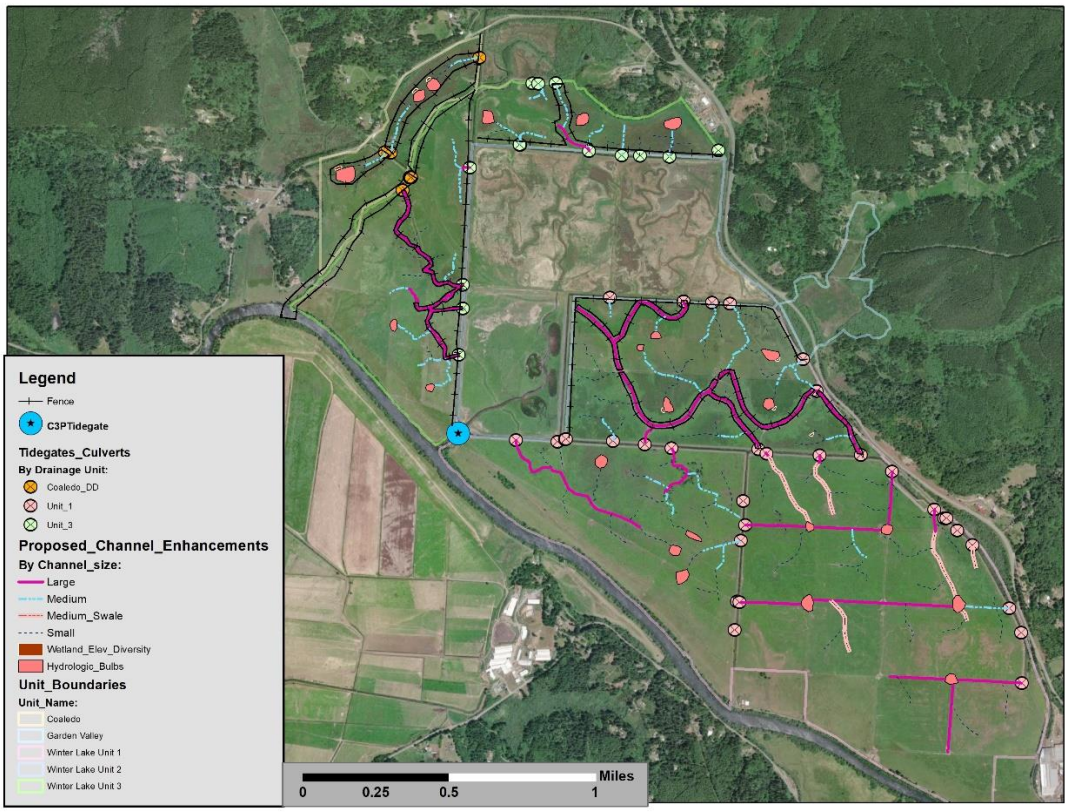
SPECIFIC EXERPTS FROM THE WINTER LAKE PHASE III 404 FILL AND REMOVAL APPLICATION to the USACE, DSL, and COOS County Planning Dept.

ADDRESSING HYDROLOGY RELATED TO POTENTIAL FOR MOSQUITO PRODUCTION

March 12th, 2024



Caley Sowers
Authorized Agent
for the Beaver Slough Drainage District

and

Christopher W. Claire
Habitat Protection Biologist
ODFW Charleston, OR

Excerpts from the Winter Lake Phase III 404 Permit App.

Note: *Additional important information, has been added on 03/11/24 (highlighted) in several short sections of this document to clarify hydrology/geomorphic conditions on site and project effects to address fish stranding and the potential for mosquito production.*

This is a joint application, and must be sent to all agencies (Corps, DSL, and DEQ). Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.

Date Stamp

U.S. Army Corps of Engineers Portland District

Oregon Department of State Lands

Oregon Department of Environmental Quality

Action ID Number	Number	

(1) TYPE OF PERMIT(S) IF KNOWN (check all that apply)

Corps: Individual ☐ Nationwide No.: _____ ☐ Regional General Permit _____ ☐ Other (specify): _____ ☐

DSL: ☐ Individual ☐ GP Trans ☐ GP Min Wet ☐ GP Maint Dredge ☐ GP Ocean Energy ☐ No Permit ☐ Waiver

(2) APPLICANT AND LANDOWNER CONTACT INFORMATION

	Applicant	Property Owners (if different)	Authorized Agent (if applicable) ☑ Consultant ☐ Contractor
Name (Required)	Beaver Slough Drainage District Manager: Fred Messerle	Fred Messerle & Sons, Inc. Bridges Foundation (Luke Fitzpatrick	Caley Sowers/ Coos SWCD District Manager
Business Name	Beaver Slough Drainage District	Everett-Ona Isenhart ranch, Inc.	379 N Adams St, Coquille, OR 97423
Mailing Address 1	60196 Old Wagon Rd.	Laura Isenhart	
City, State, Zip	Coos Bay, OR 97420		
Business Phone	541-404-6105		541-396-6879
Cell Phone			971-645-6634
Fax			541-824-0356
email	bsddbos@gmail.com		info@coosswcd.org

(3) PROJECT INFORMATION

A. Provide the project location.

Project Name *Winter Lake Phase III*			Latitude & Longitude*	
Project Address / Location	City (nearest) Coquille			County Coos
Township	Range	Section	Quarter / Quarter	Tax Lot
27	13W	20		1503
27	13W	27		400

27	13W	27		500
27	13W	28		400
27	13W	28		600
27	13W	28		700
27	13W	29		101
27	13W	29		103
27	13W	33		100
27	13W	33		200
27	13W	34		800

Brief Directions to the Site:

The Winter Lake Phase III project action area is located on private and state-owned floodplain pastures within the Beaver Slough Drainage District (BSDD and Coaledo Drainage Districts (CDD) wetlands to the South of North Bank Lane/Hwy 42 and west of Coquille, OR, on the historic China Camp and Beaver Creek floodplain (***Attachment A: Figures and Photos, Figures 1-4***).

