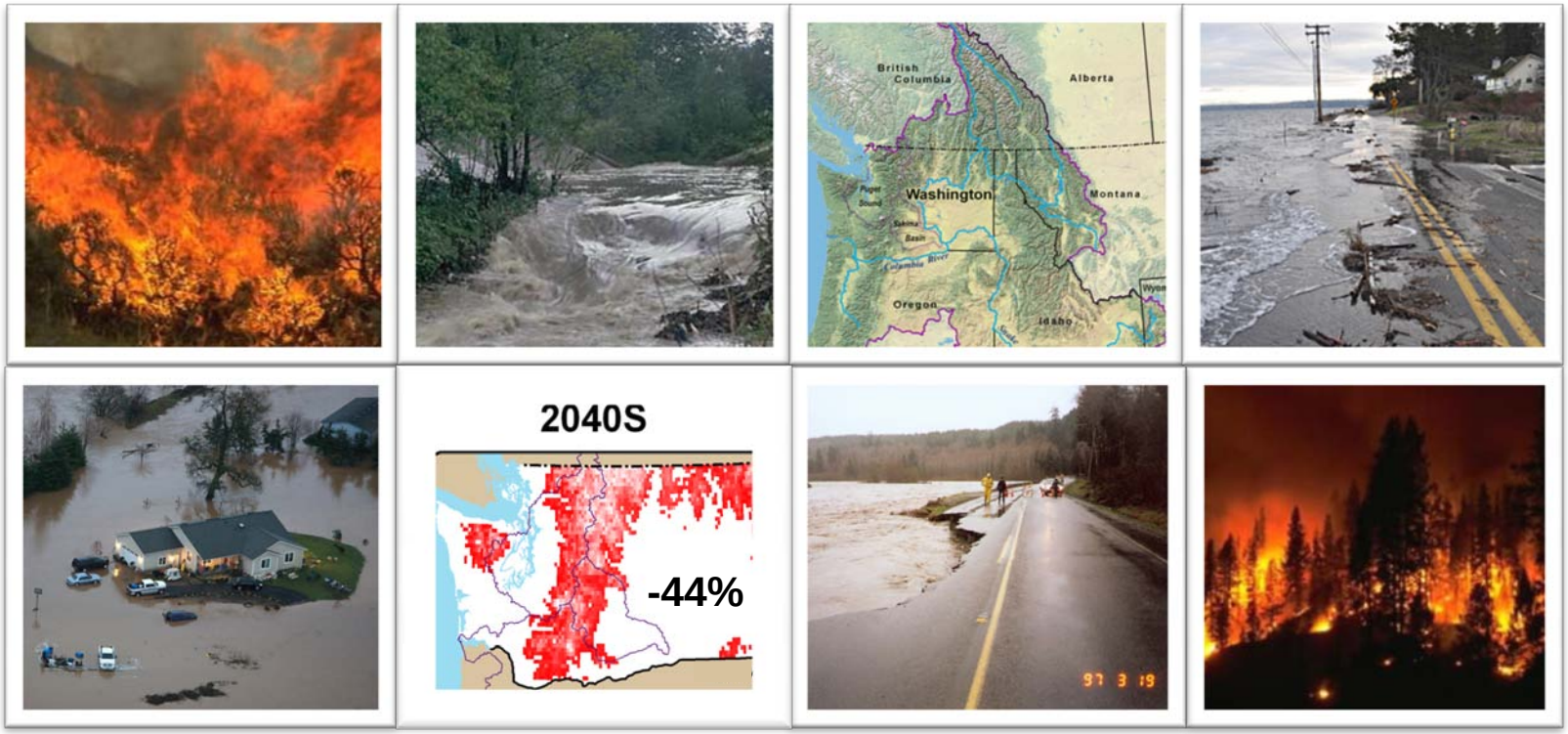
Washington State's Integrated Climate Change Response Strategy

Seth Stark
WSDOT Sustainable Transportation Program Lead



T&DI / ASCE Green Streets and Highways Conference
FHWA / AASHTO Climate Change Adaptation Workshop
Denver, CO
November 17, 2010

Washington State's Integrated Climate Change Response Strategy

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Washington State Department of Transportation

WSDOT – What are we doing?

