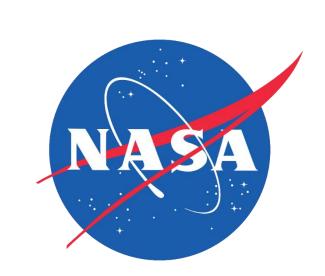


South Slough Water Resources

Monitoring Changes in Water Quality to Identify Stressors in Eelgrass **Extent Throughout the Coos Estuary**



Project Synopsis

In Oregon's Coos Estuary, the extent of eelgrass (Zostera marina) meadows has decreased substantially since 2005. The project team used remote sensing data to map water quality and eelgrass extent between the years 2016 and 2023 to better understand the conditions driving eelgrass decline. The team found that remote sensing techniques are viable for visualizing broad water quality trends, but feasibility of remote eelgrass mapping is limited in the Coos Estuary.

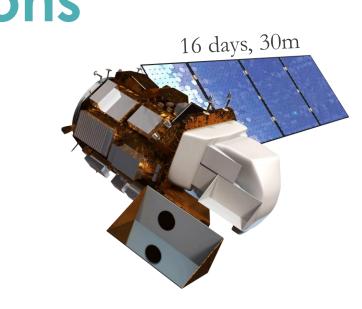
Objectives

- Develop remote sensing and spatial mapping methods to enhance water quality data collection and better understand the drivers of eelgrass decline
- Generate a time series analysis of turbidity, chlorophyll-a, and eelgrass extent
- Map water quality and eelgrass distributions in the Coos Estuary between 2016 and 2023

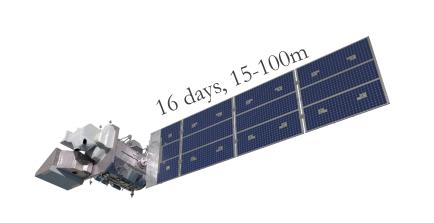
Study Area



Sentinel-2 MSI Level 2-A Surface Reflectance

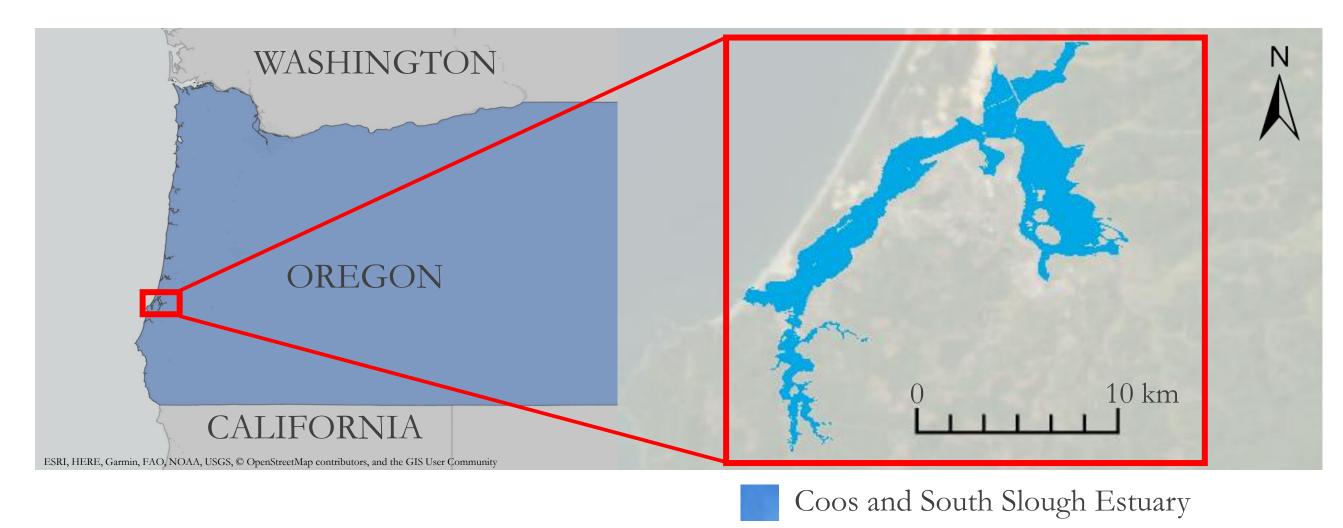


Landsat 8 OLI Surface Reflectance Collection 1, Tier 1



Landsat 9 OLI-2 Level 2 Surface Reflectance Collection 2, Tier 1

Image Credits: NASA, Rama

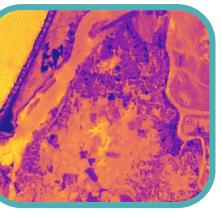


Methodology





Red-Edge



Red

Green

Blue

Eelgrass Extent



NDAVI



Eelgrass Extent

Indices

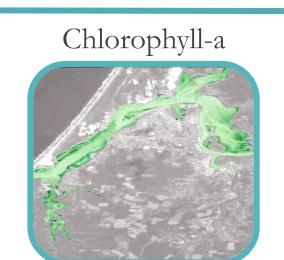
NDAVI = NIR - BLUE NIR + BLUE

NDCI =

Red-Edge - RED Red-Edge + RED

RED - GREEN NDTI = -RED + GREEN

Water Quality





Results

Fig. 1 3-Year Comparison of Normalized Difference Chlorophyll Index (NDCI)