B. What types of waterbodies or wetlands are present in your project area? (Check all that apply.)

☒ River / Stream	☐ Non-Tidal Wetland	☐ Lake / Reservoir / Pond
☒ Estuary or Tidal Wetland	☐ Other	☐ Pacific Ocean

Waterbody or Wetland Name**	River Mile	6th Field HUC Name	6th Field HUC (12 digits)
China Camp Creek and tributaries (Winter Lake)			

* In decimal format (e.g., 44.9399, -123.0283)

** If there is no official name for the wetland or waterbody, create a unique name (such as “Wetland 1” or “Tributary A”).

Key Textual Excerpts on Project Need and Goals From Phase III 404 Fill and Removal Application Submitted to DSL, USACE, and Coos County Planning Dept.

Note: *Additional important information, has been added on 03/11/24 (highlighted) in several short sections of this document to clarify hydrology/geomorphic conditions on site and project effects to address fish stranding and the potential for mosquito production.*

From pg 2

A. Summarize the overall project including work in areas both in and outside of waters or wetlands.

INTRODUCTION /OVERALL PROJECT DESCRIPTION:

Historically, the Coquille River valley floor contained extensive freshwater tidal wetlands, tidal channels, and non-tidal wetland habitats that are estimated to have once comprised over 12,000+ acres of prime fish and wildlife habitat (Benner 1992). Native salmonids, specifically coho juveniles, used these habitats heavily during fall/winter/spring months to feed and rear prior to smoltification. A significant percentage of those habitats were cleared, leveed, tidegated, and drained for agriculture in the late 19th - early 20th century, thereby substantially altering the land from its natural state as a freshwater tidal wetland complex into drained pasture used seasonally to year round for grazing and hay production.

The “Winter Lake” floodplain area south of North Bank Lane/Hwy 42S, and west of Coquille, OR, at over 1,806 acres, represents one of the largest contiguous land areas in the lower Coquille Basin with high

potential for Oregon Coast (OC) coho overwinter habitat and high-quality pasture production. Approximately 1,295 acres within the Beaver Slough Drainage District (BSDD) are below elevation 8.0ft NAVDD 88, and thus below the highest measured tides. The project-area is upstream of saline influence at River Mile (RM) 21.5 in the Coquille estuary (***Attachment A, Figure 2***). All figures and photos referenced within this permit text can be found within ***Attachment A: Figures and Photos.*** The Beaver Slough Drainage District (BSDD) was formed in 1906-1907 and this collaboration provided the framework for initiating converting the forested tidal floodplain at the project area, which prior to agricultural development and installation of the linear canals and tidegates in 1908-1909, the lands were forested and contained a dense tidal channel network (Benner 1992). The Coaledo Drainage District (CDD) was formed thereafter and installation of a tidegate on Beaver Creek in the "Winter Lake" area west of the BSDD allowed for drainage of pastures on the west side of Beaver Creek.

From 2010 to 2017 the BSDD, Oregon Department of Fish and Wildlife (ODFW), and The Nature Conservancy (TNC) developed restoration actions for a portion of lands within the BSDD. The plans focused on two projects (Phase I and II) within three management Units (***Attachment A*, *Figure 5-6***) of the BSDD. The "Winter Lake Phase I," project installed seven new tidegates to replace the previously existing undersized and top-hinged gates that had obstructed fish movements. Four 8.0ft corrugated metal culverts (CMP's) installed in the early 1990's were replaced with seven 10.0x8.0ft concrete box culverts at the interface of the BSDD floodplain with the Coquille River. Slide-gate style and side-hinged aluminum tidegates (***Attachment A, Figure 7-8***) were installed to provide a dual controllability. The Vertical Slideframe Style Tidegates (VSFTG) network is configured with both manual and remote access control. The new tidegates have the capacity to be operated with Muted Tidal Regulator (MTR) technology, whereby the tidegates can be opened to allow for tidal inflow to a desired set level, computer controlled, and linked to river/tidal level feedback. The new gates have increased the capacity for water movement into and out of the 1,700-acre BSDD by 300%.

Unit 2 lands are owned by the China Camp Gun Club and ODFW and account for 407 acres of the BSDD. The China Camp Gun Club lands are managed for summer pasture grazing and recreational duck hunting during winter months. The ODFW lands comprise 286 acres (northern portion of Unit 2) with the Gun Club accounting for the remaining 121 acres that extend south to the C3P tidegate in Unit 2. In 2018 the Unit 2 restoration project or "Winter Lake Phase II" was implemented and a total of 31,000ft of tidal channel were excavated as designed by Tetratech Engineering staff through coordination with ODFW and the BSDD in the 407 acres of Unit 2 (***Attachment A, Figure 9***). The main tidal channel upstream of the C3P tidegates in Unit 2 was designed with capacity that exceeds the four concrete box culverts and tidegates. This has allowed for full ability to serve water from the C3P tidegates to Unit 2 lands and provide juvenile coho and other native fish passage into the site as well as provide for pasture irrigation into Units 1 and 3 at appropriate elevations that tidal inflow will reach.

The Winter Lake C3P tidegate construction (Phase I) and tidal channel restoration in Unit 2 (Phase II) resolved hydrologic restriction that existed prior to the projects and is currently allowing for water management strategies that are designed to more closely mimic historical conditions in Unit 2. Hydrologic connectivity in Unit 2 is considered fully adequate following restoration in 2017-2018. <u>The proposed Phase III project does not include any actions within Unit 2.</u> However, interior culverts/channel networks within Units 1 and 3 (**Figures 5,6**) remained unchanged following completion of Phase I and II. These remaining 1,399 acres in Units 1 and 3 and CDD pastures (1,806 minus Unit 2) of Winter Lake, which have had <u>no internal restorative actions to date upstream of C3P,</u> suffer from rampant hydrologic discontinuity across the land area. The main drainage canals in Winter Lake were aligned East/West and North/South (***Attachment A, Figure 10***) rather than based on land elevations or natural flow paths. Overall these main canals are sufficient in capacity to provide proper hydrology for the new concrete box culvers and tidegates for Units 1 and 3. However, the interior pasture drainage channels were installed historically largely on property lines, pasture boundaries, and without concern for "microtopography."

