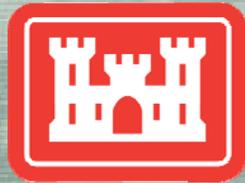
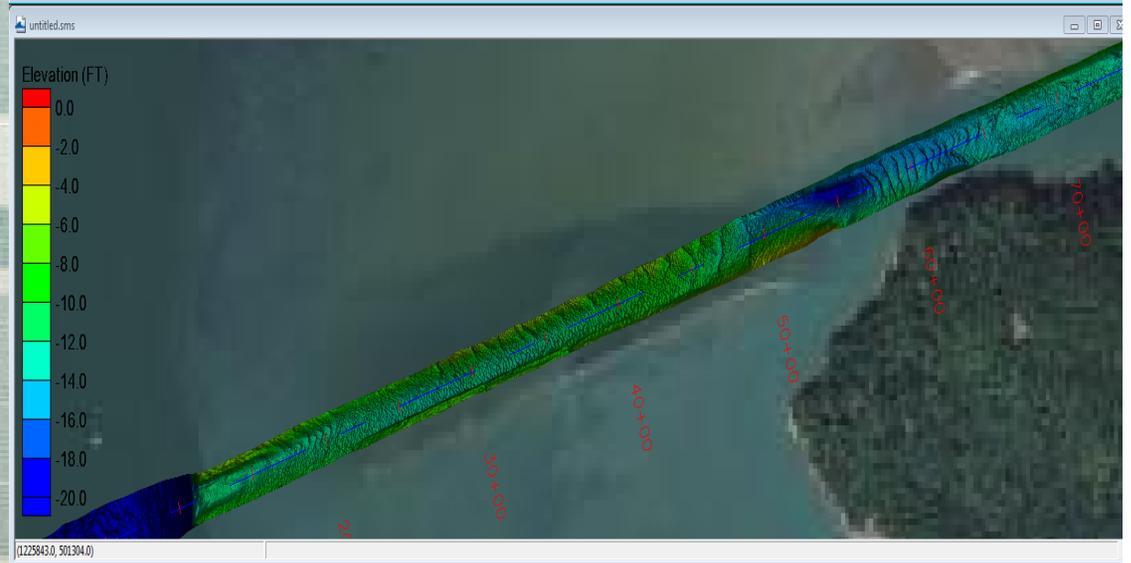
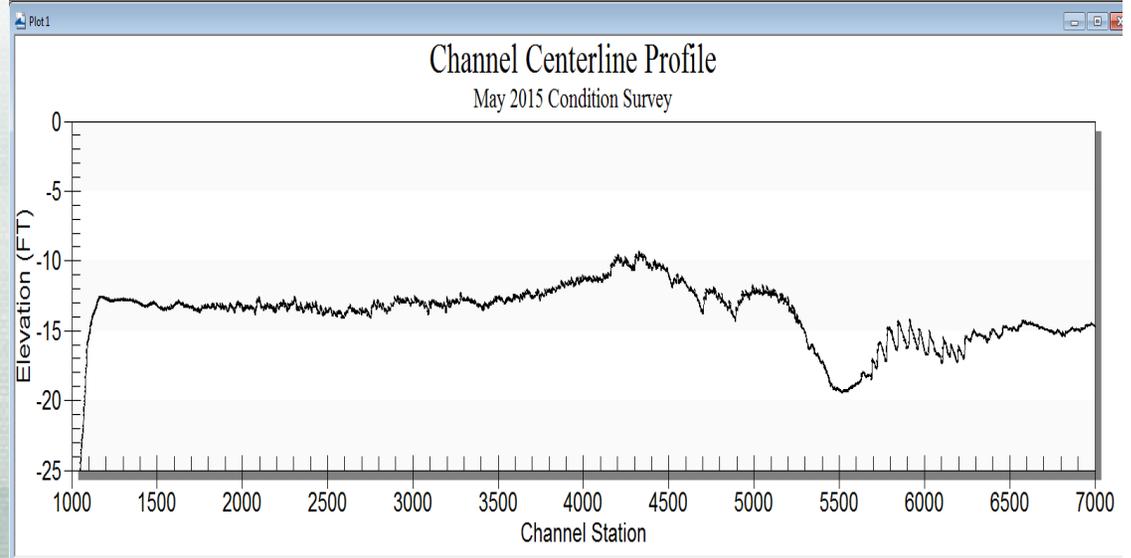


