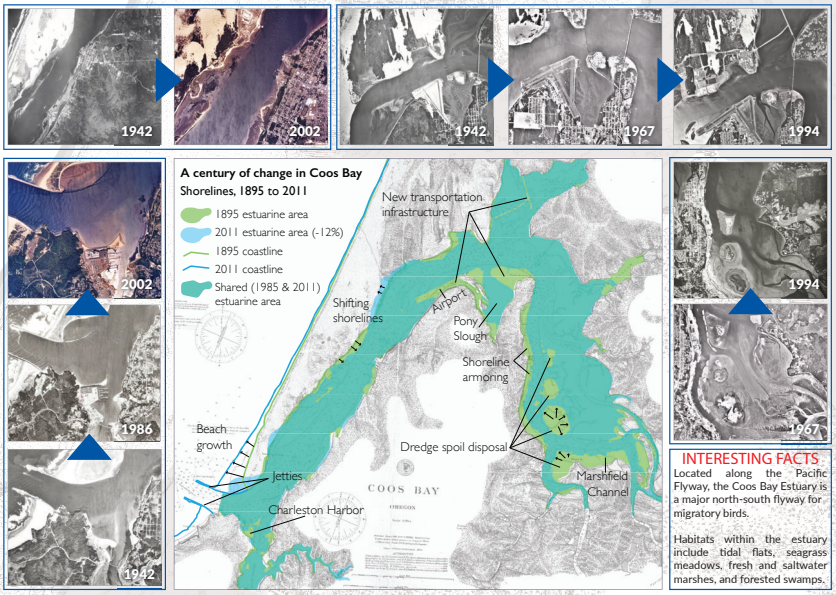
# LOOKING TO THE PAST, TO UNDERSTAND THE FUTURE:
# Changes to the Coos Bay Estuary

## Shoreline Change

**The Coos Bay estuary is a key port supporting a diverse range of life such as oysters, crabs, salmon, and seagrass, while also being an important hub of maritime industry. Over time, the estuary has changed dramatically through the addition of jetties, land reclamation, and dredging. These changes began in the mid-1800s while modifications to accommodate larger ships are still being considered today. Alterations to the estuary's bathymetry, shoreline, and intertidal areas influence the way water and sediment move throughout the bay. It is critical to understand how water circulates within the estuary at present to determine how historical and future changes will influence salinity, currents, tides, and organisms.**




### NOTABLE CHANGES

- **1914** - Addition of jetties
- **1930 -1970** - Dredge spoils placed on east tidal flats and south side of Marshfield Channel
- **1940** - Creation of Southwest Oregon Regional Airport, leading to the constriction of Pony Slough's entrance
- **1940 -1944** - Coos River re-routed from discharging onto east tidal flats, into a new primary flow path of Marshfield Channel
- **1950** - Construction of Charleston Harbor

**INTERESTING FACTS**

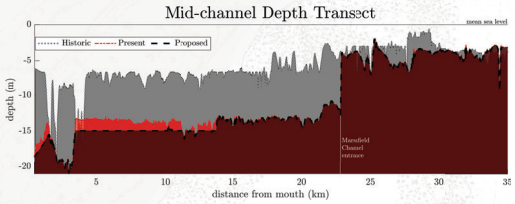
Located along the Pacific Flyway, the Coos Bay Estuary is a major north-south flyway for migratory birds.

Habitats within the estuary include tidal flats, seagrass meadows, fresh and saltwater marshes, and forested swamps.

## Bathymetric Change

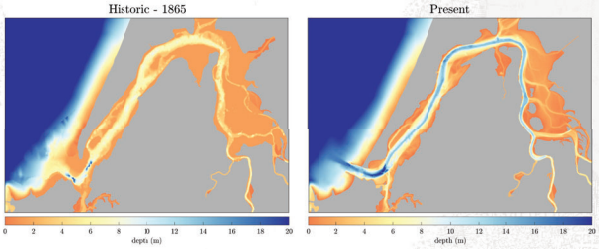
The entrance of the estuary was deepened and widened allowing for the addition of the jetty. Near the entrance of estuary, the main channel has migrated northward from its historic location. Overtime through dredging practices, the main navigation channel has been deepened around 4 m to its current depth of 13 m. A proposed channel modification project would deepen the main channel to 15 m and widen it by 45 m from the estuary mouth to 14 km up estuary.

**DID YOU KNOW?**
Over half of the Coos Bay Estuary is less than 4 meters deep.



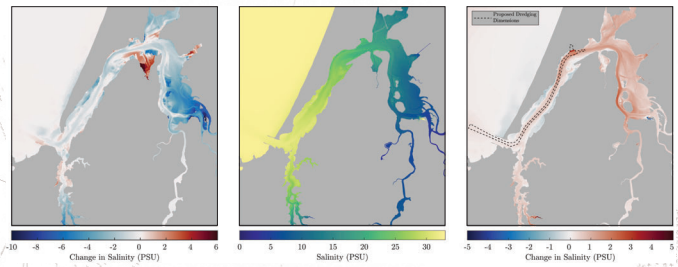

### 150 YEARS OF CHANGE

- Total estuary area reduced 12% from 58.7 km² in mid 1800s to 51 km² at present (equivalent to a loss of 1700 acres)
- Primary navigation channel deepened from 6.7 m to 11 m (64% increase)
- Volume increased by 21%




## Implications for Present and Future

Computer simulations allow for the realistic reconstruction of an estuary's historic conditions (such as tides, currents, and salt levels), while also enabling predictions based on possible future scenarios, including increased dredging or shoreline modification. Without these simulations, it is impossible to understand the complex movement of water, sediment, and organisms across the entire estuary. With these simulations, many effects on the estuary's conditions due to shoreline and bathymetry change can be assessed.




Comparison of historic (1865) salt levels to present day
(blue = fresher in past)

Middle panel: Salinity in present day case, typical of wintertime conditions

Comparison of future salt levels to present if channel is deepened
(red = saltier in future)

### SIMULATION RESULTS

#### Salinity

- Historically the estuary was fresher
- Compared to historic conditions, salt presently travels 18% (5 km) further into the estuary
- Proposed dredging will result in increased salt levels across the estuary

#### Tides

- Presently .5m higher than in 1865, a 33% increase in height
- Proposed dredging slightly reduced (~1.5%) tidal heights compared to the present

#### Currents

- Stronger in the past than now and with proposed dredging
- For example, near the jetties, historic maximum currents peaked at ~2.2 m/s versus ~1.3 m/s presently and ~1.25 m/s proposed


**Acknowledgements:**
UO Map & Aerial Photography Library
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NERRS Science Collaborative


**Lab Website:**
https://www.oceanice.org

**Hydrodynamic model simulation videos:**
https://bit.ly/2TWE7ol