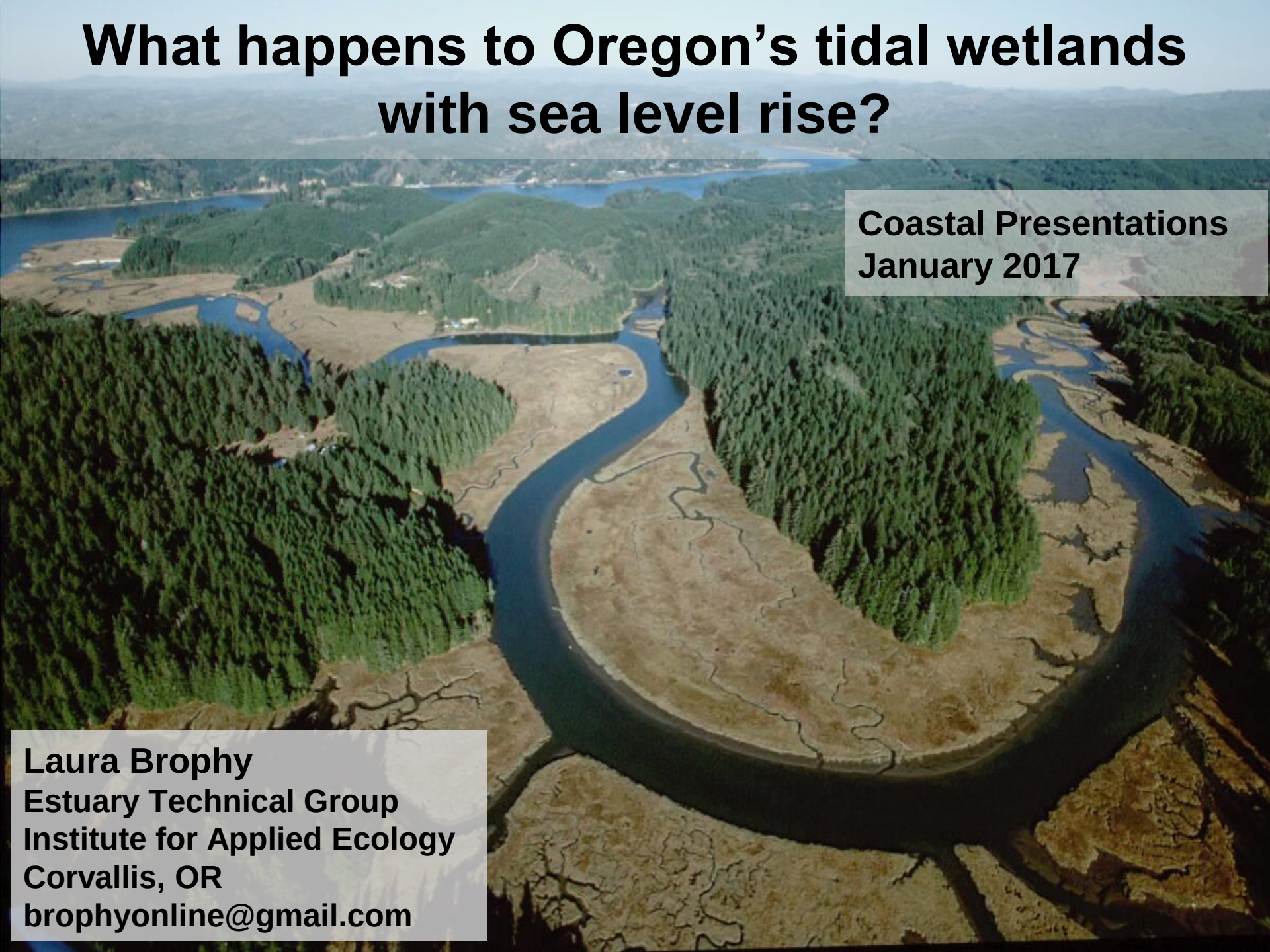
What happens to Oregon's tidal wetlands with sea level rise?



Coastal Presentations
January 2017

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Project maps future tidal wetlands, predicts losses

Funding: Oregon Watershed Enhancement Board, USFWS Coastal Program

Contractor: Estuary Technical Group (Laura Brophy, Michael Ewald)

Conducted for the MidCoast Watersheds Council

Project Manager: Fran Recht, PSMFC

Provides tools for conservation and restoration planning

This project:

- **Maps** future tidal wetlands for 4 sea level rise ("SLR") scenarios
- **Provides tools to help local groups prioritize** the mapped areas for action planning
- **Reaches out** to coastal watershed councils and other interested groups
- **Covers** all 23 Oregon estuaries S of the Columbia

What estuaries are covered by the maps?

Alsea Bay
Beaver Creek
Chetco River
Coos Bay
Coquille River
Elk River
Necanicum River
Nehalem River
Nestucca Bay
Netarts Bay
New River
Pistol River
Rogue River
Salmon River
Sand Lake
Siletz Bay
Siuslaw River
Sixes River
Tillamook Bay
Umpqua River
Winchuck River
Yachats River
Yaquina Bay

What is a tidal wetland?

…a wetland that is flooded by the tides (at least once a year, usually daily to monthly)

Our project maps tidal marsh and tidal swamp (shrub/forested), but not mud flats

Tidal wetland types

I. Tidal marsh

Low marsh

High marsh

Tidal wetland types

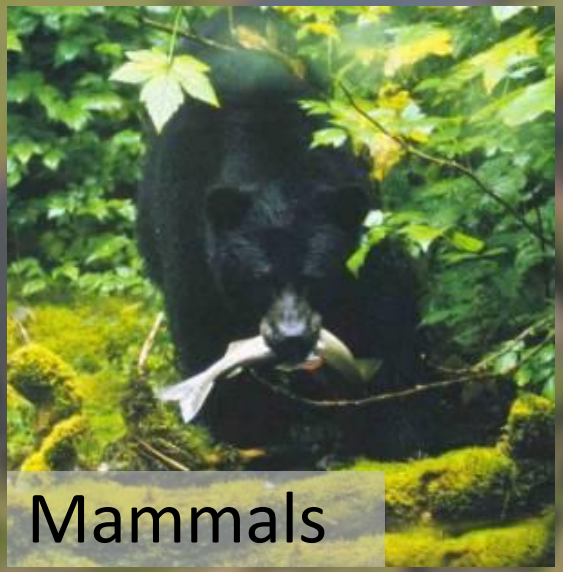
II. Tidal swamp

How will sea level rise affect tidal wetlands? And why should we care?

Tidal wetlands support many creatures

Salmon

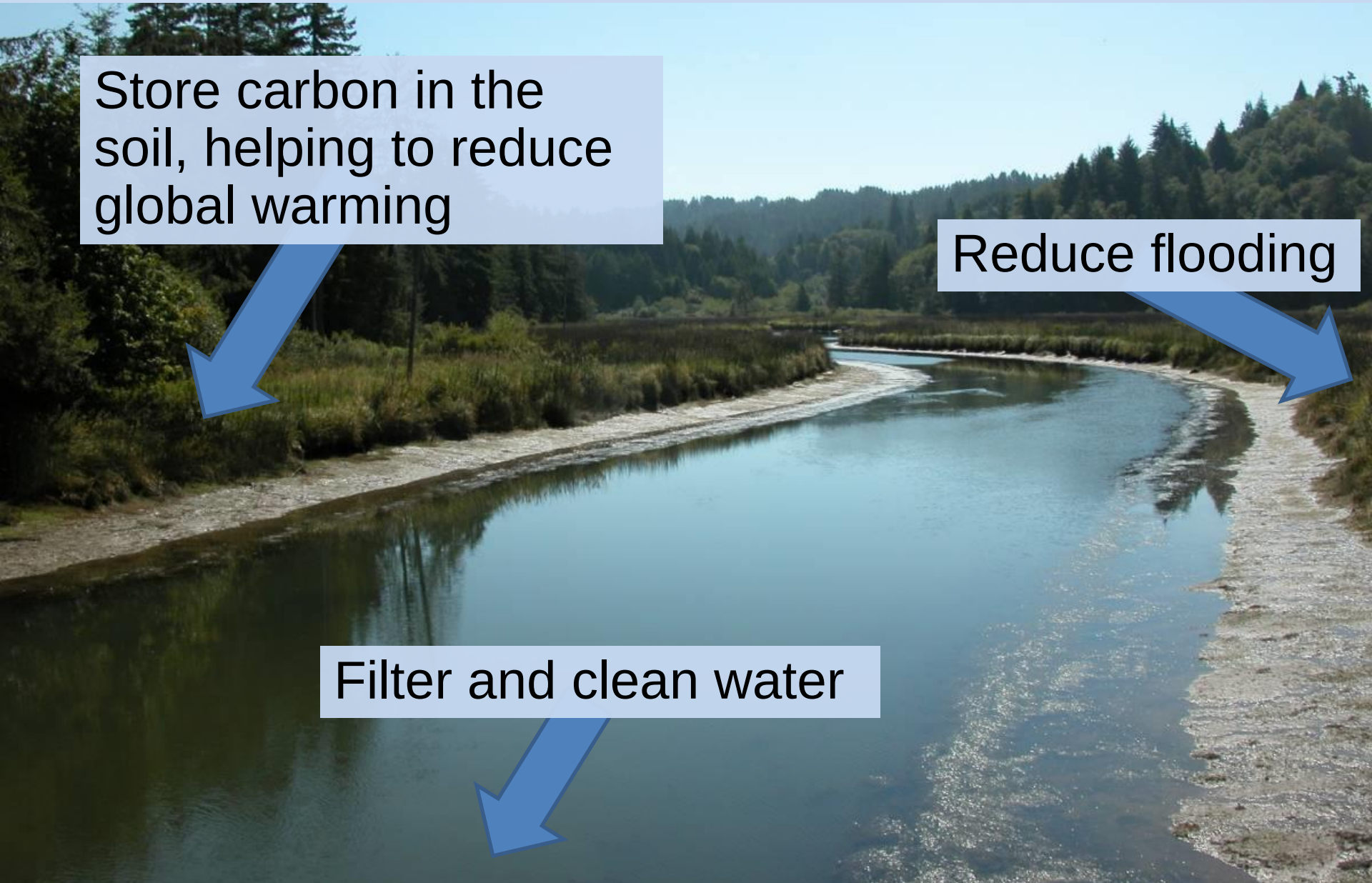
Birds



Mammals

Other fish & shellfish

What else can tidal wetlands do for us?



