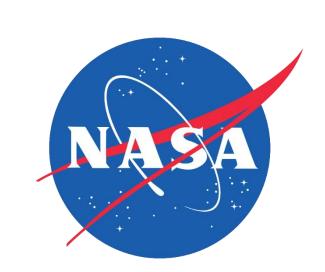


# South Slough Water Resources

# 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.

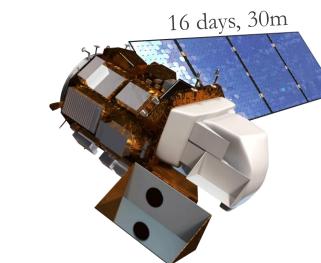
### **Objectives**

- 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

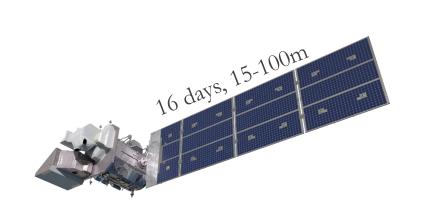
### **Study Area**





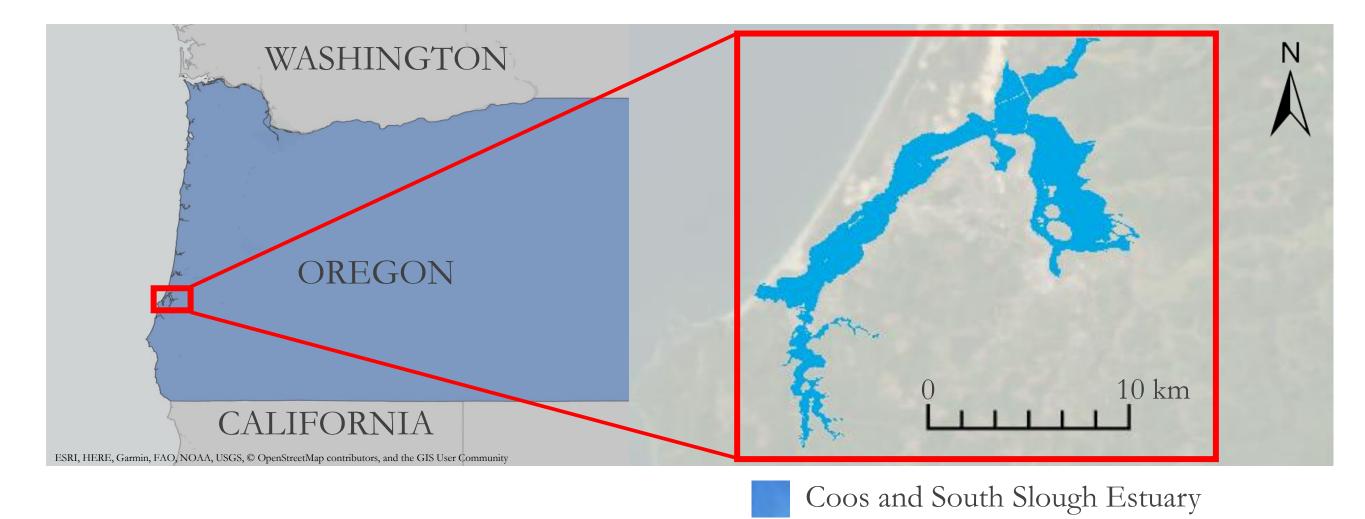


Landsat 8 OLI Surface Reflectance Collection 1, Tier 1



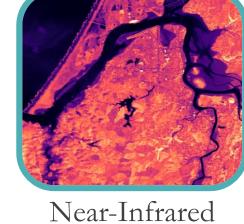
Landsat 9 OLI-2 Level 2 Surface Reflectance Collection 2, Tier 1

Image Credits: NASA, Rama



# Methodology

Bands



Red-Edge



Red

Green

Blue

**Eelgrass** Extent





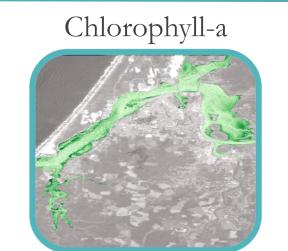
Indices

NDAVI = NIR - BLUE NDCI = NIR + BLUE

Red-Edge - RED Red-Edge + RED

RED - GREEN NDTI = -RED + GREEN

Water Quality





Eelgrass Extent

#### Results

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

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

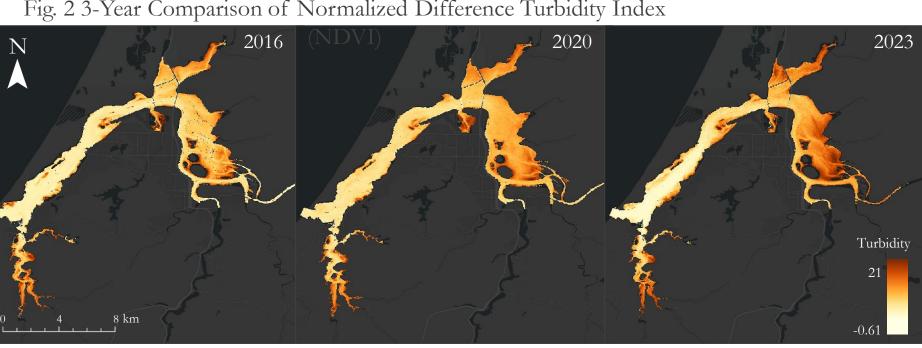


Fig. 3 3-Year Comparison with Support Vector Machine (SVM)

