

# NOAA Coastal Management Fellowship Update

## Constructing a Diked Lands Vulnerability Inventory to Support Strategic Planning for the Impacts of Sea Level Rise



Juna Hickner, for **Laura Mattison**  
Oregon Department of Land Conservation and Development,  
Oregon Coastal Management Program

# Dikes, Tidegates, and Sea-Level Rise: What They Mean for Estuaries

Laura Mattison, NOAA Coastal Fellow, Oregon Coastal Management Program

Laura.Mattison@state.or.us

The Baldwin Group Inc.

NOAA Coastal Services Center  
LEARNING FROM NATURE



Dikes prevent tide water from coming into marshes/lowlands.



Meandering tidal channels are replaced by linear drainage ditches to direct freshwater away from the marsh and tidegates allow freshwater to exit without allowing tide water to enter.



The elimination of tidal inundation and the changes in channel morphology result in dry land for pasture and agriculture, but also have many unintended effects.

## A few of the many effects of diking and drainage systems:



Oregon Salt Marsh

- Soil salinity is reduced and other biochemical and water quality changes
  - Subsidence (the lowering of land elevation)
- Fish migration is obstructed and habitat for fish, birds, and invertebrates is reduced
  - Soil moisture and in plant composition is changed
- Erosive energy is transferred to nearby marshes and deltas
- Inorganic sediment, nutrients, woody debris, and aquatic organisms from the ocean are blocked
- Temperature and turbidity in fresh water channels increases while sinuosity decreases



Oregon Cow Pasture



Diking and tidegate systems



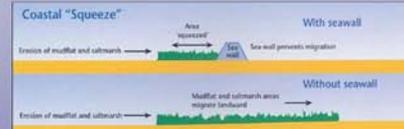
Sea-level rise and storm increases



The "coastal squeeze": rising sea levels on one side and physical barriers such as dikes on the other.

Ecosystems that would normally migrate upwards in response to increase storms and sea levels are stopped by physical barriers.

ALSO, failing dikes could jeopardize key infrastructure or economically viable operations.

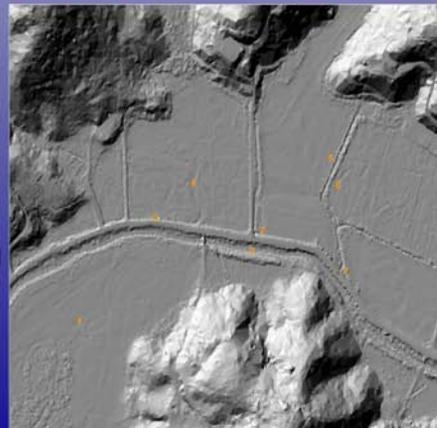


Environment Agency, 1996

Fellowship Project: Creating a dikes and levee inventory of Oregon's estuaries is one of the products resulting from the Oregon Coastal Management Program's Climate Change Adaptation Strategy. It will be a geo-spatial tool to assist coastal planners in planning for sea-level rise and risks such as "coastal squeeze" and vulnerable infrastructure. It will include the location of dikes and levees as well as their management and infrastructure regime.

### Using LiDAR!

- Former Wetland/Tidal Flat, Now Pasture
- Roadway Levee
- Dike
- Remnant Tidal Channel
- Ditch
- Ditching Side Cast
- Tidegate

