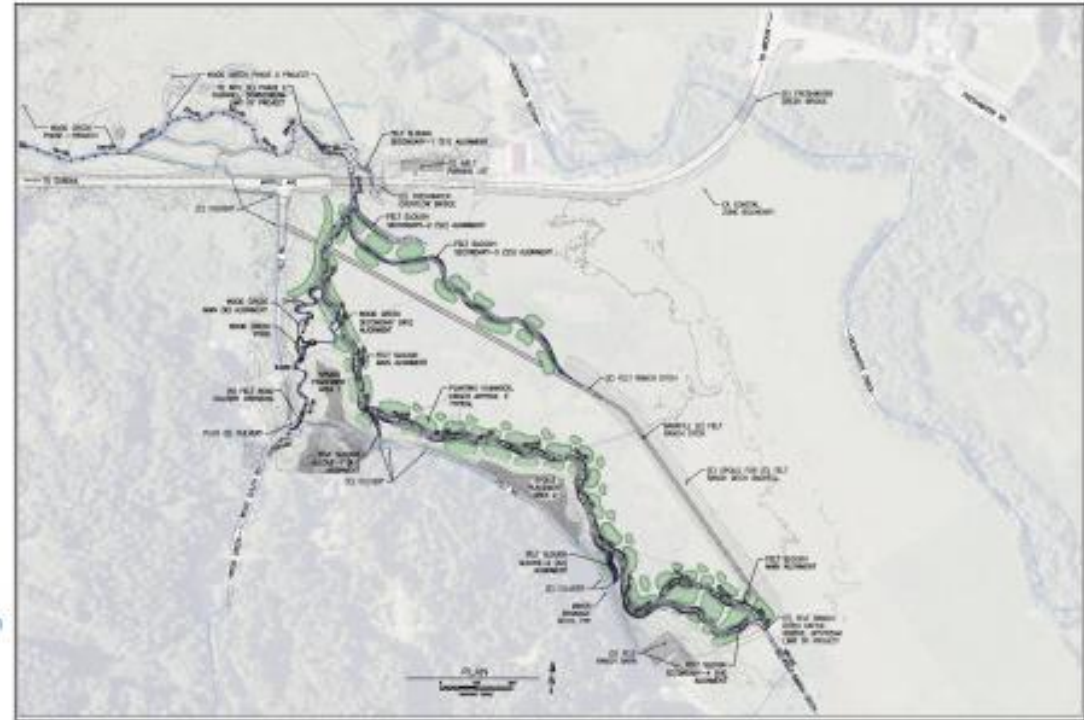


# Wood Creek Phase III

## Felt Ranch Off-Channel Rearing Habitat Project

This project will restore salmon habitat, tidal wetlands, and natural creek flows in the Freshwater Creek watershed, improving climate resilience, and supporting local agriculture, while benefiting wildlife and the surrounding community.



Funded By:



Project Partners:



Sean & Kathy O'Day



Hydrologic Solutions



Natural Resources Conservation Service



Environmental Consultants



Roscoe & Associates



SCAN HERE

to learn more about the Wood Creek Phase III Restoration Project!



NORTHCOAST REGIONAL LAND TRUST

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# Wood Creek Restoration

*Presentation and Tour  
at Freshwater Farms Reserve*

September 11, 2026

To implement the Phase III of restoration on and adjacent to Freshwater Farms Reserve, **NRLT is proud to partner with:**

- Sean and Kathy O'Day, Landowners of the Felt Ranch
- The Buckeye Conservancy
- California Department of Fish and Wildlife, Cannabis Restoration Grant Program
- Point Blue Conservation Science
- Wildlife Conservation Board
- National Fish and Wildlife Foundation
- California State Coastal Conservancy
- California State Polytechnic University Humboldt, Fisheries Dept.
- and area experts and agencies, including GHD, GR Sundberg, Michael Love and Associates, Pacific Earthscape, Pacific Watershed Associates, Samara Restoration, Thomas Gast and Associates Environmental Consulting, Wiyot Tribe, and more.

*The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Government or the National Fish and Wildlife Foundation and its funding sources. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Government, or the National Fish and Wildlife Foundation or its funding sources.*

## Schedule

*(all times approximate)*

**4:30-5:00pm** | Welcome + Sign in

**5:00 – 5:10pm** | Intro from NRLT by  
*Nadia Van Lynn*

**5:10 – 5:25pm** | Past Restoration  
(Phases I & II) and Fisheries Focus by  
*Mike Wallace and Mark Bowen*

**5:25 – 5:45pm** | Present and Future  
Restoration (Phase III) by  
*Michael Love*

**5:45 – 5:55pm** | Partner Perspectives

**6:00 – 6:30pm** | Community Toast and  
Light Refreshments

**6:30-7pm** | Optional Restoration Site  
Walk Through and Q&A



# NORTHCOAST REGIONAL LAND TRUST

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## Vision

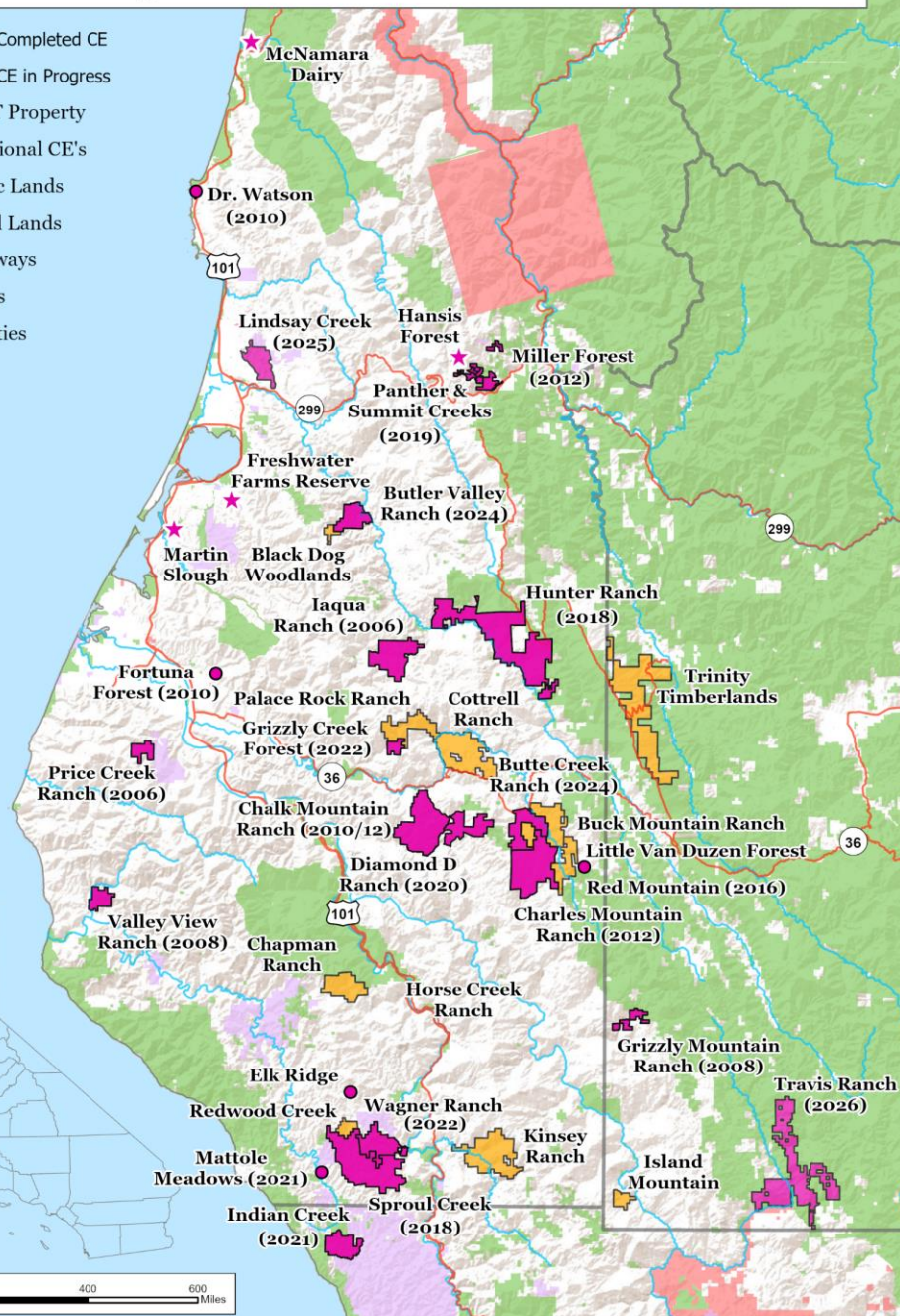
A sustainable community with a vibrant economy, resilient and productive landscapes and clean, abundant water.

## Mission

The Northcoast Regional Land Trust is dedicated to the protection and economic viability of working landscapes, farms, forests, and grazing lands, and to the preservation and protection of land for its natural, educational, scenic and historic values. We work with landowners on a voluntary basis to promote stewardship of Northern California's healthy and productive resource base, natural systems and quality of life.