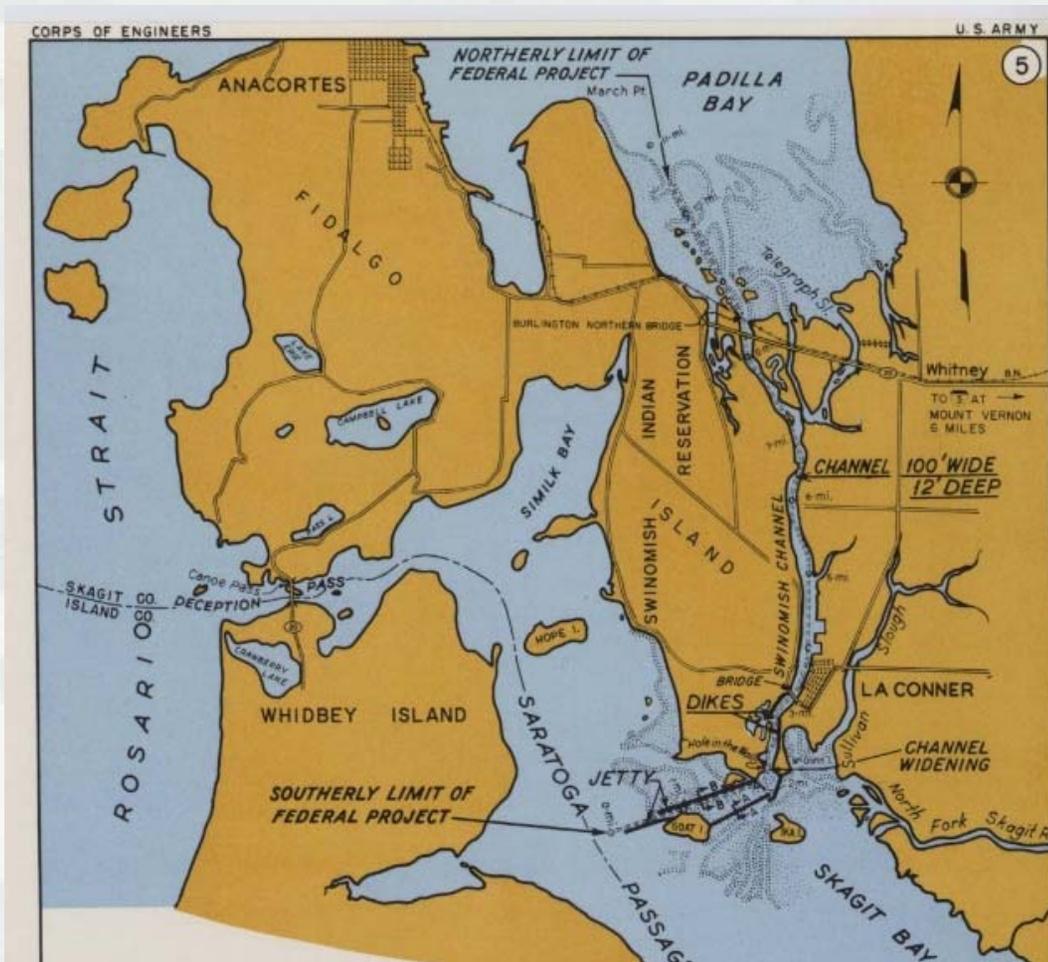
Swinomish Channel, WA FVCOM Modeling Update

Scott Brown, P.E.
Coastal Engineer
Seattle District



US Army Corps of Engineers
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Swinomish Channel, Washington



- Authorized July, 1892
- 12 ft Deep 100ft wide channel
- 11 miles from Saratoga Passage to Padilla Bay
- Combination of dredging and dike/jetty construction:
 - North Jetty
 - Goat Island Jetty
 - McGlinn Island Dike



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The Problem

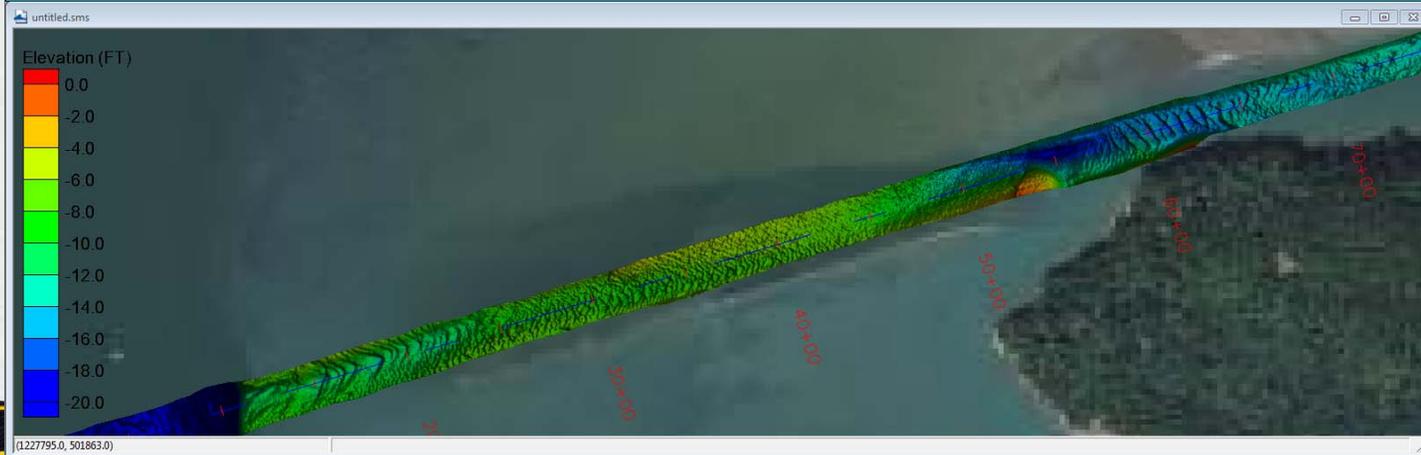
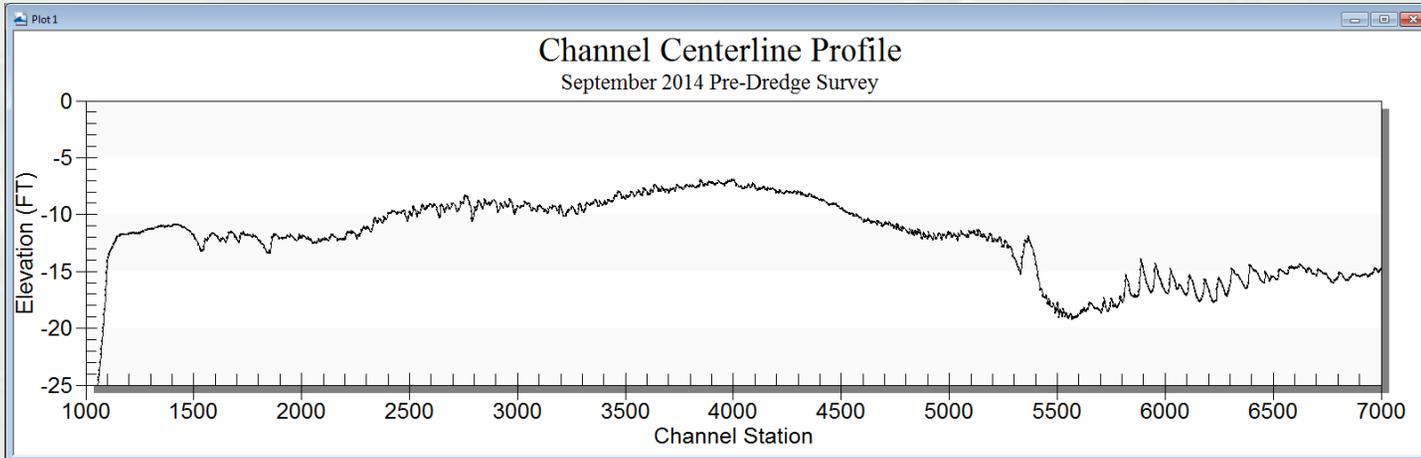


