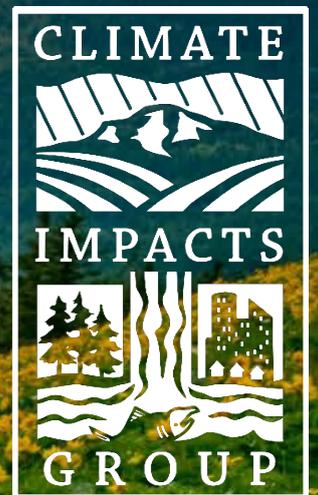


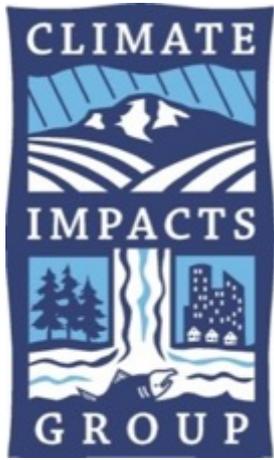
# Incorporating climate science into public agency management strategies

**Amy Snover, PhD**

Director, Climate Impacts Group  
University Director, NW Climate Science Center  
Assistant Dean, Applied Research  
University of Washington

Columbia River Gorge Commission  
13 February 2018

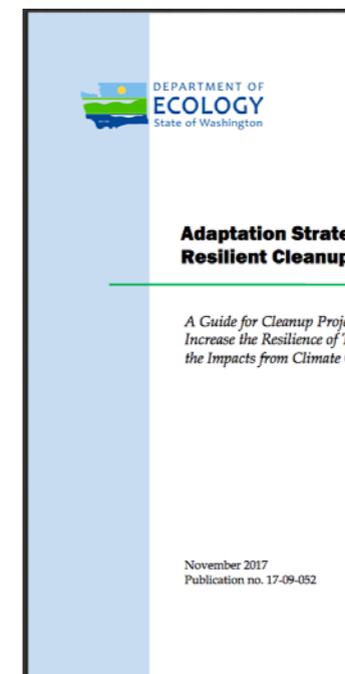
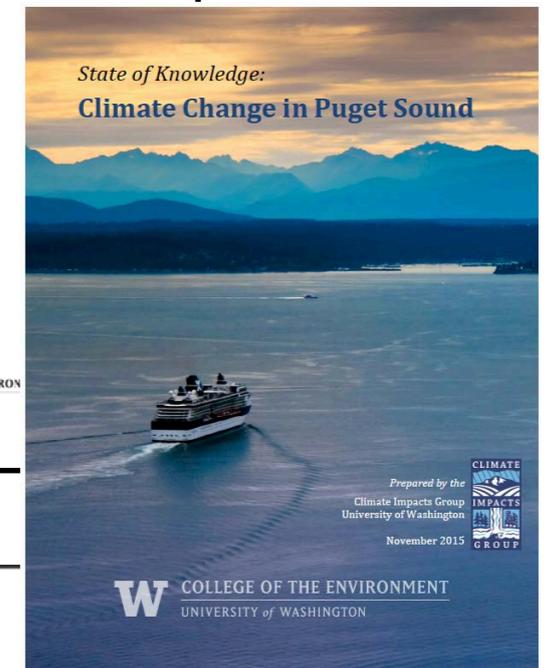
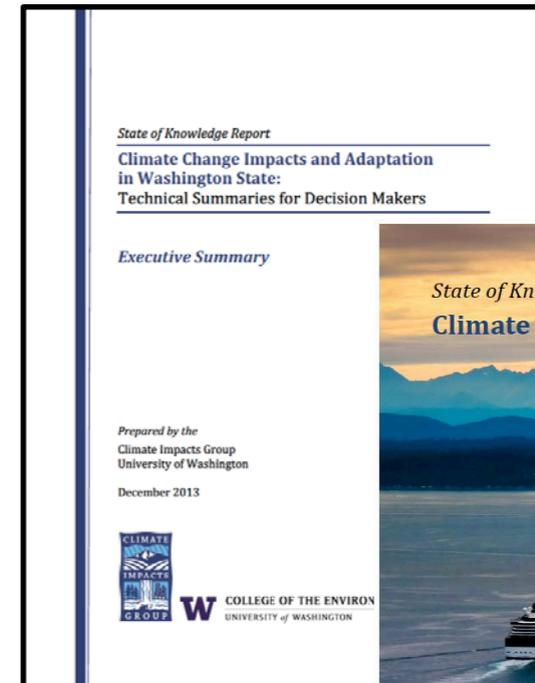