- What is Sustainable Transportation at WSDOT?
- What is an Integrated Climate Change Response Strategy?
- How did we get here?
- What are we experiencing?
- What is our internal effort?
- What is our external effort?

Sustainable Transportation

At WSDOT, a sustainable transportation system:

- Preserves the environment
- Durable and takes into account how we build and the materials we use
- Managed and operated using policies and strategies that meet society's present needs

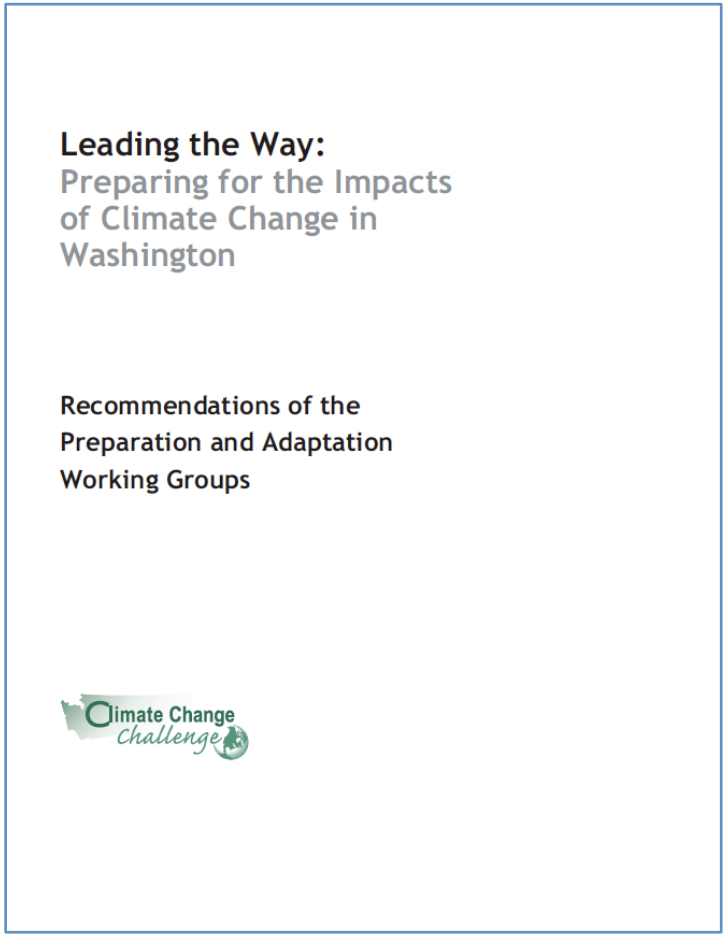
Without compromising the ability of future generations to meet their own needs