The proposed "Winter Lake Phase III" project has been developed by a team of partners including Coos Soil and Water Conservation District (Coos SWCD), the ODFW, and the BSDD. The project is designed as both ecological restoration and agricultural improvement to complement the BSDD C3P tidegate replacement project completed in 2017 (Winter Lake Phase I) and the 2018 installation of 31,000 ft of restored natural tidal channel which was completed in Unit 2 (Winter Lake Phase II). The Phase III Project Proposal seeks to address hydrologic connectivity within BSDD Units 1 and 3 (1,700 acres) and two pastures, which are 62 and 44 acres respectively, in the Coaledo Drainage District (CDD) (***Attachment A, Figure 5***).

Winter Lake Units 1 and 3 have high inherent potential for fish production; however, their current hydrologic disconnection yields:

- **a).** Poor access for fish from existing canals into floodplains which are rich in macroinvertebrate food items when flooded; resultantly, there is limited potential for fish use of the floodplain for foraging.
- **b).** Few or no channels present across large portions of the floodplain land area to provide refugia for native fishes when floodwaters periodically recede, which results in high potential for mortality due to predation and stranding.
- **c).** Poor capacity for landowning ranchers to move irrigation water from the canals into pastures during summer months.

Winter Lake Phase III specifically proposes to replace 42 existing undersized culverts and associated old style top-hinged tidegates with 38 new culverts and redesigned channels. The project actions are anticipated to maximize hydrologic connectivity in order to achieve a balance of fish/wildlife and agricultural (pasture) production.

From pg 4-6

PROPOSED PROJECT ACTIONS: ***ALL ASSOCIATED WORK BOTH WITHIN AND OUTSIDE OF WATERS/WETLANDS AND TOTAL GROUND DISTURBANCE***

There are no active streams generated or moving through the active work areas on project site.

Note: *The lands within the project area were Shrub/Scrub and Forested wetland historically with tidal inflow/outflow. The Phase III project is designed to provide a substantial net benefit increase in wetland function over current condition that fully offsets the impacts of work. The site is anticipated to be for the most part dry during the work period although there will be water in existing historical channels. Some non-salmonid fish may be present in low lying areas during construction although no coho or other salmonids will likely be present in channels and ponded water in pastures during July 1 to September 15th as the temperatures are known to exceed thermal lethal limits during summer months in these habitats.*

1. Installation of New HDPE Culverts

We will be replacing 38 individual culverts in Units 1 and 3, (see ***Attachment B "Project Actions," Sheet 1, pg. 16***) that connect pasture floodplain channels with canals. New culverts will be primarily HDPE materials as this material provides for maximized life expectancy in tideland soils (with possibility of installation of three Corrugated Metal Pipes). The interior pasture channel network culverts currently are substantively undersized, and the new culverts have been sized to accommodate appropriate inflow/outflow. This ***"Winter Lake Hydrologic Assessment"*** is located in ***Attachment C***. Sizing was based on:

- **a).** The volumetric inflow/outflow capacity of the C3P project and previous ODFW and NMFS approvals for fish passage.
- **b).** The precipitation hydrology for the "micro-watershed" pasture areas specifically associated with the individual culverts (Figure 12).
- **c).** Culvert hydraulic capacity for a given culvert size, which was then paired to a, and b.

The overall BSDD Water Management Plan (DWMP) guides inflow/outflow into Units 1 and 3 through the C3P tidegate. This DWMP plan has substantive effects on the methodology for the hydrology within Units 1 and 3, which is fully discussed in the "*Winter Lake Phase III Hydrologic Assessment."* The **DWMP and Winter Lake Phase III Hydrologic Assessment** are located within ***Attachment C.***

2. Installation of New Water Control Mechanisms

We will install two styles of water control mechanisms on the on the new HDPE pasture channel and canal connection culverts that provide for a higher degree of control over previously used top-hinged wooden and flapper tidegates. These new structures will allow for an open culvert strategy during late fall and winter months maximizing fish access to pasture channels and floodplain habitats and they will provide for individual pasture irrigation tactics during summer months.

Water control structures that will be used shall consist of two styles (specific style based on individual site and landowner needs):

a). Side-hinged aluminum tidegates (***Attachment A, Figure 13***) with an additional arm that can be set in a manner for the tidegate to be managed fully open or closed as is the water management strategy. Aluminum slide-gates (***Attachment A, Figure 14***) on adjustable worm drive hand wheel operated.

b). Aluminum slide-gates (***Attachment A, Figure 14***) on adjustable worm drive hand wheel operated shafts that allow for incremental degrees of door openness.

c). The BSDD and ODFW are in the process of developing a third louvered water control structure and seek the approval to install a single site as a prototype for testing.

3. Install New Bridge:

One new free-spanning 60ft railcar that is channel spanning ("Winter Lake Phase III Project Actions" in Attachment B; Figures 15-18) will be installed over the S.E. portion of the Unit 1 main canal (see Attachment A, Figure 15, 16 for location of bridge). This bridge provides the landowner livestock management access point into the Messerle property from Hwy 42 ~1.0 miles west of the City of Coquille. This bridge will have appropriate approach sloping so as to minimize erosion. Riprap will be installed on banks to prevent inflow/outflow scour. The earthen streambanks provides the channel form and the location is generally low-energy hydrology, with the site subject to slow rising tidal inflow and outflow. Footer design will be a rock/fabric layered pattern with a railcar beam for the decking to rest upon (Attachment A, Figures 17-18). The bridge is designed to have fully sufficient capacity to provide for proper hydrologic connectivity and fish passage for all channels developed upstream of that location.