# Science for climate risk management

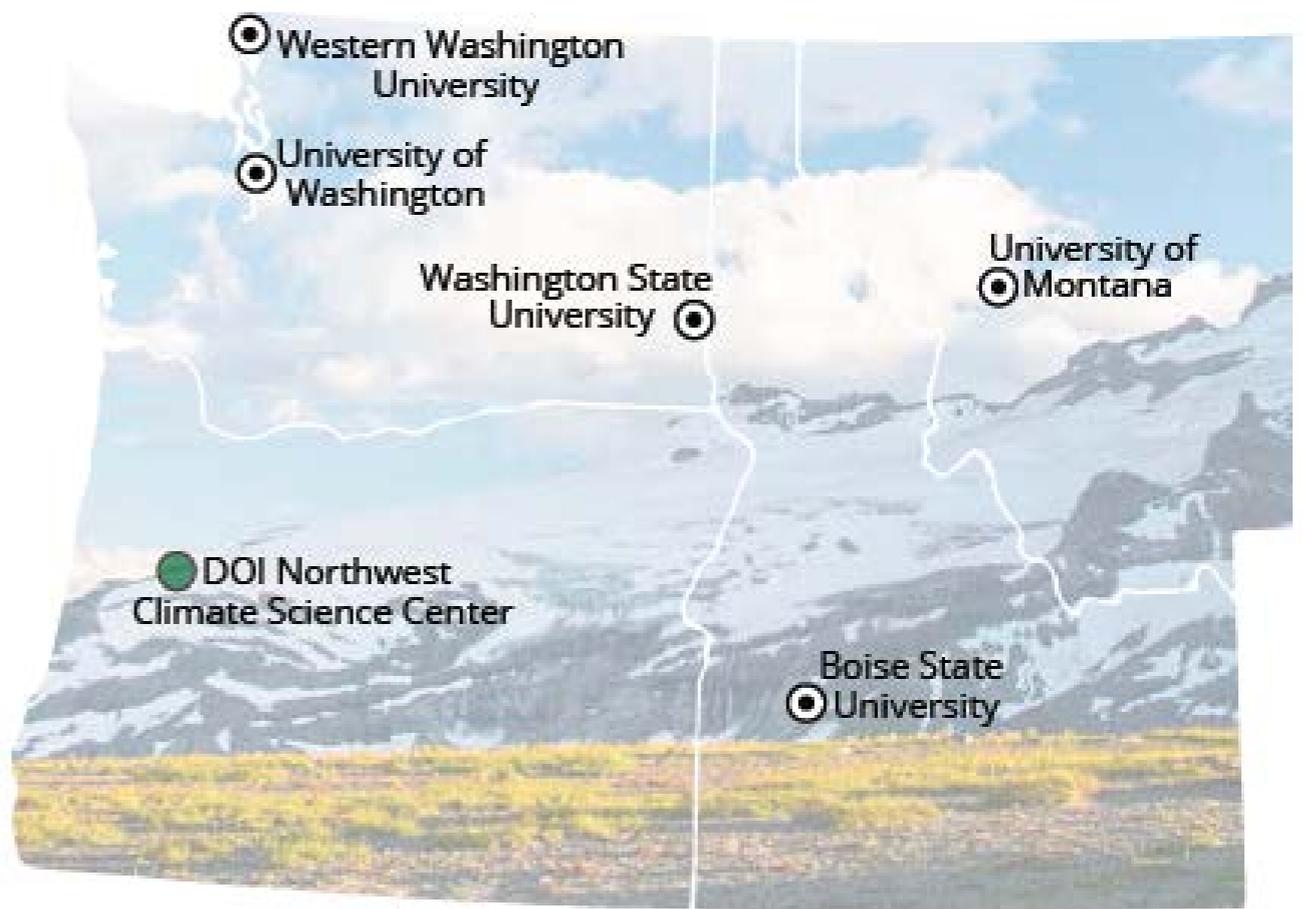
The Climate Impacts Group is Washington State's resource for climate impacts science, tools and decision-support.

- *State of Knowledge* reports on WA climate impacts, adaptation progress and data
- Online data & tools delivery
- Cutting-edge science on climate risks and adaptation responses
- Technical guidance and support for climate risk assessment and management



# NORTHWEST CLIMATE SCIENCE CENTER

The Department of Interior Northwest Climate Science Center advances climate resilience through research, training and regional partnerships.



## **Address the root cause**

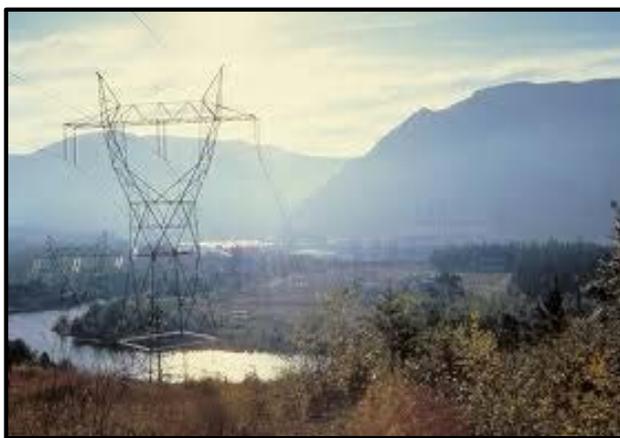
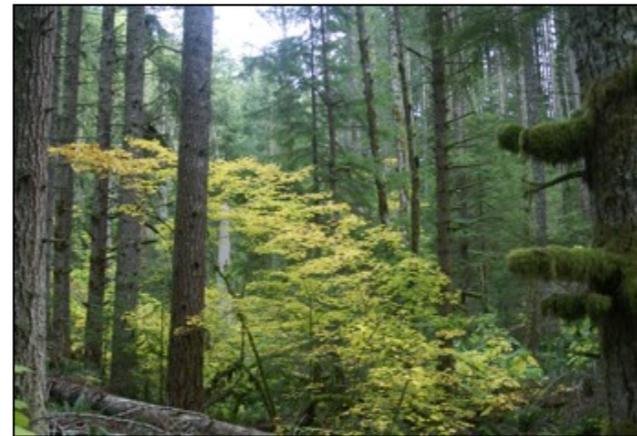
Reduce atmospheric greenhouse gases

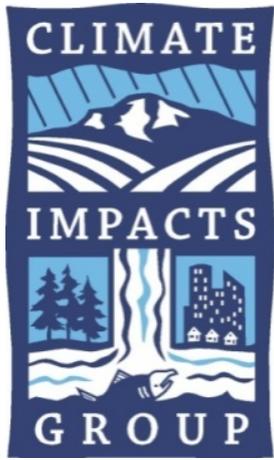


## **Prepare for the consequences**

Reduce vulnerabilities and build resilience

# Climate change affects...





# Building Climate Resilience Through Adaptation: Ask the Climate Questions

Can we **achieve our goals** in a changing climate?

How do we **protect our investments** as the climate changes?