2009 State Legislation

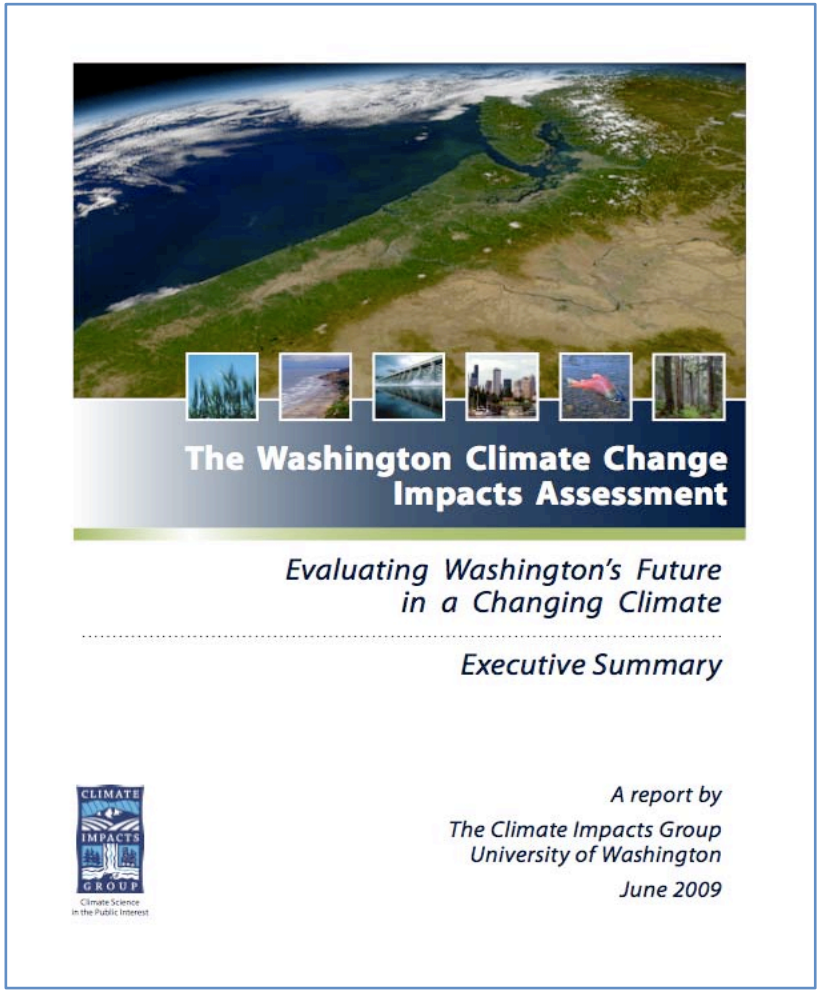
- Directs five state agencies (including WSDOT) to work together to develop an "*integrated climate change response strategy to better enable state and local agencies, public and private businesses, nongovernmental organizations, and individuals to prepare for, address, and adapt to the impacts of climate change*."

RCW 43.21M.010

Foundation for Strategy



"2008 PAWG reports"



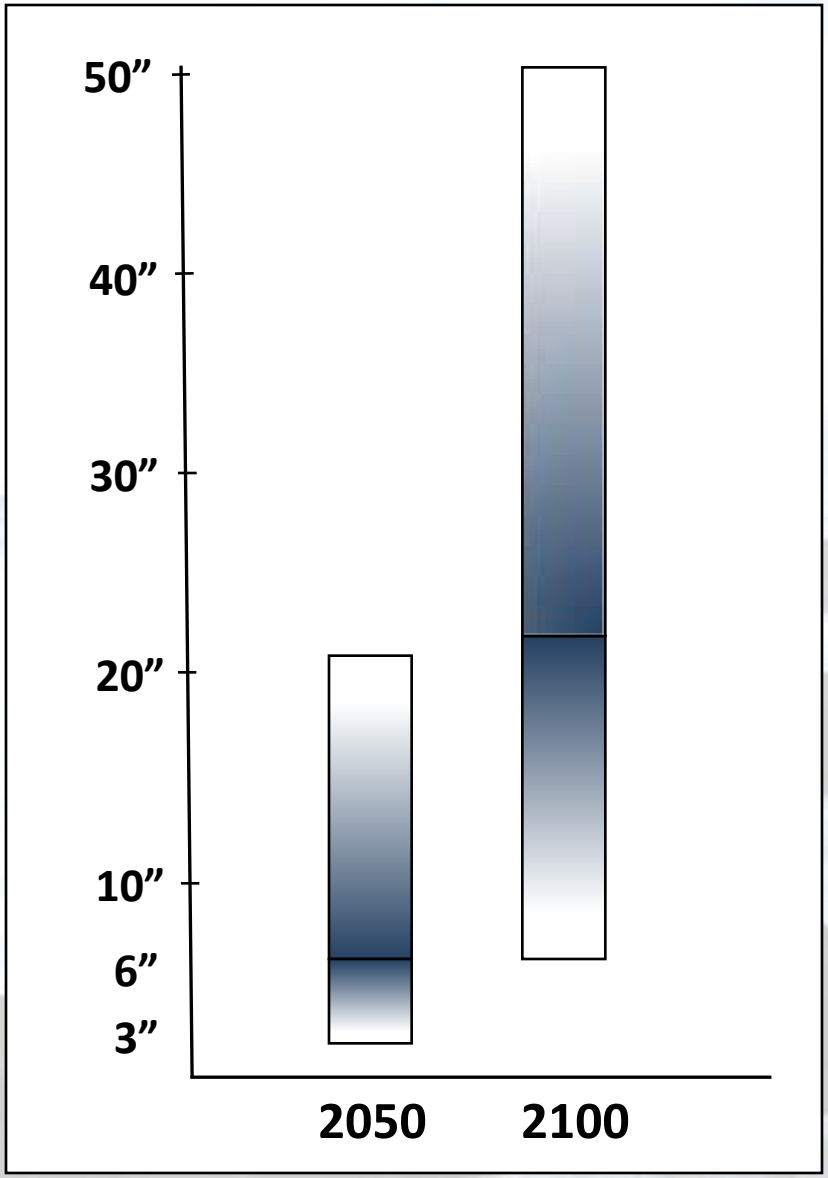
UW/Climate Impacts Group (CIG) Feb. 2009 Assessment

