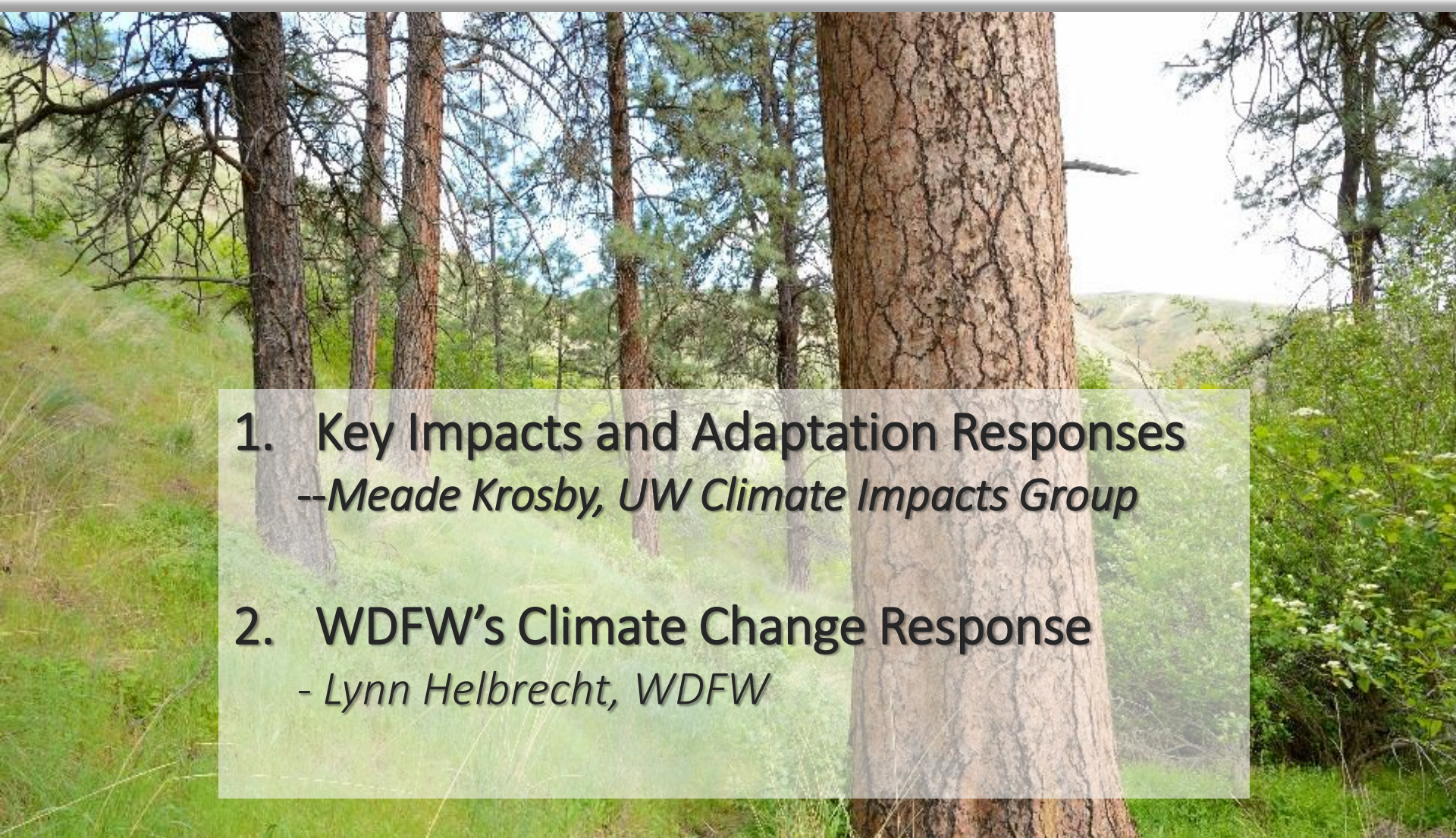
Fish and Wildlife in a Changing Climate

June 10th, 2016



1. Key Impacts and Adaptation Responses
   --Meade Krosby, UW Climate Impacts Group

2. WDFW's Climate Change Response
   - Lynn Helbrecht, WDFW

Fish & Wildlife in a Changing Climate:

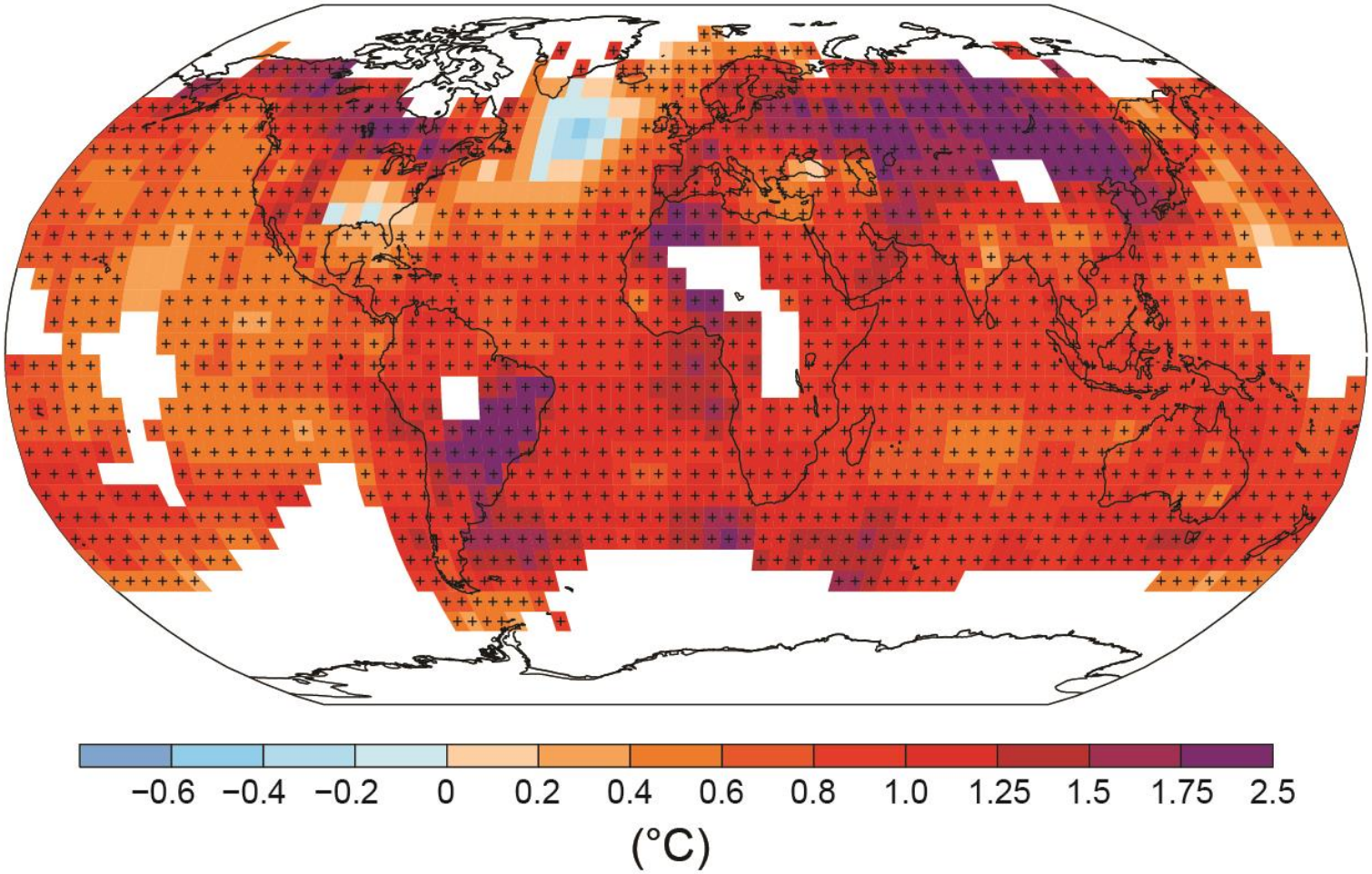
Key Impacts and Adaptation Responses

Meade Krosby
Climate Impacts Group, University of Washington
mkrosby@uw.edu

COLLEGE OF THE ENVIRONMENT
UNIVERSITY of WASHINGTON

CLIMATE IMPACTS GROUP

Average annual global temperature increased +1.5˚F between 1880 and 2012



Map of observed changes in global surface temperature, 1901 to 2012

IPCC, 2013: Summary for Policymakers.

Figure adapted from IPCC, 2013: Summary for Policymakers.