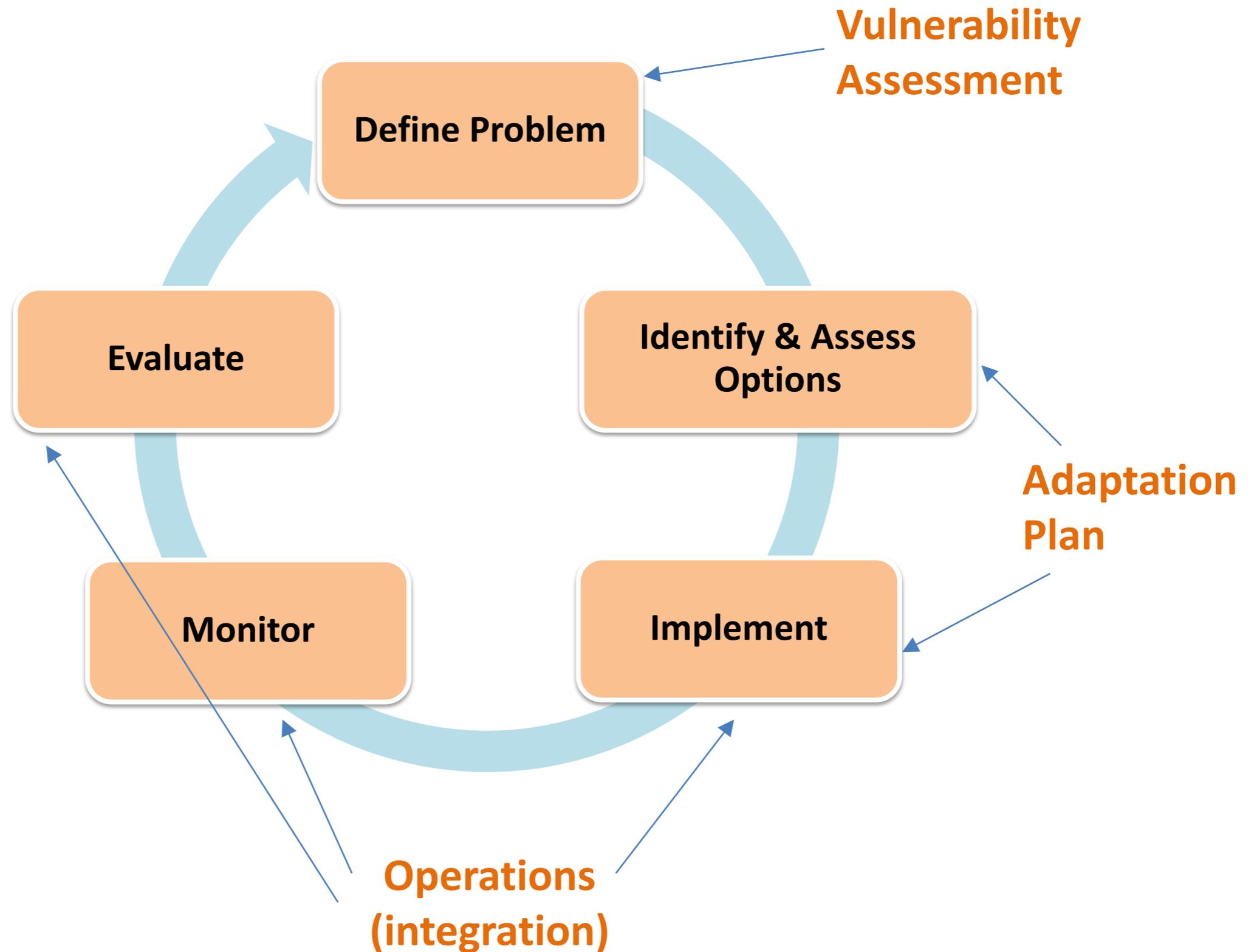
What is necessary to **reduce risks** associated with a changing climate?

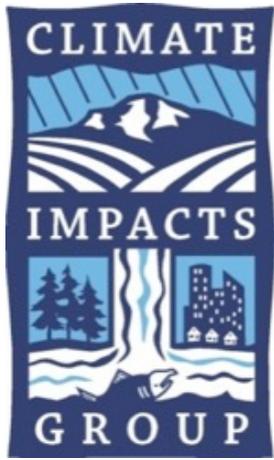
How do we **avoid creating new risks**?

What **opportunities** should we prepare for?

What is **necessary for success** in a world of ongoing change and certain uncertainty?

# Preparing for climate change





# Vulnerability assessments



2011

**Clearwater River Subbasin (ID) Climate Change Adaptation Plan**

Nez Perce Tribe Water Resources Division  
Model Forestry Policy Program  
Cumberland River Compact

12/30/2011

**Climate Change Vulnerability Assessment and Adaptation Options Study**

**Final Report – December 2014**

Oregon Department of Transportation  
U.S. Department of Transportation Federal Highway Administration

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

Confederated Tribes of the Umatilla Indian Reservation

**Climate Change Vulnerability Assessment**

September 2015

**Southwest Washington Adaptation Partners**  
Preparing for climate change through science-management collaboration

Home Objectives & Target Outcomes Approach & Schedule Partners

Southwest Washington Adaptation Partners (SWAP)

- National Forest
- Wilderness
- National Monument
- National Park
- Indian Reservation
- Washington DNR