Yaquina Estuary – normal high tide

Yaquina Estuary – “King Tide”… Future normal high tide?

So how can our tidal wetlands survive into the future?

They'll move upslope – if they can…

If tidal wetland vegetation can't survive in its current location, wetlands will "migrate" upslope.

We call the area they'll move to, the "Landward Migration Zone" or "LMZ".

First step in determining where future tidal wetlands may be:

Tidal wetlands aren’t always easy to identify

But… this recent project in Oregon gives us accurate maps of current tidal wetlands:

Updating Oregon's estuarine wetland habitat maps:
Modernizing the foundation for coastal resource management

Products released Oct. 2014:
http:///www.coastalatlas.net/cmecs

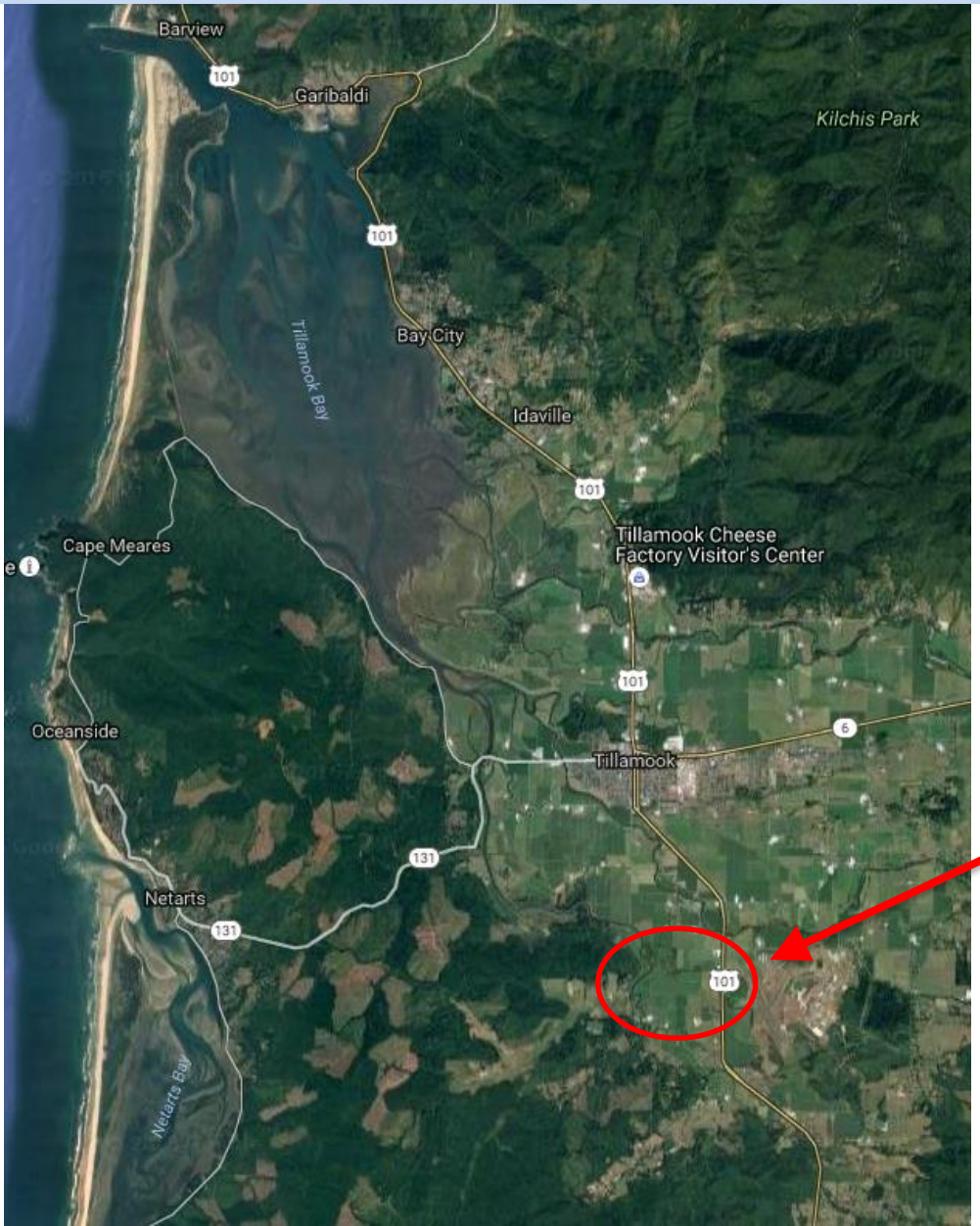
Andy Lanier[1], Laura Brophy[2],
Tanya Haddad[1], Laura Mattison[1]

[1]Oregon Coastal Management Program,
Department of Land Conservation and Development, Salem, OR
[2]Estuary Technical Group, Institute for Applied Ecology, Corvallis, OR

What's new about the 2014 Oregon estuary habitat maps?

- All current and former tidal wetlands, including diked
- All the way to head of tide, including freshwater tidal
- Based on land elevations and NOAA water level models
- Much greater accuracy than past maps
- A very good starting point for mapping future tidal wetlands