4. Construct On-Grade Tidal/Floodplain Channels:

NOTE: (All channels proposed for construction are assumed to have the ecological productive capacity similar or equal to "Pasture Trenches" referenced in North Bank Access permit application (ODFW unpublished 2016).

These channels will provide a greatly improved level of accessibility to the site for fish that has not been present since the interior pastures were originally bermed and drained in the early 1900's. Additionally the channels will allow for natural hydrologic regimes to the extent that is possible. The C3P tidegate ultimately controls water levels during low and moderate elevations and flows. The project is anticipated to improve water quality through:

a). Increased movement of water inflow/outflow and mixing. Elimination of stagnation of water where organic decomposition results in high levels of bioprocessed compounds, related to increased movement.

b). Improved thermal regimes resulting in decreased water temperatures during warmer months due to movement of water and elimination of shallow ponded areas where solar input is extreme. On-grade channels constructed to connect these low-lying areas in the floodplain will address this issue.

c). Greatly improved nutrient and energy cycling, which will result from increased inflow/outflow and movement of waters in winter through pasture stubble height vegetation prior to entering the main canals and Coquille River mainstem.

Small Swale Channels:
A total of 38,090 smaller swale type channels with an avg depth of 2.5ft in first 300ft; 1.5ft thereafter Avg width 8.0ft for first 300ft 9.5ft thereafter *(***"Winter Lake Phase III Project Actions" Attachment B; Sheets 2-17**); will be constructed on grade with side-sloping of 4:1 from connection point with Medium Size Conveyance Channels. Bottom width will be on average 2.0ft in width (***Attachment A, Sheets 2-17***). These channels will be at a depth that varies depending on the surrounding pasture elevations, however, are designed to provide fish ingress/egress to locations currently that have juvenile coho/salmonid stranding potential during the winter months and generate stagnate water areas during the summer that present risk for mosquito production. These will be on-grade and located in the low-lying zones of the landscape as determined by LiDAR (***Attachment A, Figure 24-26***).

From pgs 13-14
Key Hydrology/Habitat Issues
The current culvert/tidegate infrastructure and channel network within the BSDD interior floodplain upstream of the C3P tidegate have multiple features that remain dysfunctional for tidal and floodwater inflow/outflow. Specifically, the project will work to improve conditions for Oregon Coast (OC) juvenile coho overwinter rearing and landowner pasture grazing production in Units 1 and 3. The project will address:

• *Hydrologic Flow Paths:* Discontinuity of channel networks due to construction of linear networks in 1909-current that redirected flow from the historical natural hydrologic flow paths.

• *Channel Density/Limited Intrusion:* Lack of density, per acre and limited length of interior channels within Units 1 and 3. These features are need to provide access routes to feed and sufficient refugia depth for juvenile fish within the BSDD floodplain. This deficiency results in very limited use of large portions of the floodplain by native salmonid fishes except at very high flood levels.

• *Salmonid Stranding Areas:* Low-lying land areas within individual ownership pastures are in many locations disconnected from channel networks, which results in water retention when flood levels decline resulting in high stranding risk for juvenile coho on the floodplain. ***Note in addition to 404 permit info; 01/10/24:*** *Linear channels constructed historically traversed across and disconnected low spots that can be visually identified on site and from the LIDAR. These low spots now struggle to drain during lower tidal conditions and if irrigation water is delivered to an elevation to fill these locations. Resultantly, there currently are numerous locations where mosquito production can occur if water is delivered into these locations during the warmer months of the year (June-September). These areas represent locations where salmonids tend to feed as they are slightly deeper (1-3ft deeper) than the surrounding pasture area. As the water recedes fish can become stranded and eventually die during late spring from warmer temperatures and predation. This project specifically used a new and hybrid channel layout to develop channel networks that enter these low lying stranding and potential mosquito production areas to ensure they will drain as waters recede in late spring and on low tide drainout following irrigation events. Project actions will address ponding water locations that currently serve as fish stranding and mosquito production risk locations.*

• *Undersized Culverts for Hydrology:* Undersized culverts connecting to the main canals within Units 1 and 3 that restrict proper tidal/flood-flow and underserve irrigation needs in summer months. ***Note in addition to 404 permit info 01/10/24:*** *Installation of this water control infrastructure will provide greater ability to drain low-lying areas that have potential for mosquito production.*

• *Invert Elevations Inappropriate:* Culverts that were installed with an elevation invert where interior pasture channel networks at early winter flow levels are disconnected from the main canals resulting in delayed ability for fish to enter the floodplain and subsequent increased potential for stranding and predation as floodflows recede.

• *Top Hinged Tidegates:* Top-hinged tidegates on the existing interior culverts upstream of the C3P tidegates that are difficult to manage in the open position. This results in long periods where the tidegate doors are closed leading to restriction of fish movements from the main canals into pasture floodplain channels where food availability is higher and competition with non-native fish lower.

• *Channels Not On Grade:* Channel networks that were not constructed on-grade and thus do not allow for sediments to be transported properly, resulting in premature accumulation, limited connectivity for fish movement, and poor drainage for landowners. ***Note in addition to 404 permit info 01/10/24:*** *Installation of redesigned and new channels will provide greater ability to drain low-lying areas that have potential for mosquito production.*

• *Poor Channel Locations:* Poorly located linear channel networks that do not follow land elevation hydrologic paths and undersized internal channels that do not provide sufficient length or route to provide connectivity to hundreds of acres of agricultural pastures within the BSDD resulting in highly limited ability to utilize the capacity of the new C3P tidegate for irrigation.

• *Non-Native Fish:* Canal networks that do not have substantial upstream channels that result in limited exchange volume when tidal influence is induced at the C3P tidegate. Resultantly, non-native fish including bullhead catfish, yellow perch, black crappie, bluegill, and mosquitofish are served by the relatively slack conditions within the canals that serve Units 1 and 3. This project will allow much greater exchange of volume in those canals reducing life history preference for the current condition and move favorability towards native fish.