**Preparing for a Changing Climate**  
Washington State's Integrated Climate Response Strategy

DEPARTMENT OF ECOLOGY  
State of Washington

April 2012  
Publication No. 13-01-004

**CLIMATE CHANGE PREPARATION STRATEGY**

**RISK AND VULNERABILITIES ASSESSMENT**

**PREPARING FOR LOCAL IMPACTS IN PORTLAND AND MULTNOMAH COUNTY | 2014**

**WASHINGTON'S STATE WILDLIFE ACTION PLAN 2015 Update**

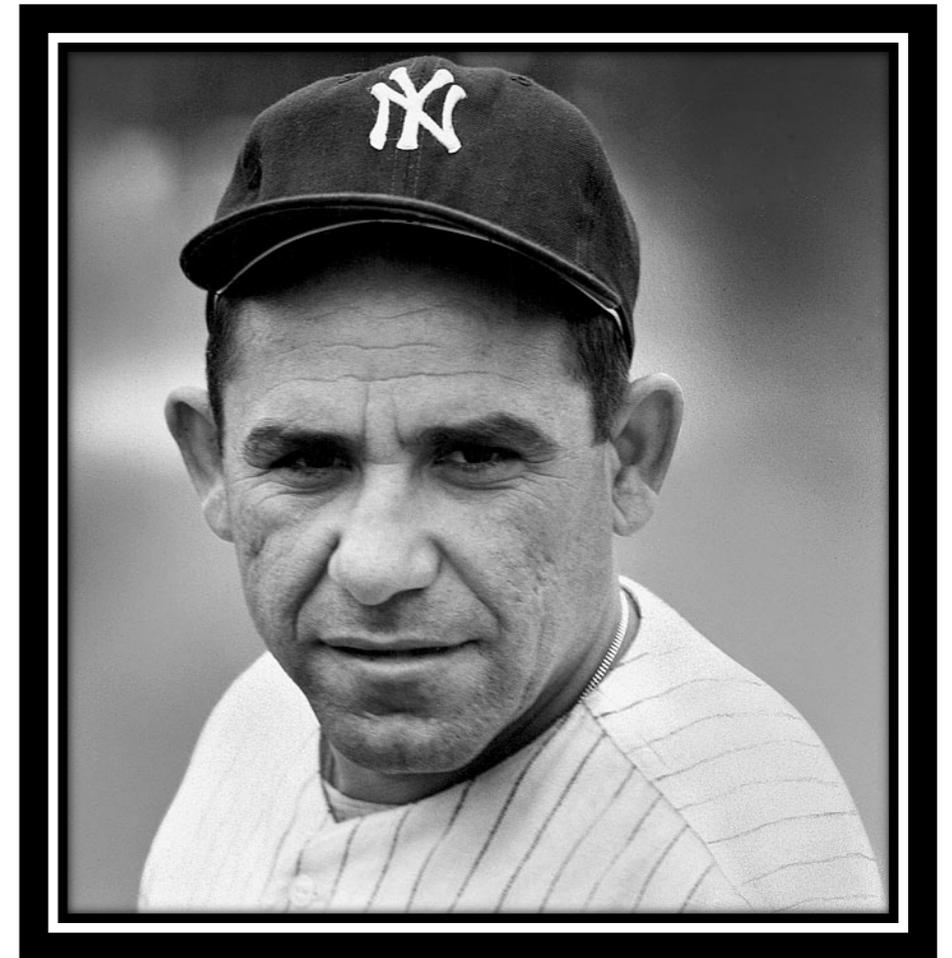
Prepared by the Washington Department of Fish and Wildlife  
September, 2015

**Climate Adaptation Plan for the Territories of the Yakama Nation**

APRIL 2016

# Look for embedded assumptions

- Assumptions of stationarity
- Actions pegged to specific thresholds or (past) time periods
- Qualitative terms that could take on new meanings



“The Future Ain’t What it  
Used to Be”



## *Example*

# Lower Columbia Estuary Partnership

## **Habitat Restoration**

**ACTION 2:** Protect, conserve, and enhance priority habitats, particularly wetlands, on the mainstem of the lower Columbia River and in the estuary.

- How will climate change affect habitats & wetlands of concern?
- Would the definition of “priority habitats” change if climate impacts are considered?
- Do standards for defining what it means to “protect”, “conserve”, and “enhance” need to change?



# Preparing for climate change: A two-pronged approach

## 1. Deliver Adaptive Actions

Implement actions to  
address specific climate  
vulnerabilities

Choice and timing of actions may  
depend on specific climate  
projections

## Adaptation Actions (examples)

- Increase water conservation measures
- Strengthen dikes and levees where appropriate
- Restore critical habitat for climate-sensitive species
- Plant tree species known to have a broad range of tolerances
- Adjust zoning, siting & design choices

“GMA goal: Protect and enhance agricultural land for agricultural uses. Agricultural lands are those lands that are used for or suitable for agricultural use.”



# Preparing for climate change: A two-pronged approach

## 1. Deliver Adaptive Actions

Implement actions to  
address specific climate  
vulnerabilities

Choice and timing of actions may  
depend on specific climate  
projections

## 2. Build Adaptive Capacity

Address institutional, legal,  
cultural, technical, fiscal and  
other barriers to change