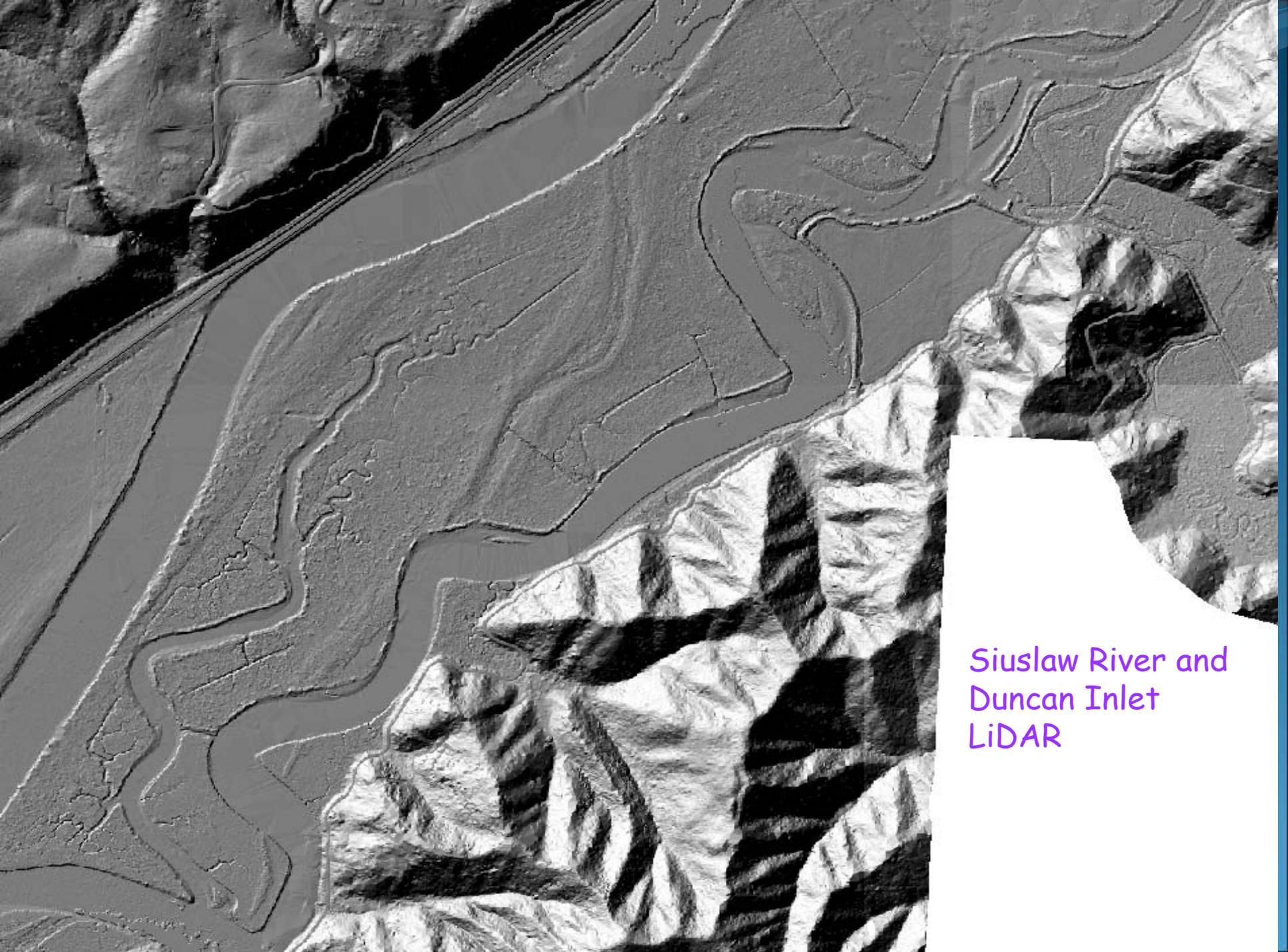


- ### Making Maps and Databases
- Dike Classification
  - Diking District Boundaries
  - Status of Diking Districts Management Activities
  - Dike Materials and Condition
  - Wetland Classification of Protected Land
  - Management Status of Protected Land

