



U.S. Department of Transportation
Federal Highway Administration

State Transportation Agencies Facing Climate Change

Highlights of The Northeastern State FHWA Climate Change Resilience Pilot Projects

Northeast Transportation and Wildlife Conference
September 12, 2016

CLIMATE
CHANGE



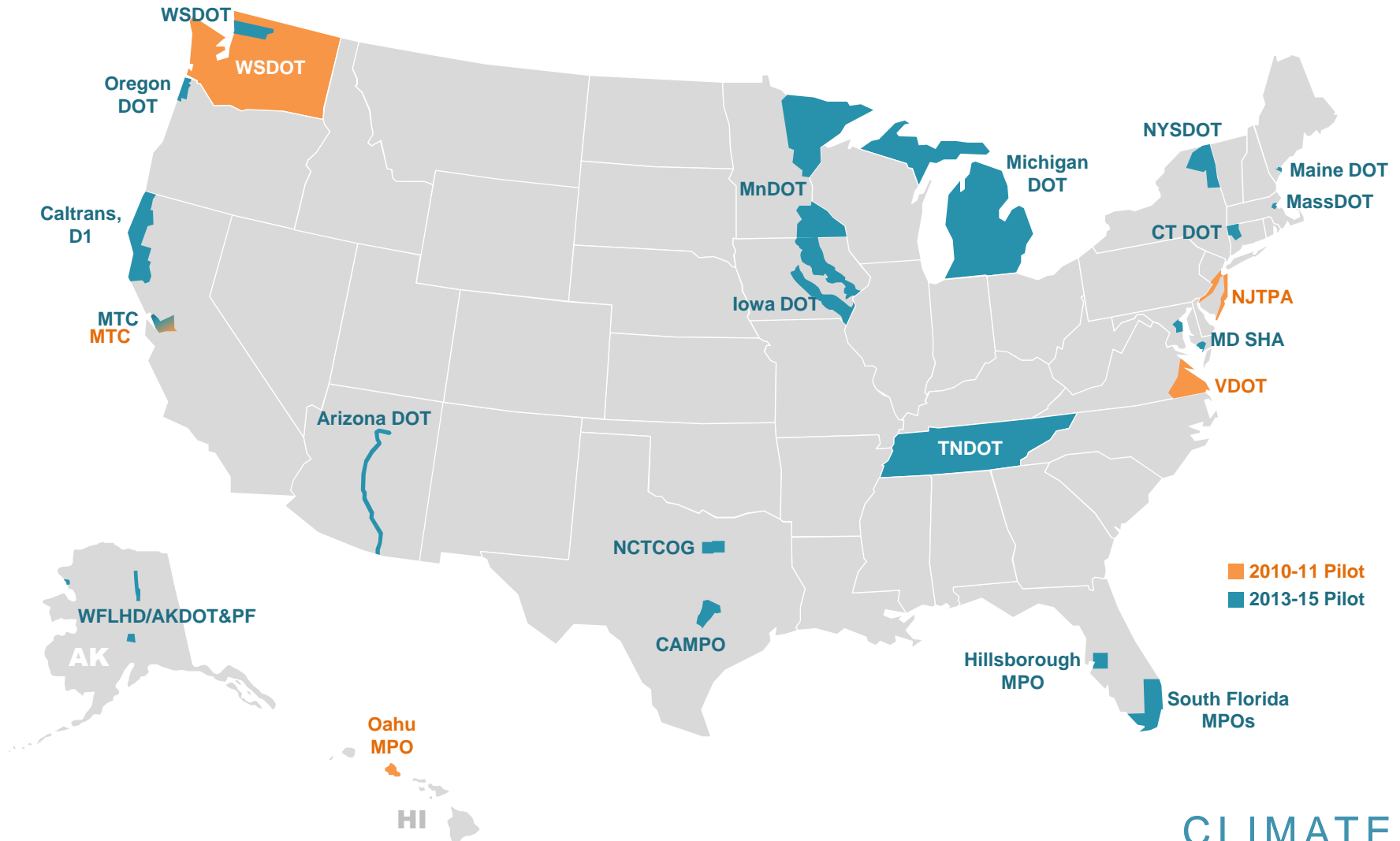


- Recent Executive Orders (E.O.):
 - [E.O. 13514](#) - Federal Agency Adaptation Planning (2009)
 - [E.O. 13653](#) - Climate Preparedness (2013)
- U.S. DOT Policy Statement on Climate Change Adaptation (2011)
- FHWA Order 5520: Transportation System Preparedness and Resilience to Climate Change and Extreme Weather Events, (December 2014)
- FAST Act
 - Resiliency and reliability into planning factors
 - Metropolitan plans include strategies to reduce vulnerability of transportation infrastructure to natural disasters

CLIMATE VULNERABILITY ASSESSMENT PILOTS



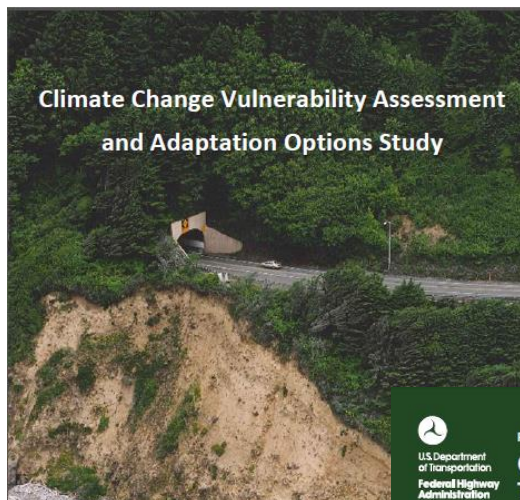
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PILOT LESSONS LEARNED



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Climate Change Vulnerability Assessment and Adaptation Options Study



FHWA Climate Resilience Pilot Program: Oregon Department of Transportation

FHWA-HEP-16-039

Final Report – December 2015



This report was developed by the Oregon Department of Transportation in accordance with a grant from the U.S. Department of Transportation (FHWA). The statements, findings, conclusions and recommendations are those of the Oregon Department of Transportation and do not necessarily reflect the views of FHWA or the U.S. Department of Transportation.