Activities can be independent of  
specific climate projections

## Building Adaptive Capacity (examples)

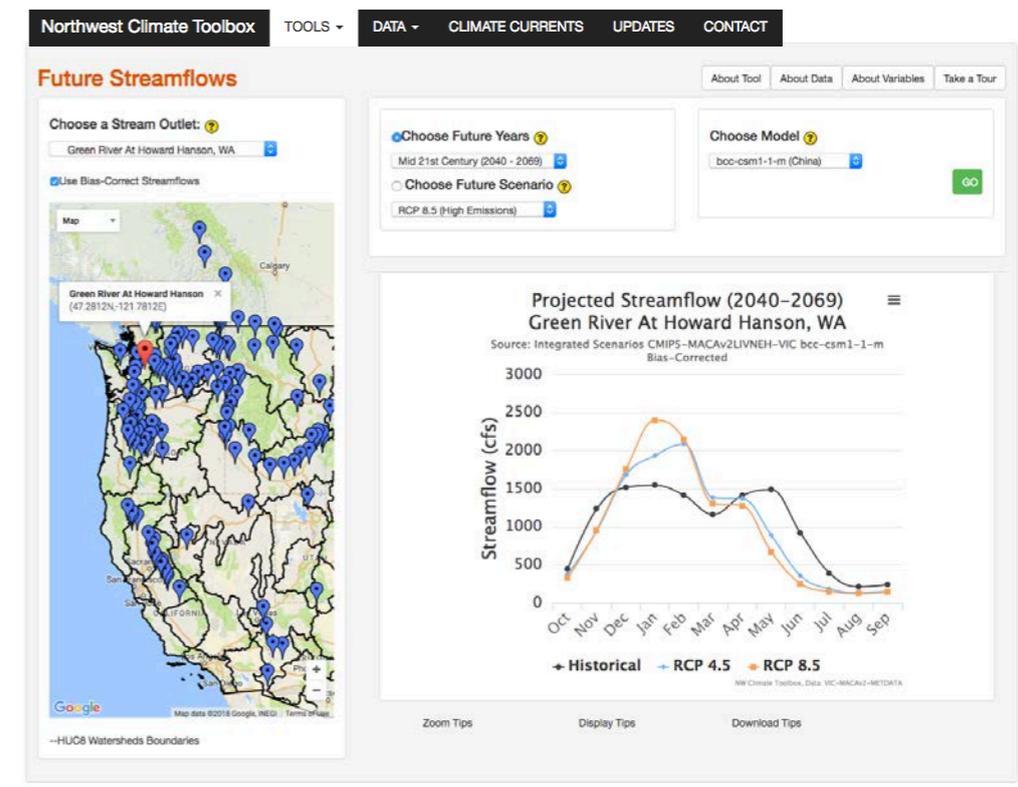
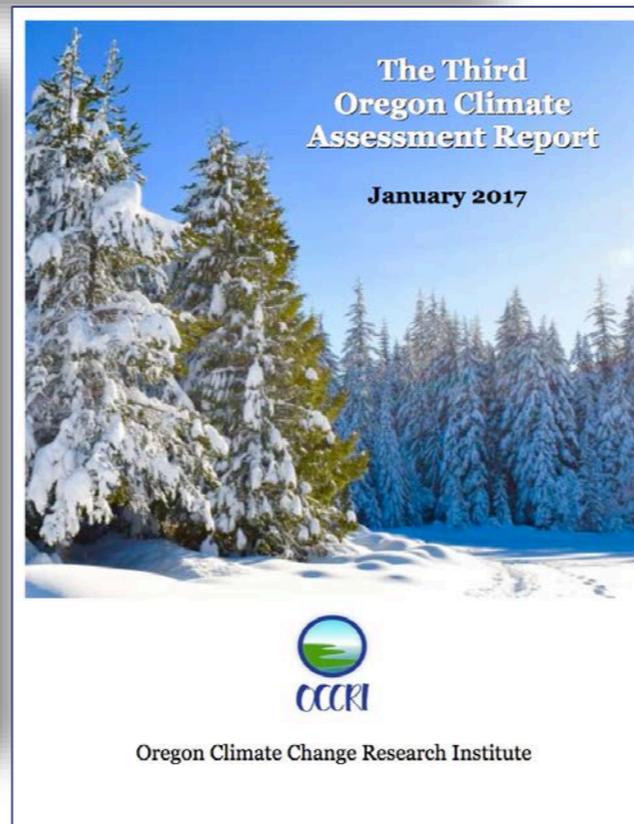
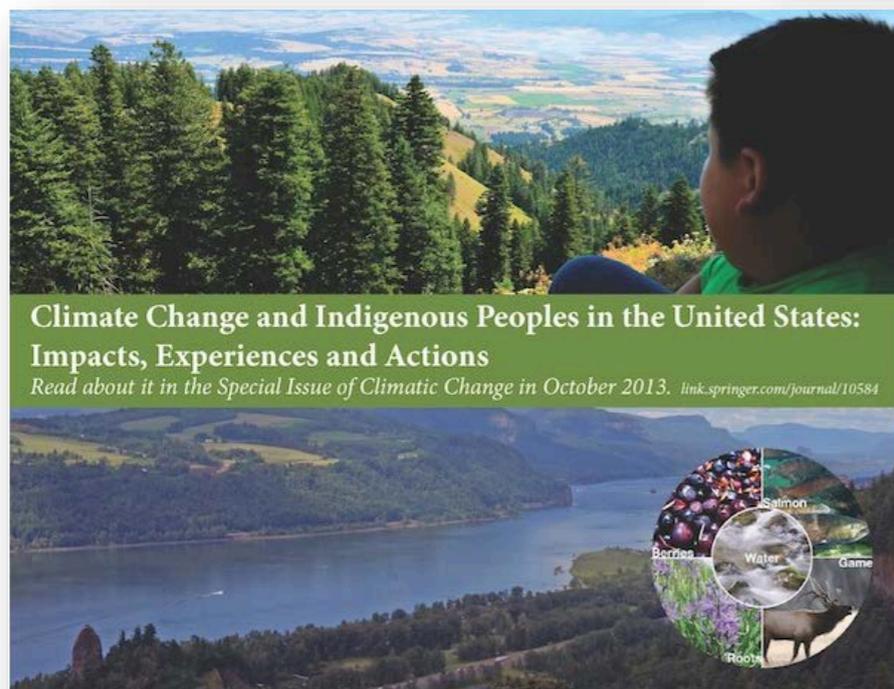
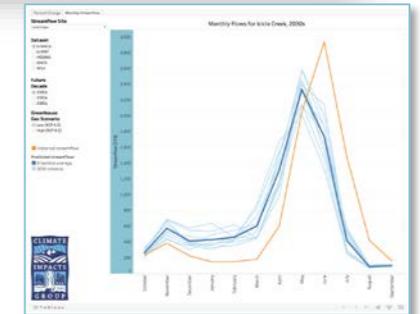
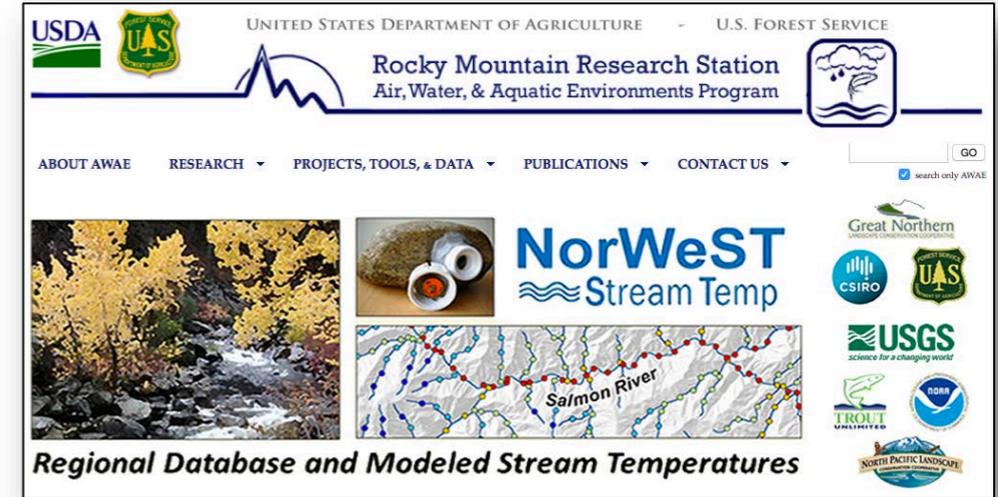
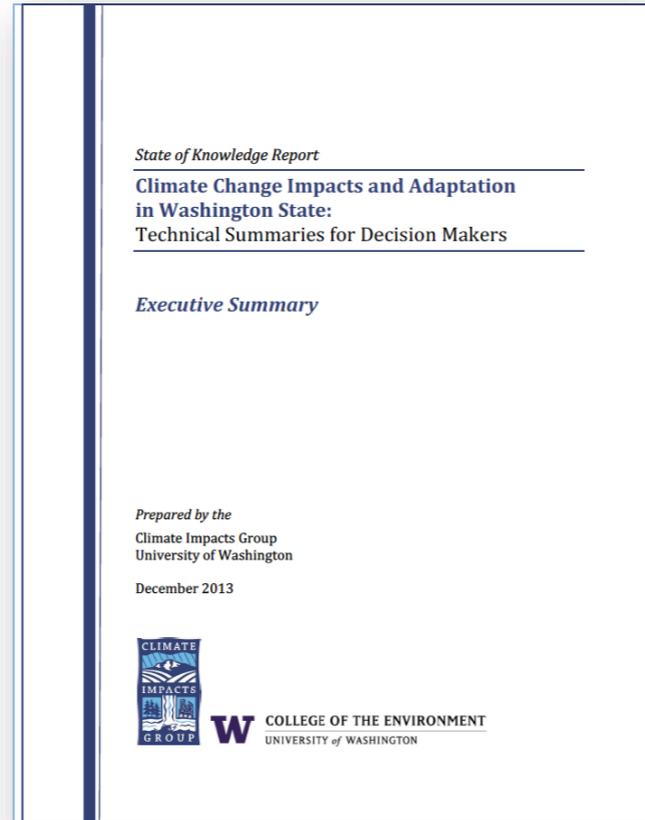
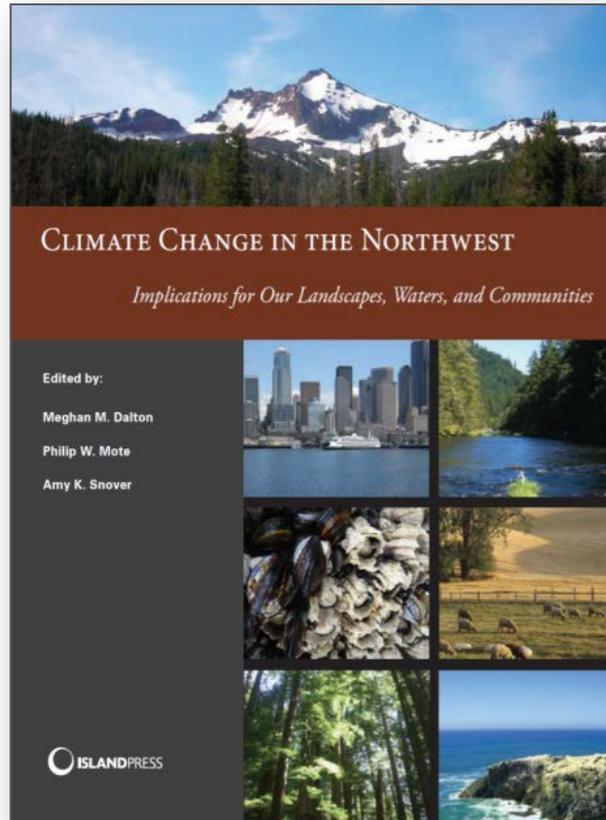
- Increase outreach and education to stakeholders about climate change and adaptation
- Increase staff training opportunities
- Increase partnerships with organizations that can support adaptation needs
- Identify and address regulatory, institutional, and other barriers to adaptation planning
- Identify and address key information gaps