Climate impacts on species and ecosystems

Changes in the timing of biological events

Changes in species distributions

Novel ecological communities

Increased disturbance

Increased wildfire risk

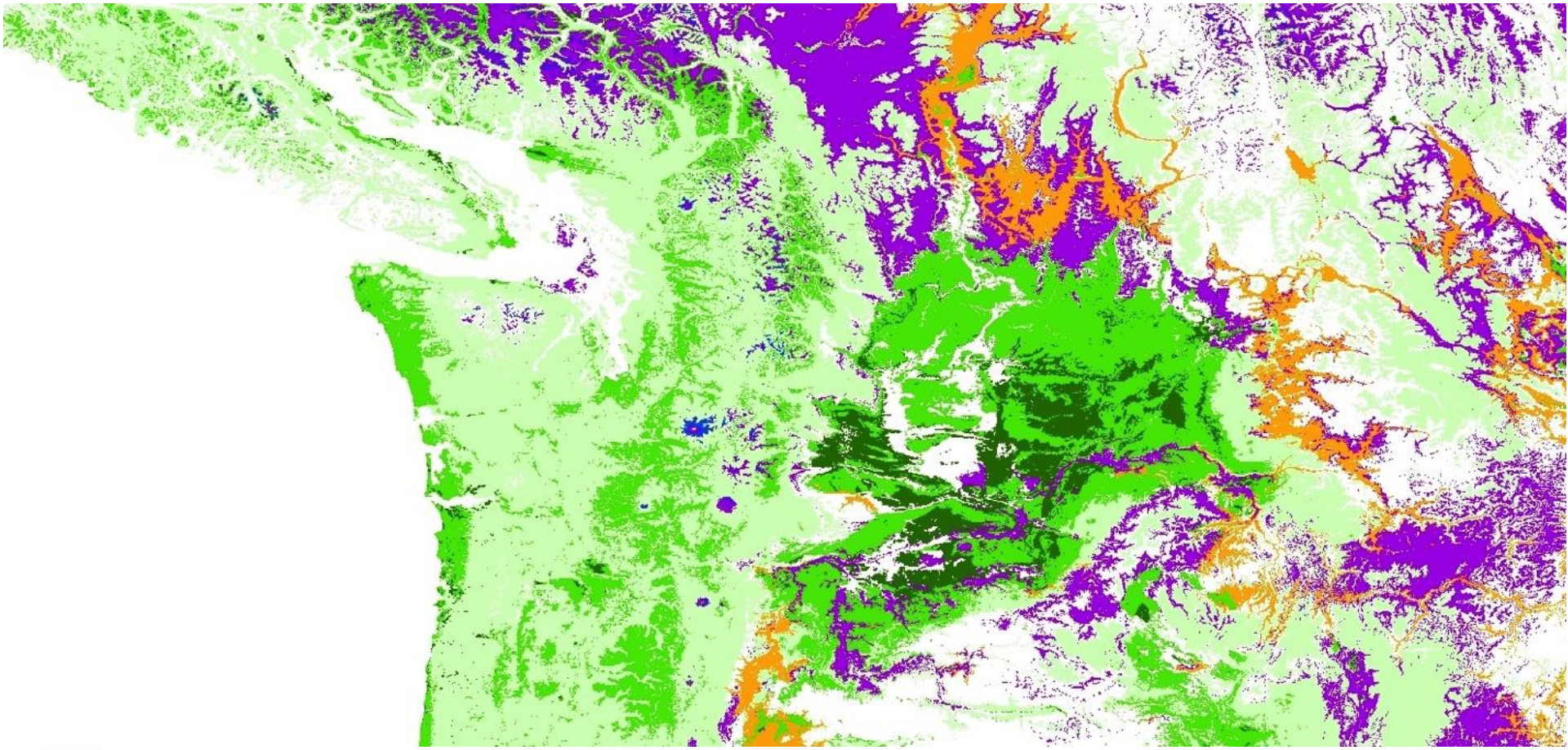
Area burned by fire in the Columbia River Basin is projected to double by 2020s, triple by 2040s, x5 by 2080s (relative to median for 1916-2006).
(Littell et al. 2010, 2012)

Discovery Fire burns near volatile stands of insect-damaged trees, 2009, DNR

Increased risk of insect outbreaks

Near-term increased risk of mountain pine beetle outbreaks in drier forests will exacerbate fire risk.
(Littell et al. 2010, 2012)

Dynamic future landscapes will challenge traditional conservation approaches



Extremely low change (>= 95% retention, < 5% immigrants)
Very low change (>=90% retention, < 10% immigrants)
Low change (>= 75% stable, <25% expansion or contraction)
High influx (>= 75% stable and expansion, <25% contraction)
Species loss (>=50% contraction, < 50% expansion or stable)
> 50% Turnover; High Loss and Gain

Projected vertebrate turnover
Climatic niche projections
A2 emissions scenario
HadCM3 GCM
2080s

How do we pick spatial priorities for climate change?

Places that will help species avoid climate change?

Places that will help species adapt to change?

Places that will maintain existing biological communities?

Places that will maximize future biodiversity?

…and how would we identify these areas?

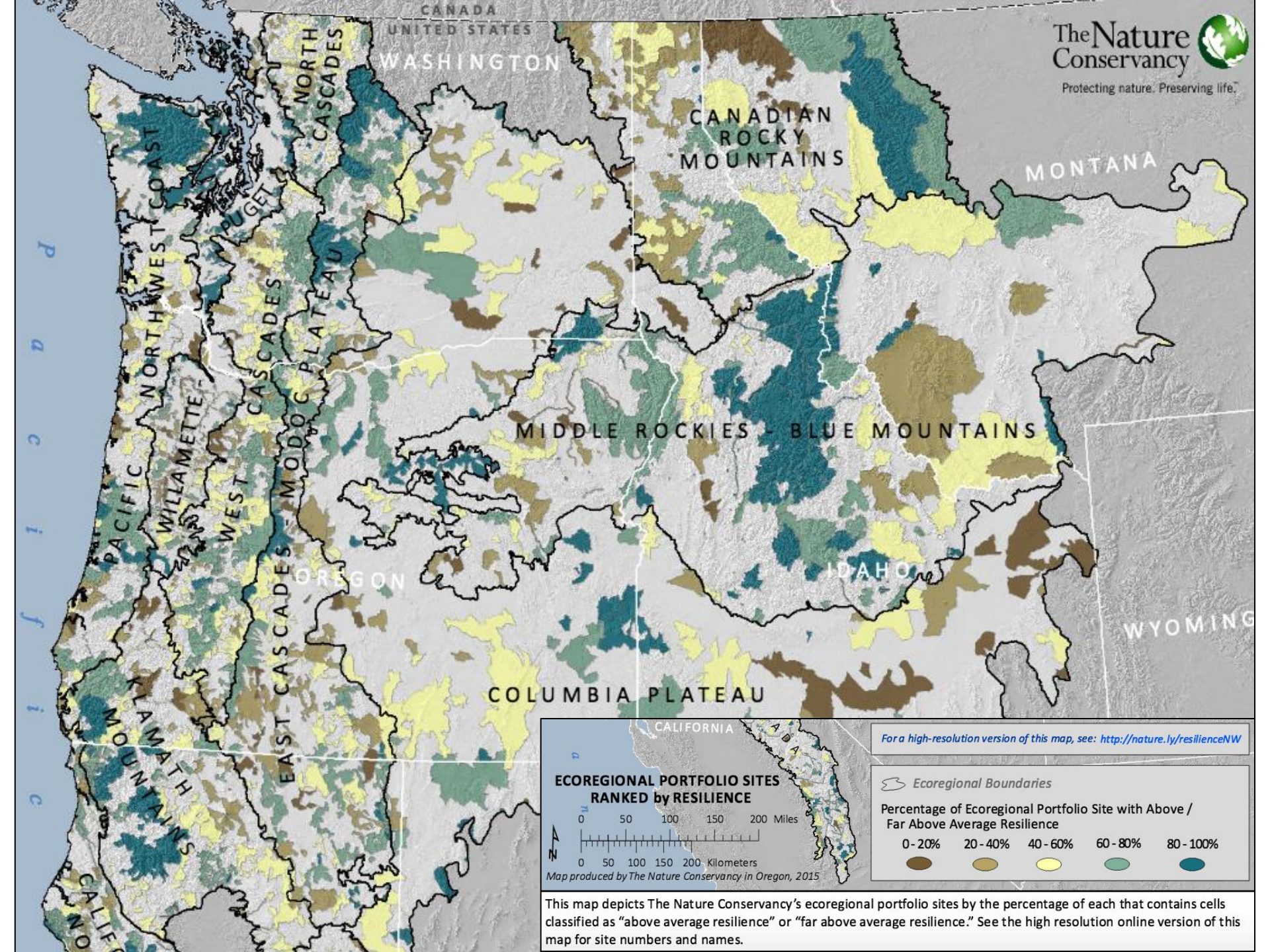
There is no single “correct” model or approach for identifying priority areas