Sea Level

Sea level rise (SLR) will increase the risk of flooding, erosion, and habitat loss along much of Washington's 2,500 miles of coastline.

- **Global SLR: 7-23" by 2100**
- **Medium** estimates of SLR for **2100:**
  - +2" for the NW Olympic Peninsula
  - +11" for the central/southern coast
  - +13" for Puget Sound
- Higher estimates

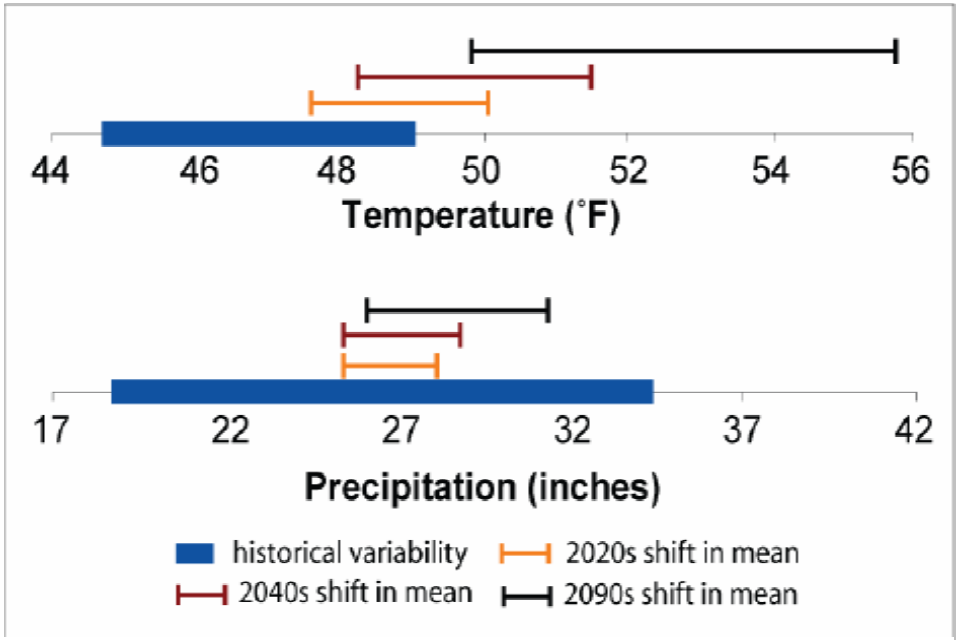
  (up to 4 feet in Puget Sound) cannot be ruled out at this time.



Projected SLR in Washington's waters relative to 1980-1999, in inches. Shading roughly indicates likelihood. The 6" and 13" marks are the SLR projections for the Puget Sound region and effectively also for the central and southern WA coast (2050: +5", 2100: +11").