- Since 2008 approximately 40,000 cy/yr deposited at southern entrance
- Shoaling rates have been increasing as the condition of the navigation structures have deteriorated



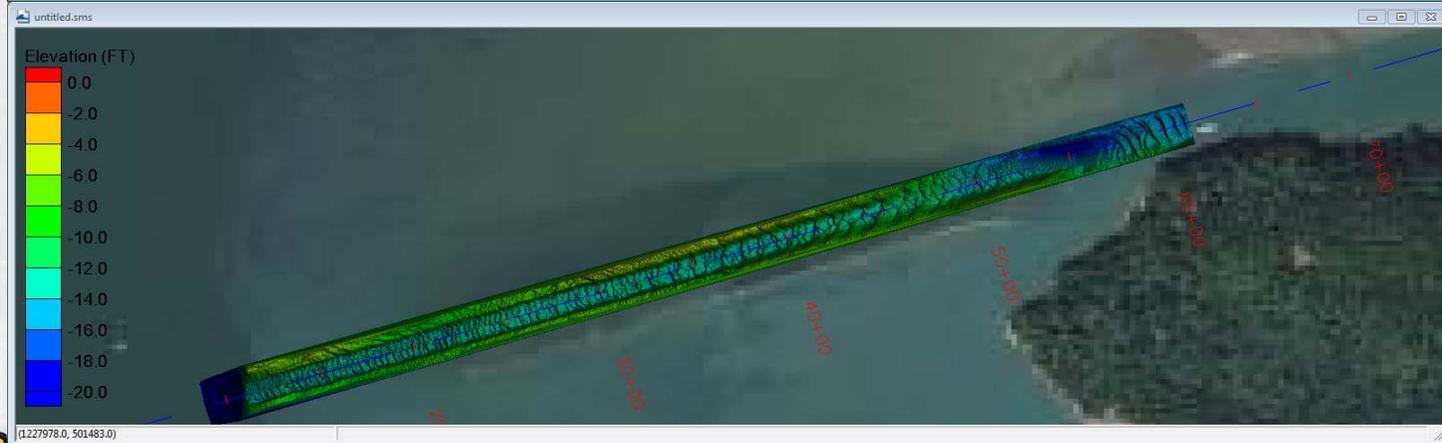
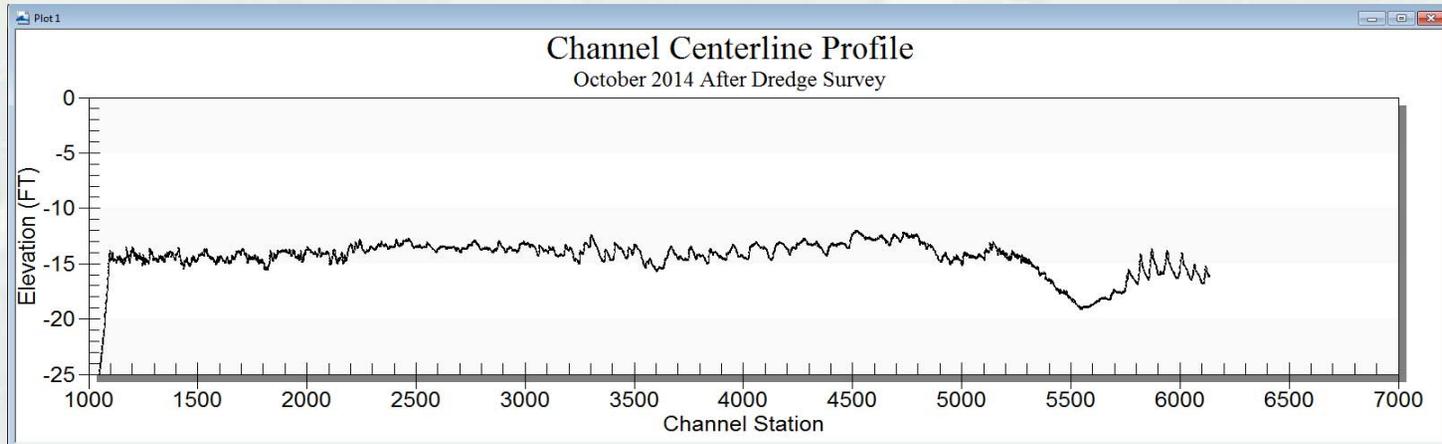
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Pre Dredge Elevations