“GMA goal: Protect and enhance agricultural land for agricultural uses. Agricultural lands are those lands that are used for or suitable for agricultural use.”

# Assets for Building Climate Resilience



# Knowledge, assessments & data







# Climate change preparation in WA state



King County



Tacoma



City of Seattle



City of OLYMPIA



1854



Snohomish County



SOUNDTRANSIT



CHELAN COUNTY



Washington State Department of Health



WASHINGTON STATE DEPARTMENT OF Natural Resources



WA OIC



ATTORNEY GENERAL OF WASHINGTON



DEPARTMENT OF ECOLOGY State of Washington



WSDOT



Washington Department of FISH and WILDLIFE

PugetSoundPartnership our sound, our community, our chance



CLIMATE IMPACTS GROUP



OWSC OFFICE OF THE WASHINGTON STATE CLIMATOLOGIST

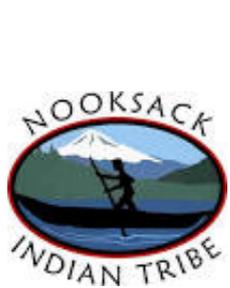


CIRC Climate Impacts Research Consortium



REACCH Regional Approaches to Climate Change - PACIFIC NORTHWEST AGRICULTURE

BioEarth



NOOKSACK INDIAN TRIBE



Swinomish Indian Tribal Community



CONFEDERATED TRIBES AND BANDS YAKAMA NATION TREATY OF 1855



NEZ PERCE TRIBE TREATY OF 1855



WALLA WALLA-UMATILLA CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION Treaty of 1855



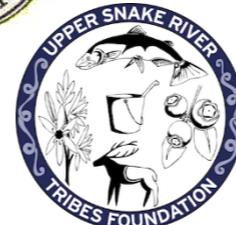
THE STRONG PEOPLE JAMESTOWN SKLALLAM TRIBE