## Northcoast Regional Land Trust Conservation Easements

- NRLT Completed CE
- NRLT CE in Progress
- NRLT Property
- Additional CE's
- Public Lands
- Tribal Lands
- Highways
- Rivers
- Counties



## What we do

1. Land Conservation (*conservation easements, acquisitions, etc.*)
2. Land Stewardship (*restoration, landowner support, volunteer trail stewards, etc.*)
3. Build Community for Conservation (*education and outreach programs*)

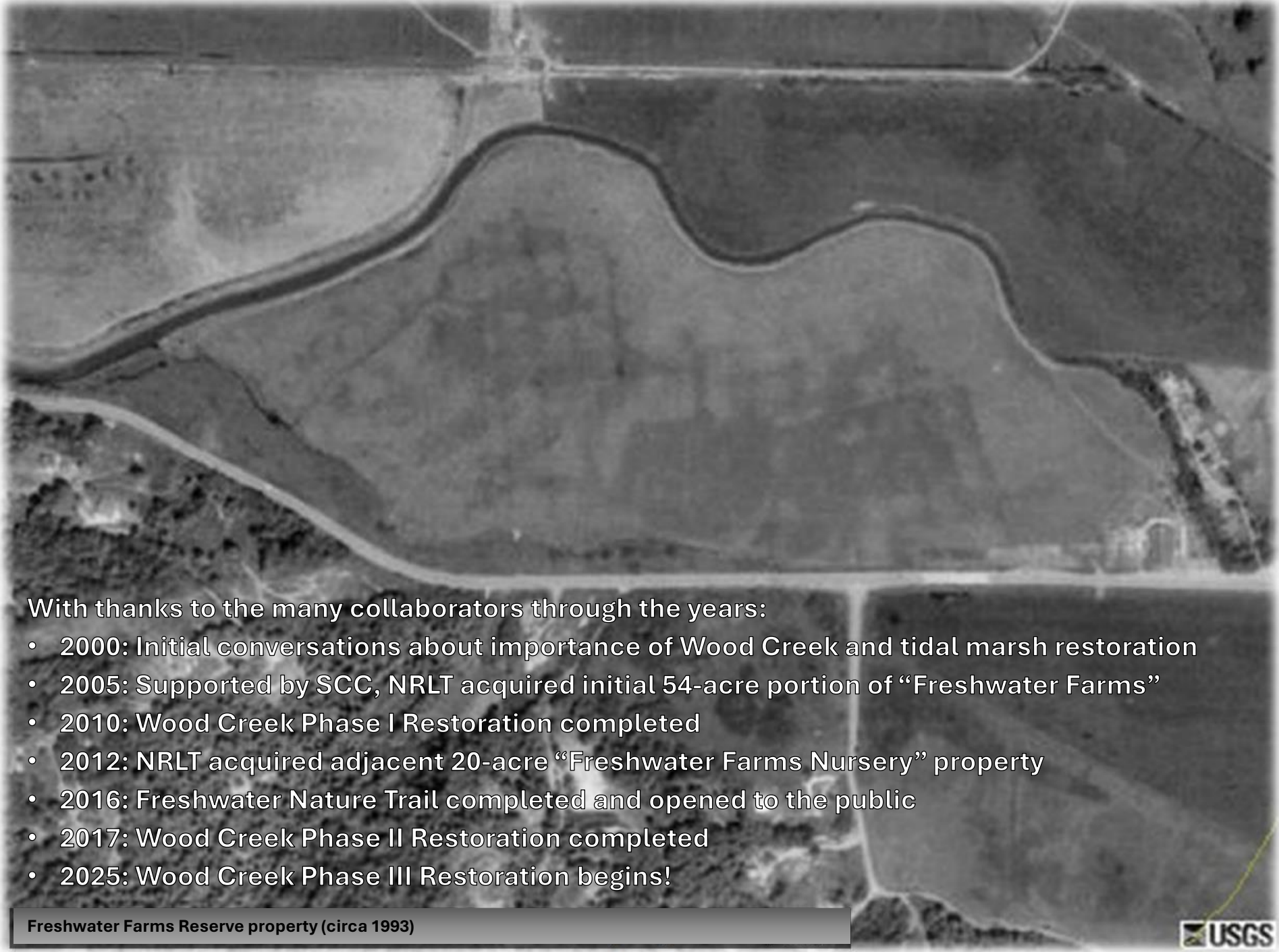
## Protecting lands for over 25 years!

- Since 2000, thanks to the support of so many, NRLT has worked with private landowners to **permanently protect over 81,000** acres of wild and working landscapes in Northwestern California.
- Through our **education and outreach programs** **we've connected with thousands of people**, deepening connections to the land, broadening NRLT's community of support, and engaging the next generation of land stewards.

# Freshwater Farms Reserve

Community Conservation on a Historic Working Farm and Native Plant Nursery



An aerial photograph showing a landscape with a winding waterway, likely a creek or river, flowing through agricultural fields. The fields are divided into large, irregular plots, some of which are dark, possibly indicating forest or wetland areas. The waterway has a meandering path, with several sharp turns. The overall tone is grayscale, giving it a historical or archival appearance.

With thanks to the many collaborators through the years:

- 2000: Initial conversations about importance of Wood Creek and tidal marsh restoration
- 2005: Supported by SCC, NRLT acquired initial 54-acre portion of “Freshwater Farms”
- 2010: Wood Creek Phase I Restoration completed
- 2012: NRLT acquired adjacent 20-acre “Freshwater Farms Nursery” property
- 2016: Freshwater Nature Trail completed and opened to the public
- 2017: Wood Creek Phase II Restoration completed
- 2025: Wood Creek Phase III Restoration begins!



*Freshwater Farms Reserve – Wetlands Reconnected and Restored (2017/2018)*

# Upcoming Events!

- **Boots & Birkenstocks Annual Celebration** – *October 10<sup>th</sup>, 5-9pm*
  - Our biggest fundraiser of the year! Live and silent auction, dinner, live music, and special presentation of NRLT's work in 2026. Tickets and more information available on our website.
  - *Interested in volunteering for a free ticket? Email [n.vanlynn@ncrlt.org](mailto:n.vanlynn@ncrlt.org).*
- **Trail Stewardship Days at Freshwater Farms Reserve** – *Sept. 20<sup>th</sup> and Oct. 18<sup>th</sup>, 9am-12pm*
  - Join the NRLT, Humboldt Trails Council, & other partners for a morning of trail maintenance and invasive species removal!
  - Third Sundays of the Month.

More info available on our website [ncrlt.org/](http://ncrlt.org/)

# WOOD CREEK 3 – FELT RANCH COHO HABITAT RESTORATION PROJECT SEPTEMBER 11, 2026

Mike Wallace, CDFW, Retired

And

Mark Bowen, Ph.D., CFP,  
Thomas Gast & Associates  
Environmental Consultants



Thomas Gast & Associates  
Environmental Consultants

# salmon life cycle

**Adults** Once in the ocean, smolts will feast on smaller fish and shrimp until they mature into adults. Coho will usually stay in the ocean for about 18 months.



**Spawners** Coho transform into spawning adults and, generally, return to the stream of their birth to lay eggs before they die. Most coho return when they are three years old, but some (known as jacks) return a year early.

**Eggs** are laid in coarse gravel in the winter.



**Alevin** are tiny salmon that hatch from their eggs and survive on nutrients in their yolk sacs until they are absorbed in a few weeks and they emerge as free-swimming fry.



**Smolts** After about a year, fry transform into silvery smolts and migrate downstream to the ocean. This usually happens in the spring.