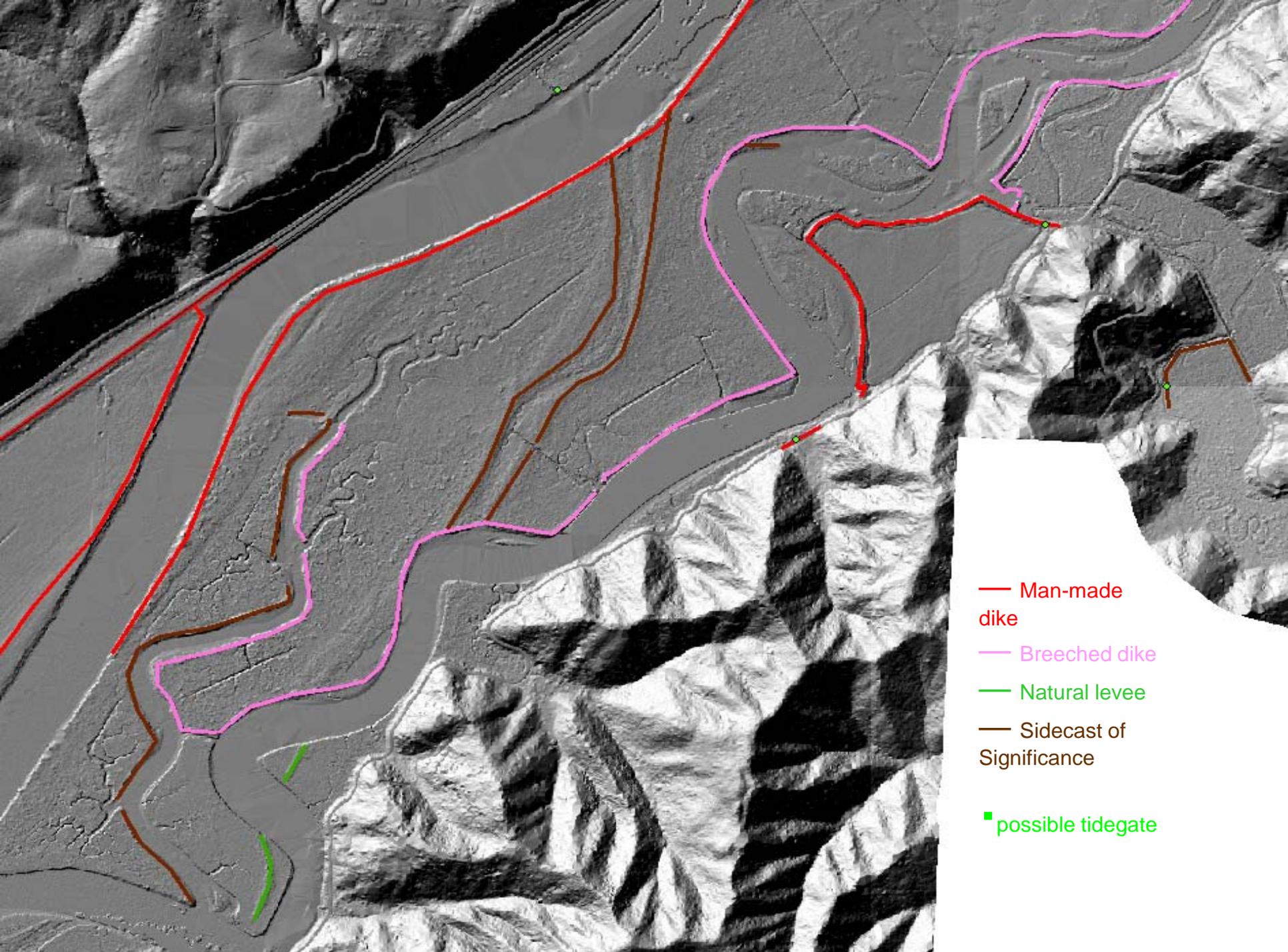


# Overview of the Process...

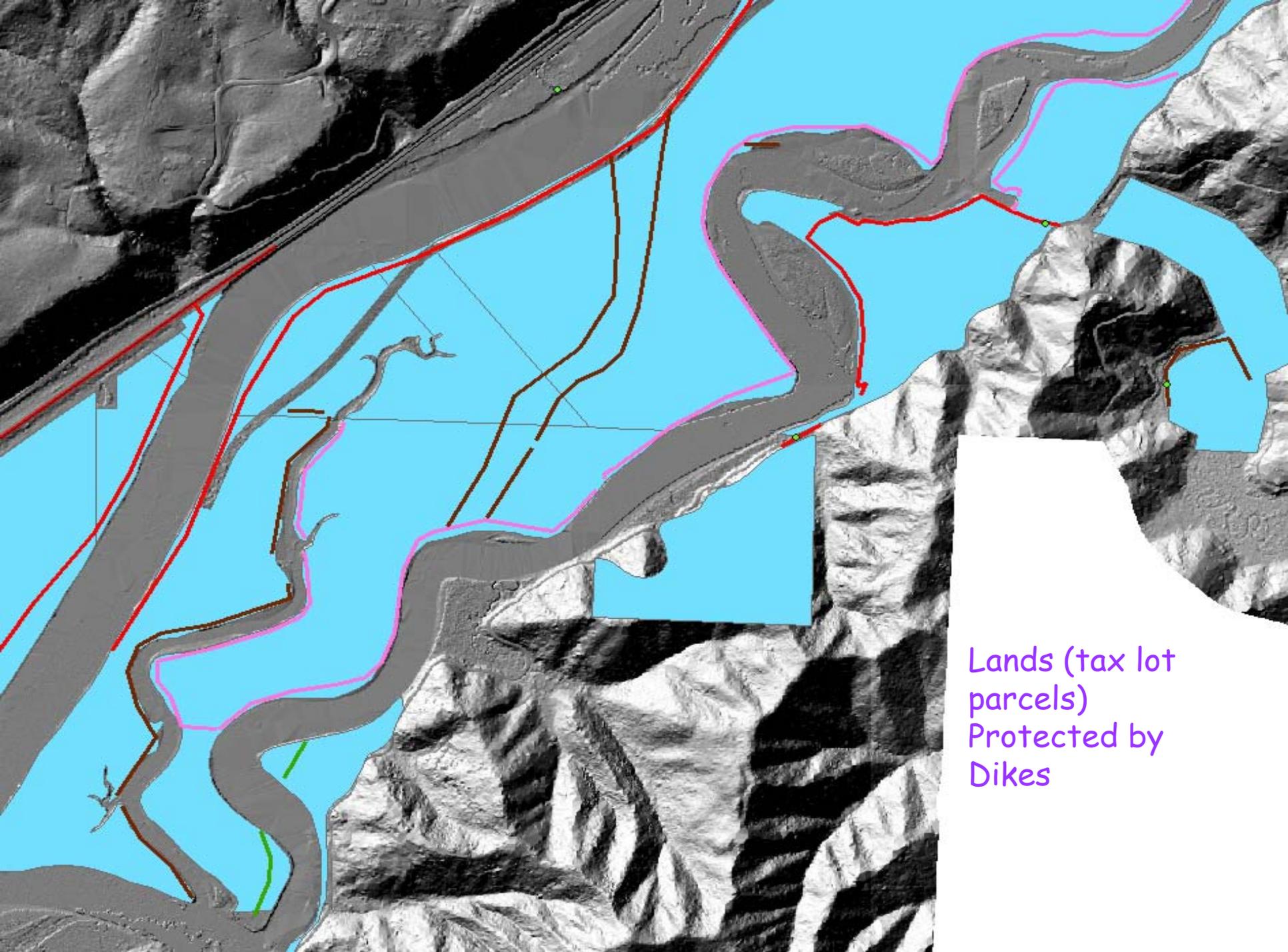
1. Digitizing dike and levee location using LiDAR, arial photography, tidegate surveys, soil surveys, USGS Topo maps, county road data
2. Verifying and enhancing data analysis with local knowledge and ground truthing
3. Researching the existence, or lack thereof, of pertinent special districts and mapping their boundaries/verifying their activity status
4. Completing attribute data for dikes and levees, land protected by dikes and levees, and land protected by dikes and levees with cultural or historical significance



Siuslaw River and  
Duncan Inlet  
LiDAR



- Man-made dike
- Breached dike
- Natural levee
- Sidecast of Significance
- possible tidegate



Lands (tax lot  
parcels)  
Protected by  
Dikes

<b>OBJECTID</b>	<b>SHAPE_Length</b>	<b>SHAPE_Area</b>
20696	8174.030622	2807306.571596
20791	37048.918041	14047550.348998

<b>Parcel Number</b>	<b>Jurisdiction</b>	<b>Watershed</b>
21122401200	Douglas County	Smith River
21123600200	Douglas County	Umpqua River