• *Low-Lying Pasture Production Issues:* Channel networks that do not connect to low-lying areas properly resulting in long periods of standing water reducing pasture grass production during spring drain-out and early summer.

• *Channel Location Irrigation Issues:* Channel networks that are not located properly for individual pasture irrigation, resulting in over/under-watering of individual landowner pastures. ***Note in addition to 404 permit info 01/10/24:*** *Installation of redesigned and new channels in elevationally appropriate paths will provide greater ability to drain low-lying areas that have potential for mosquito production.*

(6) DESCRIPTION OF RESOURCES IN PROJECT AREA

A. Describe the existing physical, chemical, and biological characteristics of each wetland or waterbody. Reference the wetland and waters delineation report if one is available. Include the list of items provided in the instructions.

The Coquille River Valley is an expansive alluvial floodplain extending upstream from the mouth of the Coquille River at Bandon, OR upstream to the head of tidal influence at river mile 41. Other than the Columbia River, the Coquille River Valley encompasses the longest coastal estuary in Oregon. Historically the Coquille valley floor contained extensive freshwater tidal wetlands, tidal channels, and non-tidal wetland habitats that are estimated to have comprised over 12,000+ acres (Benner 1992) with some estimates as high as 17,000 acres. These habitats provided very high-quality fish and wildlife habitat historically (Benner 1992; Scranton, 2004). The Winter Lake Phase III project action area is located on floodplain pastures within the BSDD and CDD wetlands to the South of Northbank Lane/Hwy 42 and west of Coquille, OR, on the historic China Camp and Beaver Creek floodplain (***Attachment A, Figures 1 - 6***). The project area is predominated by lands that are below elevation 8.0ft (1,295+ acres).

The predominant majority of the floodplain and wetlands habitats in the Coquille estuary were cleared,

leveed, tidegated, and drained for agricultural purposes in the late 19th - early 20th century, thereby substantially altering the land from its historical natural state as a freshwater tidal wetland complex into drained pasture lands. These lands are currently used seasonally to year-round for grazing. By the 1990s, the amount of tidally influenced and standing wetland within the Coquille Valley was reduced to less than 600 acres or ~5% of historical. Resultantly, there have been widespread ecological changes in the capacity of the valley floor to produce fish and wildlife. Coho abundance has averaged ~14,499 annually in the 1990- 2020 period compared to peak estimated abundance of over 400,000 historically and an annual abundance that likely averaged near ~150,000.

Research and salmonid population monitoring indicate that tidal floodplains, wetlands, and estuaries are a highly important habitat for young salmon. Restoration of these habitats is repeatedly identified as a critical action for increasing endangered coho populations in multiple federal, state, and local recovery plans. Substantial scientific evidence indicates that body size at ocean entry is an important, if not the primary, indicator of an individual's probability of returning from the ocean to spawn (*Katz JVE, et al. 2017*). Studies of the Coquille River Basin specifically have shown smolt growth rates are often 1.5-2.0 times greater for off channel and wetland habitats (*Nickelson 2012*) compared to stream and river locations. The Coquille River valley floodplain channels and freshwater tidally influenced habitats are believed to have the capacity to rear sufficient numbers of juvenile coho to produce up to 11-17 returning coho adults per acre of restored habitat on average (*Nickelson 2012*).

Enabling native salmonid fish access onto these productive floodplain rearing habitats is currently presents a widespread and complex challenge within the Coquille watershed. One of the largest factors suppressing juvenile fish use of the Coquille River Valley floodplains specifically has been the elimination of tidal inflow and access for fish due to installation of tidegate and levee networks onto such low-lying floodplain pastures that historically comprised large tidal wetlands. These tidegate networks were installed historically to facilitate agricultural production. Currently exhibited tidegate styles reflect legacy design and are typically top-hinged wood or steel (***See Attachment A, Figure 11***); typical style of existing top-hinge interior tidegate). The angle these gates open is generally <20% when open on an outgoing tide and velocities during winter months can be above swimming thresholds for juvenile salmonid fish. When tide levels are above inside pasture water elevations the tidegate doors are closed and the resultant condition result is severe restriction of juvenile fish movements from the main stem Coquille River into locations that would historically have provided very high quality fall and winter rearing.

Wetland Habitats: The project area has a substantial component of wetlands below elevation 8.0ft NAVDD 88 (***as determined by LiDAR and ground engineering survey; Attachment A, Figures 24 and 25***). Above elevation 8.0ft. the vegetative community is primarily a mixture of upland grasses and shrubs. All lands (except for berm crests that run east-west along the main Unit 1 canal and north-south along the new China Camp Creek canal to the east of Unit 2) within the action area are predominantly classified as Freshwater Emergent Wetlands (Figure 30). They are specifically classified as PEM1Ch or PEM1Ah (Palustrine Emergent Persistent Semi Permanently Flooded Berm Impounded and Palustrine Shrub-Shrub Broad Leafed Seasonally Flooded Berm Impounded wetland) and under the Hydrogeomorphic Class and Cowardin Class wetlands based on information obtained from the U.S. Fish and Wildlife Service National Wetlands Inventory. For this project the small strips of land elevated by historical berm construction that are not classed as wetland, under the USFWS national wetlands Inventory, will be considered wetland and ecological uplift of the implemented as a restoration action has been designed to develop ecological uplift that exceeds impacts. Overall there will be around 130 acres of impact (***Table 2 and "Winter Lake Phase III Project Actions" Attachment B***).