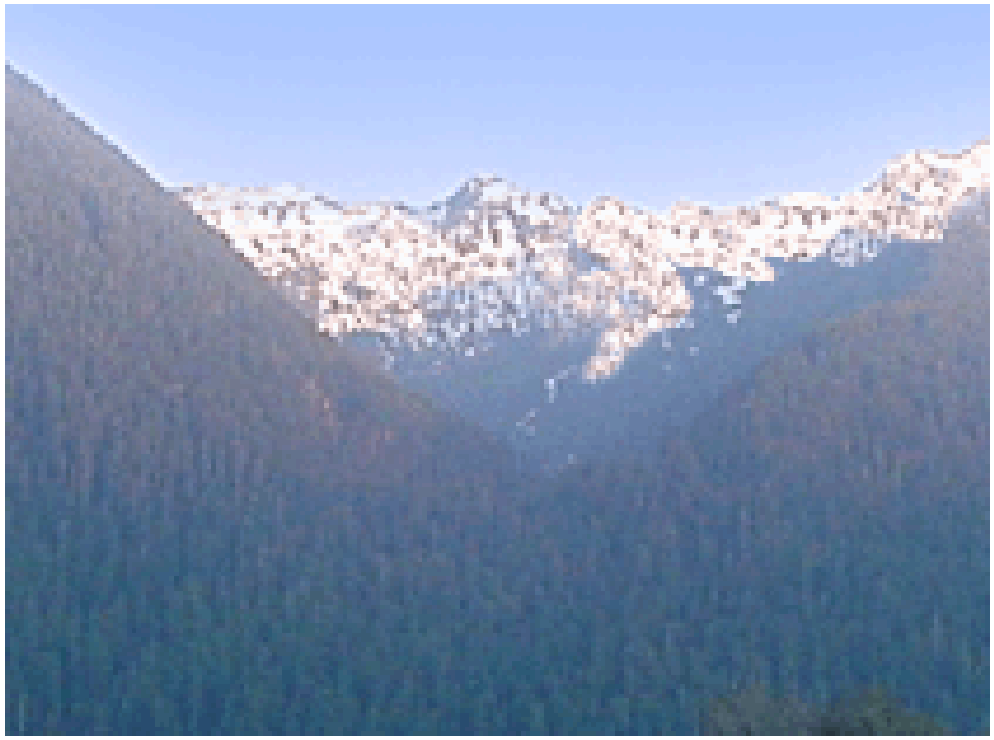
Temperature and Precipitation Changes in Washington State

Relative to 20th Century



Source: Climate Impacts Group (CIG), University of Washington

High confidence in projected temperature changes, less in precipitation changes



Key Impacts in Washington

- Sea level rise
- Transition from snow-dominant watersheds to rain-dominant watersheds
- Wildfire, river dynamics, landslides, and more