Coarse-Filter

Fine-Filter

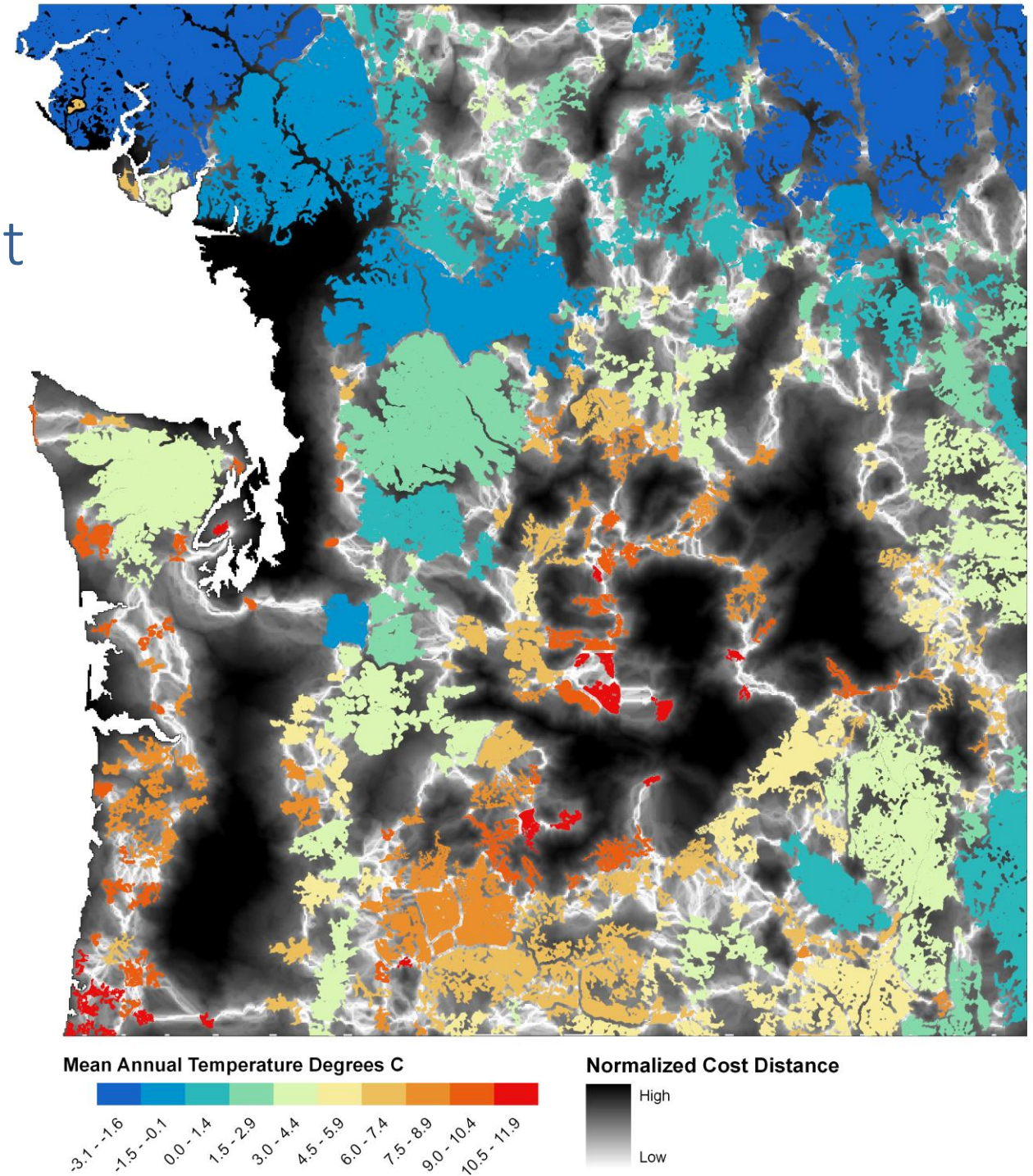
- Land facets / enduring features
- Climate refugia
- Climate-gradient corridors
- Areas of low climate velocity