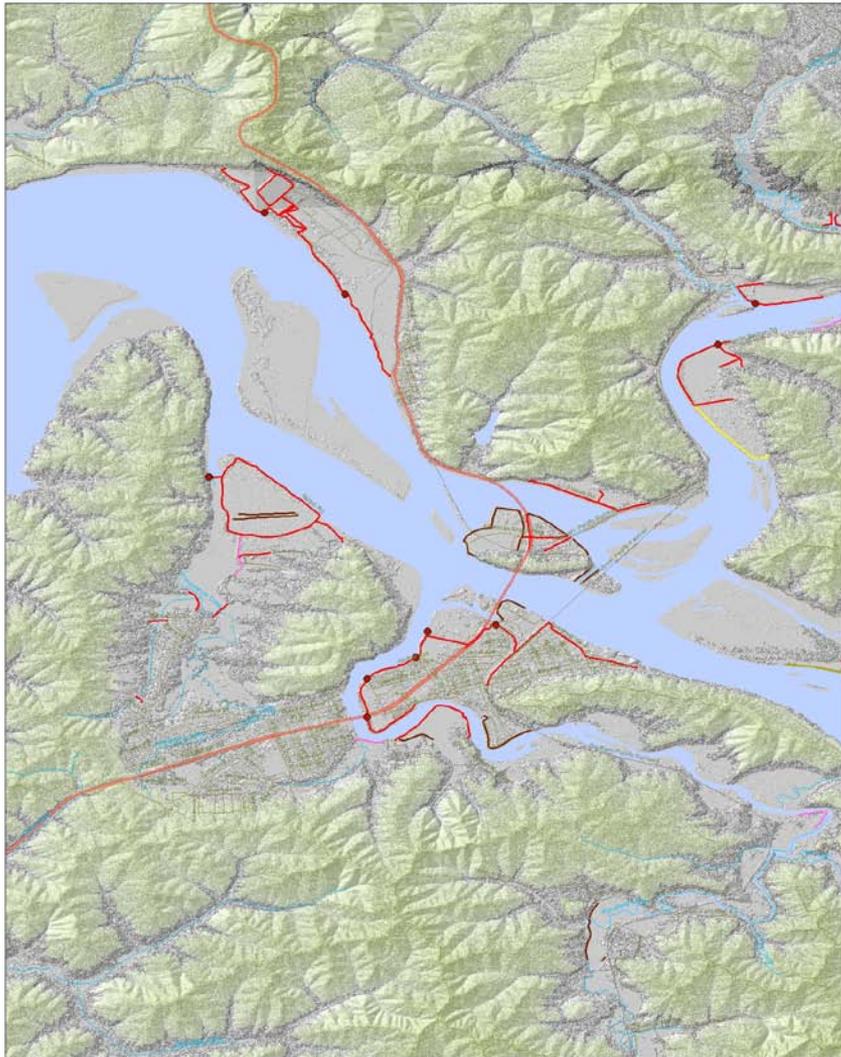
<b>Subwatershed</b>	<b>Owner</b>
3372	Dawson, Lucille S
3437 and 3372	Butler Creek Farm Inc

<b>Owner_Address</b>	<b>Land_Uses</b>
889 Dawson Section Rd	Agricultural Lands
P.O. Box 144	Special Shoreland Site

**NWI\_Classification**  
 PEMC, PEMCh, E2USN, E2EMN, E1UBL, PFO/SSC  
 E2EMN, PFOR, PEMA, PEMR, PFOA, PFOS, PEMS,  
 E2USN, PEM/FOC, R1UBV, E1UBL

**General\_Notes**  
 Classified as diked; Ditched and tidegated  
 Mowed and grazed

<b>City</b>	<b>State</b>	<b>Zip</b>
Reedsport	OR	97467
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## Tidegates and Dikes of the Umpqua and Smith Rivers

1:23,559

July 2010



# Present and Future Tangential Projects:

- Tidegate inventory (most comprehensive to-date)
- Historic ecologically significant lands based on Laura Brophy, Patricia Benner, and coastal tribes
- Boundary maps of current and historical special districts from ancient records
- Story documentation from “old-timer” accounts
- Tools and maps to VIP groups and volunteers, possible article in local county newspapers
- Gathering ideas for other, more community-oriented mapping projects of other perceived risks and resources identified by estuarine land VIPs
- Identify data needed for climate change scenario planning (i.e. CAPIS and SLAMM)

# Lessons Learned...

- GIS tricks and tools
- How to use Microsoft Access
- How to see the way that land has been altered, even subtly, and how that can have dramatic consequences
- How knowledge of history and what is natural can become lost, but perhaps dug up in old sources (people, old paper files in basements, old government surveys)
- How to perceive man-made alterations to land using LiDAR and photography
- How people will tell you most anything if they meet you in person and like you, even if you work for the government
- Generally, people like maps and holding the pen
- Estuary Planning and Zoning in Oregon
- What it means to prioritize wetland mitigation projects and how those projects happen, both politically and ecologically
- How coastal managers are preparing for climate change and sea-level rise in Oregon and nationally

[laura.mattison@state.or.us](mailto:laura.mattison@state.or.us)