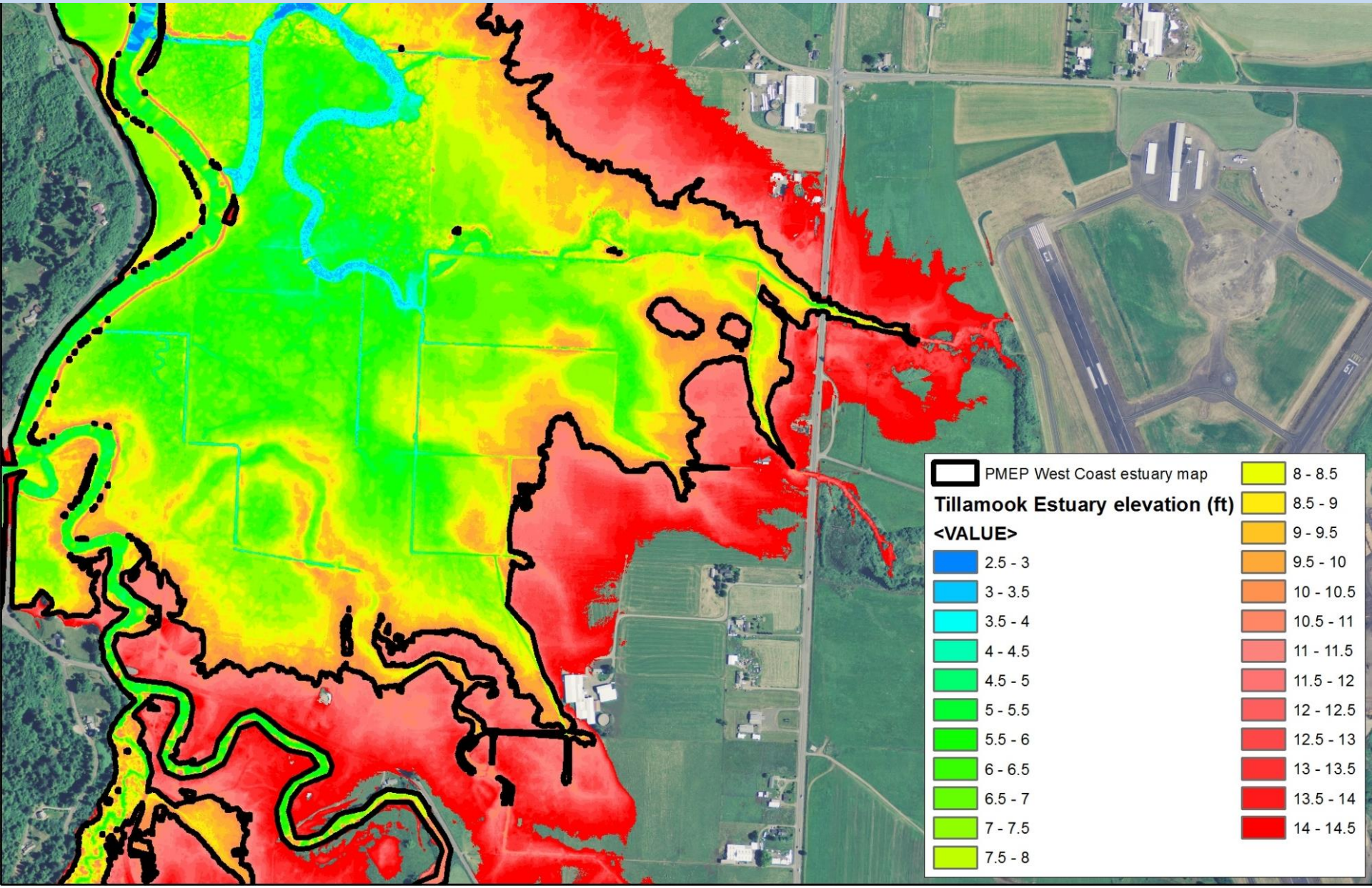
Elevation-based mapping - example



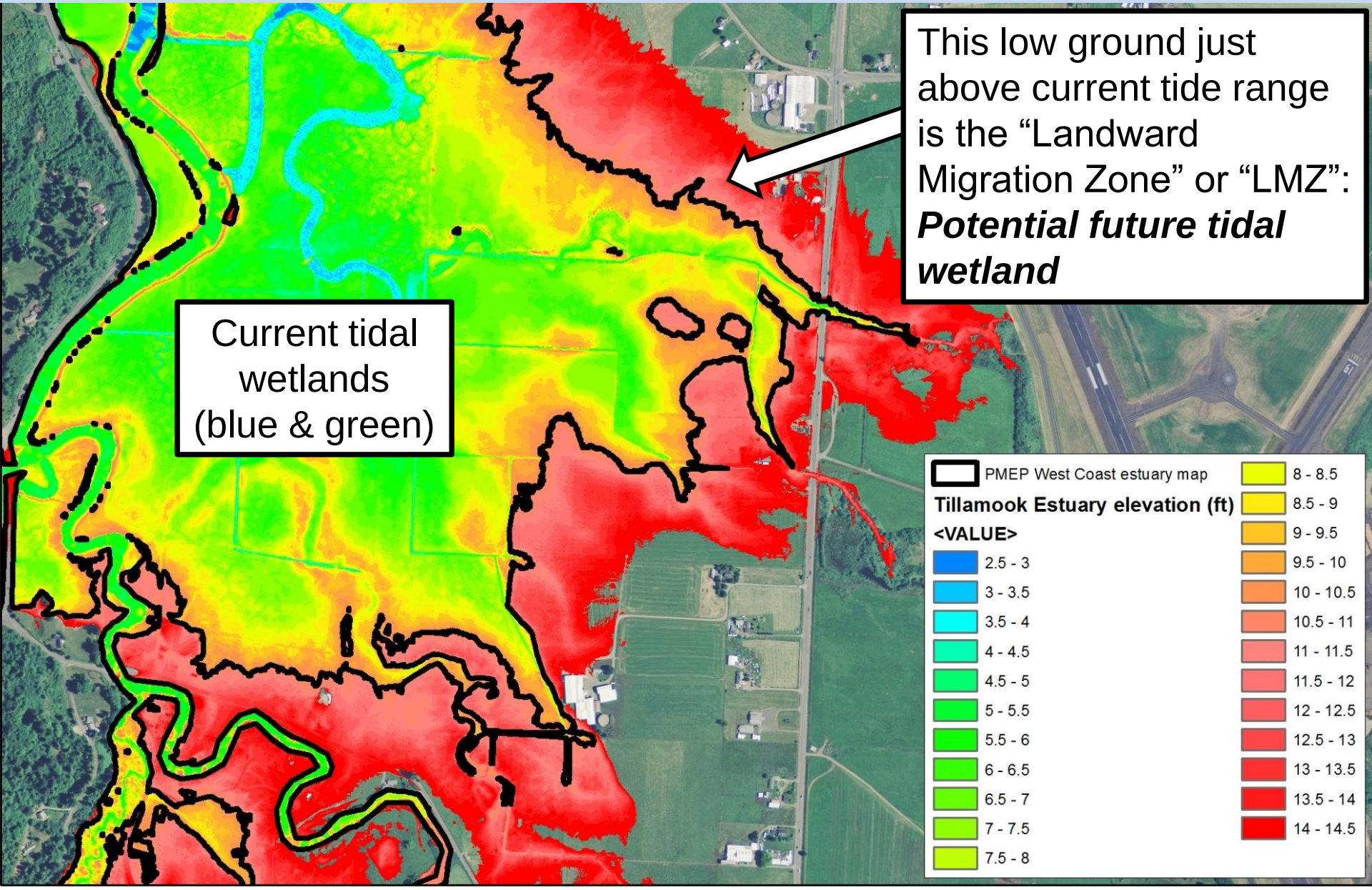
Tillamook estuary tidal floodplain – 12 miles upstream

Elevation-based mapping

Elevation-based mapping

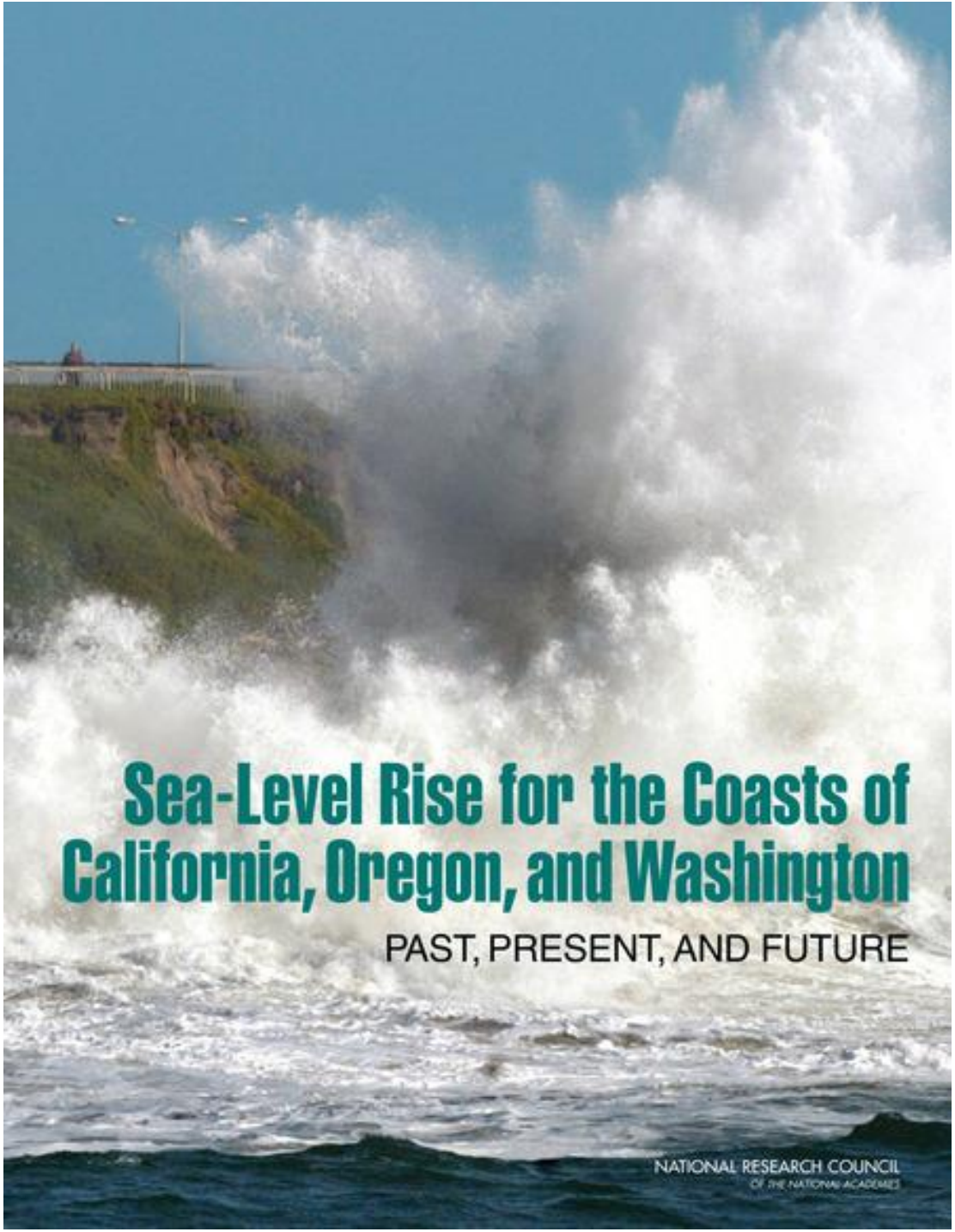


We use the same elevation-based method to map future tidal wetlands



Source of projected sea level rise data:

National Academy of Sciences 2012 West Coast SLR study



SLR scenarios

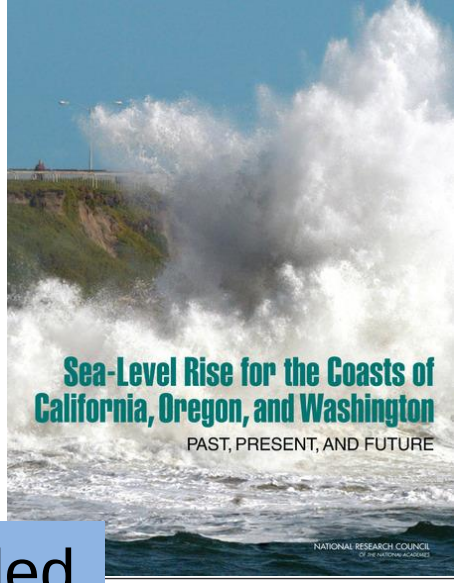


TABLE 5.3 Regional Sea-Level Rise Projections (in cm) Re

Component	2030 Projection	2030 Range	2100 Projection	2100 Range
Steric and dynamic ocean[a]	3.6 ± 2.5	0.0–9.3 (B1–A1FI)	20.9 ± 7.7	9.9–37.1 (B1–A1FI)
Non-Alaska glaciers and ice caps[b]	2.4 ± 0.2		11.4 ± 1.0	
Alaska, G		ingerprint effect[c]		
Seattle, W				
Newport,				
San Franc				
Los Ange				
Vertical la				
North of			-12	
South of		0.6–8.4	1.0–14.0	2.0–28.0
Sum of all contributions				
Seattle	6.6 ± 5.6	-3.7–22.5	16.6 ± 10.5	-2.5–47.8	61.8 ± 29.3	10.3–143.0
Newport	6.8 ± 5.6	-3.5–22.7	17.2 ± 10.3	-2.1–48.1	63.3 ± 28.3	11.7–142.4
San Francisco	14.4 ± 5.0	4.3–29.7	28.0 ± 9.2	12.3–60.8	91.9 ± 25.5	42.4–166.4
Los Angeles	14.7 ± 5.0	4.6–30.0	28.4 ± 9.0	12.7–60.8	93.1 ± 24.9	44.2–166.5