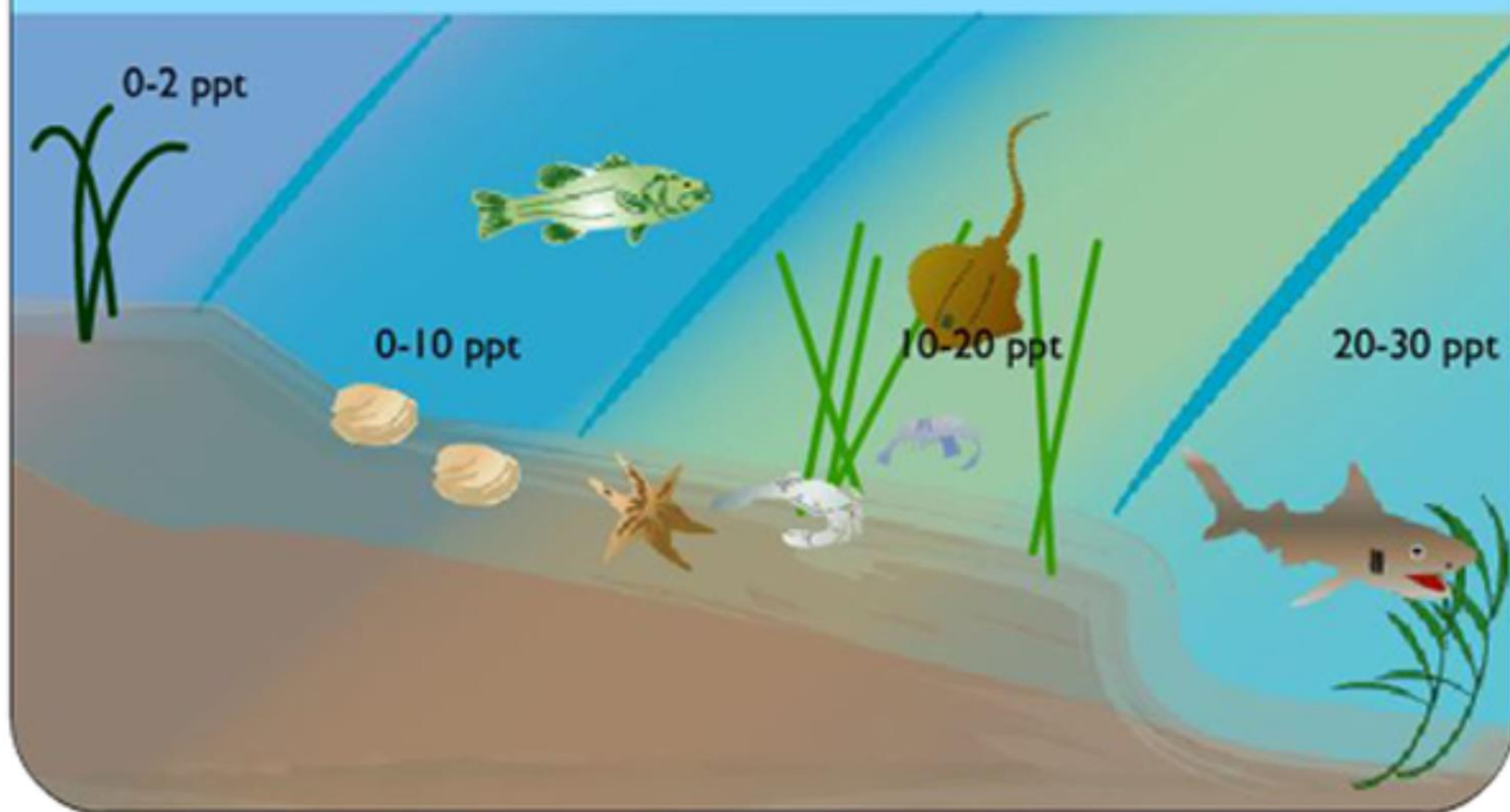
**Fry**, or "young-of-the-year" (yoy), are young fish with stripes called "parr marks".

