Improving resilience

WSDOT is taking actions today to stabilize slopes, replace small culverts, and improve bridge design and construction methods. These are also examples of actions that make our system safer and more resilient.

Rock scaling and slope stabilization on US 12 White Pass vicinity.

Box culvert in place replaced a small culvert on SR 542.

Drilled shafts support new bridge at Gold Creek on I-90.

Ongoing work

WSDOT continues to partner with the USDOT agencies on adaptation and preparation efforts. We are assisting Sound Transit with a vulnerability assessment funded by Federal Transit Administration.

We want to help people "ask the climate question" when looking at long-term transportation asset issues. We are developing tools and guidance so that WSDOT and local transportation planners and project teams can access and apply the study results into their work. We are building internal capacity, tracking the science and refining technical information for site-specific needs.

Finally, we are working with our emergency managers to monitor weather emergencies, improve our ability to reduce storm-related impacts, and to prepare for the future.

For more information:

WSDOT's Climate Impacts Vulnerability Assessment report (November 2011, 70 pages) is posted on WSDOT's sustainable transportation website at *http://www.wsdot.wa.gov/SustainableTransportation/adapting.htm*

WSDOT's project-level greenhouse gas and climate analysis

Information about how WSDOT considers climate change in project-level SEPA and NEPA documents can be found online at *http://www.wsdot.wa.gov/SustainableTransportation/adapting.htm*

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Resources on Climate Change in Washington

The WA State Department of Ecology serves as the clearinghouse for state policy and technical information:

www.ecy.wa.gov/climatechange/adaptation.htm

For the full report entitled PREPARING FOR A CHANGING CLIMATE: Washington state's integrated strategy visit:

www.ecy.wa.gov/climatechange/ipa_responsestrategy.htm

Washington State Department of Transportation

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Washington State Department of Transportation

November 2012

Adapting to a changing climate

Statewide study of climate-related infrastructure risks

Our climate is changing. Building a more resilient and sustainable transportation system is key to keeping our state's infrastructure safe. This supports our economy and our communities.

Protecting infrastructure, freight routes and keeping drivers safe for the long-haul

Our economy and quality of life can take serious hits when inclement weather floods interstates, closes critical bridges and brings relentless snow to our mountain passes.

WSDOT's job is to keep the state's transportation system safe and operational. This means planning and preparing to protect our vital roads, bridges, ferry terminals and other facilities that could be vulnerable to severe weather. We must be resilient and adapt to future environmental conditions.

WSDOT pilots infrastructure vulnerability assessment

Thanks to a $189,500 Federal Highway Administration (FHWA) national pilot project grant, WSDOT was able to assess how our state-owned and operated transportation assets may fare under extreme weather changes. Completed in November 2011, our report to FHWA explains the lessons learned from conducting the vulnerability assessment, and offers suggestions for improving the model.

We conducted workshops with our field staff from across the state to assess the vulnerability of our highways, ferry terminals and other infrastructure to changes in our climate and weather extremes. We presented the participants with climate scenarios such as extreme temperatures and sea-level rise (2, 4, and 6 feet), asking "What would be the likely impact on our facilities?" The results from each workshop were used to create a series of planning-level maps.