Hydrology: Diking and land elevation manipulations have resulted in a high degree of dysconnectivity in the project area as documented on the landscape and visible from LiDAR elevation information (Figure 24-25). Resultantly, accessibility for anadromous and resident fish is limited and stranding potential following

flooding events is currently high. Function of the pasture wetlands has also been substantially altered due to lack of nutrient movements that would have occurred historically with tidal inflow/outflow and excessive persistent water in low-lying areas during late spring months that have been disconnected due to Euro-human channel construction tactics. In native tidal floodplains channel densities have been documented to have been as high as 192ft per acre. Densities at this magnitude and would have resulted in daily tidal inflow/outflow patterns. The historical plant communities adapted to tidal water regimes. Those conditions had vegetative native composition with a high disposition for aquatic production. Floodwaters currently flow onto a number of locations in the project area and remain for long periods in low areas surrounded by berms or where culvert and channels have altered historical flow paths. Overall the project actions are anticipated to improve Ecological Function for aquatic plants and production of fish/wildlife substantively:

- The project will restore more natural fish passage from main canal networks into secondary channel networks and pasture floodplain habitats.
- There will be a greater quantity of water exchange within the networks and the Coquille River improving oxygenation loading.
- There will be a greatly enhanced processing of livestock nutrients. New channels are designed with 1:1 (main channels), 2:1 (medium channels), and 4:1 (pasture swale channels) side-sloping. This side-sloping will provide for greatly reduced bank erosion over traditional channels. The bottom and side slopes will be planted with a pasture seed mix. Roughly 60-70% of the channel surface in the upper 2/3 distance of these channels will be at an elevation where grasses will grow providing filtering of livestock nutrients during outflow from pasture floodplains.
- The amplified size of culverts feeding channels will increase the ability to irrigate pastures during single high tide events.

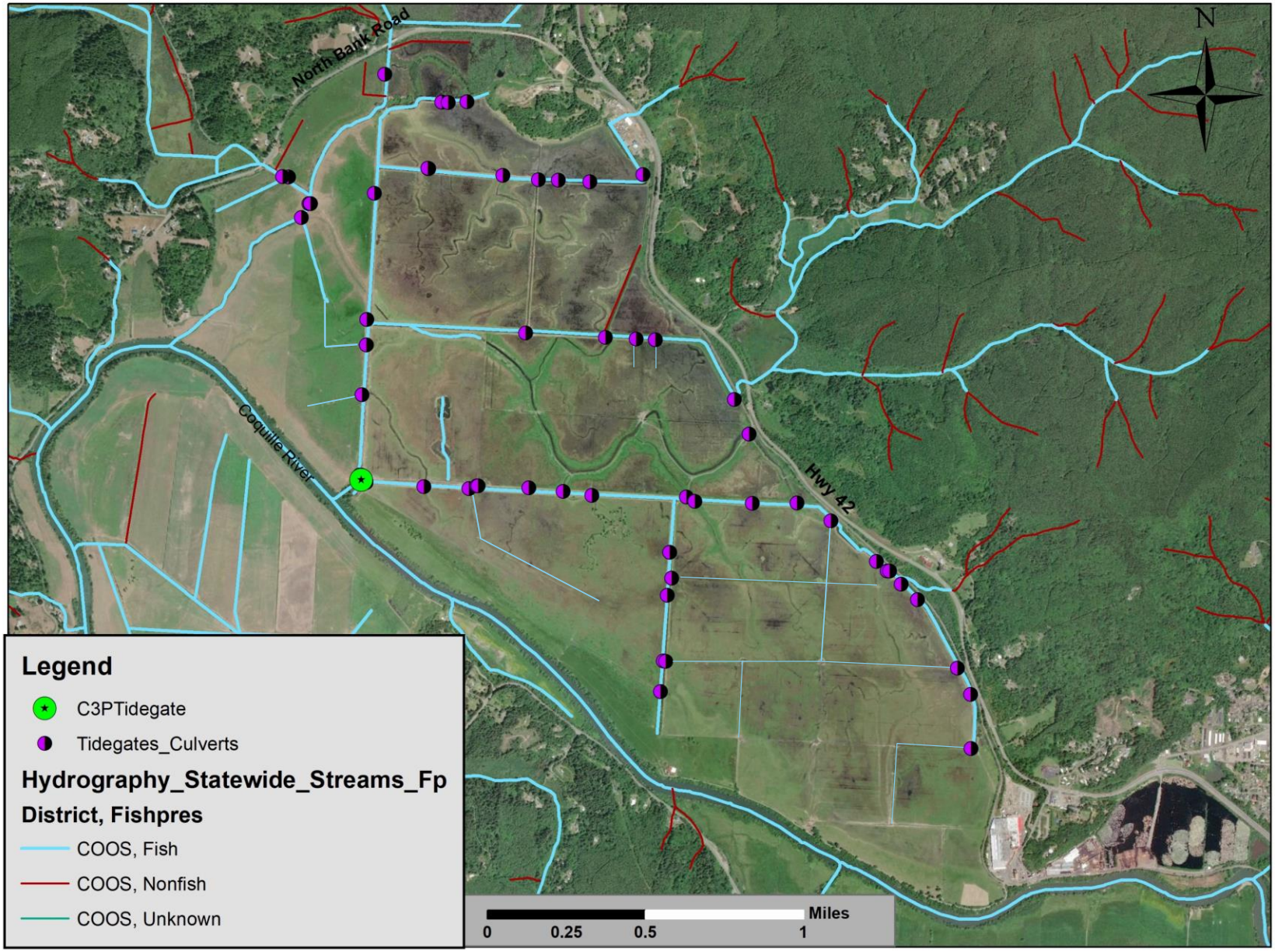


Figure 1. Winter Lake Phase III project area tidal channel *existing* layout (w. aerial imagery) with largely linear configuration and traverse connections without penetrating small channels across and disconnecting low-lying swales where water can collect.