The Federal Highway Administration's (FHWA) Climate Resilience Pilot Program seeks to assist state Departments of Transportation (DOTs), Metropolitan Planning Organizations (MPOs), and Federal Land Management Agencies (FLMAs) in enhancing resilience of transportation systems to extreme weather events and climate change. In 2013-2015, 19 pilot teams from across the country partnered with FHWA to assess transportation vulnerability to extreme weather events and climate change and evaluated options for improving resilience. For more information about the pilot program, visit http://www.fhwa.dot.gov/environment/climate_change/adaptation/.



Oregon's north coast is served by highway routes that run along coastal bluffs, rivers, estuaries, and a mountain range. In the past, precipitation events have resulted in flooding, high water, landslides, rock falls, and coastal erosion. The Oregon DOT pilot project engaged maintenance and technical staff and utilized asset data to assess the vulnerability of highway infrastructure to extreme weather events and higher sea levels. For select priority hazard areas, the pilot conducted further analysis of specific adaptation sites, options, benefits, and costs.

Scope

The study area covered two counties on Oregon's north coast: Clatsop and Tillamook Counties. The vulnerability assessment focused on ten state-owned highway corridors, totaling nearly 300 miles of roadways. Primary climate drivers include extreme precipitation events, coastal flooding, and storm surge.

Using the results of the vulnerability assessment, the team selected a 25-mile Study Corridor to narrow the focus of the adaptation analysis. Five landslide and storm hazard sites were evaluated within the Study Corridor.

Objectives

- Assess the vulnerability of highways in the study area to known and projected climate impacts.
- Develop and evaluate a set of site-specific adaptation strategies for vulnerable infrastructure and conduct a benefit-cost analysis.
- Collaborate with stakeholders, including state and local agencies and coastal communities, planning for resilience to climate hazards on the north coast.



A failed section of US 301 after extreme storms in March 2013. Photo credit: Oregon Department of Transportation.

Debris from a landslide on Oregon Highway 6 in March 2014. Photo credit: Oregon Department of Transportation.

Road collapse along US 101 after extreme storms. Photo credit: Oregon Department of Transportation.



Maryland State Highway Administration

Climate Change Adaptation Plan with Detailed Vulnerability Assessment

Final Report – October 11, 2014



FHWA Climate Resilience Pilot Program: Maryland State Highway Administration

FHWA-HEP-15-066



The Federal Highway Administration's (FHWA) Climate Resilience Pilot Program seeks to assist state Departments of Transportation (DOTs), Metropolitan Planning Organizations (MPOs), and Federal Land Management Agencies (FLMAs) in enhancing resilience of transportation systems to extreme weather and climate change. In 2013-2015, 19 pilot teams from across the country partnered with FHWA to assess transportation vulnerability to climate change and extreme weather events, and evaluate options for improving resilience. For more information about the pilot, visit http://www.fhwa.dot.gov/environment/climate_change/adaptation/.

Maryland's transportation assets, especially those in close proximity to the state's over 7,500 miles of shoreline and numerous rivers, are exposed to a variety of coastal and flooding hazards. Maryland State Highway Administration (SHA) conducted a vulnerability assessment in two counties. The project team developed a three-tiered vulnerability assessment and adaptation process using flood inundation modeling, mapping, vulnerability and risk ratings, and expert input. SHA engineers, planners, and maintenance personnel used the assessment results to transform adaptation measures.



Scope

The assessment focused on two counties, selected for their differing representative locations and exposure to climate stressors (including sea level rise, storm surge, and increased intensity in precipitation). Somerset County, located on Maryland's Eastern Shore, is representative of low-lying Eastern Shore counties between the Chesapeake Bay and Atlantic Ocean. Anne Arundel County, which abuts the Chesapeake Bay, is representative of counties along the Western Shore of Maryland. Both counties are considered at risk for sea level rise, storm surge, and riverine flooding.

Assets included in the vulnerability assessment were bridges and roadway segments. Small culverts and

drainage conveyances were more difficult to assess, due to a lack of location and condition data in some areas of the state and the complex interdependencies within each drainage area.

Objectives

- Assess the vulnerability of SHA's transportation assets to sea level rise, storm surge, and flooding.
- Review and consider design strategies, best management practices, planning standards, and other ways to support the adoption of adaptive management solutions to improve the resiliency of Maryland's highway system.



Large culvert over Sawmill Creek in Anne Arundel County that is vulnerable to heavy precipitation. Photo credit: MD Department of Environment.

Roadway segment failure from a severe weather event. Photo credit: SHA.

Example of roadside erosion in Maryland. Photo credit: SHA.



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