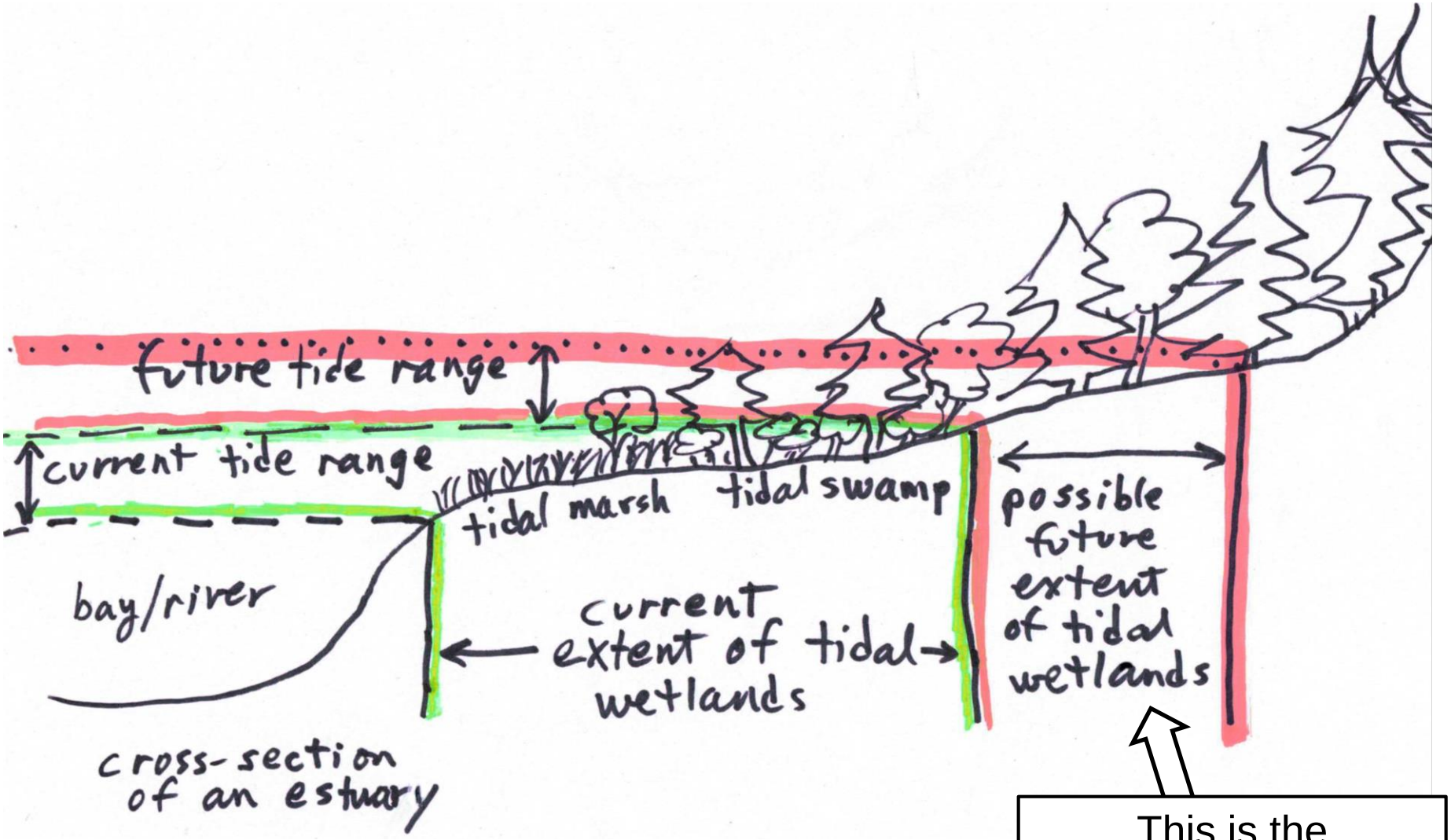
We also added an intermediate scenario: 2.5 ft (75 cm)

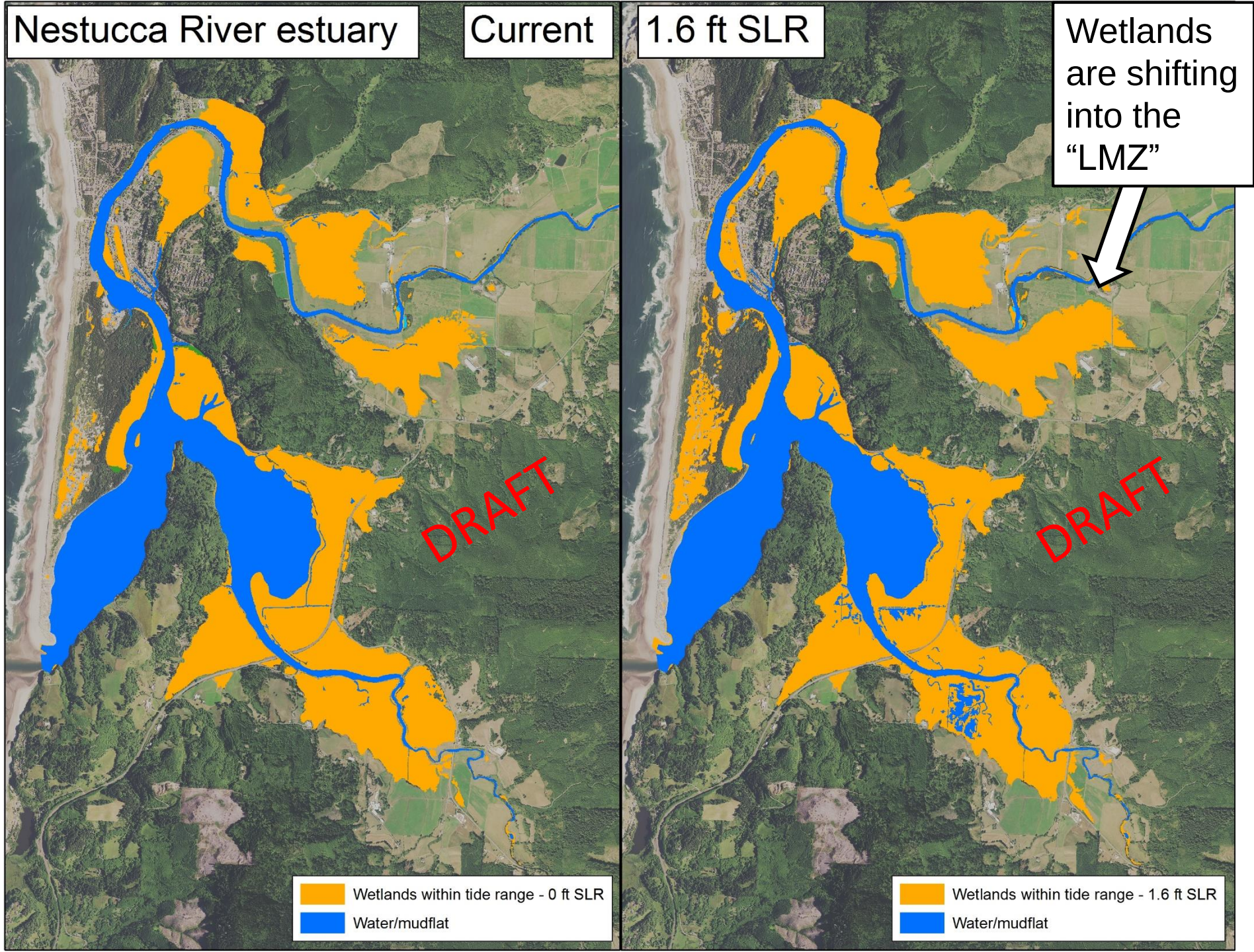
For Newport, high end of 2030 range = 9” (23 cm)

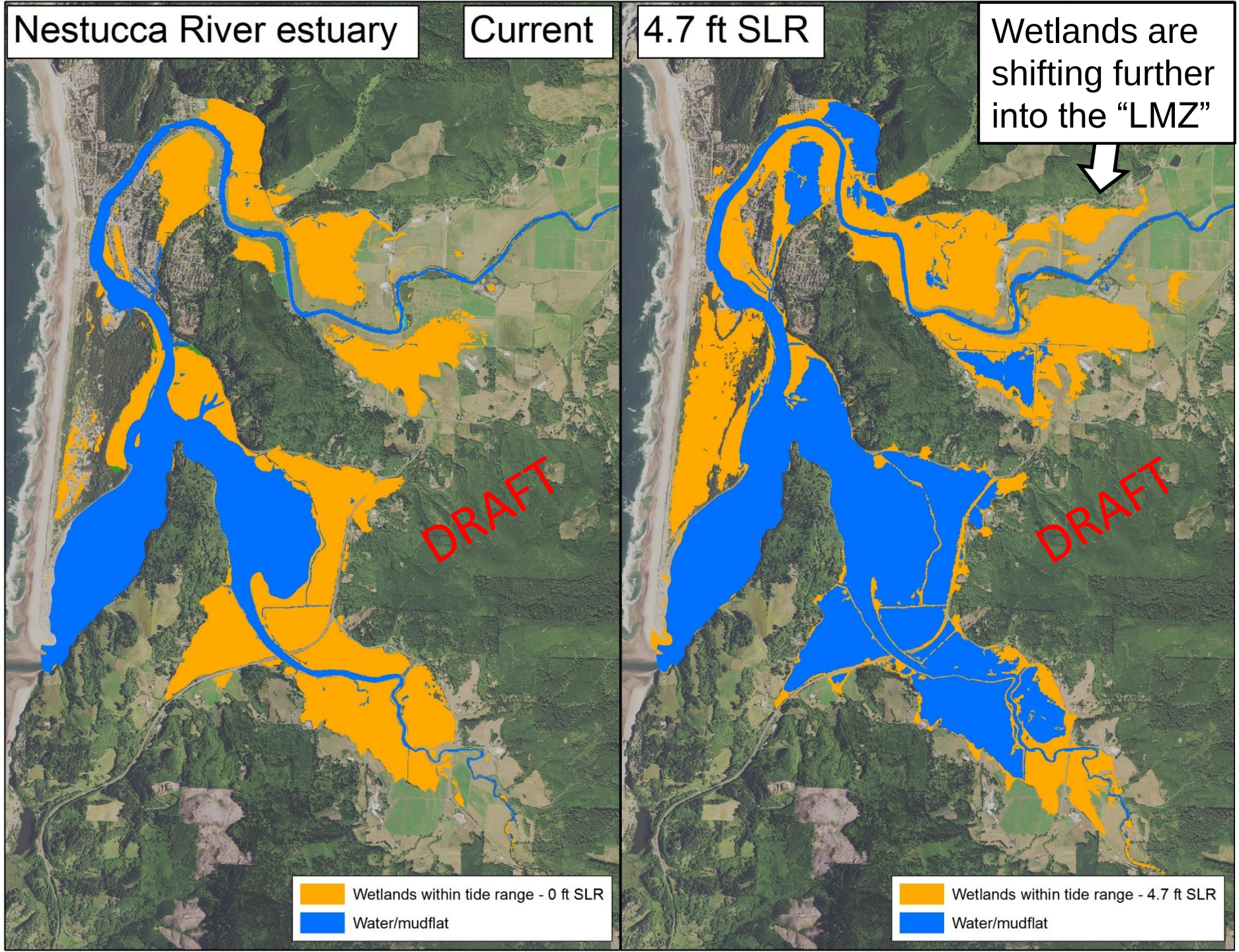
High end of 2050 range = 1.6 ft (48 cm)