Sea level rise effects

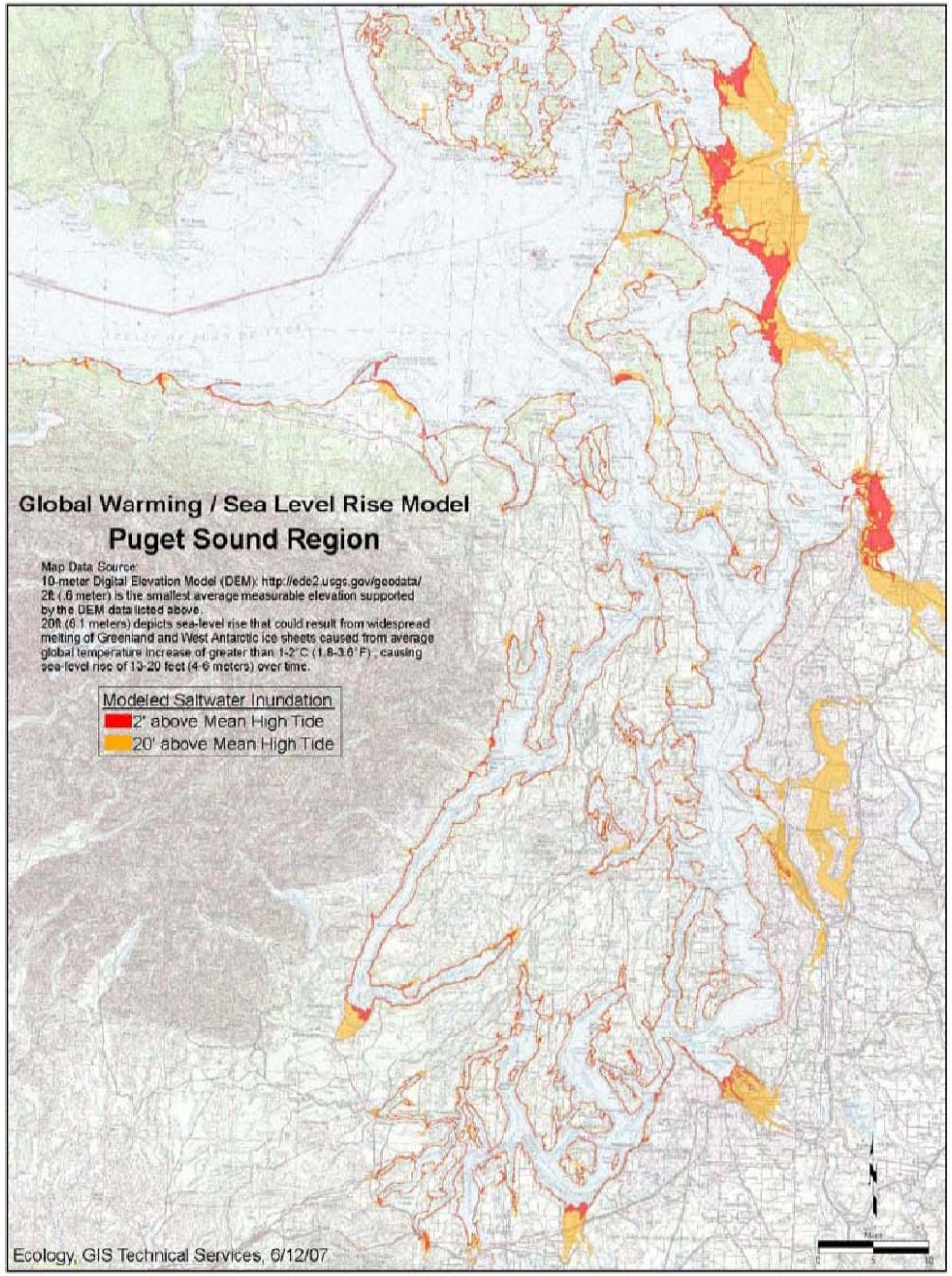
- Inundation
- Wave height increases
- Erosion

Washington State Department of Transportation

Inundation

- Inundation maps draw attention to large, low-lying areas where extensive flooding is possible

- These maps downplay high risk areas where flooding is not the primary hazard (downtown waterfront, bluff landslides, contaminated shoreline sites)