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Post 2014 Dredge Elevations



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Study Objectives

- Apply a 3-d Hydrodynamic circulation and transport model to evaluate sedimentation in the Swinomish Channel:
 - ▶ Evaluate sediment delivery and shoaling in the Swinomish Channel
 - ▶ Assess the performance of existing dikes and jetties
 - ▶ Evaluate dike/jetty repair and modification alternatives
 - ▶ Evaluate regional sediment management scenarios



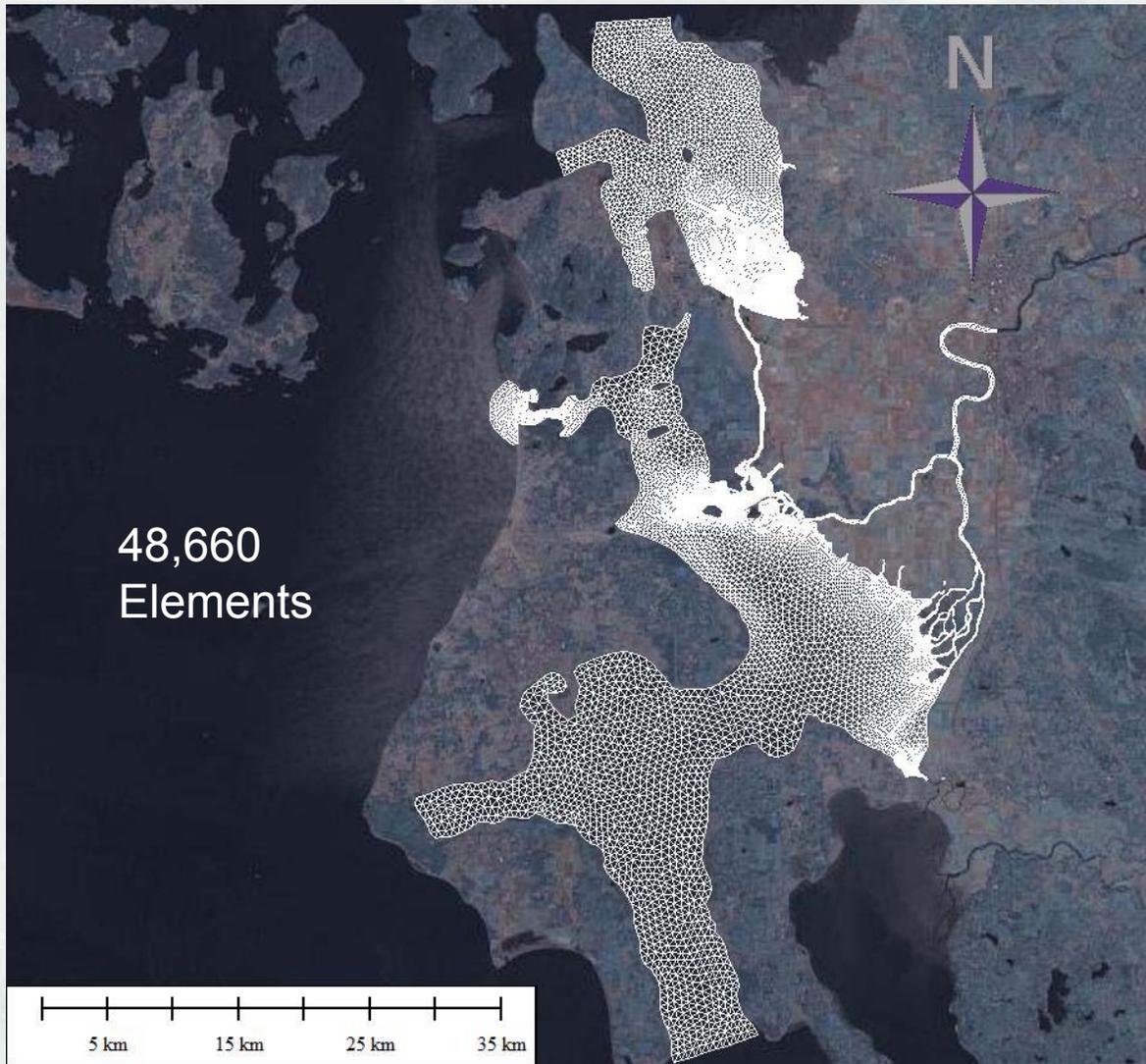
Modeling Approach

- Leverage existing model and expertise
- Partner with PNNL to update and improve existing FVCOM model
- Update model bathymetry, grid resolution, and incorporate sediment transport
- Can be made available for multiple project applications
- Calculates temperature and salinity for information purposes