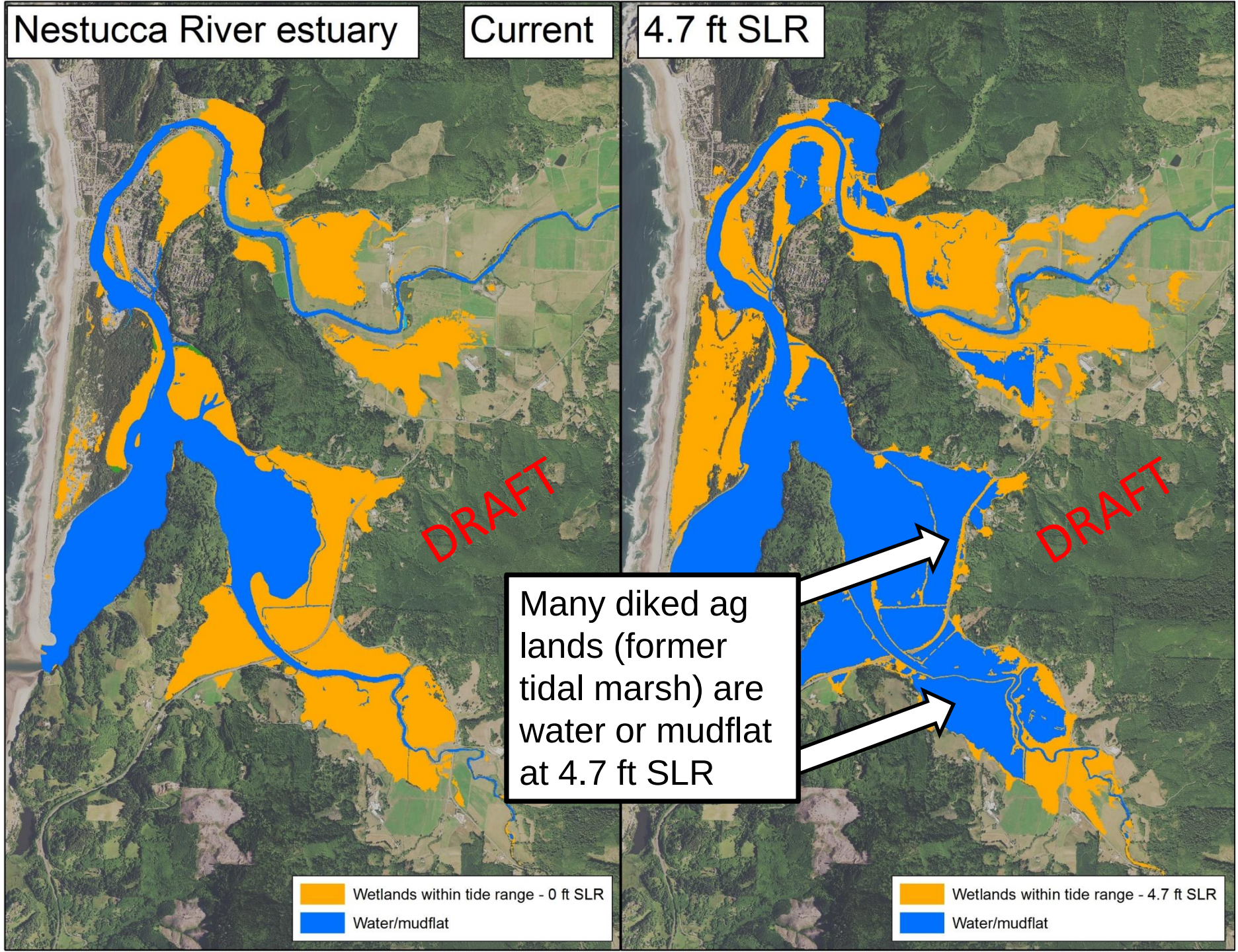
High end of 2100 range = 4.7 ft (142 cm)

Tidal wetlands form in a narrow elevation range



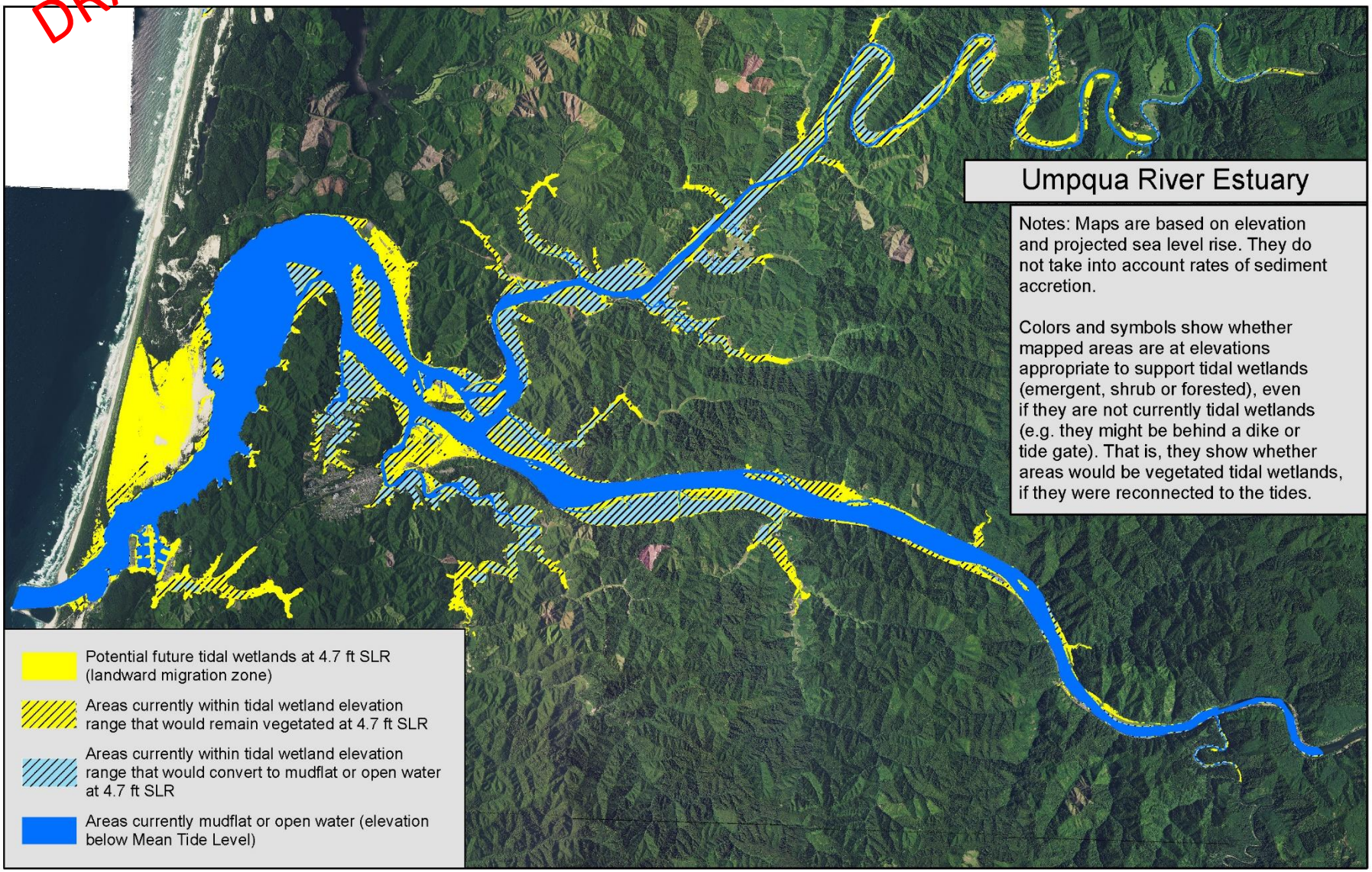

Nestucca River estuary
Current
DRAFT
Wetlands within tide range - 0 ft SLR
Water/mudflat
1.6 ft SLR
Wetlands are shifting into the "LMZ"
DRAFT
Wetlands within tide range - 1.6 ft SLR
Water/mudflat


Nestucca River estuary
Current
DRAFT
Wetlands within tide range - 0 ft SLR
Water/mudflat
4.7 ft SLR
Wetlands are shifting further into the “LMZ”
DRAFT
Wetlands within tide range - 4.7 ft SLR
Water/mudflat


Nestucca River estuary
Current
4.7 ft SLR
DRAFT
DRAFT
Many diked ag lands (former tidal marsh) are water or mudflat at 4.7 ft SLR
Wetlands within tide range - 0 ft SLR
Water/mudflat
Wetlands within tide range - 4.7 ft SLR
Water/mudflat

DRAFT

Areas currently within tidal wetland elevation range (crosshatched) and future landward migration zones (yellow) up to 4.7 ft SLR



0 0.5 1 2 3 4 5 Miles

N

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So… What should we do?