Fig. 2 3-Year Comparison of Normalized Difference Turbidity Index

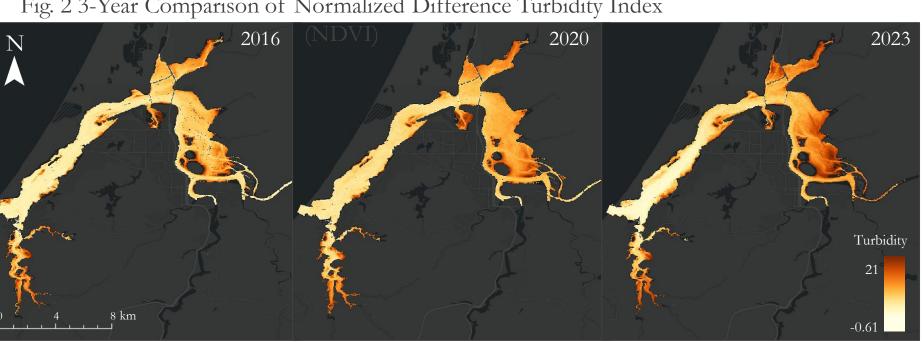


Fig. 3 3-Year Comparison with Support Vector Machine (SVM)

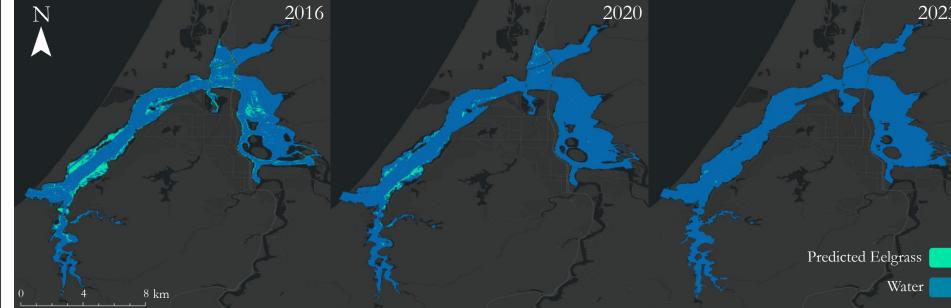
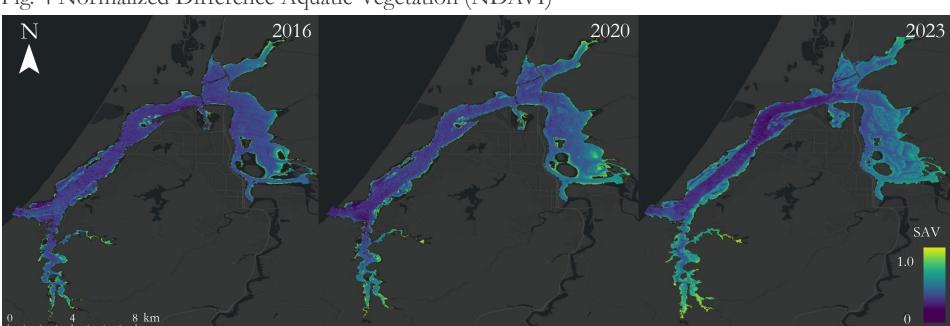
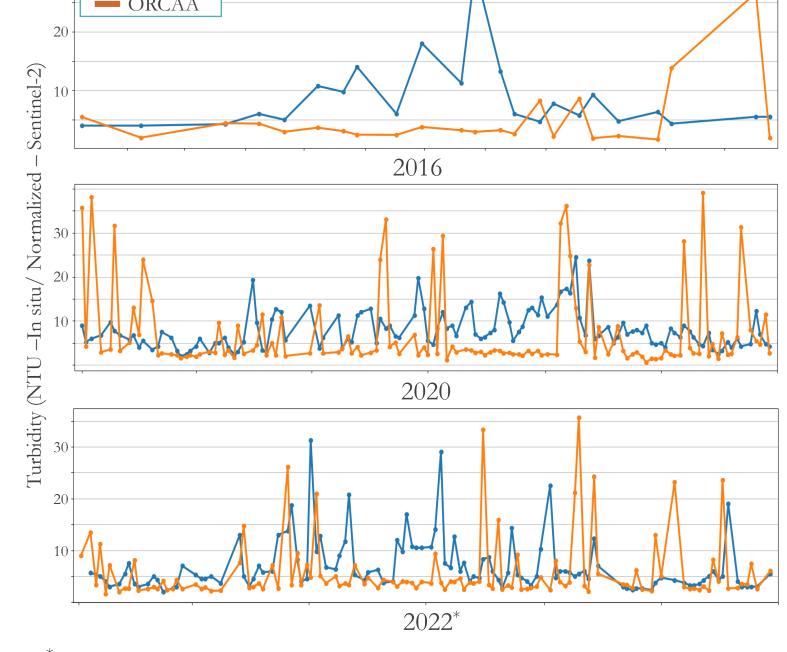


Fig. 4 Normalized Difference Aquatic Vegetation (NDAVI)



Conclusions

Fig. 5 ORCAA and In situ Data for 2016, 2020, and 2022 In situ ORCAA



* 2023 data not available at the time of project completion

Project Partners

South Slough National Estuarine Research Reserve

Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians' Department of Natural Resources

Team Members



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- Remote sensing using satellite data offers the potential to visualize broad water quality trends in the South Slough
- Indices such as NDAVI are useful to the partners for exploratory investigations into potential eelgrass meadows
- In-situ measurements are highly recommended and can improve eelgrass identification and classification from satellite data in the study area

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