Aquatic organisms are adapted for certain ranges of salinity

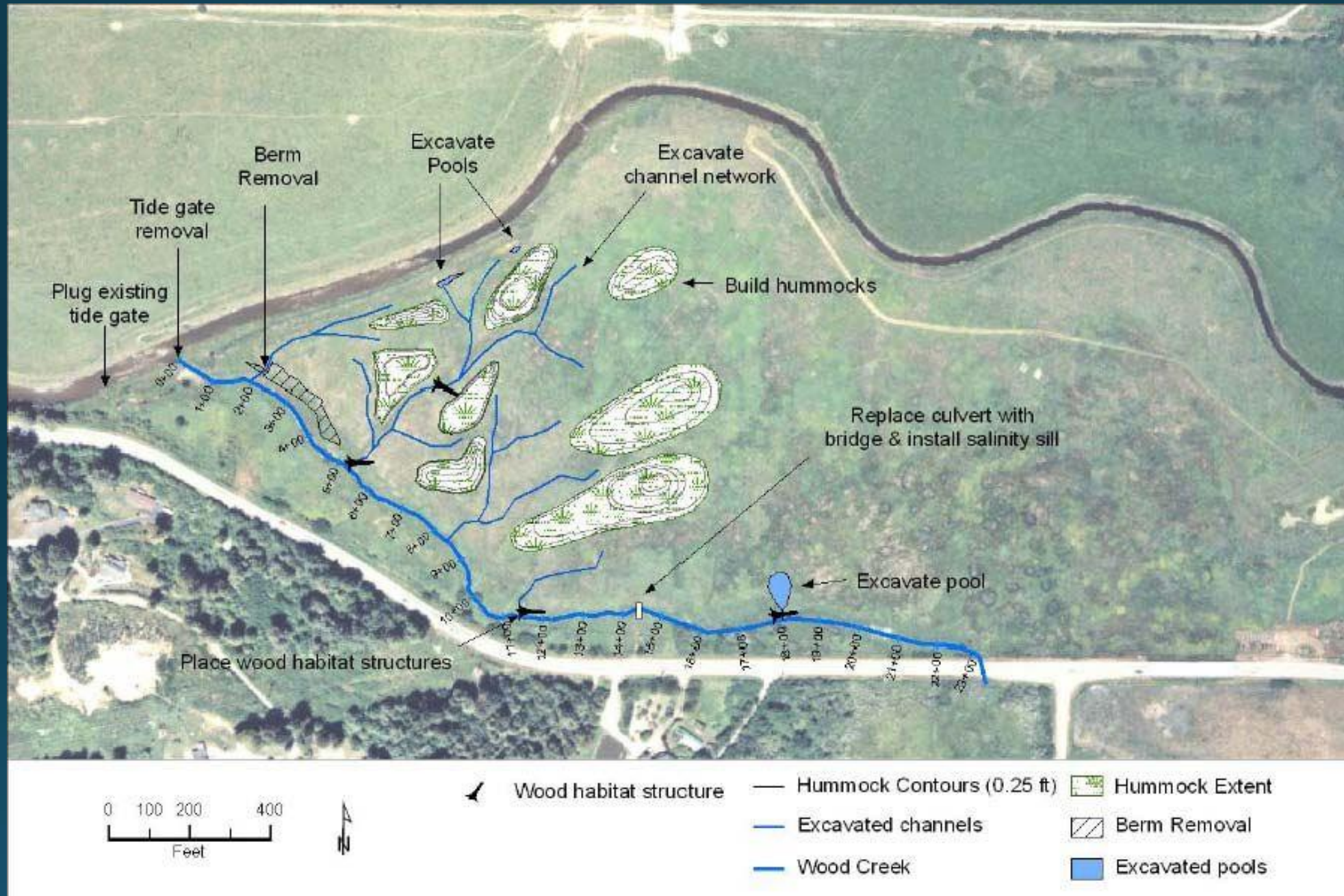
Low salinity

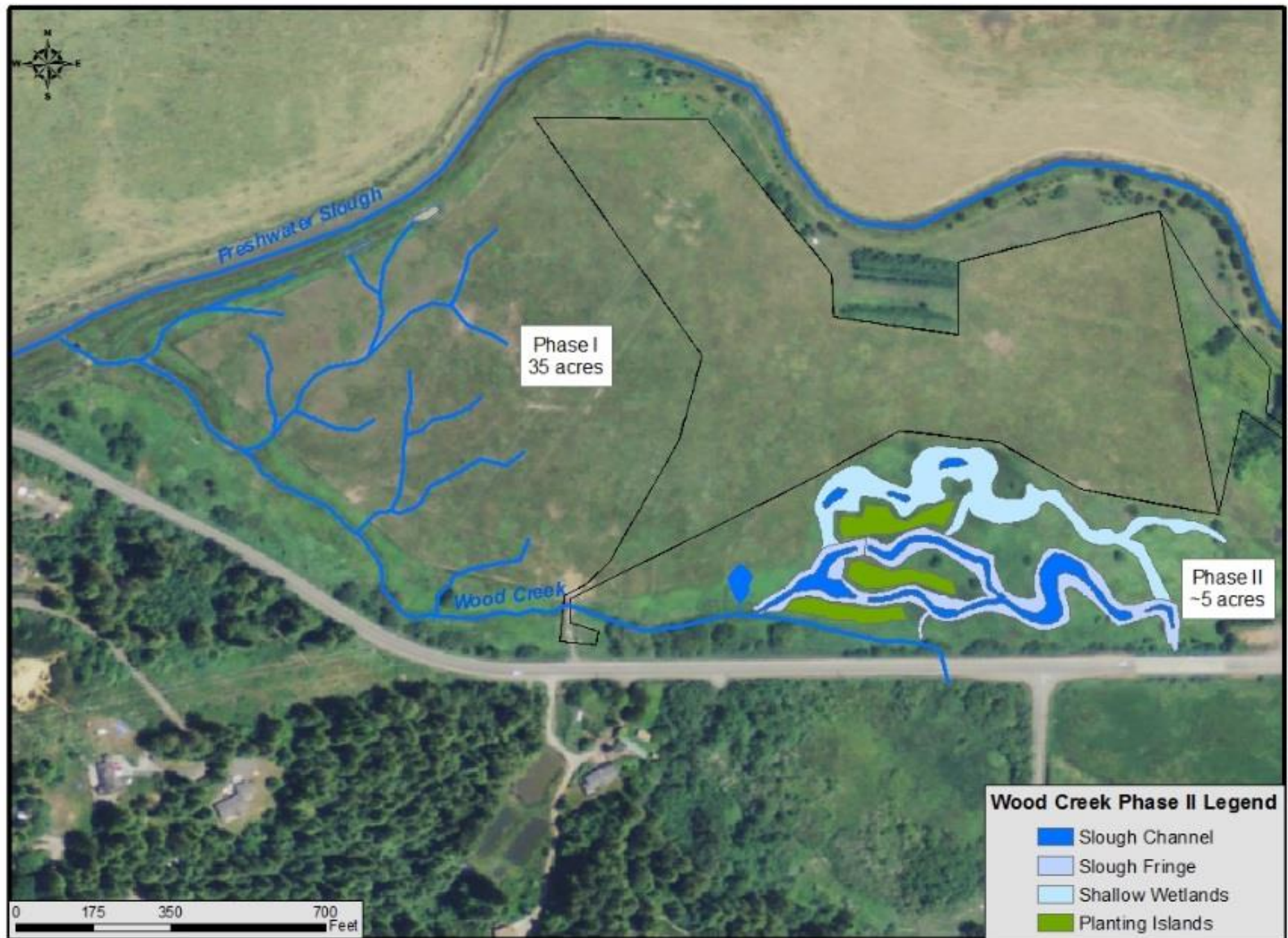
High salinity

Salinity also affects water chemistry and water density



# Wood Creek Phase 1 Project Design





# Estuary Residency (in days)

Sub-yearling Coho Salmon

## Freshwater Slough

## Elk River Slough

| <u>Year</u> | <u>n</u> | <u>Avg</u> | <u>Range</u> | <u>n</u> | <u>Avg</u> | <u>Range</u> |
|-------------|----------|------------|--------------|----------|------------|--------------|
| 2008        | 0        | –          | –            | 104      | 58         | 6–168        |
| 2007        | 12       | 68         | 6–167        | 55       | 44         | 5–124        |
| 2006        | 57       | 33         | 5–106        | 41       | 39         | 6–128        |
| 2005        | 112      | 32         | 4–128        | 121      | 34         | 4–110        |
| 2004        | 36       | 38         | 5–244        |          |            |              |

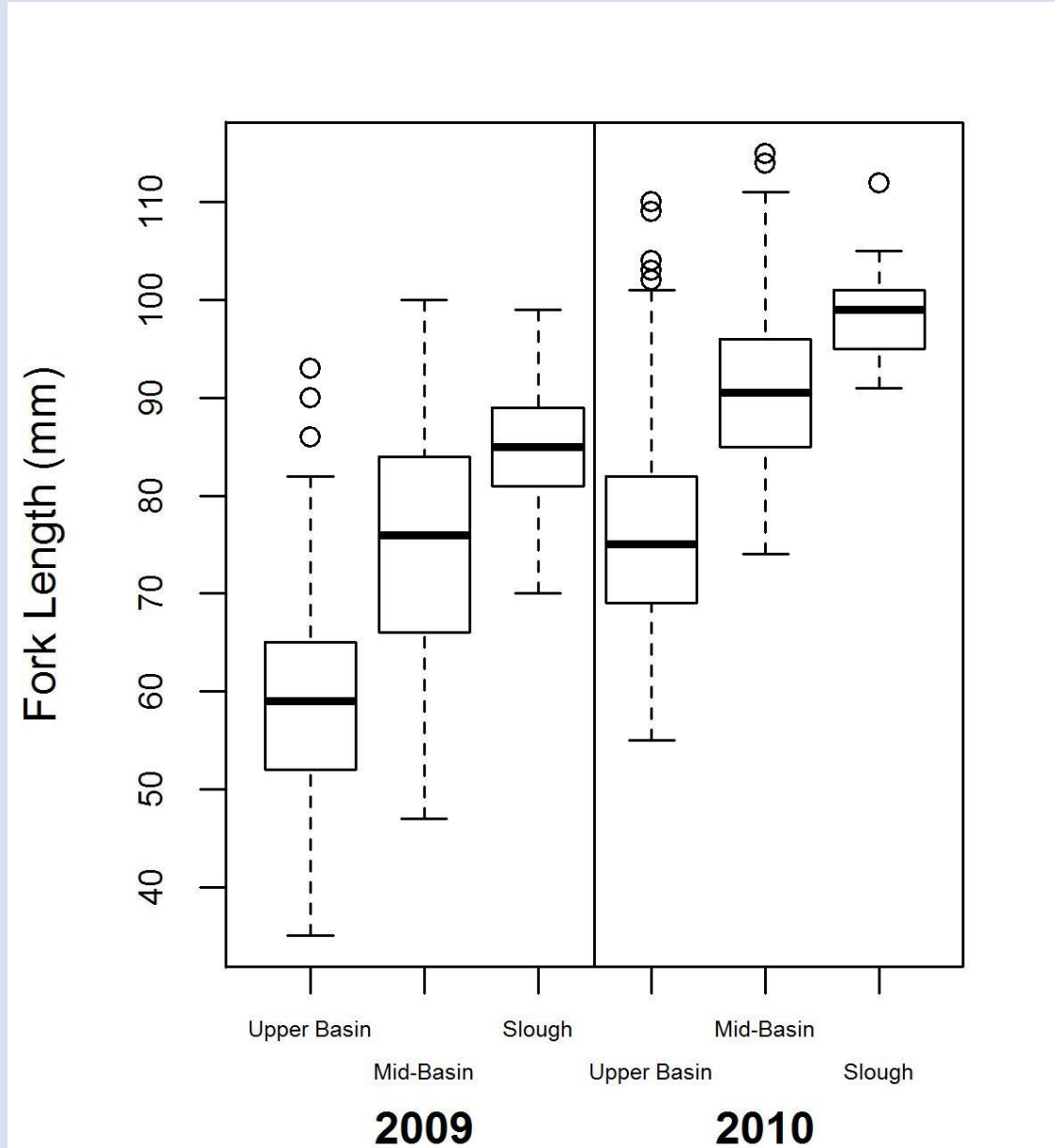
Table 21. Origin of PIT tagged juvenile Coho Salmon tagged in Freshwater Creek basin detected at Wood Creek pond antennas during January to September 2010, October 2010 to October 2011, October 2011 to July 2012, September 2012 through August 2013, and September 2013 through August 2014, September 2014 to August 2015, and September 2015 through August 2016, and Wood Creek Phase 2 antennas September 2016 to August 2017.

\*Wood Creek Phase 2 restoration sites

\*\* Wood Creek Phase 1 restoration sites

| Fish Origin                   | 2010 | 10/11 | 11/12 | 12/13 | 13/14 | 14/15 | 15/16 | 16/17 |
|-------------------------------|------|-------|-------|-------|-------|-------|-------|-------|
| Stream Estuary Ecotone        | 7    | 1     | -     | 1     | 0     | 1     | 3     | 6     |
| Lower Mainstem Freshwater Cr  | 11   | 6     | 26    | 2     | 0     | 6     | 1     | 11    |
| Middle Mainstem Freshwater Cr | -    | 11    | 16    | 1     | 1     | 4     | 8     | 11    |
| Upper Mainstem Freshwater Cr  | 7    | 6     | 12    | 4     | 0     | 4     | 1     | 8     |
| Little Freshwater Creek       | 12   | -     | -     | -     | -     | -     | -     | -     |
| Cloney Gulch                  | 9    | 4     | 6     | 4     | 0     | 1     | 3     | 6     |
| South Fork Freshwater Creek   | -    | 0     | 10    | 2     | 0     | 1     | 6     | 6     |
| Freshwater Creek (total)      | 46   | 28    | 70    | 14    | 1     | 17    | 22    | 48    |
|                               |      |       |       |       |       |       |       |       |
| Wood Creek Pond               | 74   | 8     | 199   | 42    | 5     | 2     | 3     | 270*  |
| Wood Creek                    | 27   | 19    | 20    | 11    | 11    | 13    | 2     | 41**  |
| Ryan Slough/Creek             | 0    | 0     | 7     | 3     | 0     | 0     | 0     | 1     |
| Freshwater Creek Slough       | 5    | 0     | 8     | 6     | 0     | 2     | 5     | 25    |
| HFAC Weir                     | 1    | 0     | 2     | 0     | 4     | 1     | 0     | 1     |
| Estuary Ecotone (total)       | 107  | 27    | 236   | 62    | 20    | 18    | 10    | 338   |
|                               |      |       |       |       |       |       |       |       |
| Grand Total                   | 153  | 55    | 306   | 76    | 21    | 35    | 32    | 386   |

# Size of Sub-Yearling Coho in the fall Freshwater Cr



## Growth Rate of Juvenile Coho Salmon Ponds vs. Stream (Feb-May)

| Location      | Year       | Pond<br>Growth Rate | Stream<br>Growth Rate |
|---------------|------------|---------------------|-----------------------|
| Wood Creek    | 2013-2015  | 0.39                | 0.28                  |
| Martin Slough | 2015       | 0.48                | 0.21                  |
| Jacoby Creek  | 2016;14/15 | 0.28                | 0.12                  |
| Salmon Creek  | 2013-2015  | 0.82                | n/a                   |
| Freshwater Sl | 2013-2015  | n/a                 | 0.18-0.31             |
| Ryan Slough   | 2013-2015  | n/a                 | 0.19-0.42             |