- Areas of species range stability
- Areas of species expansion
- Areas of low species turnover
- Areas of high future diversity

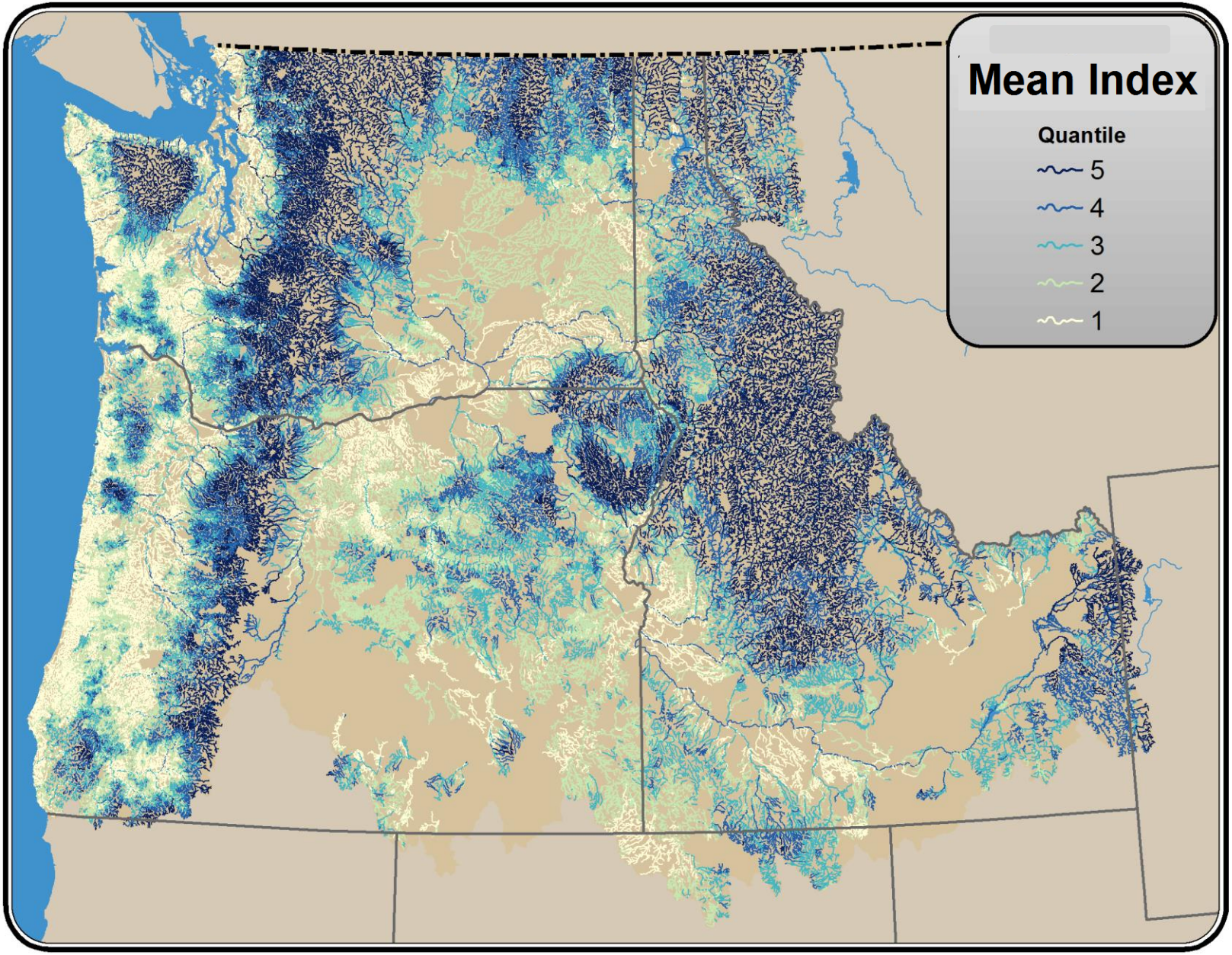


This map depicts The Nature Conservancy's ecoregional portfolio sites by the percentage of each that contains cells classified as "above average resilience" or "far above average resilience." See the high resolution online version of this map for site numbers and names.

