chinook salmon are also migrating through the estuary and early migrant waterfowl begin to show up in the basin to utilize the Unit 2 restoration area. In Units 1 and 3, the main objective is still agricultural grazing, so water levels will be managed at the 3.0-3.5 foot levels with an increase to 4.0-4.5 foot levels as needed for landowners to irrigate pastures. Water levels in the main canals will have some level of tidal flushing (water levels 3.0-3.5 feet to improve water quality, increase DO, reduce temperature and prevent buildup of aquatic vegetation in the canals

Winter Operations – October to March

The objective of all units during this time period is to provide improved fish passage for juvenile salmonids, especially juvenile Coho Salmon. In Unit 2, water levels will be managed for 4.5 to 5.5 feet elevation during non-high water events. This will allow maximum opening time for the MTR's for juvenile salmon movement into and out of unit 2. In Units 1 and 3, grazing operations are still occurring until the first flood event or until the cattle are pulled off the sites. Once the floodplain is inundated from heavy rainfall and/or levee overtopping, cattle are removed and water levels will be managed for 4.5 to 5.5 foot levels to provide access to juvenile salmon. As described in the operation appendices, the MTR's will be lifted on a sliding frame to allow passage of juvenile Coho salmon during rising river and flood events. This will also aid the Drainage District in "equalizing" their water levels to prevent damage to their infrastructure. This operation will provide much improved fish access to off river channel over winter habitat and provide habitat for migrating and over wintering waterfowl and shorebirds.

Spring Operations- April to May

This transition period is when the agricultural landowners are attempting to drain out their pastures for grazing use and the time when Coho salmon are smolting and migrating to the ocean. In Unit 2, water levels will be slowly reduced to summer flow levels and operated at the 3.5 to 4.0 level. This level will provide water levels for rearing and migrating juvenile salmon as well as migrating waterfowl and shorebirds. In Units 1 and 3, water levels will be reduced over time to 2.0- 4.0 water levels to prepare the pastures for grazing. As the water recedes, migrating waterfowl and shorebirds will use the edge of the pastures for foraging.

INVASIVE SPECIES MANAGEMENT

Invasive plants and animals will need to be managed under the management system. The Nature Conservancy has secured \$5,000 to manage invasive plant species such as Himalayan blackberry, Scotch Broom and various species of thistles on ODFW lands in Unit 2, which will be controlled by ODFW. Reed Canary grass is one species which is non-native and considered by some to be invasive. Management of Reed Canary grass will be managed by two methods. In Units 1 and 3, as well as the Gun Club property in Unit 2, Reed Canary grass will be managed by intensive grazing practices by livestock. This management system is currently in use now and provides excellent gains for livestock on private property and provides ideal forage habitat for migratory and wintering waterfowl and migratory shorebirds during the fall, winter and spring months. Current research shows that Reed Canary grass can be reduced substantially by shade. Planting approximately 130,000 trees consisting of Oregon Ash, Red Alder, willow, cottonwood, Sitka Spruce and Oregon crabapple on 240 acres of the ODFW property will provide enough shade to substantially reduce any reed canary grass within the planting zone.

Several species of non-native fish and wildlife species are present on the site. Animal species include nutria and bullfrogs. Management of these two species will include.....

Non-native fish species found within Unit 2 include brown bullheads, yellow perch, largemouth bass and bluegill. Management of these species will include the promotion of angling on ODFW's Coquille Valley Wildlife Area and habitat restoration anticipated to favor cold water species over non-native warm water species. Treatment toward eradication is not currently planned, but is a tool available to consider if necessary.

MONITORING PLANS

Monitoring plans include a number of species and environmental surveys that will be completed during and after the project. Some monitoring is currently being conducted by state agencies:

- 1) Plant species: ODFW in cooperation with National Resource Conservation Service (NRCS) conducted a vegetation survey in 2014 to determine species composition and percent cover as part of the pre-project monitoring. This monitoring will continue post-project. In addition, tree species composition and survival will be monitored in the planted area for five years post-project to determine tree survival.
- 2) Water Quality: Water quality, including temperature, DO, N and P will be monitored in 2015 as part of the pre-project monitoring and will continue to be monitored post-project by local high schools and ODFW.
- 3) Coho Salmon and other fish species: ODFW has been monitoring fish presence/absence and species composition for fish on the ODFW property for three years and will continue to monitor post-project to determine differences. Coho salmon have been marked using PIT tags and

elastomer marks to facilitate monitoring. ODFW is committed to exploring the opportunities to secure funds that will allow their fish research team to implement a full research project on the project site.

- 4) Birds: ODFW has been conducting bird surveys of the ODFW property for three years to establish pre-project population levels and species composition. These surveys have been completed once every 3 months and will be continued post project to determine species composition and numbers as planted tree species survive and mature.
- 5) Water Management: The BSDD will monitor water levels at the MTR tide gates to determine that the district is meeting the management outlined in the District Water Management Plan. Existing water data loggers located in the Coquille River, in each of the four management units and in China Camp Creek will be monitored for water levels and temperatures to document parameters and effects of implementing the projects. .
- 6) ODFW will monitor increases in recreational opportunities that have resulted from the projects and establishment of the Coquille Valley Wildlife Area (CVWMA) including fishing, hunting and wildlife viewing.
- 7) Project partners continue to seek resources to monitor the project impacts on Agricultural production and management.