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Updated FVCOM Grid

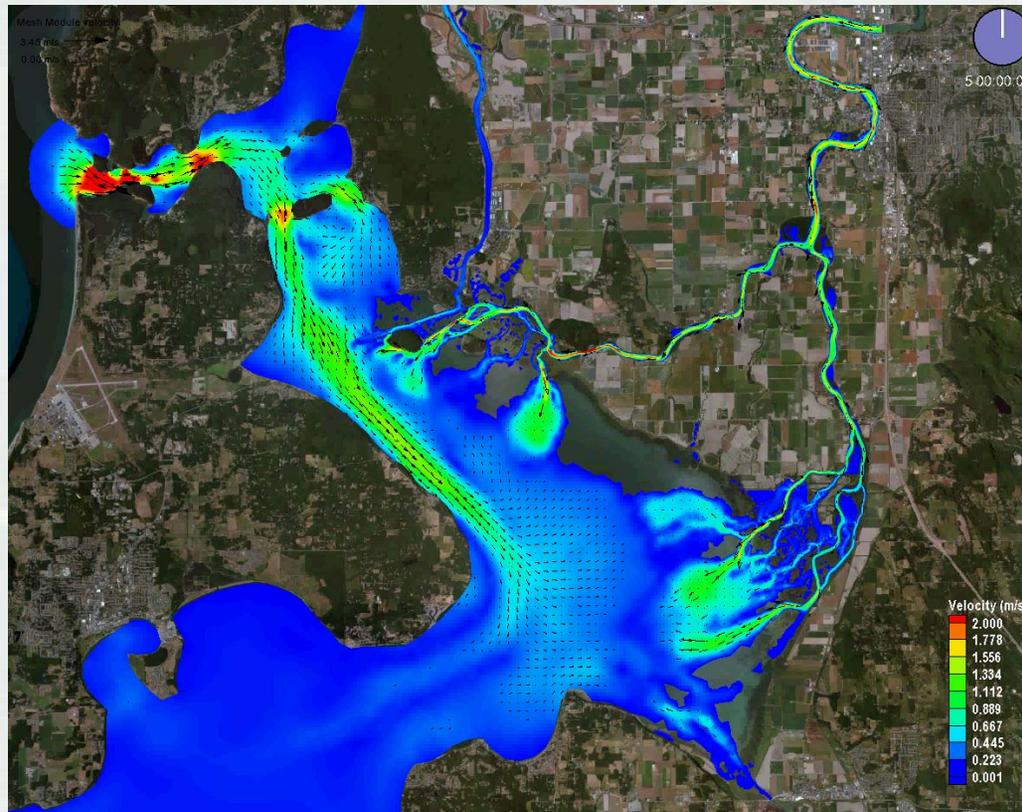


48,660
Elements