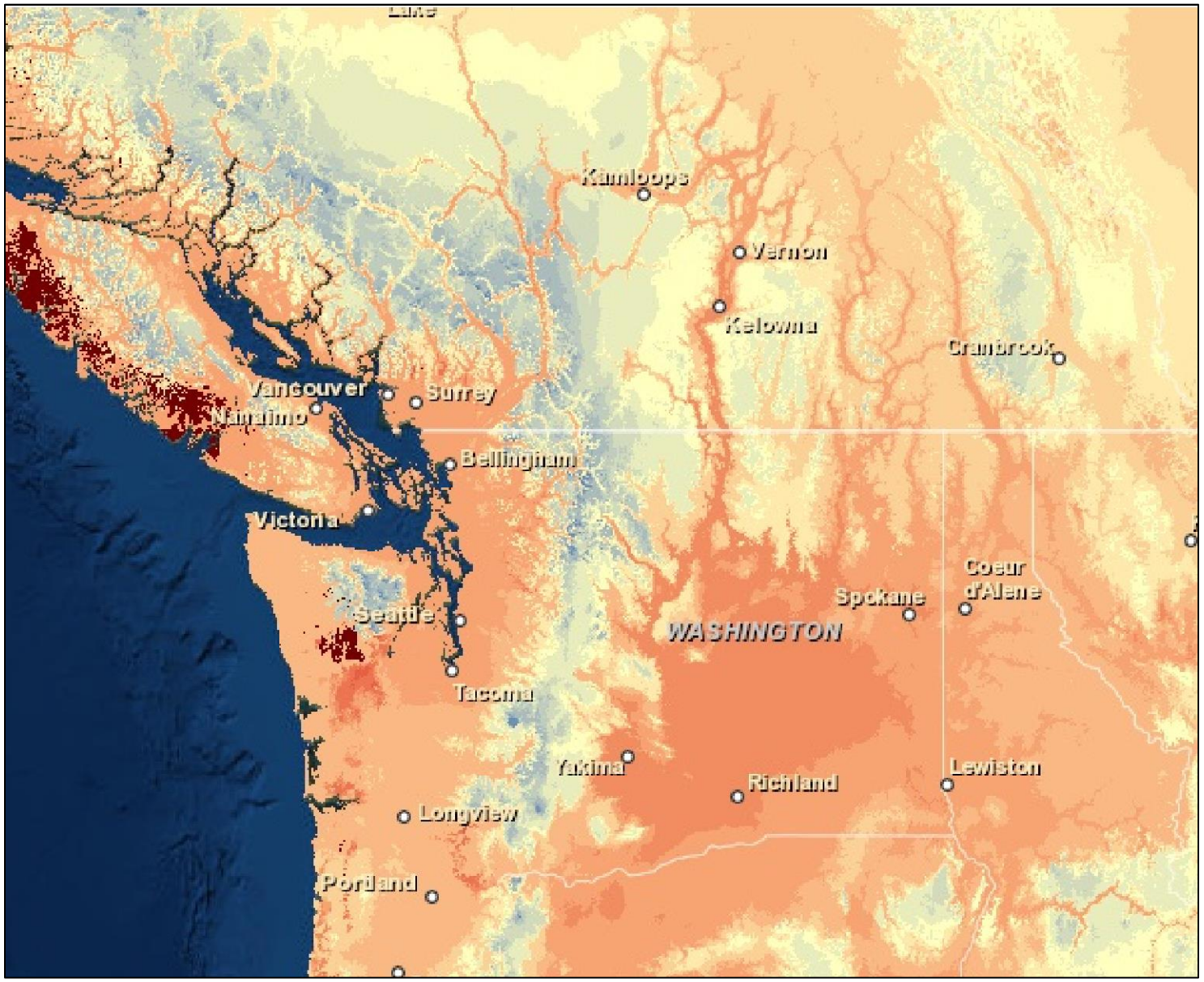
WHCWG Climate-Gradient Corridors



Riparian Climate Corridors



Climate Velocity

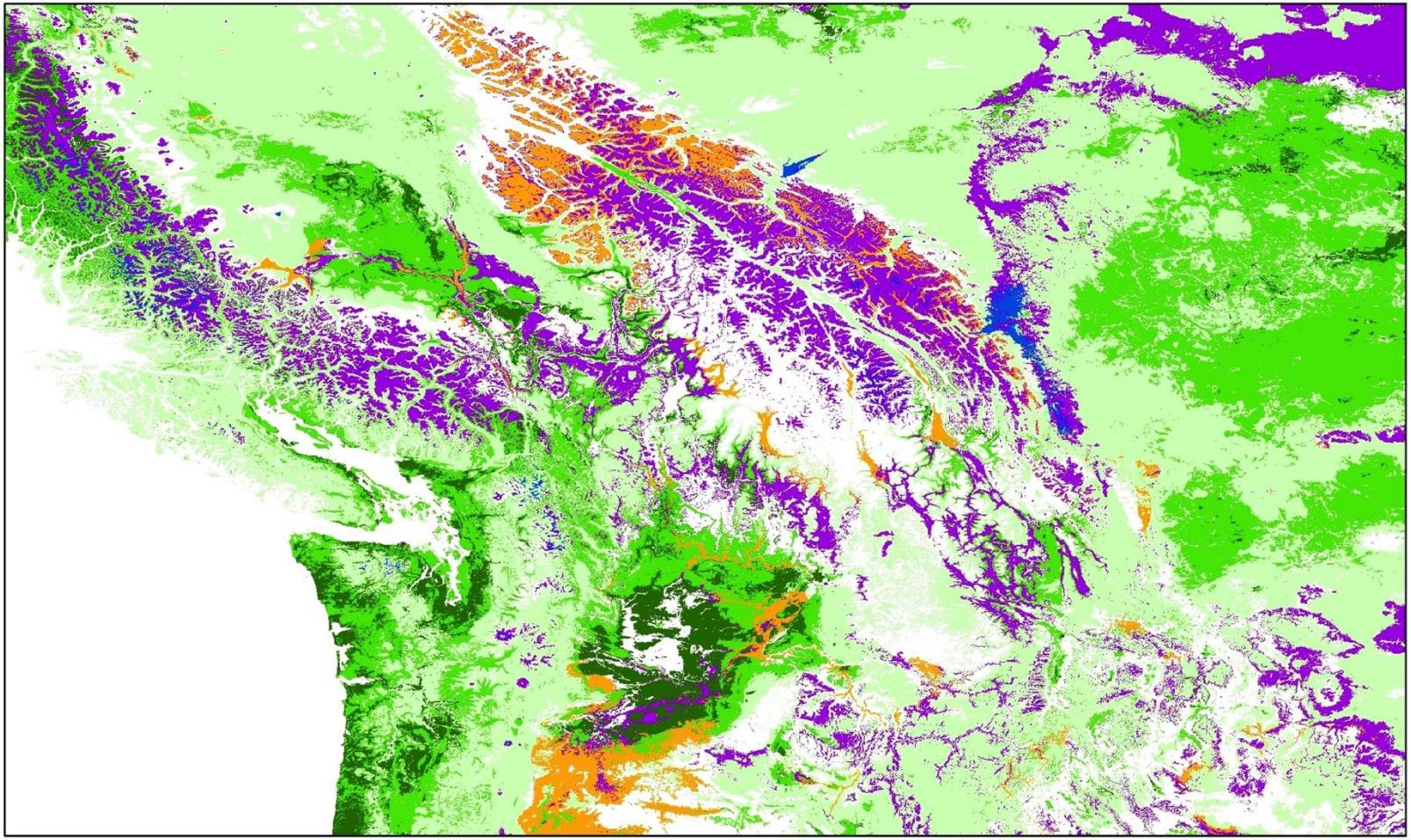


Backward multivariate climate velocity km/yr

- 0.01
- 0.01 - 0.03
- 0.03 - 0.05
- 0.05 - 0.07