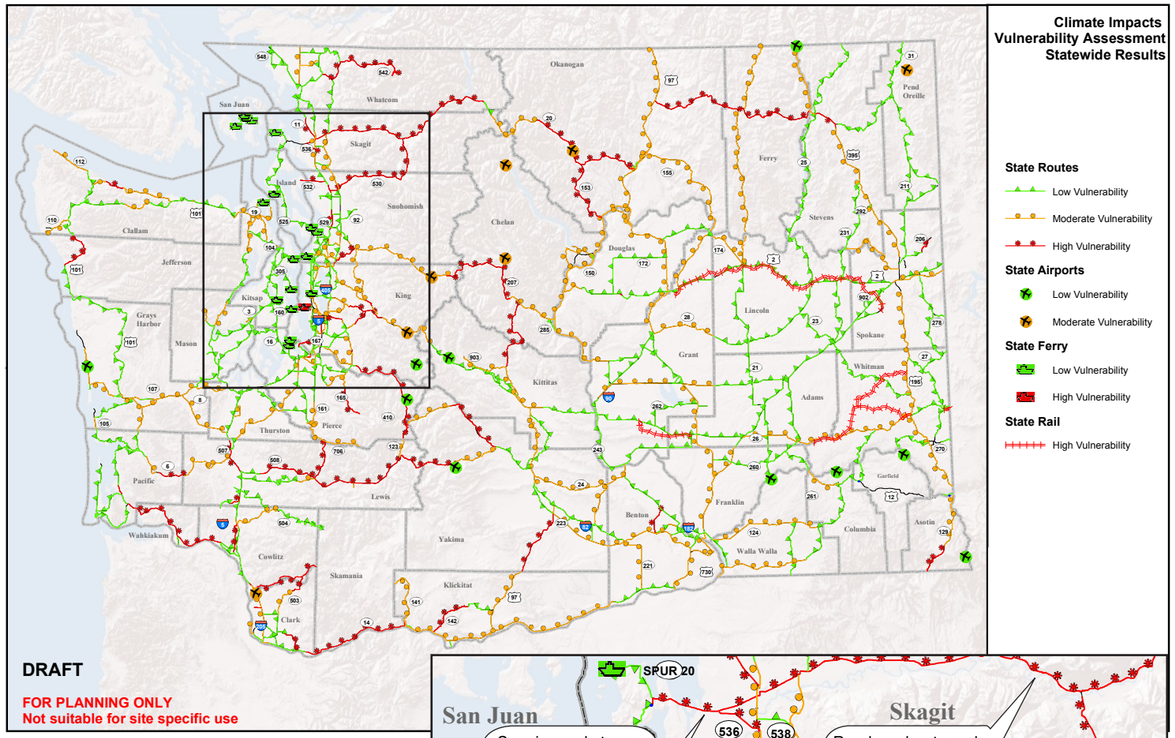
USDOT Climate Change Policy

United States Department of Transportation (USDOT) policy supports climate adaptation efforts. In a June 2011 policy statement, U.S. Transportation Secretary Ray LaHood directed USDOT agencies (such as the federal highway and transit administrations) to consider climate change impacts on current systems and future investments.

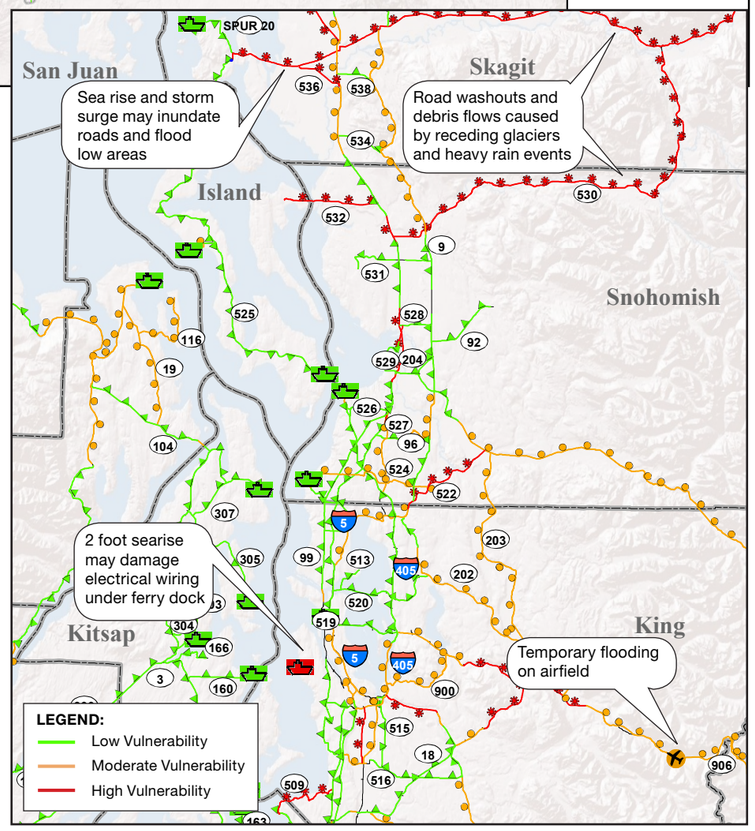
http://www.fhwa.dot.gov/environment/climate_change/adaptation/