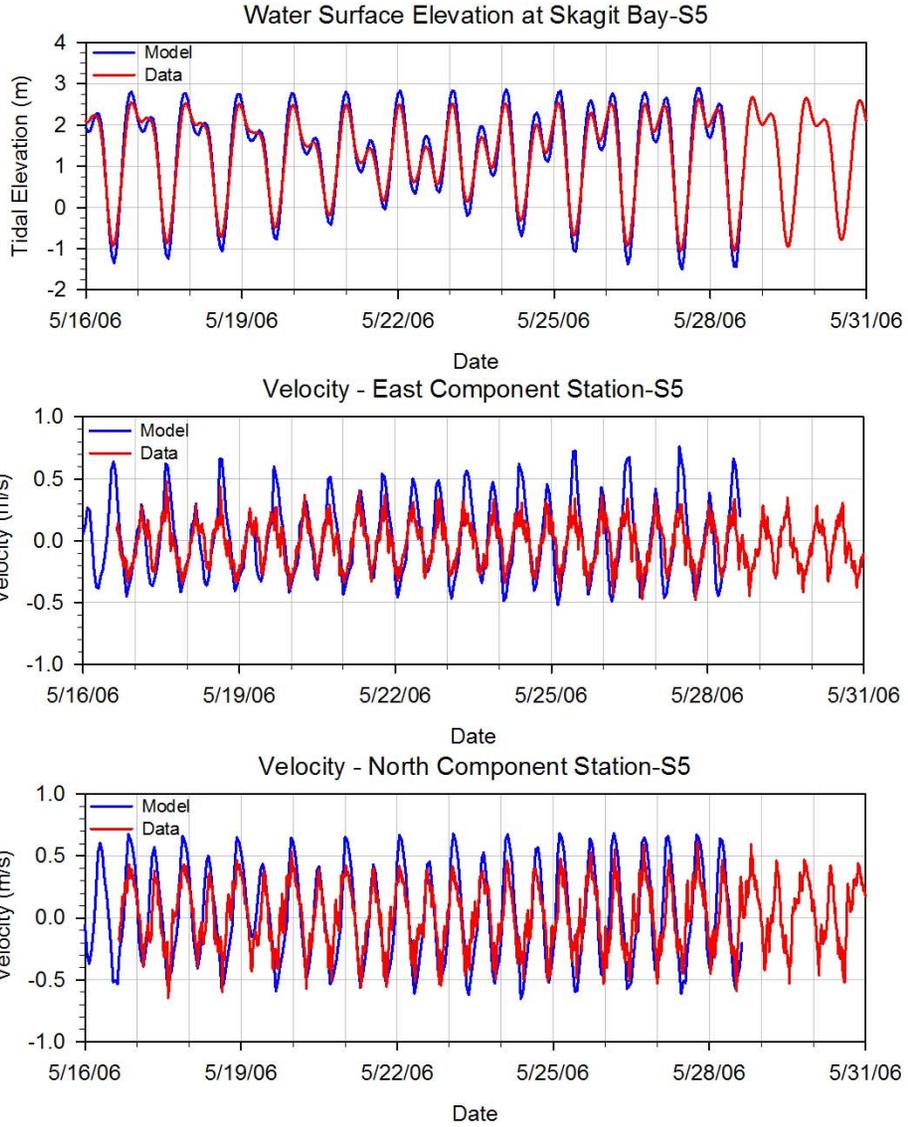
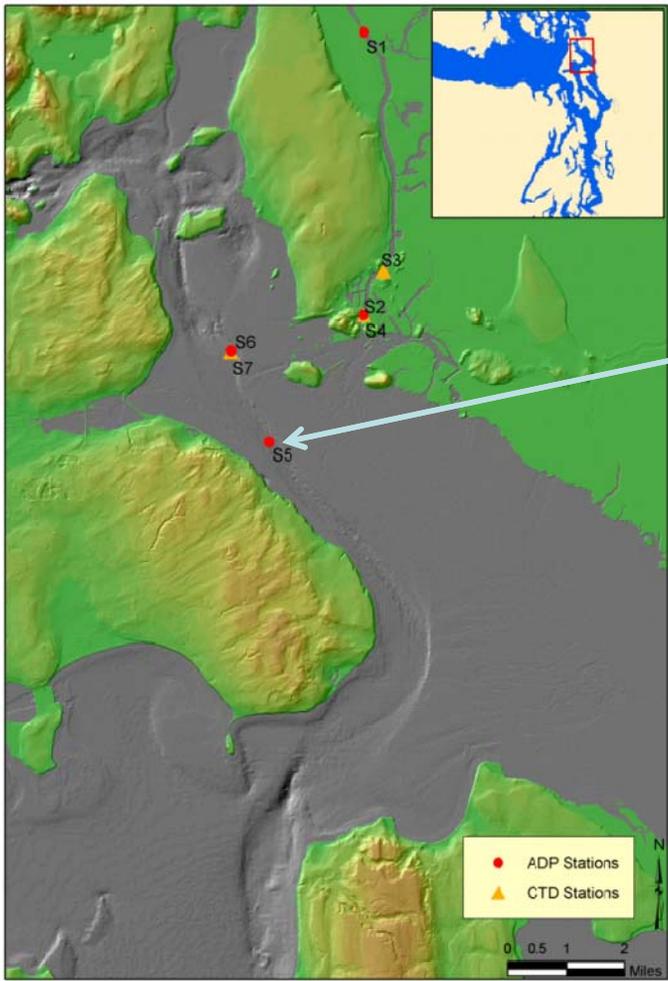
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FVCOM Model Velocities