- 0.07 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2.5
- 2.5 - 4
- 4 - 7
- 7 - 11
- 11 - 18
- 18 - 30
- 30 - 50
- 50 - 98
- No-analog climates

RCP 8.5
Ensemble Projection
1995-2085

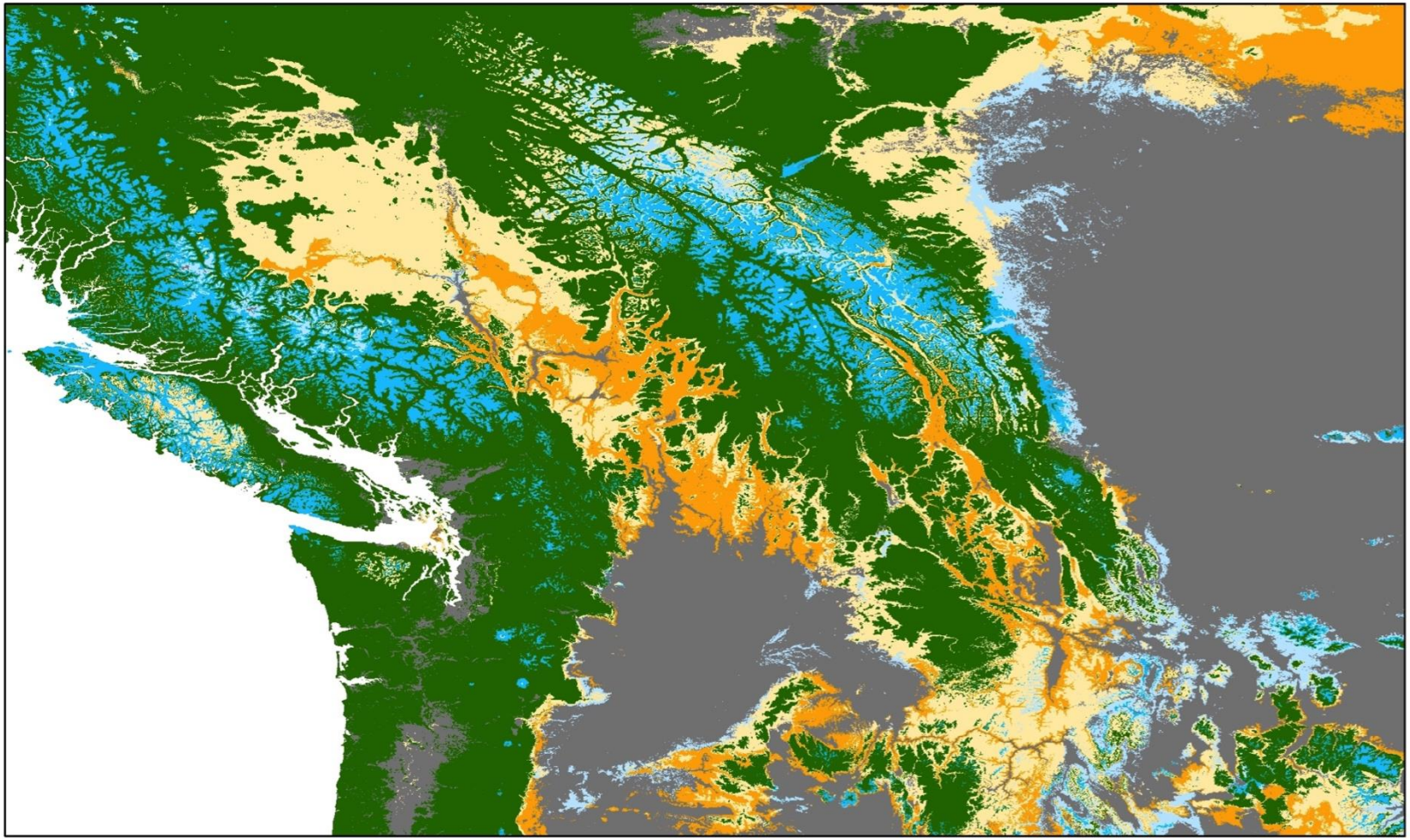
Areas of Projected Vertebrate Species Turnover