Source: Hugh Shipman, Dept. of Ecology

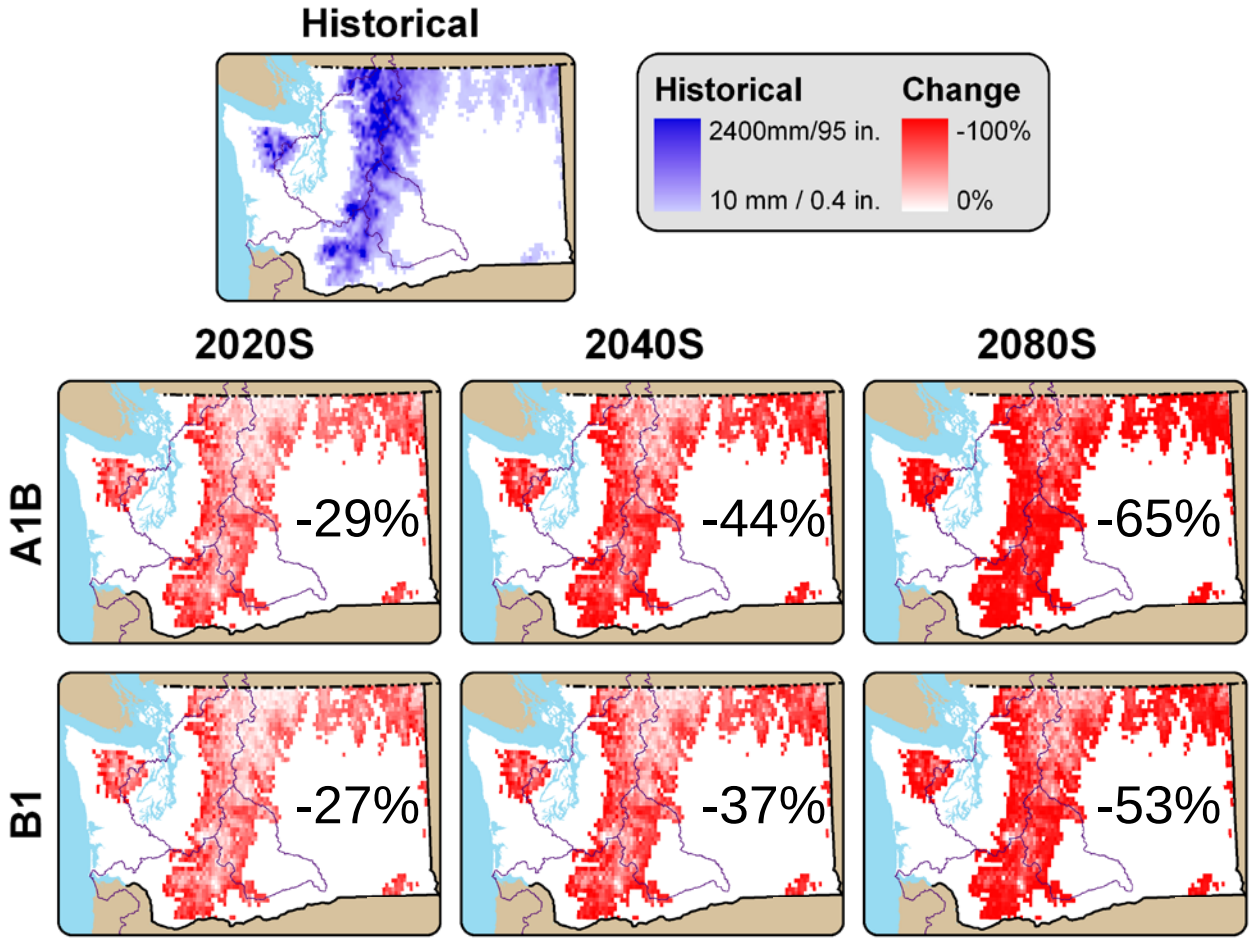
Wave height increase

Anacortes (4 February 2006)

Whidbey Island (4 February 2006)

Erosion

Key Impact:
Transition from Snow Dominant Watershed to a Rain Dominant Watershed



Climate Impacts Group 2009, Ch. 3a Map: Rob Norheim

Key Impact: Loss of April 1 Snow Cover

White Chuck Glacier Ice Loss
Glacier Peak, WA 1973

Photo Leor Pantilat

Key Impact: Loss of April 1 Snow Cover

White Chuck Glacier Ice Loss
Glacier Peak, WA 2006

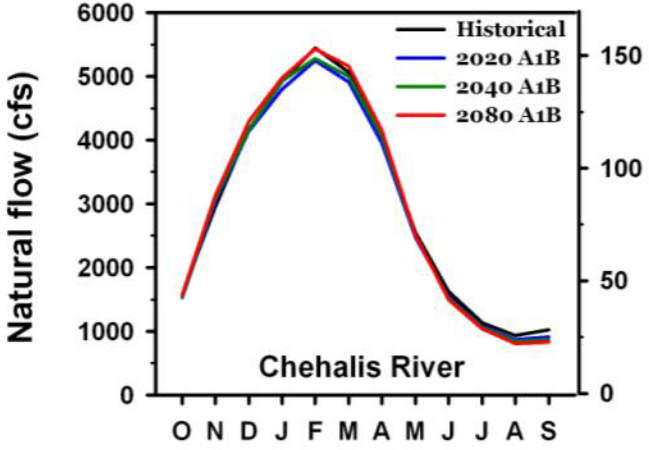
Photo Leor Pantilat

Changes in Flood Risks

- Floods in western WA will likely increase in magnitude due to the combined effects of warming and increasingly intense winter storms.