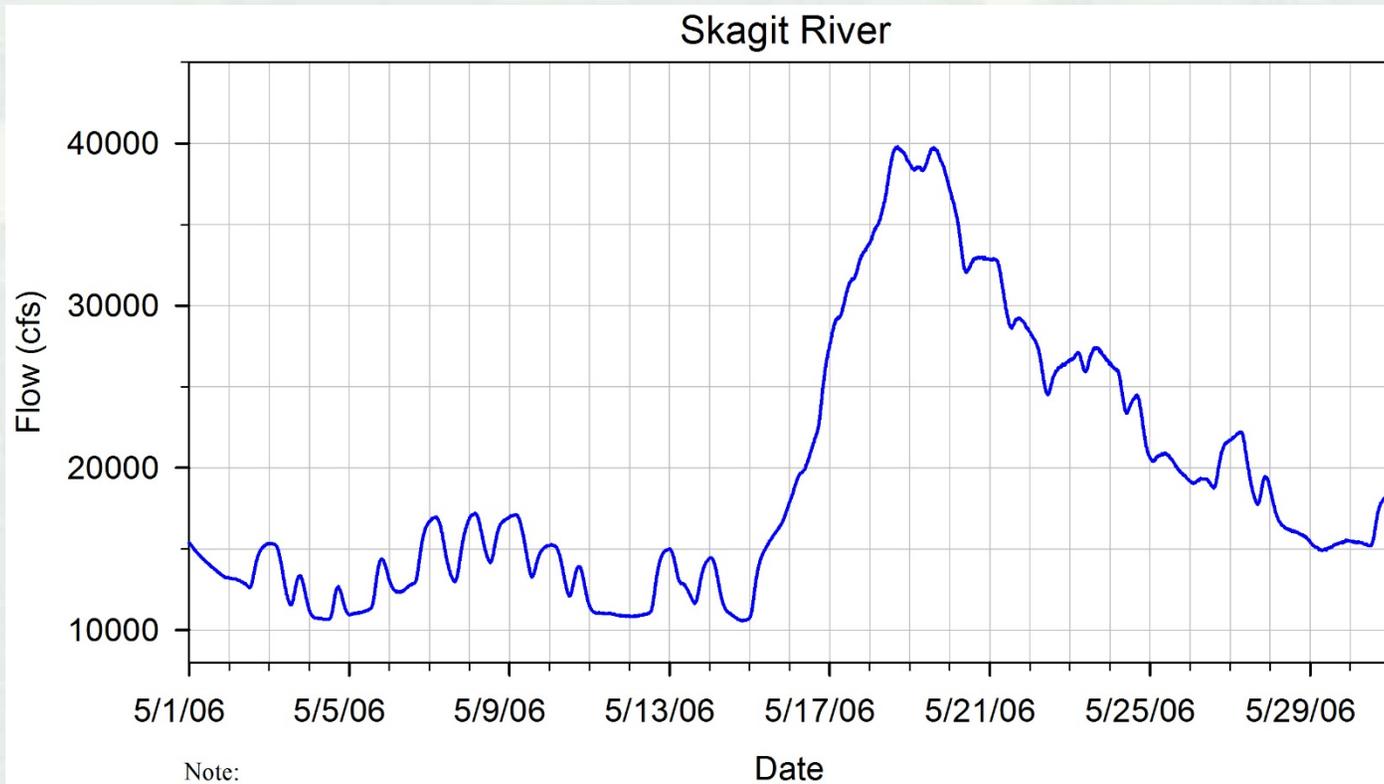


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Comparison of simulated and measured currents and tides



River Flows



Note:

- USGS Gage at Mt. Vernon



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Modeling Next Steps

- Setup and Test version 3.1 FVCOM model
 - Results expected mid January
- Test sediment transport model
 - Underway awaiting preliminary results
- Finalize and run Alternatives Analysis
 - Completed by October 2016



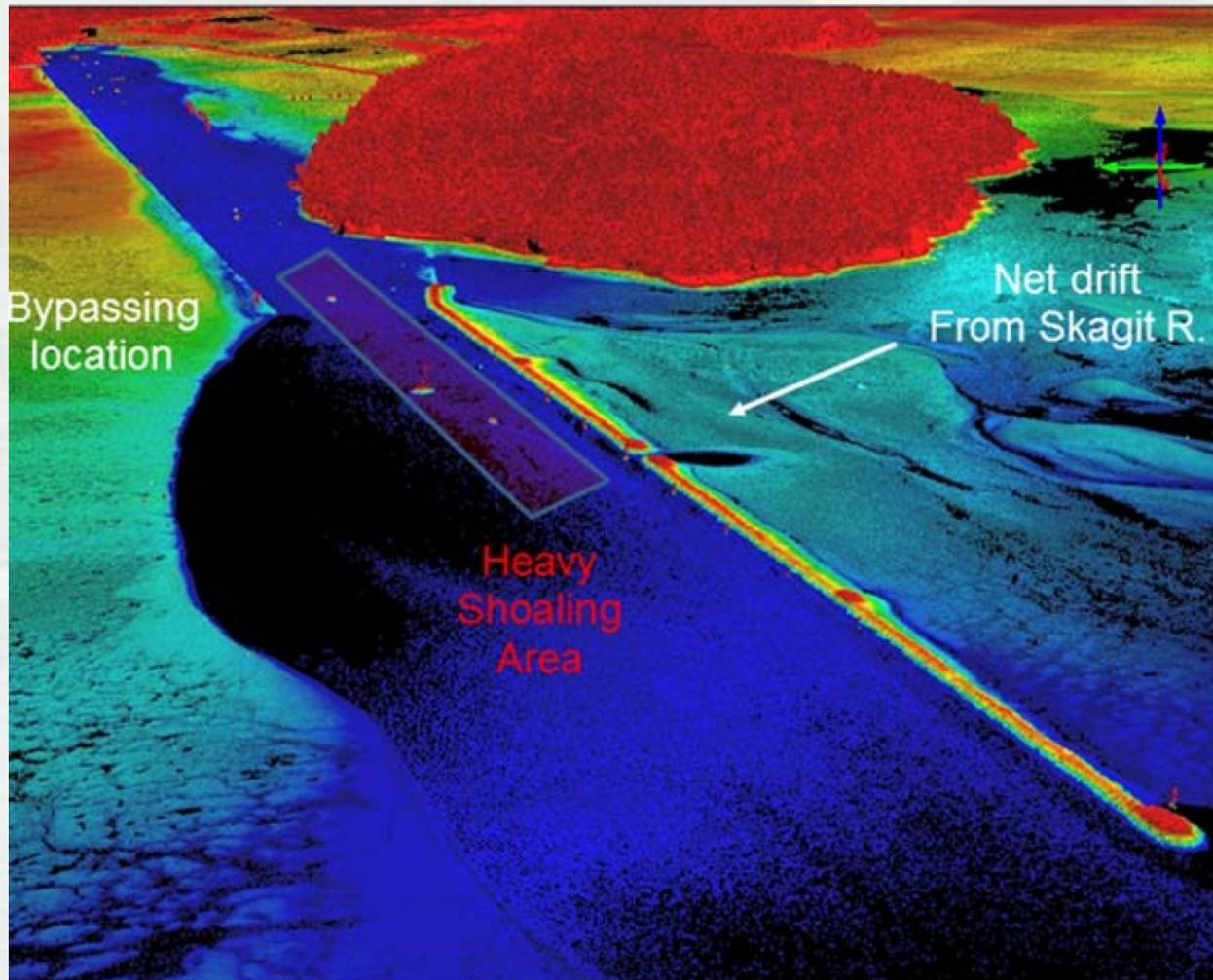
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NAVIGATION STRUCTURES