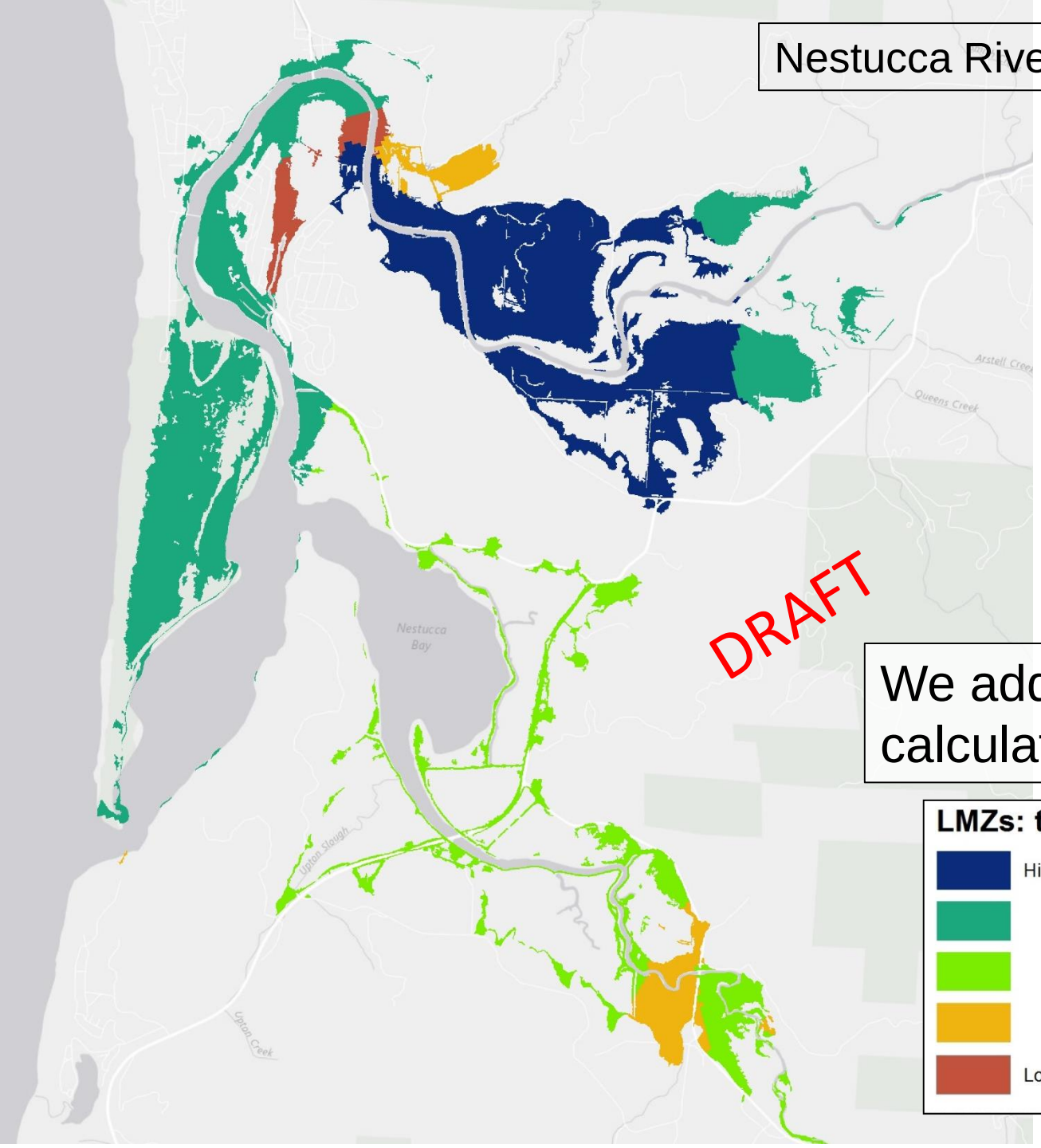
- The landscape is big; funds are small
- Strategic focus is vital
- Working to help groups with their action planning

Setting priorities: some criteria

Data is available for 5 factors that affect *importance* and *feasibility* of conserving & restoring LMZs. These 5 factors are:

- Future tidal wetland area (hectares) at 4.7 ft SLR (more = higher)
- Area of even higher LMZs (8.2 and 11.5 ft SLR)
- Current land use zoning (non-developed = higher)
- Land ownership (public = higher)
- Development status (undeveloped = higher)

Nestucca River estuary



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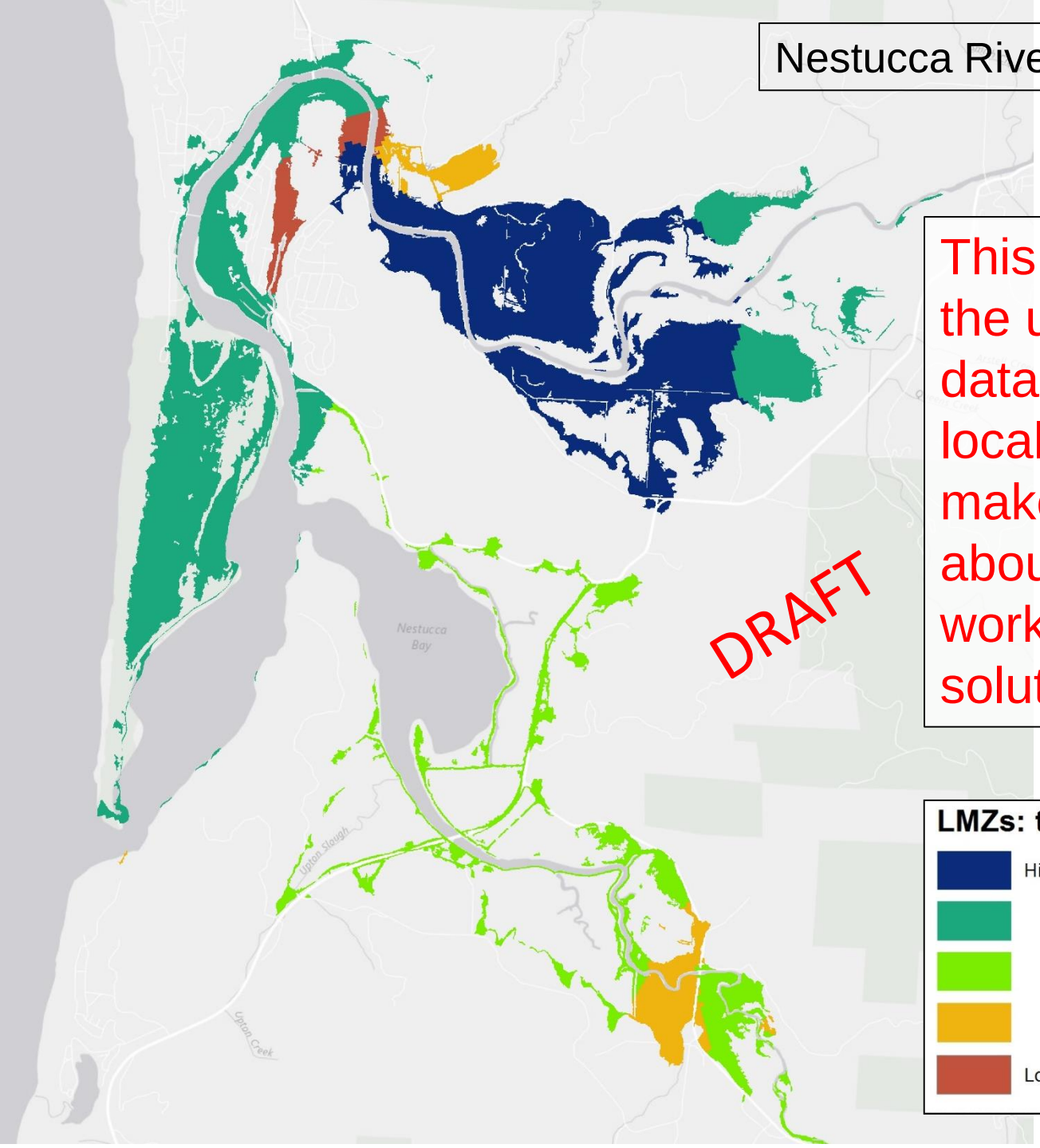
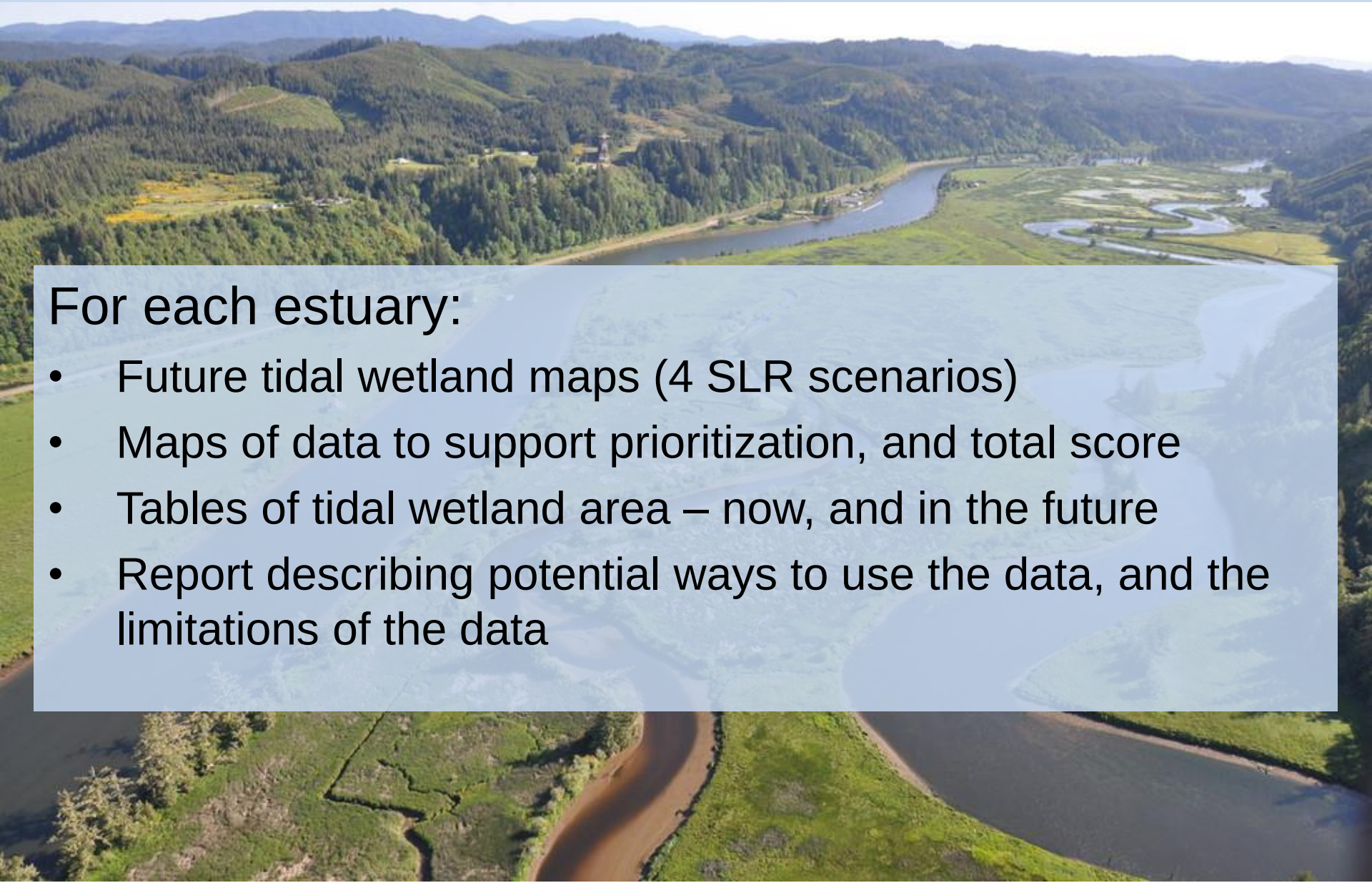
We added the 5 scores to calculate a **total score:**