QUINALT INDIAN NATION



THE CONFEDERATED TRIBES OF THE COLVILLE RESERVATION 1872



UPPER SNAKE RIVER TRIBES FOUNDATION



NORTH PACIFIC LANDSCAPE CONSERVATION COOPERATIVE



NATIONAL PARK SERVICE



FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE



U.S. FISH & WILDLIFE SERVICE DEPARTMENT OF THE INTERIOR



U.S. DEPARTMENT OF THE INTERIOR MARCH 3, 1849



NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE



US ARMY CORPS OF ENGINEERS



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



U.S. DEPARTMENT OF HOMELAND SECURITY

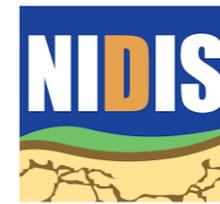


FTA

FEMA



NATIONAL MARINE SANCTUARIES



NIDIS NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM



Great Basin LANDSCAPE CONSERVATION COOPERATIVE



Great Northern LANDSCAPE CONSERVATION COOPERATIVE



USDA Northwest Regional Climate Hub

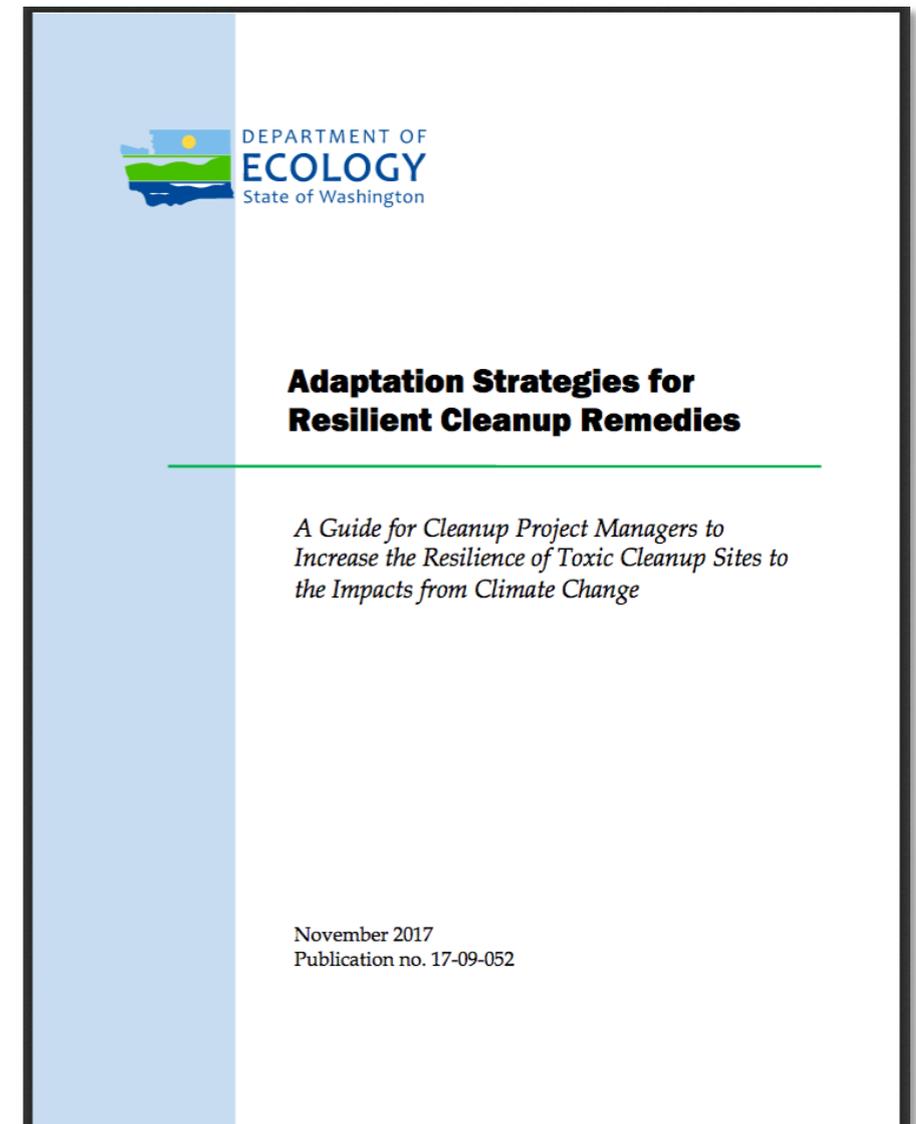
# Example: WA Ecology Toxics Clean-Up

**Goal: Ensure cleanup of state toxic sites that is protective of human and environmental health over the long term**

## **Guidance:**

Provides geo-specific information about magnitude of hazard associated with key climate impacts (sea level rise, coastal and riverine flooding, landslides, wildfire, drought)