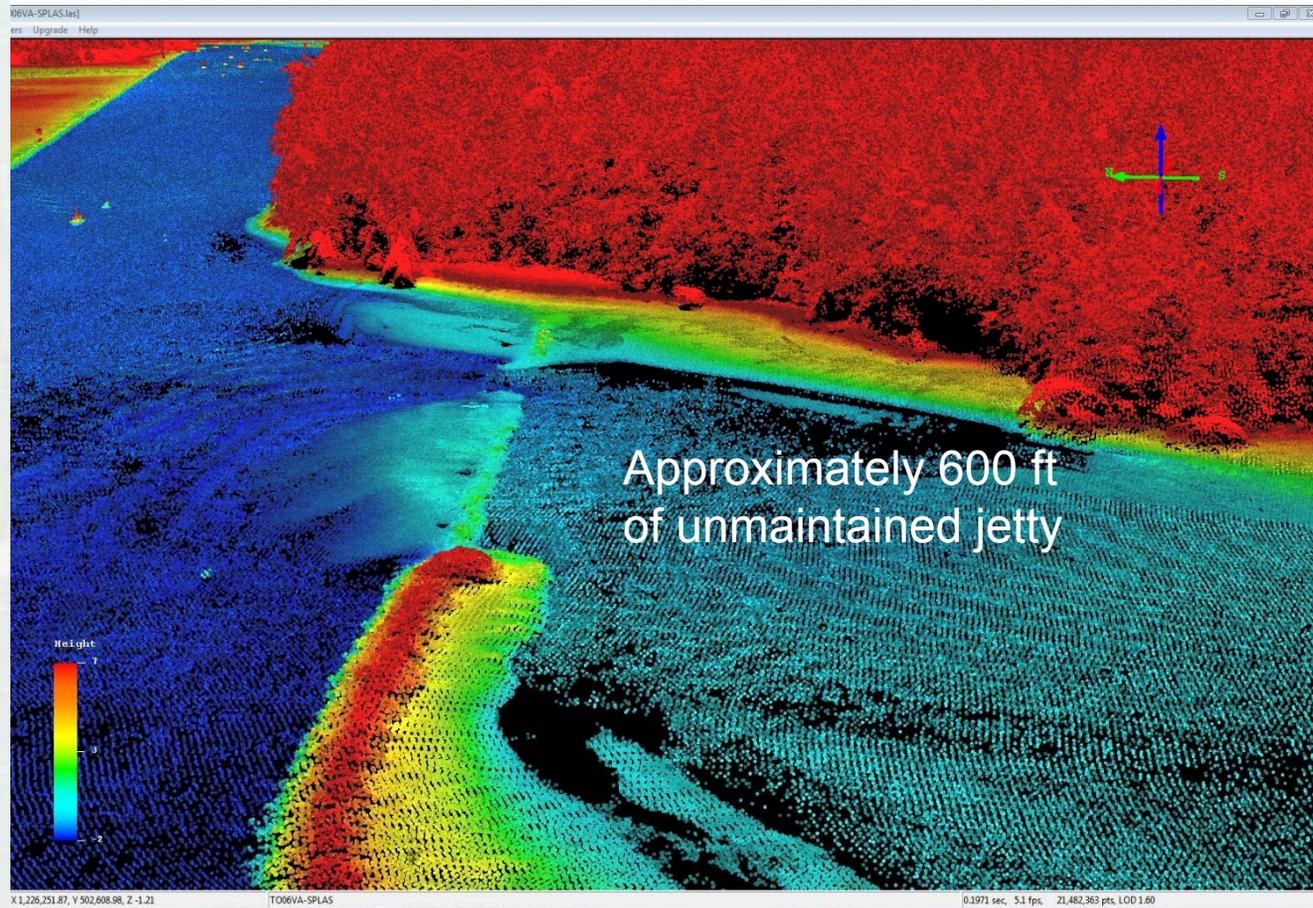
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Goat Island Jetty



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Goat Island Gap



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Draft Alternatives for Modeling

- 1. Close Goat Island gap (O&M)
- 2. Close Goat Island gap and rehab Jetty (O&M)
- 3. Raise Jetty crest height (New Authorization)
- 4. Lengthen Jetty (New Authorization)
- 5. Settling Basin (New Authorization)



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Regional Sediment Management Evaluation

- ▶ Use model to evaluate scenarios for sediment bypassing system
 - Nearshore placement of dredge material down drift (north) of channel
 - Bottom dump barge or unconfined hydraulic discharge from submerged pipeline.
- ▶ Activities Funded for FY 16
 - Particle Tracking Model using FVCOM model output
 - Updated NEPA/SEPA documentation if scenario identified



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What's Next

- Confirm alternatives with Port
- Present results of alternatives analysis and regional sediment management analysis
- Develop and vet recommended plan, if viable options identified
- Develop work packages and add to budget requests to HQ



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