LMZs: total score

- High
- Low


Nestucca River estuary
DRAFT
This scoring- and the underlying data - may help local groups make decisions about how to work towards solutions.
LMZs: total score
High
Low
Nestucca Bay
Upton Slough
Upton Creek

Tools we will provide



For each estuary:

- Future tidal wetland maps (4 SLR scenarios)
- Maps of data to support prioritization, and total score
- Tables of tidal wetland area – now, and in the future
- Report describing potential ways to use the data, and the limitations of the data

How can the results be used?

- Talk with upslope landowners
- Consider easements, restoration activities, other tools to conserve LMZs
- Use maps to understand vulnerability
- “Plan in 4 dimensions” for resilience
- Recognize that gradients and connectivity are important, regardless of sea level rise

Questions?

Now on to the maps of results in your estuary…

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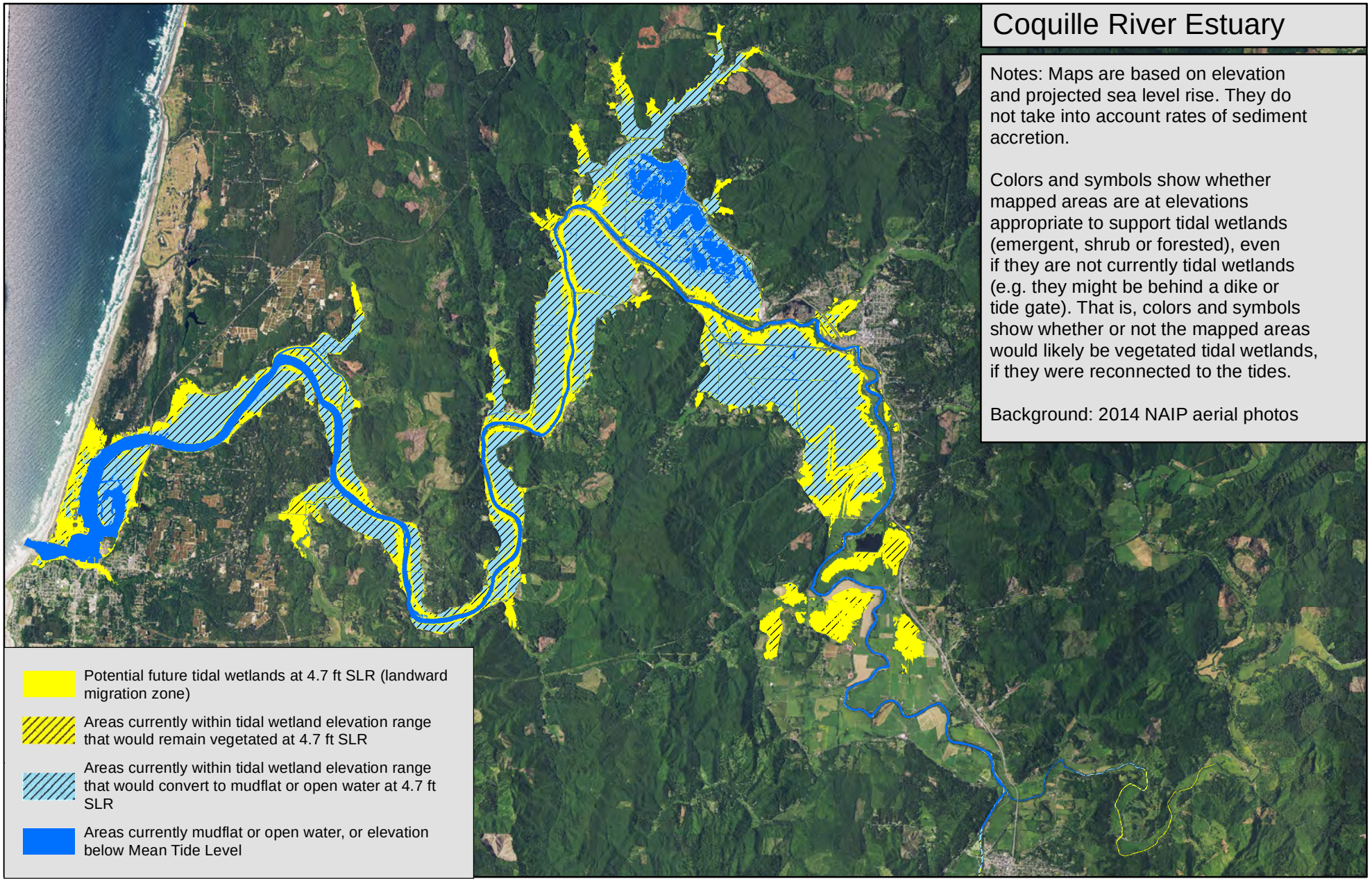
Institute for Applied Ecology, Corvallis, OR

Potential future tidal wetlands and mudflats/open water at 4.7 ft SLR, versus areas currently within tidal wetland elevation range (see legend for details)



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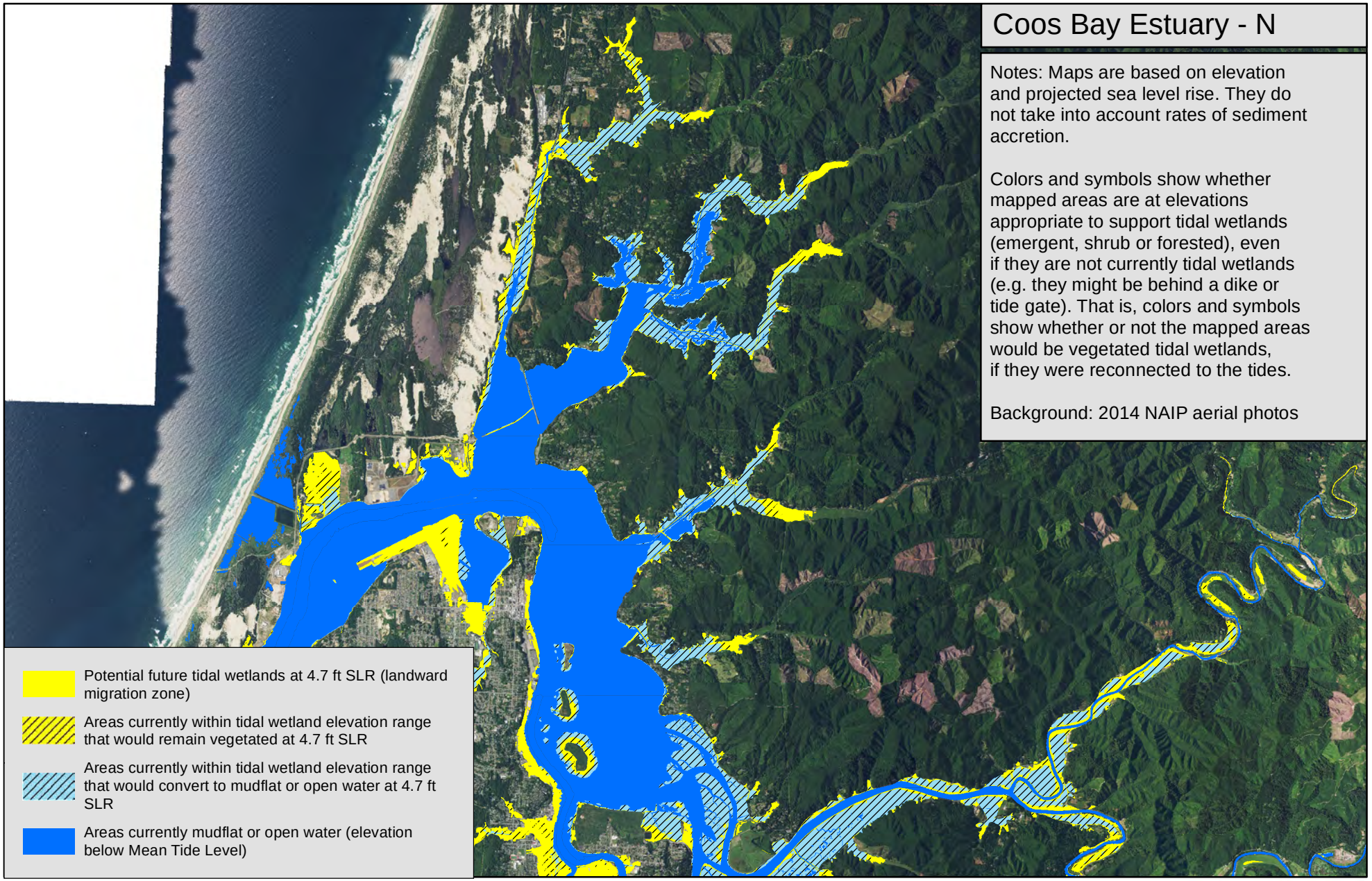
Potential future tidal wetlands and mudflats/open water at 4.7 ft SLR, versus areas currently within tidal wetland elevation range (see legend for details)