# **Stream-Estuary Ecotone Importance to Coho Salmon**

- **Prolonged residence**
- **Used by multiple life stages**
- **Good growth/survival**
- **Substantial portion of population uses habitat**
- **Provides habitat during stressful periods**

# Wood Creek Phase 3 – Felt Ranch

Fish Sampling  
2022-2023

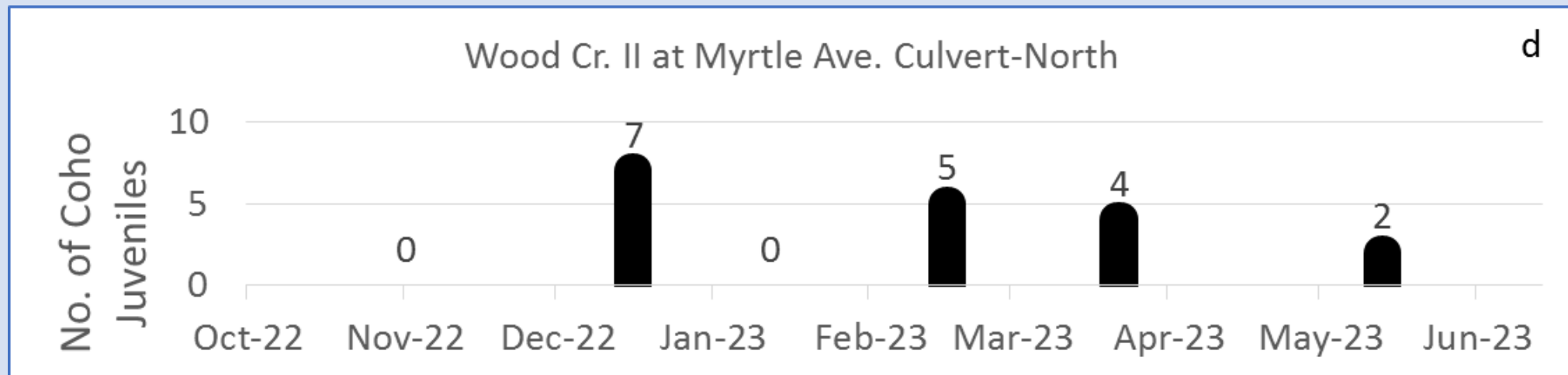


# Wood Creek Phase 3 – Felt Ranch

Hypotheses regarding making the SEE longer

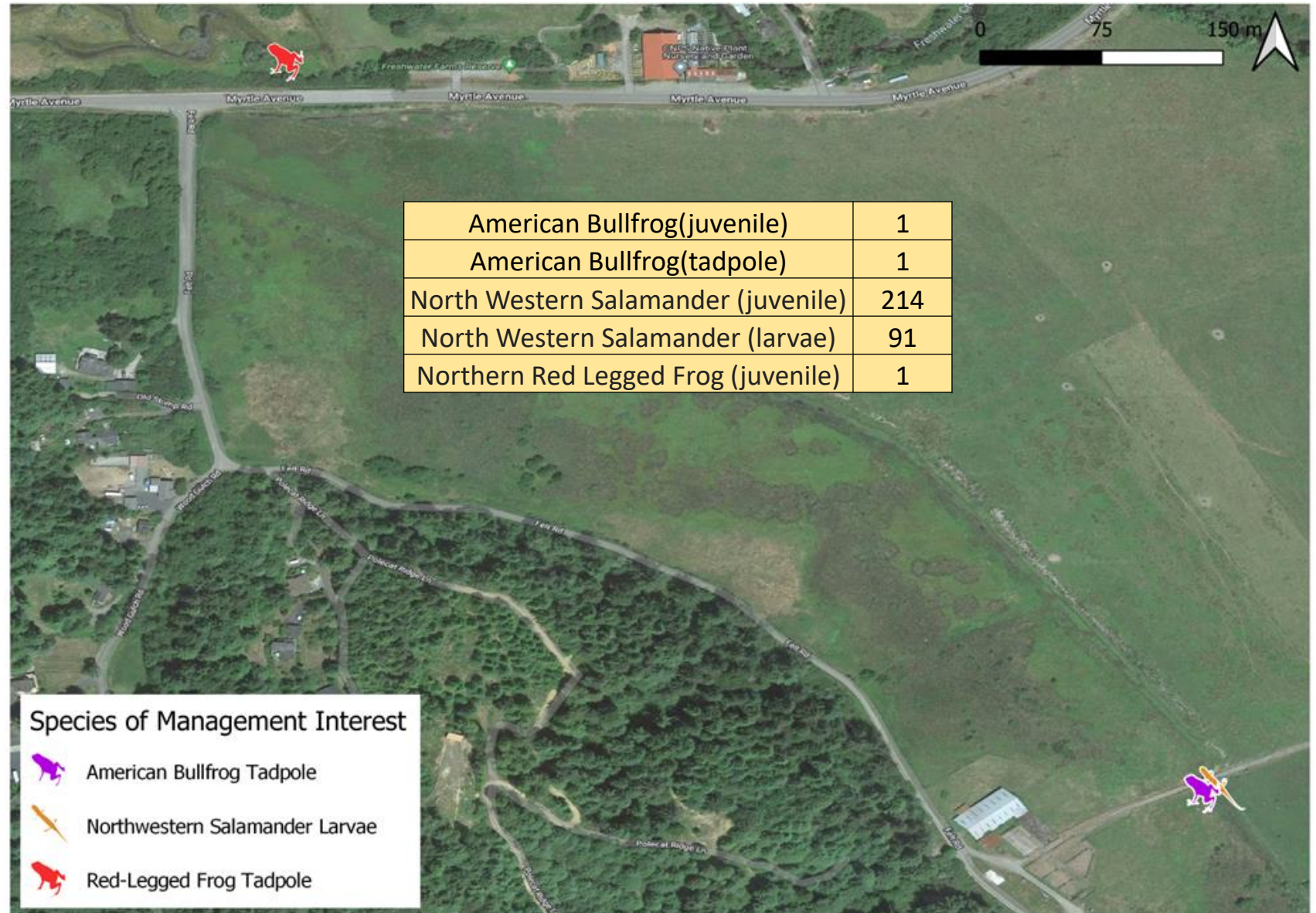
Hypothesis 1: The range of months that Coho juveniles use the SEE will increase on Wood Creek and Felt Ranch.

Hypothesis 2: Tidewater Goby range will expand south with saltwater.



