Local adaptation to climate change
assessing vulnerabilities and finding solutions at
Port Susan Bay

Roger Fuller

rfuller@tnc.org
360-419-0175
Mount Vernon, WA
What affects estuary *habitat* resilience?

- Water level
  - Topography
  - Sediment
  - River flow
  - Tides
  - Storms

- Salinity
  - River flow
  - Tides
What affects **community vulnerability**?

- Water level
  - Topography
  - Sediment
  - River flow
  - Tides
  - Storms
- Protective infrastructure
  - Grey
  - Green
Habitats and Communities are Linked Systems

Community and habitat vulnerability need to be evaluated together.

A mix of green-grey solutions are possible, and necessary.

Look for strategies that have multiple benefits.
Using simple models to identify vulnerabilities and find solutions.

Marshes on the Move

A Manager’s Guide to Understanding and Using Model Results Depicting Potential Impacts of Sea Level Rise on Coastal Wetlands

www.coastalresilience.org
www.csc.noaa.gov/digitalcoast
Port Susan Bay

River Flood Risk
Historical

Stillaguamish Annual Peak Flows

[Graph showing annual peak flows from 1920 to 2020 with a trend line indicating an increase over time]
Port Susan Bay

River Flood Risk Future

![Graph showing peak flow comparison between historical, hybrid delta, mean, and composite delta in the 2020s under the A1B scenario.](image)
Port Susan Bay

January 5, 2010
High Tide plus light breeze from the north

Coastal Storm Risk

February 4, 2006
High Tide plus 44 knot wind from the south

Breached Dike
Puget Sound sea levels are projected to rise ~ 24” by 2100 (NAS 2012)

12” of SLR turns a 100-year coastal flood into a 10-year event

24” of SLR turns a 100-year coastal flood into an **annual** event
Green and Grey Infrastructure are Linked

Low Marsh Boundary
1964 ...
2004 —
Green and Grey Infrastructure are Linked
Port Susan Bay

- Sea level rise
- Accretion rates
- Freshwater flows (salinity)
- Restoration alternatives
- Surprises (snow geese)
- Etc.

Using simple models to identify vulnerabilities and solutions
Salinity Vulnerability

0.6m SLR

0.6m SLR + 20% less river flow

[Graph showing percentage of loss of vegetated tidal flat by 2100 for different scenarios.]
Salinity vulnerability

Management Choices

A. Existing conditions

B. Restoration

The Nature Conservancy
Community Dynamics
Conflicts Over Natural Resources
Finding Common Ground: Community Resilience

*Intersecting interests = multiple benefit strategies*
Restoration Project Objectives – Multiple Benefits

- Restore tidal marsh for fish and birds
- Increase resilience in broader system
- Reduce flood risk by improving both green and grey infrastructure
Adapting to Climate Change: How to be an “early adopter”

Focus on Community Resilience provides the common ground that brings all interests to the table in search of multiple benefit strategies.
Local adaptation to climate change
assessing vulnerabilities and finding solutions at
Port Susan Bay

Thanks!

Roger Fuller

rfuller@tnc.org
360-419-0175
Mount Vernon, WA