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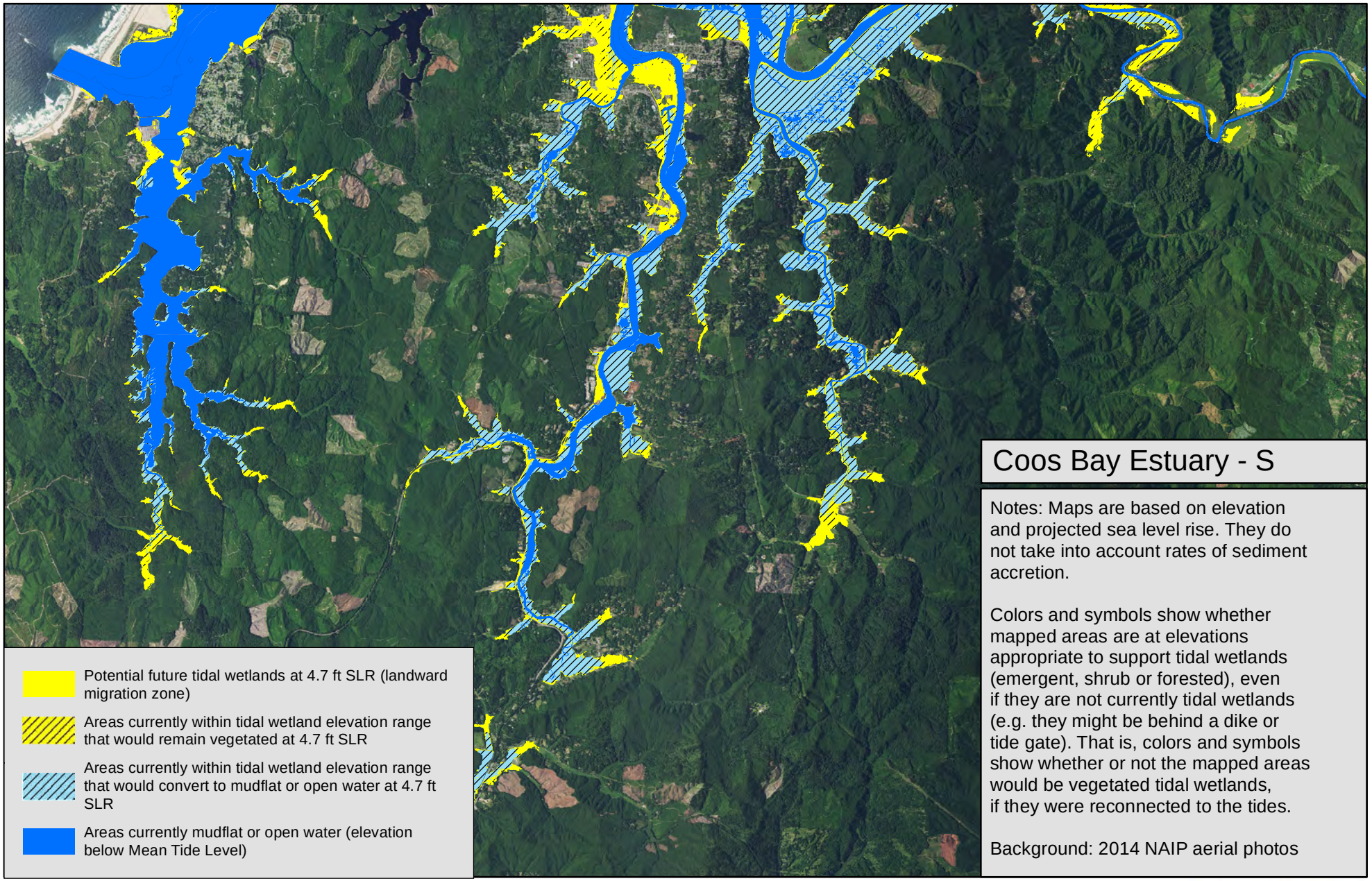
Potential future tidal wetlands and mudflats/open water at 4.7 ft SLR, versus areas currently within tidal wetland elevation range (see legend for details)



Coos Bay Estuary - S

Notes: Maps are based on elevation and projected sea level rise. They do not take into account rates of sediment accretion.

Colors and symbols show whether mapped areas are at elevations appropriate to support tidal wetlands (emergent, shrub or forested), even if they are not currently tidal wetlands (e.g. they might be behind a dike or tide gate). That is, colors and symbols show whether or not the mapped areas would be vegetated tidal wetlands, if they were reconnected to the tides.

Background: 2014 NAIP aerial photos

0 0.5 1 2 3 4 5 Miles

N

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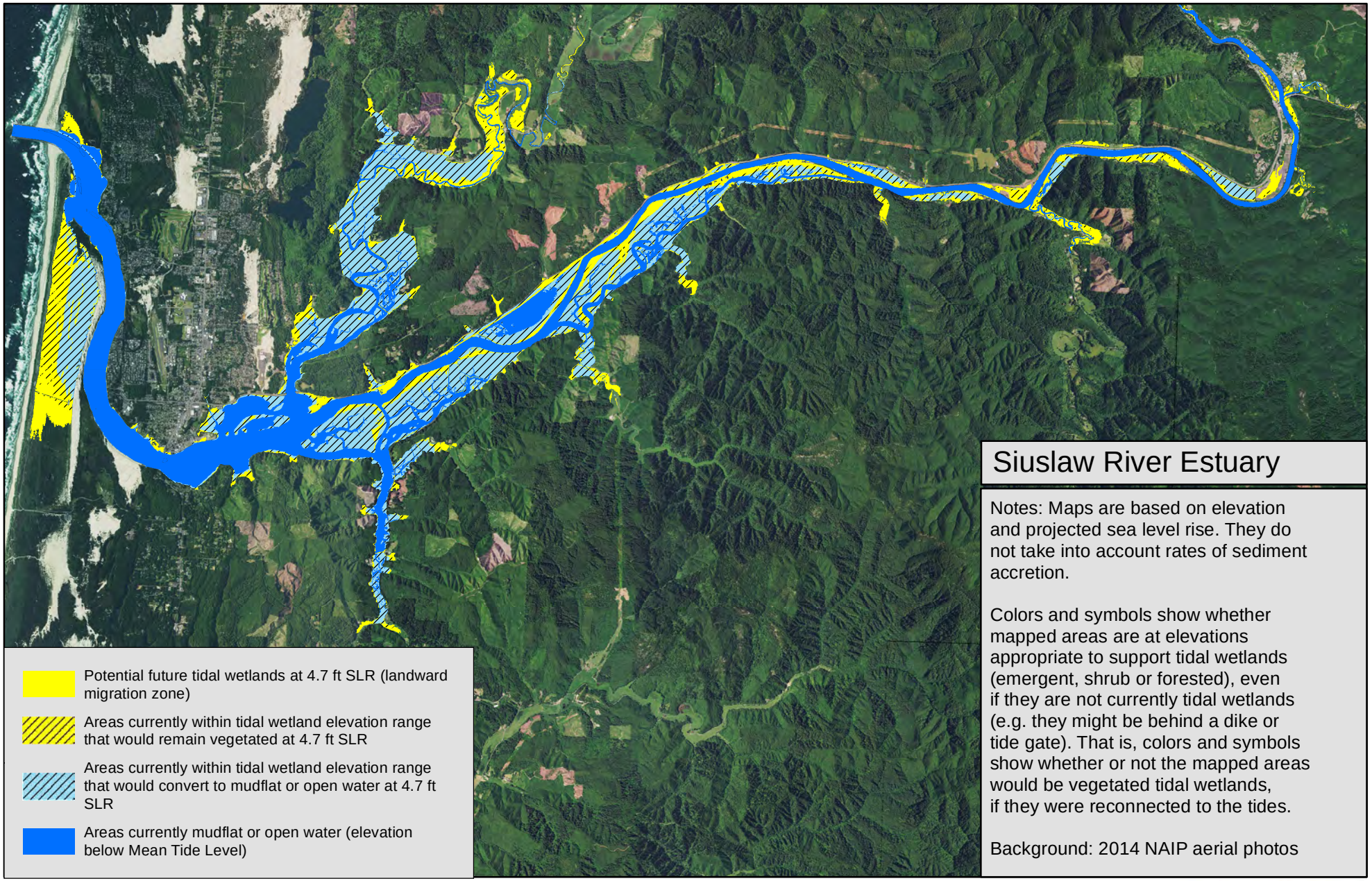
Potential future tidal wetlands and mudflats/open water at 4.7 ft SLR, versus areas currently within tidal wetland elevation range (see legend for details)



Siuslaw River Estuary

Notes: Maps are based on elevation and projected sea level rise. They do not take into account rates of sediment accretion.

Colors and symbols show whether mapped areas are at elevations appropriate to support tidal wetlands (emergent, shrub or forested), even if they are not currently tidal wetlands (e.g. they might be behind a dike or tide gate). That is, colors and symbols show whether or not the mapped areas would be vegetated tidal wetlands, if they were reconnected to the tides.

Background: 2014 NAIP aerial photos

0 0.5 1 2 3 4 Miles

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