USDOT funded five transportation agencies to test FHWA's climate risk model. For details, visit:

http://www.fhwa.dot.gov/hep/climate/ pilots.htm



Statewide results showing 2' sea-level rise and changes in rainfall, temperature and related climate impacts



Puget Sound area results

WSDOT's statewide assessment used data from the University of Washington's Climate Impacts Group[1] and applied a model developed by Federal Highways. WSDOT employees considered a range of possible scenarios, from gradual shifts to more dramatic impacts such as:

- Compounding effect of high tides, storm surges, and upriver flooding during extreme rain events.
- Effect on steep slopes and surrounding areas due to drought, wild fire, and sudden intense rain.
- Melting glaciers filling streams with debris combined with uncharacteristic higher elevation snow/rain events and resulting dynamics.

Fourteen workshops were held across the state to draw from local knowledge from within the region offices, state ferries, aviation and rail. We asked our maintenance folks and others to take a hard look at the future projections and what "keeps them up at night" today. Over 200 WSDOT employees helped to create this qualitative assessment of vulnerability.

The experience and knowledge of WSDOT maintenance staff, emergency coordinators, bridge engineers, and hydrologists informed the rankings of potential climate risks for state highway segments, ferry terminals, rail lines, and aviation facilities[2].

1 Comprehensive Assessment of Climate Change Impacts on Washington State, Climate Impacts Group (CIG), University of Washington: www.ecy.wa.gov/climatechange/ipa_resources.htm

2 Only WSDOT-owned and managed infrastructure was assessed.

RESULTS: Extreme weather intensifies known vulnerabilities

We found vulnerable infrastructure across the state – East and West.

This assessment showed that the areas where impacts were anticipated are already experiencing problems. The results of this effort reinforced the value of programs that WSDOT already has in place to fix recurring problems like unstable slopes and bridge scour.

We also found that our newer designs and construction techniques help make our assets more resilient. These include storm water flow features, riverbank protection, culvert retrofit for fish passage and other creative solutions.

We learned through this assessment that most of our newer bridges are not vulnerable; some can withstand a sea level rise of up to 4 feet or more. While this is good news, we did find that in some areas, road approaches may be more vulnerable than previously thought.

The products include GIS layers linked with the notes from the workshops to explain the vulnerability ratings. While the information is qualitative, it gives WSDOT a good understanding of where the system is strong, and points to where there is a potential for weather-related impacts to our transportation network.

Progress in 2012

Soon after the report was published in late in 2011, we began sharing results within WSDOT. We presented information to design and construction engineers, executive managers and others. We've also presented the results of our pilot study to national audiences through webinars and meetings.

WSDOT's work informed a series of recommendations for identifying vulnerable infrastructure contained in the Washington State Integrated Climate Change Response Strategy, published in May 2012.

WSDOT maintains a strong asset management system. The vulnerability assessment is one important piece of the puzzle. Instead of creating a separate program to look at climate change, WSDOT is integrating information on climate-related risks into existing asset management frameworks.

We updated the guidance for considering climate change and extreme weather events during project-level environmental review. Our project teams use the results in their environmental studies – including environmental impact statements. We are working to update other manuals to help employees recognize when they should think about climate impacts.

Progress is also evident in our investments that address storm water, fish passage, roadside vegetation management – we are now seeing how these actions help to protect our highways from severe storms.