# Wood Creek Phase 3 – Felt Ranch

Amphibian Sampling  
Colored Icons: 2022-2023  
Results Table: Sept-2025



# Felt Ditch – Aquatic Species Relocation

Felt Ditch  
Fish & Amphibian Relocation  
Results Table: Aug. 25-27, 2026



# Wood Creek Phase III Felt Ranch Off-Channel Rearing Habitat Planning Project



Thomas Gast & Associates  
Environmental Consultants



NORTHCOAST  
REGIONAL LAND TRUST



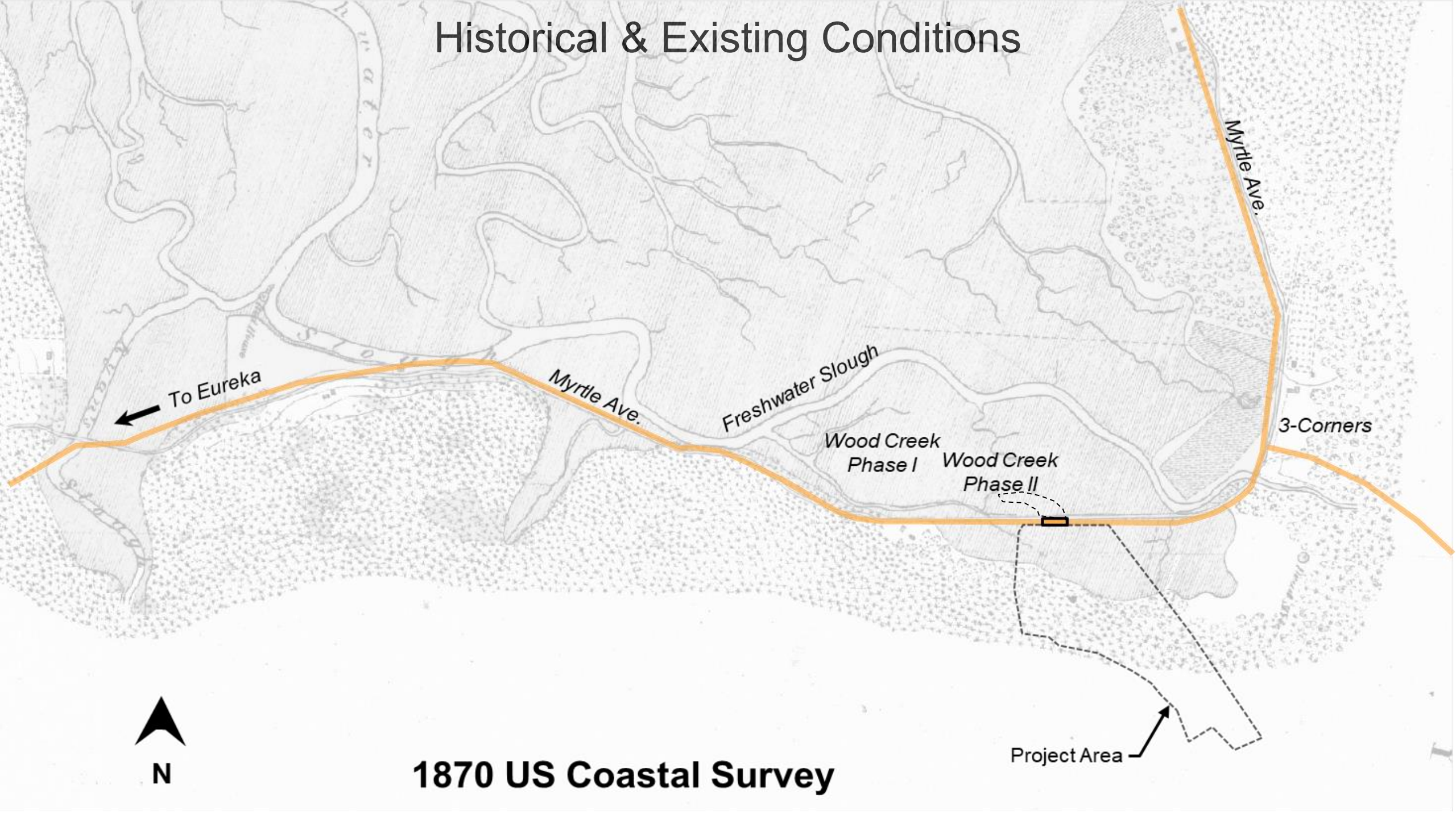
# Project Objectives

- Restore hydrologic connectivity and fish access between Wood Creek Phase I & II restoration project areas and the wetlands on Felt Ranch
- Reintroduce tidal influence onto Felt Ranch to elongate the transition zone from brackish to fresh-water conditions
- Enhance existing freshwater wetlands on Felt Ranch creating a diversity of slow-water productive habitats for native wetland dependent fish, wildlife and vegetation
- Enhance drainage and reduce inundation of adjacent agricultural areas on Felt Ranch



*NRLT Wood Creek Phase II and Felt Ranch*

# Historical & Existing Conditions



To Eureka

Myrtle Ave.

Freshwater Slough

Wood Creek  
Phase I

Wood Creek  
Phase II

Myrtle Ave.

3-Corners



1870 US Coastal Survey

Project Area

# Freshwater Farm Reserve & Felt Ranch

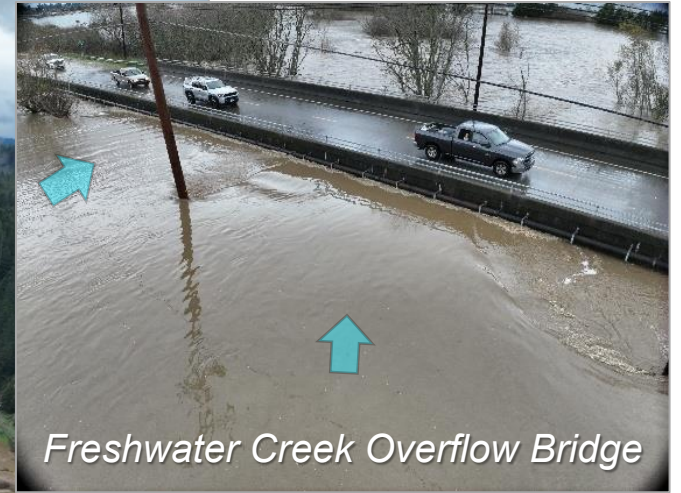
1947



Figure 2-6. 1947 oblique aerial image looking southeast up Freshwater Valley and across the project study area (from Cal Poly Humboldt Shuster Collection)

# Flooding Patterns

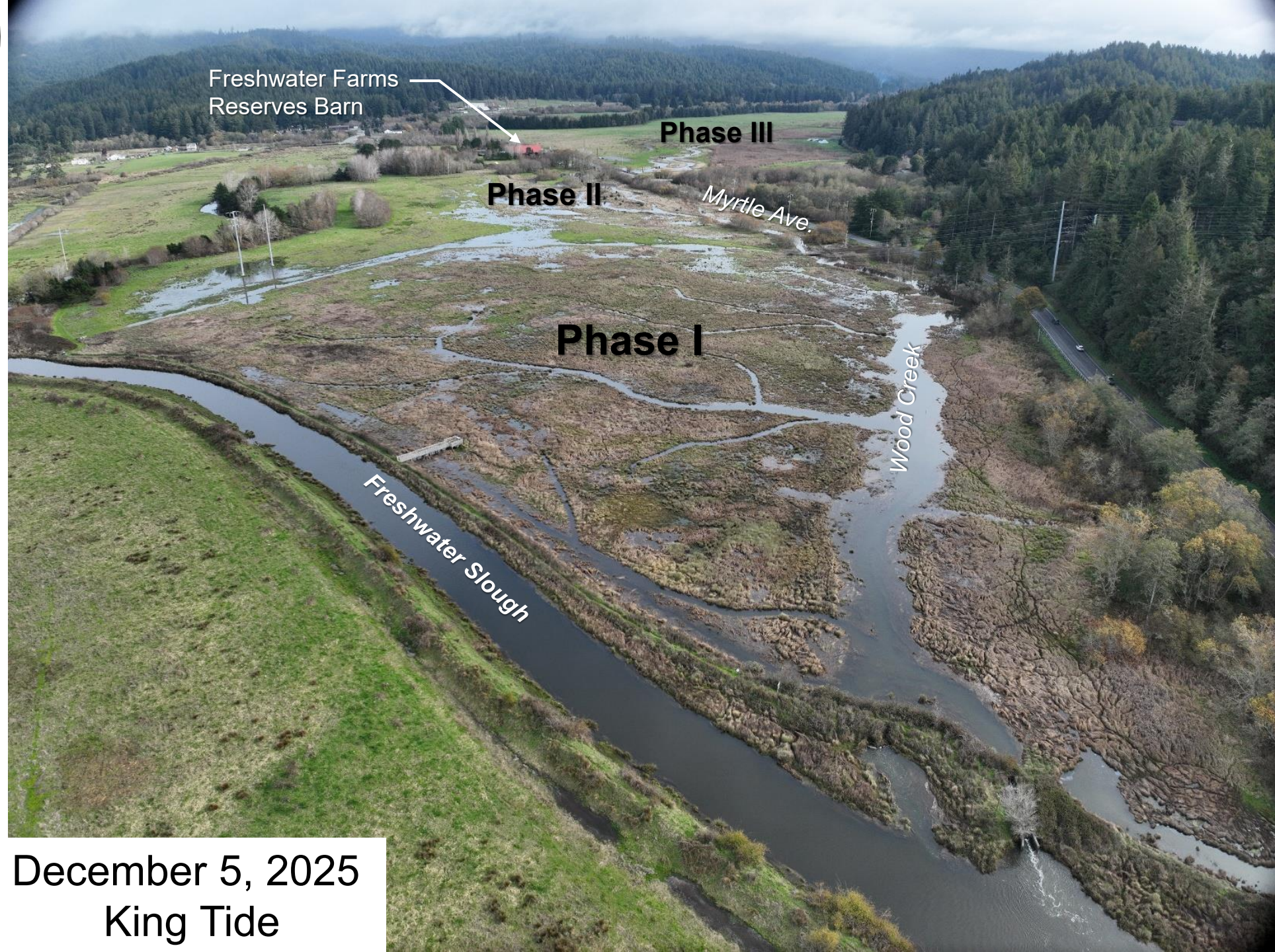
Felt Ranch and  
Myrtle Ave.