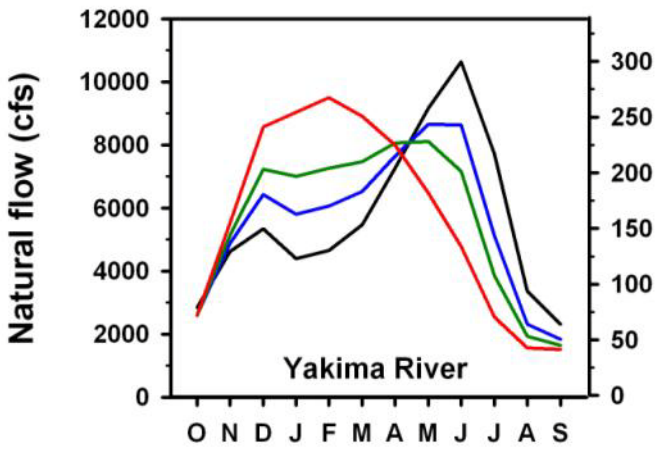
- In other parts of the State, changes in flooding are mixed, and in eastern WA projected *reductions* in spring flood risk are common due to loss of spring snow cover.

Rain Dominant



Chehalis River (Western WA)

Mixed Rain/Snow



Yakima River (Eastern WA)

Mantua et al. 2009, Elsner et al. 2009

WSDOT Adaptation

Asset Management and Climate Change

- Scenario planning
- Sea level rise mapping
- Bridge Scour monitoring
- Risk Assessment

West Seattle, Alki Beach

Hoh River flooding

Changes in River Dynamics

- Channel migration and avulsion

Kautz Creek
6 November 2006

Only year-round road into and out of Park.

In response to flood a new creek also flowed down a service road, carving a channel through the park's primary helipad.

Mount Rainier
6 November 2006

Recent channel evolution

Tahoma Creek

Just off US 12 at Davis Creek

Scour and damage to structures

WSDOT's Preparation and Adaptation Response

- **Internal Effort**
  - Risk assessment and response strategy for state owned infrastructure
- **Leverage our existing programs**
  - Maintenance, Materials, Emergency Response, Planning
- **External Effort**
  - Multi-agency team developing climate change response and adaptation strategy and design

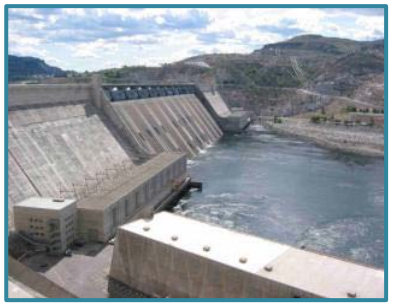
Washington State's Integrated Climate Change Response Strategy

Statewide Steering Committee:

- Dept. of Transportation
- Dept. of Ecology
- Dept. of Agriculture
- Dept .of Fish and Wildlife
- Dept. of Natural Resources, and
- Dept. of Commerce

Topic Advisory Groups:

- TAG1 - Built Environment/Infrastructure and Communities
- TAG2 - Human Health and Security
- TAG3 - Ecosystems, Species, Habitats
- TAG4 - Natural Resources (working lands and waters)



Increasing infrastructure resiliency

- Limit armoring
- Restore shorelines
- Targeted removal of dikes
- Improve processes for siting new construction
- Set back development
- Protect key geomorphologic processes (sediment supply)
- Identify critical natural and built environments
- “When engineering is inevitable, be imaginative”

Expanding Existing Practices

- Expanding application of existing practices
- Integrating new technologies
- Design policy changes (flexibility in design)
- Project-level decisions
  (look at site, avoid, mitigate impacts)
- Material selection – quality and lifespan
- Environmental assets are key
  plan enhancements so they last

WSDOT's
Integrated Climate Change Response Strategy

- Sustainable Transportation at WSDOT
- Integrated Climate Change Response Strategy
- Our internal effort
- Our external effort

Questions or Comments:

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(360) 705-7913

WSDOT Sustainable Transportation Link:

http://www.wsdot.wa.gov/SustainableTransportation/

Washington State's
Integrated Climate Change Response Strategy

Statewide Steering Committee

Link**:** http://www.ecy.wa.gov/climatechange/adaptation.htm

Topic Advisory Group #1

Built Environment, Infrastructure and Communities

Link: http://www.ecy.wa.gov/climatechange/tag_infrastructure.htm