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
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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
Leading the Way:
Preparing for the Impacts of Climate Change in Washington

Recommendations of the Preparation and Adaptation Working Groups

“The 2008 PAWG reports”

The Washington Climate Change Impacts Assessment
Evaluating Washington’s Future in a Changing Climate
Executive Summary

A report by
The Climate Impacts Group
University of Washington
June 2009

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

High confidence in projected temperature changes, less in precipitation changes

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

Erosion

Whidbey Island (4 February 2006)

Anacortes (4 February 2006)
Key Impact:
Transition from Snow Dominant Watershed to a Rain Dominant Watershed

Historical

2020S
A1B -29%
B1 -27%

2040S
A1B -44%
B1 -37%

2080S
A1B -65%
B1 -53%
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.


Chehalis River (Western WA)

Yakima River (Eastern WA)
WSDOT Adaptation
Asset Management and Climate Change

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

West Seattle, Alki Beach
Changes in River Dynamics

- Channel migration and avulsion

Hoh River flooding
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
Scour and damage to structures

Just off US 12 at Davis Creek
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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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