December 21, 2025

# Wood Creek Phase I, II, & III

NRLT Freshwater  
Farms Reserve



December 5, 2025  
King Tide

# Wood Creek Phase II

NRLT Freshwater  
Farms Reserve



Existing Freshwater Creek  
Overflow Bridge

Freshwater Creek

Phase III Project Area

Realign Felt Ditch  
and Wood Creek

Phase II – Phase III  
Tie-in Locations

Felt Ditch

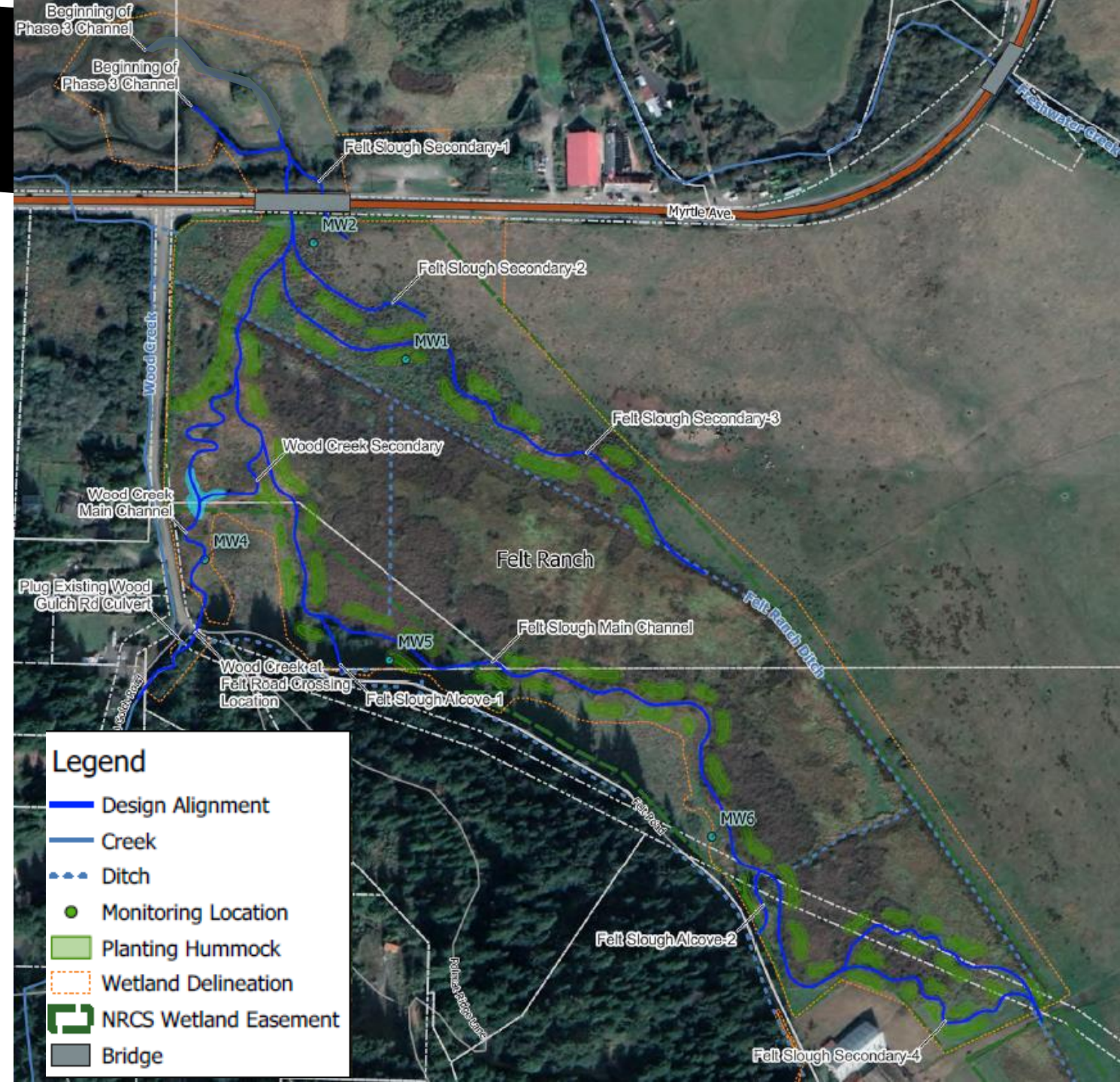
Wood Creek in Road Ditch

Myrtle Ave.

Wood Creek Phase II Project

# Preliminary Design Features

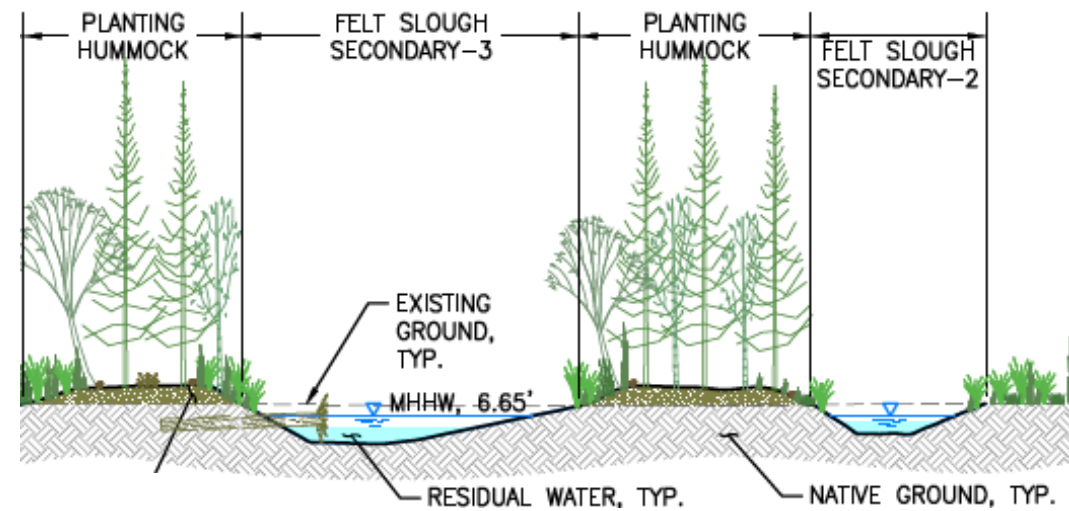
- Felt Slough Channel - 5,440 feet (partial tidal)
- Secondary Channels – 2,550 feet (partial tidal)
- 2 Alcoves at Springs
- 4 acres of Planting Hummocks
- Realign 900 feet of Wood Creek
- Wood Creek Pond above Head of Tide
- New Wood Creek Crossing on County Rd
- Fill Felt Ditch and build seasonal ponds
- Excavation Approximately 25,000 yards<sup>3</sup>
- Overall Limits of Disturbance ~27 acres



# Planting Hummocks

## Planting Hummocks Intended to:

- Restore “tidal swamp” microtopography to support a diversity of tidal forest/woodland and tidal scrub-shrub wetland species similar to pre-agricultural conditions
- Shade out Cattails in new Felt Slough
- Provide future source of wood recruitment for channels
- Reuse of excavated materials



Example of Spruce and Willow Planting Hummocks (Mounds)



From Anderson Creek, South Slough National Estuary Research Reserve, Oregon

Source: Diefenderfer et. al. 2016. Restoration Design Challenges for Topographic Mounds, Channel Outlets and Reed Canarygrass

# Examples of Sitka Spruce “Tidal Swamps”



# Lower Project Reaches

Connect to Phase III

Freshwater Creek Overflow Bridge

Parking Lot

Myrtle Ave.

Planting Hummock Blocks Connection to Existing Culverts/Ditch

Tidal Channels Capture Freshwater Creek Overflow

SECTION A

Ditch Plug

Near Head of Tide

New Wood Creek Pond (freshwater with tidal influence)