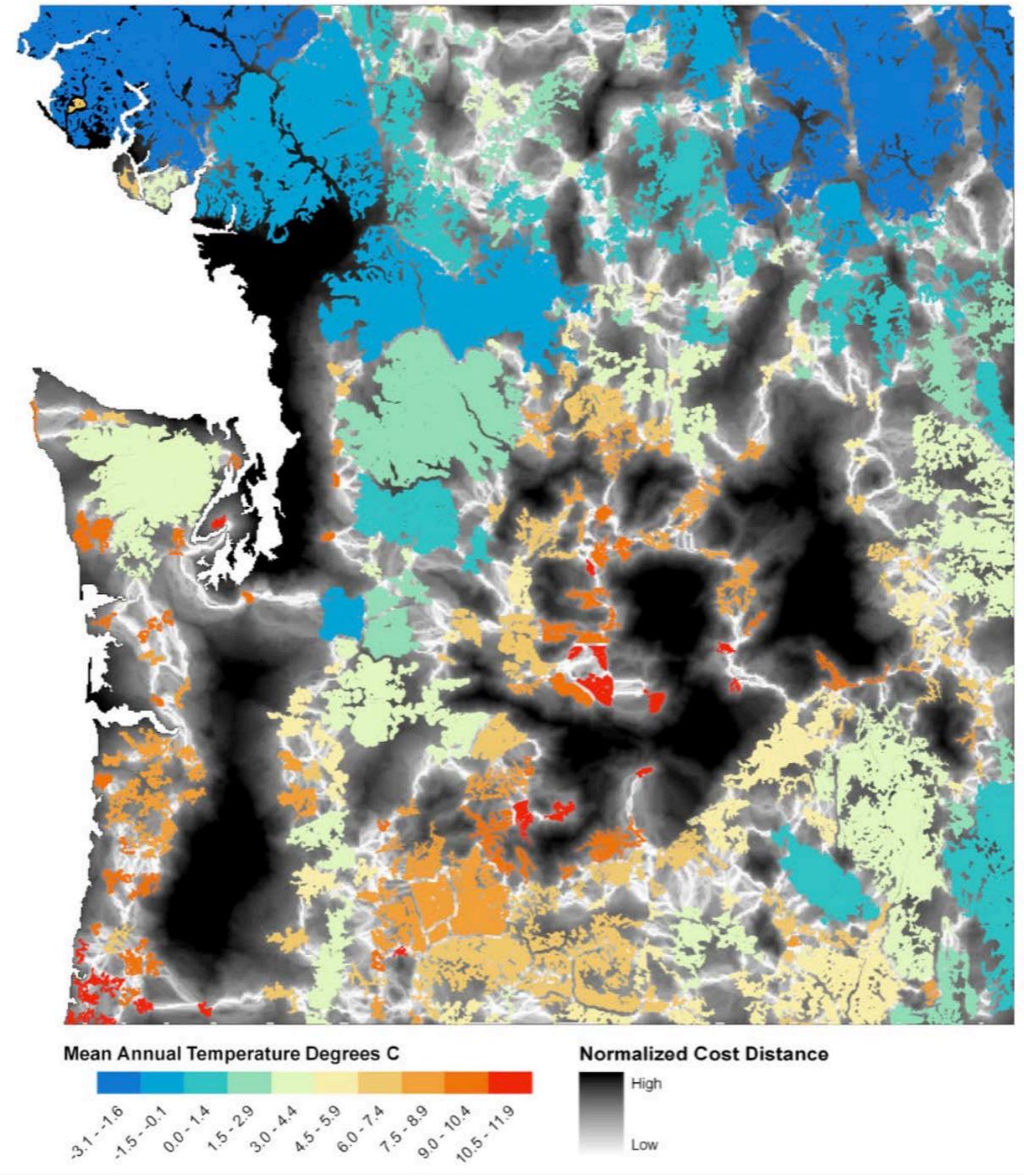
Provides resilience recommendations based on: location & type of site, type of remedy, cleanup stage.



# Example: Climate-gradient corridors

Connecting warm areas in good condition to cooler ones, using corridors that span gentle climatic gradients and avoid areas of human land use

Applied by WDFW in land acquisition decisions



Washington Focus Area

WASHINGTON WILDLIFE HABITAT  
CONNECTIVITY  
WORKING GROUP



## The Washington Connected Landscapes Project

WASHINGTON WILDLIFE HABITAT  
CONNECTIVITY  
WORKING GROUP

# Example: Adaptation Funding

**\$12m to help wildlife & ecosystems adapt to climate impacts (2011-2016)**



**WCS**

## **CLIMATE ADAPTATION FUND**

*Supporting innovative, on-the-ground projects that develop practical solutions to the impacts of climate change*

**PROJECTS**

*“Proactively considering climate change makes it more likely that the investments we make today will produce successful results in the decades ahead.”*

# Summary

Climate change will have widespread impacts on Washington's communities, businesses & natural systems.

Today's decisions determine:

*How much* climate change we'll experience

*How severe* the impacts will be

*How well* today's investments perform into the future

“

Proactively considering climate change makes it more likely that the investments we make today will produce successful results in the decades ahead.

”

Wilderness Conservation Society

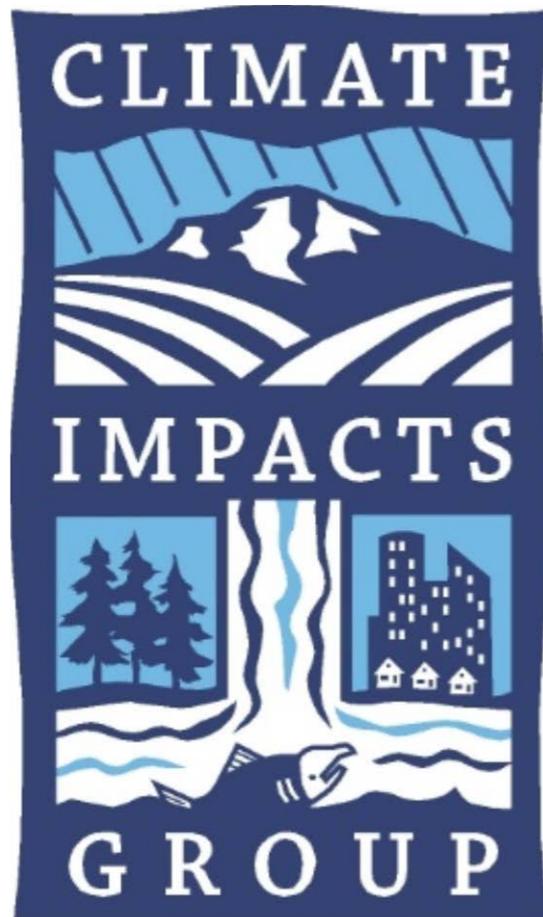
# Prepare for a changing climate

- Reduce identified risks
- Adjust existing efforts and expectations to align with changing conditions
- Build capacity for change









The Climate Impacts Group

[www.cig.uw.edu](http://www.cig.uw.edu)

The NW Climate Science Center

[www.nwclimatescience.org](http://www.nwclimatescience.org)

Amy Snover

[aksnover@uw.edu](mailto:aksnover@uw.edu)