Tidal Barrier Correction in WA, OR and CA: Identifying Best Practices and Design Standards for Tidal Restoration

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3.3 Culvert Conditions that Make
There are a number of site conditions that B assessments, or require a more sophisticated of. These conditions are addressed below.

Culverts in Tidal Areas
Currently there is no barrier assessment pre-
variable conditions of tidally influenced culverts are not applicable. At this time WDFW supports photos taken of the culvert outlet at both the WDFW.
Estuaries – Not Just Highway Rest Stops Any More

Past...

... and Present

The Watershed’s Good Stuff

Estuary

Portland

HOW PORTLAND CONQUERED THE FOOD WORLD!
Scott Creek – Steelhead Growth Rates

Hayes et al. (2008)
West Coast Distribution of Coastal Inlets & Lagoons

Heady et al. (2014)

PSNERP (2011)
Tidal Inlets – Tidal Scour v. Wave-Driven Transport

NGS (1930)
A Range of Inlet States & Water Levels

[Graphics showing various graphs and charts illustrating water levels and inlet states.]
Wave Power vs Tidal Prism

Russian River Management Challenges

Actual performance

Regulatory target

3.2 ft NAVD

Ocean Tide
Estuary Tide – Daily Min.
Estuary Tide - Hourly

Water level (ft NGVD)

Percent Exceeded
Kilisut Harbor Fish Habitat

Daubenberger et al. (2017)
Wave Power vs Tidal Prism

Inlet morphology and lagoon water levels: a quantified conceptual model (QCM)
Lagoon Model Predictive Skill: Russian River

Mouth Closure Days Per Month

- Observed: 54 days closed per year
- Model: A1; 59 days closed per year

Avg. No. of Days Closed

Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

0   | 1   | 1   | 0   | 0   | 0   | 0   | 0   | 5   | 16  | 13  | 5
Lagoon Model Predictive Skill: Russian River

North Position

South Position

Inlet centerline position north of jetty

- Observed: photographs
- Observed: RR Camera
- Model
Deveraux Slough Restoration Design

Pre-restoration

Post-restoration

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Alternatives for Barrier Beach Estuary Crossings

WDFW (2013)
Appendix D
Hierarchy of Benefits

Assessment process
- Level 1 - a qualitative assessment of tidal effects
- Level 2 - a more sophisticated engineering approach
- Level 3 - quantitative assessment with computer modeling

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<th>B</th>
<th>C</th>
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<td>760 ft bridge</td>
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<td>Tidal inundation</td>
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<td>93%</td>
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Lessons Learned & Best Practices

- In tidal areas, generalizing guidance can be challenging.
- Estuary shorelines and wetlands can also be influenced by waves.
- A geomorphic approach establishes framework for management.
- Empiric geomorphic analyses illuminate hydrologic function.
- Empiric tools require data from reference sites.
- Geomorphic interpretation can inform management & restoration.
- Geomorphology x fish data = better management.
Thank You. Questions?