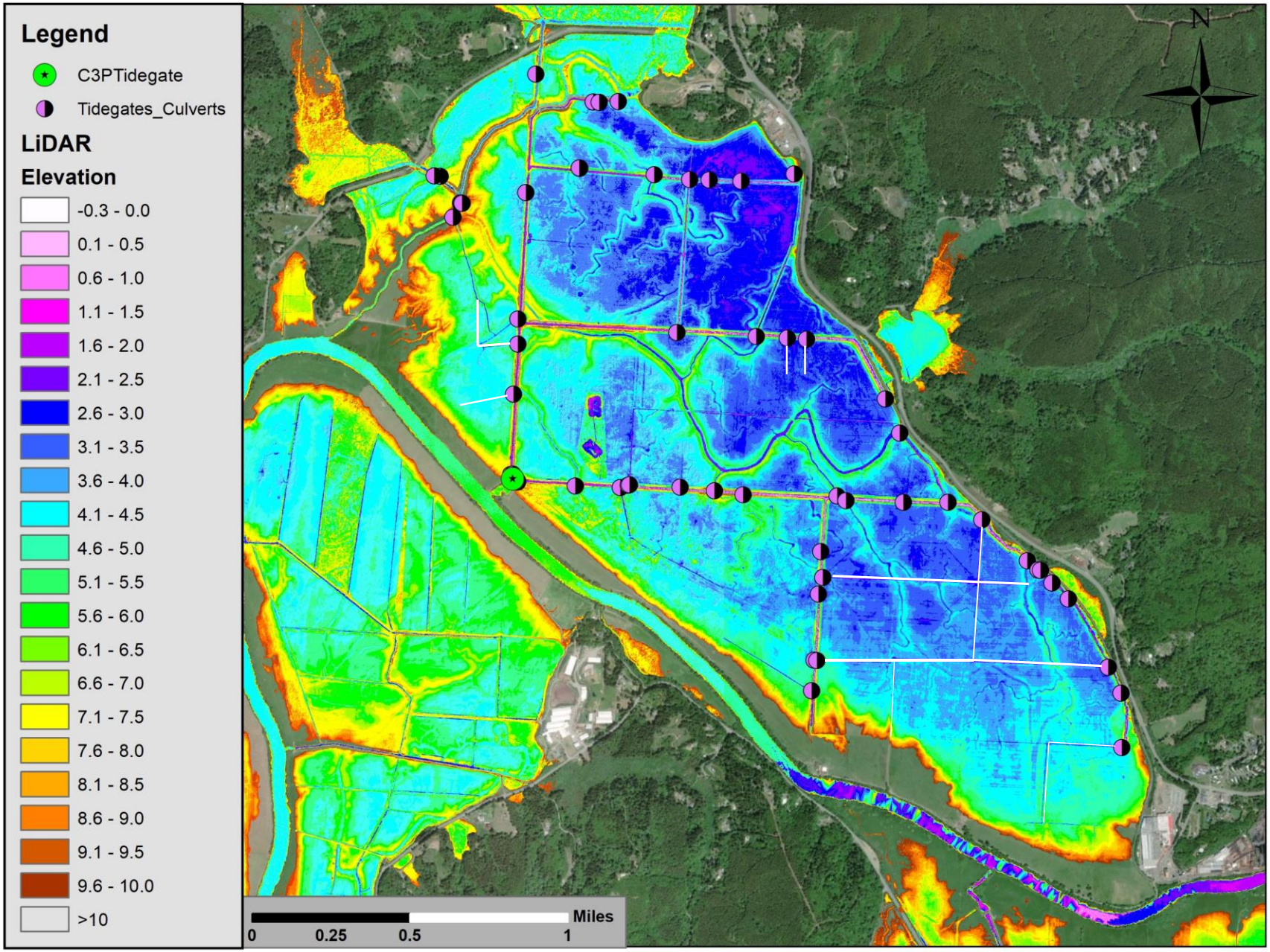


Figure 2. Winter Lake Phase III project area tidal channel *existing* layout (w. LiDAR imagery) with largely linear configuration and traverse connections without penetrating small channels across and disconnecting low-lying swales where water can collect.