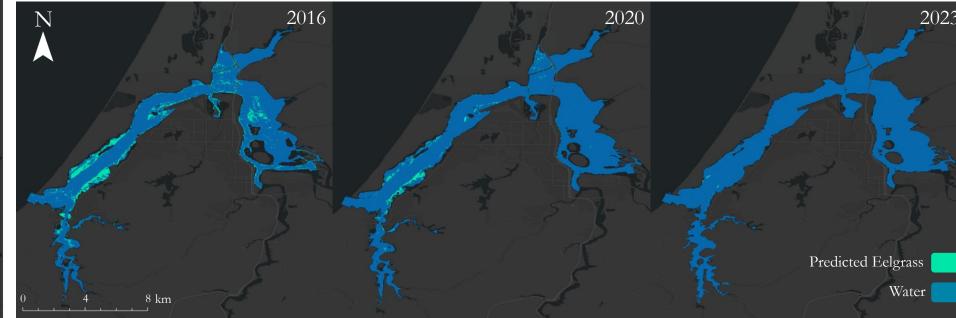


Fig. 4 Normalized Difference Aquatic Vegetation (NDAVI)

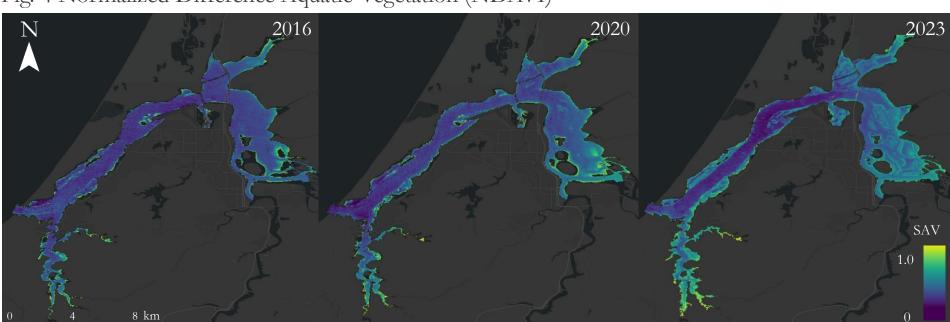
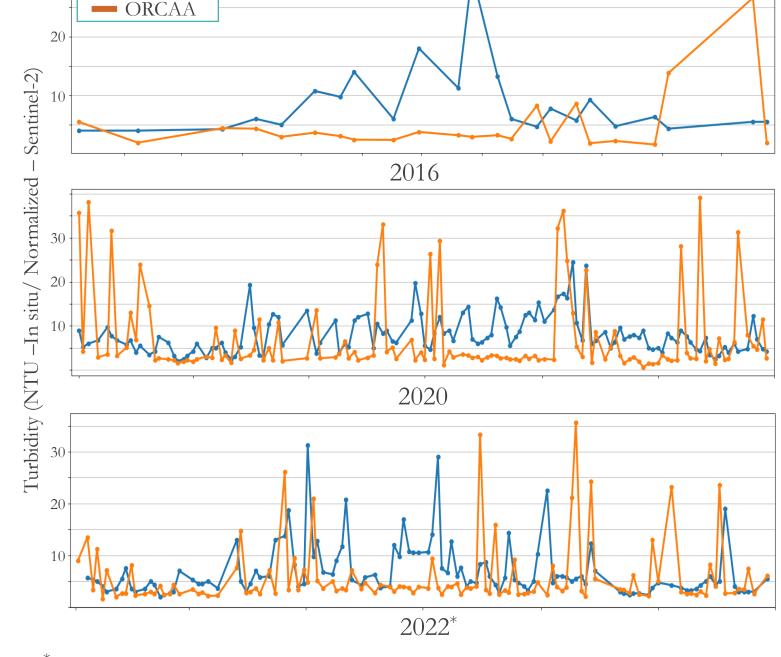


Fig. 5 ORCAA and In situ Data for 2016, 2020, and 2022 In situ



\* 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**



(Project Lead)

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#### Conclusions

This material is based upon work supported by NASA through contract NNL16AA05C. Any mention of a commercial product, service, or activity in this material does not constitute NASA endorsement. Any opinions, findings, and conclusions or recommendations expressed in this material does not necessarily reflect the views of the National Aeronautics and Space Administration and partne

- 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

# Acknowledgements

The South Slough Water Resources team would like to thank Dr. Juan Torres-Pérez, Dr. Liane Guild, Britnay Beaudry, Benjamin Holt, Dr. Kent Ross, and Lisa Tanh for their support, knowledge, feedback, and time throughout this project.

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