Upland Area 1

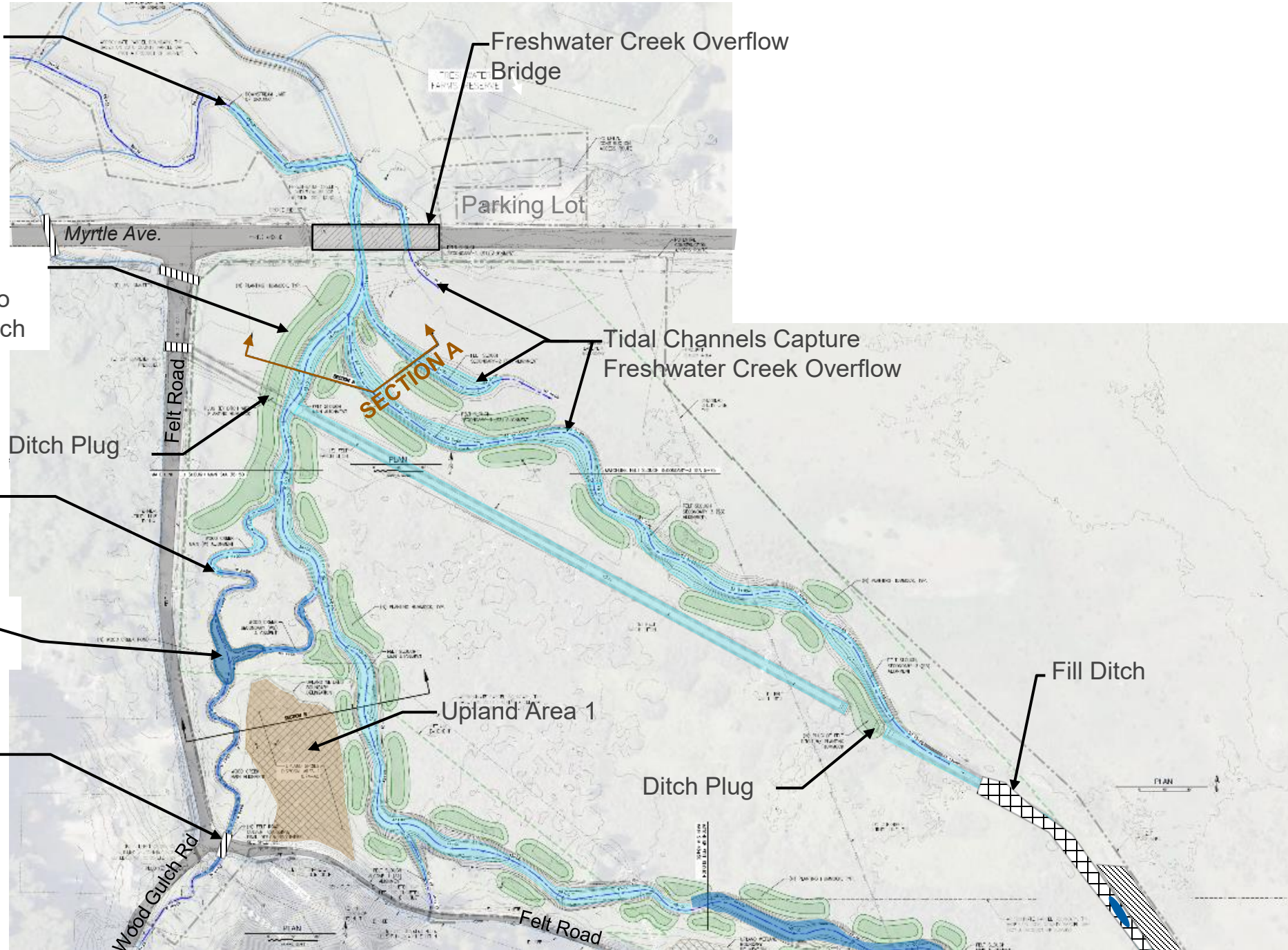
New Fish Friendly Culvert Crossing

Ditch Plug

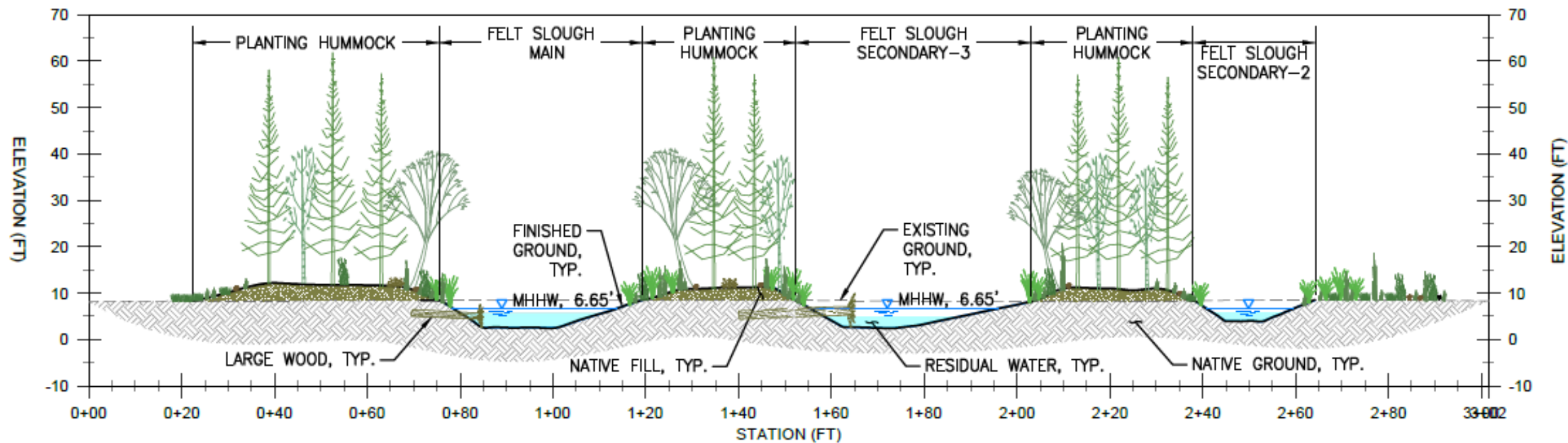
Fill Ditch

Wood Gulch Rd

Felt Road

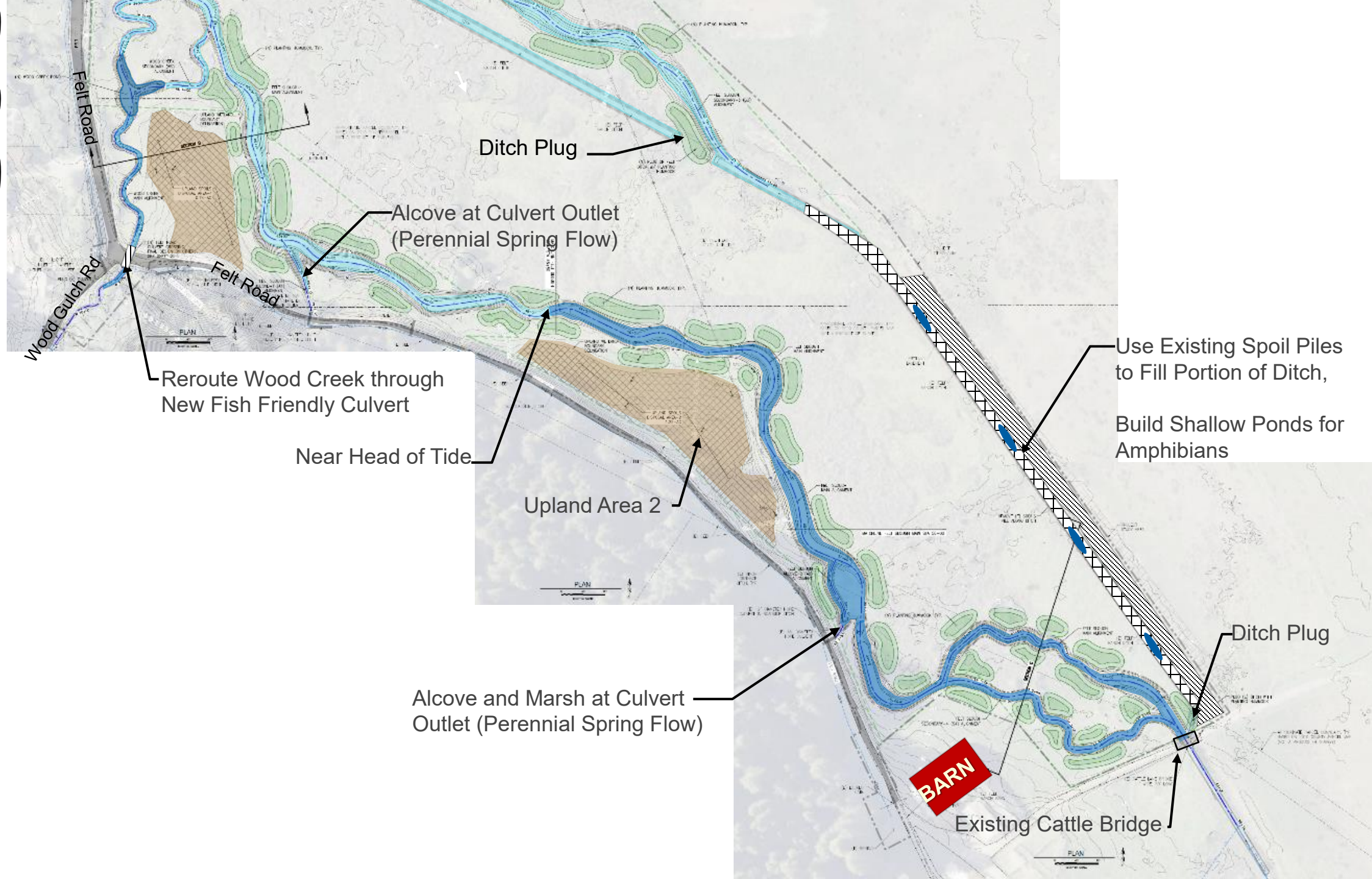


# Typical Channel Cross Section



SECTION A

# Upper Project Reaches





Felt Road

Phase II  
Restoration

Freshwater Creek Overflow Bridge

Phase III  
Restoration  
(Felt Ranch Year 1)

Myrtle Ave.

April 3, 2026



Phase III  
Restoration  
(Felt Ranch Year 1)

Myrtle Ave.

December 4, 2025  
King Tide



Myrtle Ave.

Phase III  
(Felt Ranch Year 1)

Felt Road

New Head of  
Tide

New Wood  
Creek Pond

New Felt Slough

August 31, 2026

# Wood Creek – Felt Road Crossing

- Realign Wood Creek onto Felt Ranch
- Stream Simulation Design – 8'x8' Box Culvert  
Bottom Embedded 4 ft below Channel
- County Designed Crossing





Barn

Myrtle Ave.

Upstream End  
of Project

August 31, 2026



Thomas Gast & Associates  
Environmental Consultants





## Want to get involved or learn more?

Email [info@ncrlt.org](mailto:info@ncrlt.org) to **sign up for NRLT's email list**- write "Volunteer" in the message if you are also interested in volunteering.

Find **updated information** on [www.NCRLT.org](http://www.NCRLT.org) *News and Announcements*, or in our biannual newsletter. If you're not already on our mailing list, you can join by sending your mailing address to [info@ncrlt.org](mailto:info@ncrlt.org).

**Support our work!** Donate on our website or by scanning the QR code (right) to help NRLT continue supporting, protecting, and restoring wild and working lands in our region.