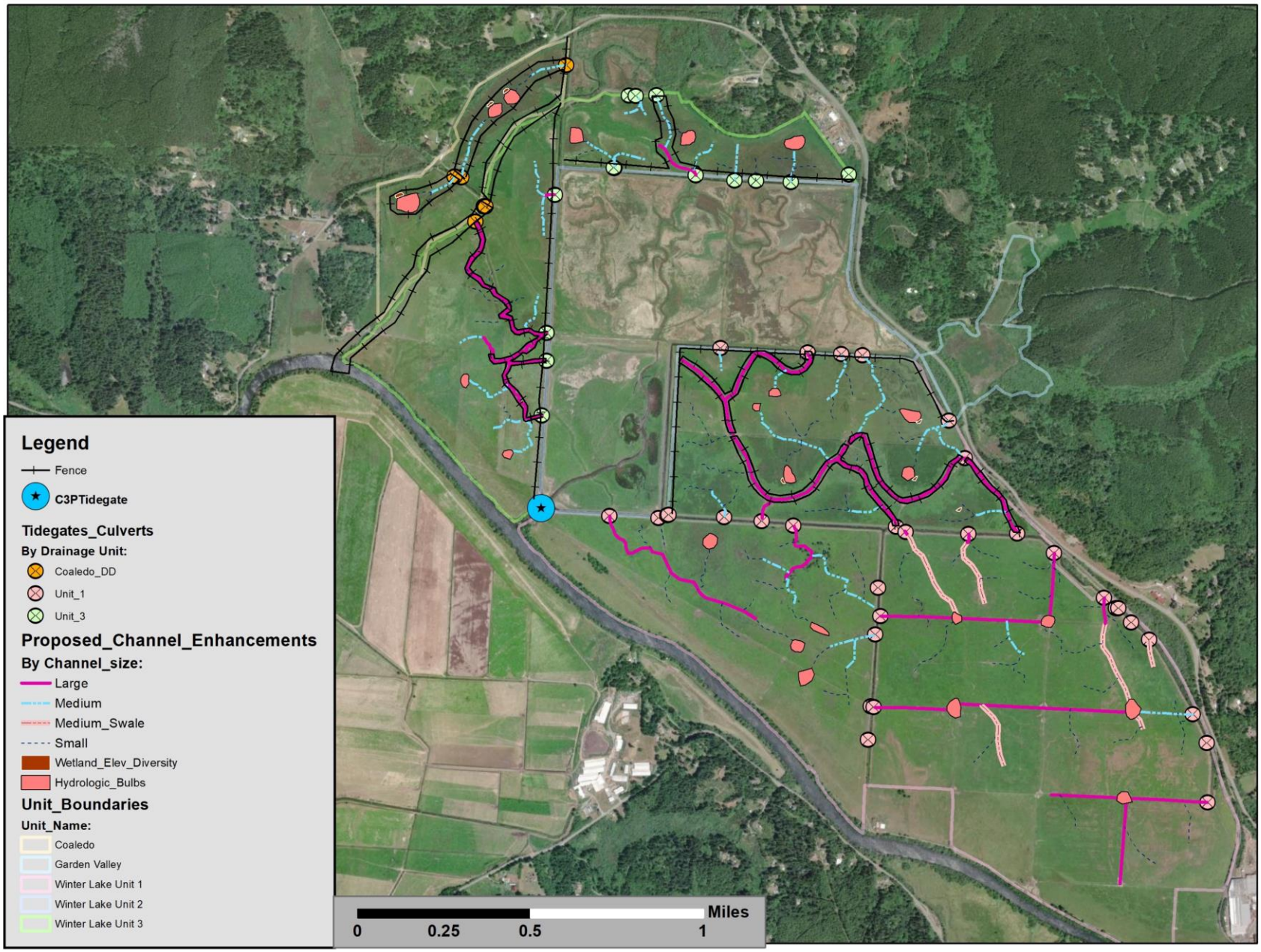


Figure 3. Winter Lake Phase III project area tidal project proposed reconstructed channel layout (w. aerial imagery) designed to develop channels traversing to enter low-lying swale areas to facilitate drain-out in spring and during low tide elevations. ***Note:*** *Hydrologic bulbs are sloped to drain fully into channels.*

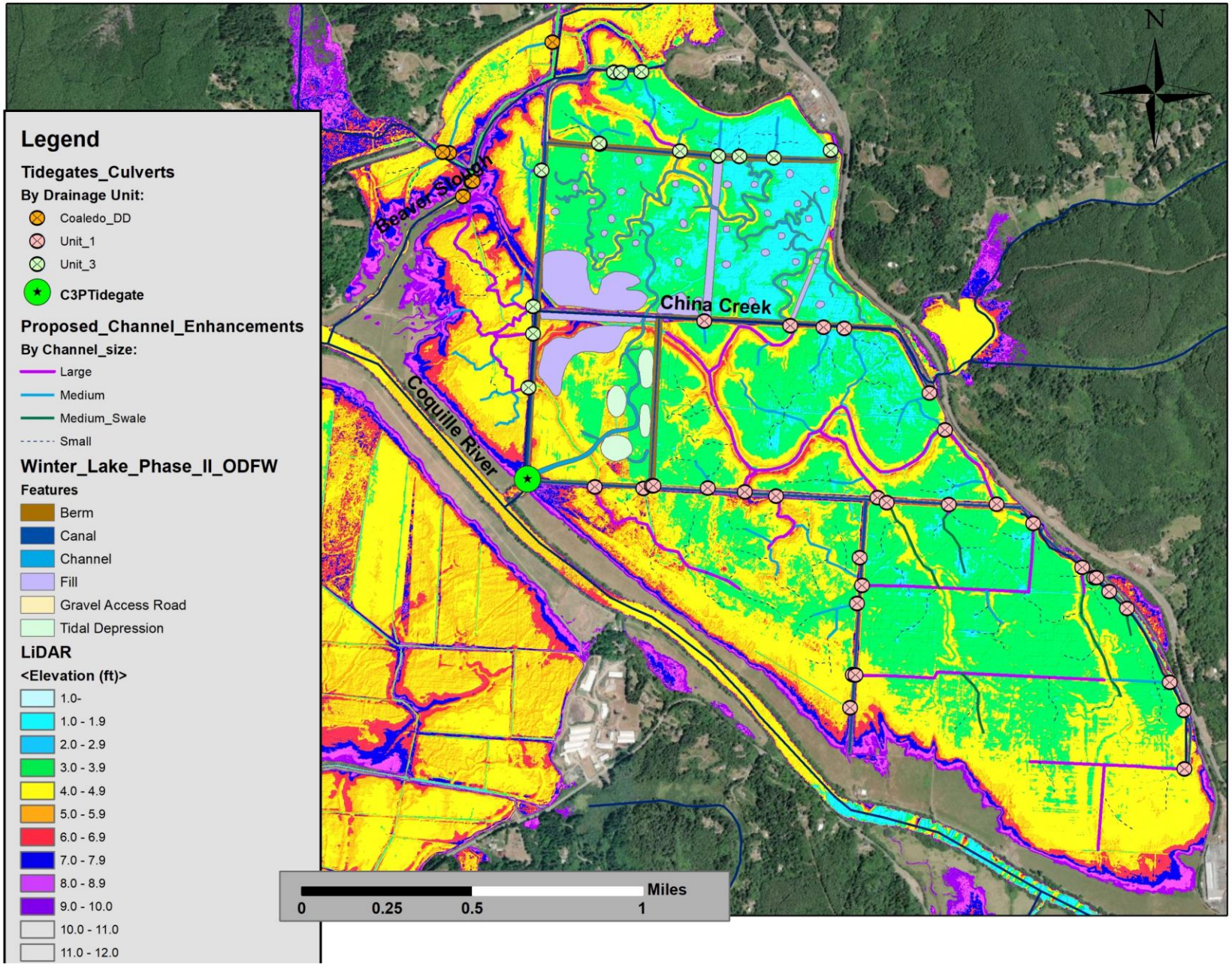


Figure 3. Winter Lake Phase III project area tidal project proposed reconstructed channel layout (w. LiDAR imagery) designed to develop channels traversing to enter low-lying swale areas to facilitate drainout in spring and on and low tide elevations.