Extremely low change (>= 95% retention, < 5% immigrants)
Very low change (>=90% retention, < 10% immigrants)
Low change (>= 75% stable, <25% expansion or contraction)
High influx (>= 75% stable and expansion, <25% contraction)
Species loss (>=50% contraction, < 50% expansion or stable)
> 50% Turnover; High Loss and Gain

Projected vertebrate turnover
Climatic niche projections
A2 emissions scenario
GCGM3.1 GCM
2080s

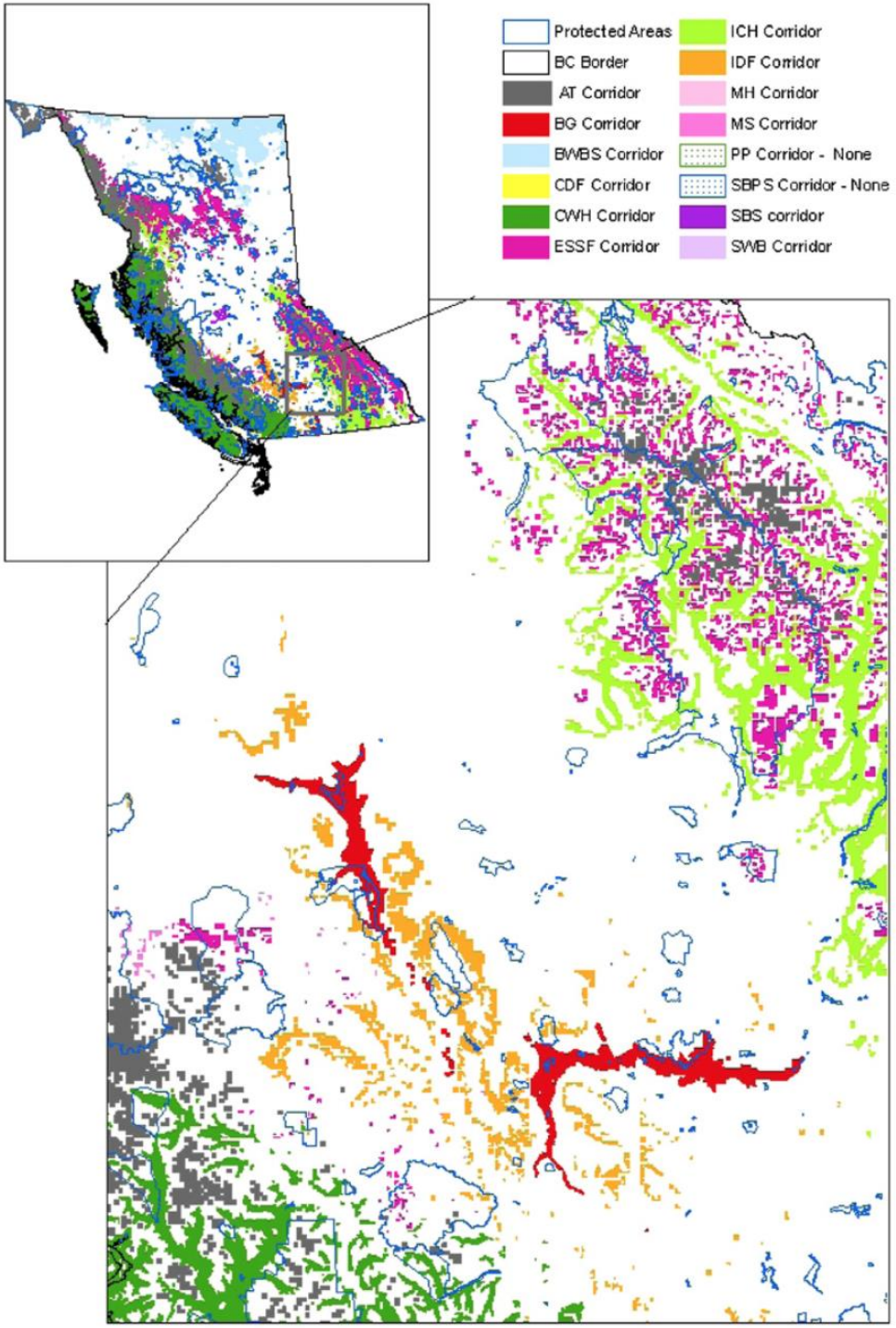
Areas of Projected Range Stability - Wolverine



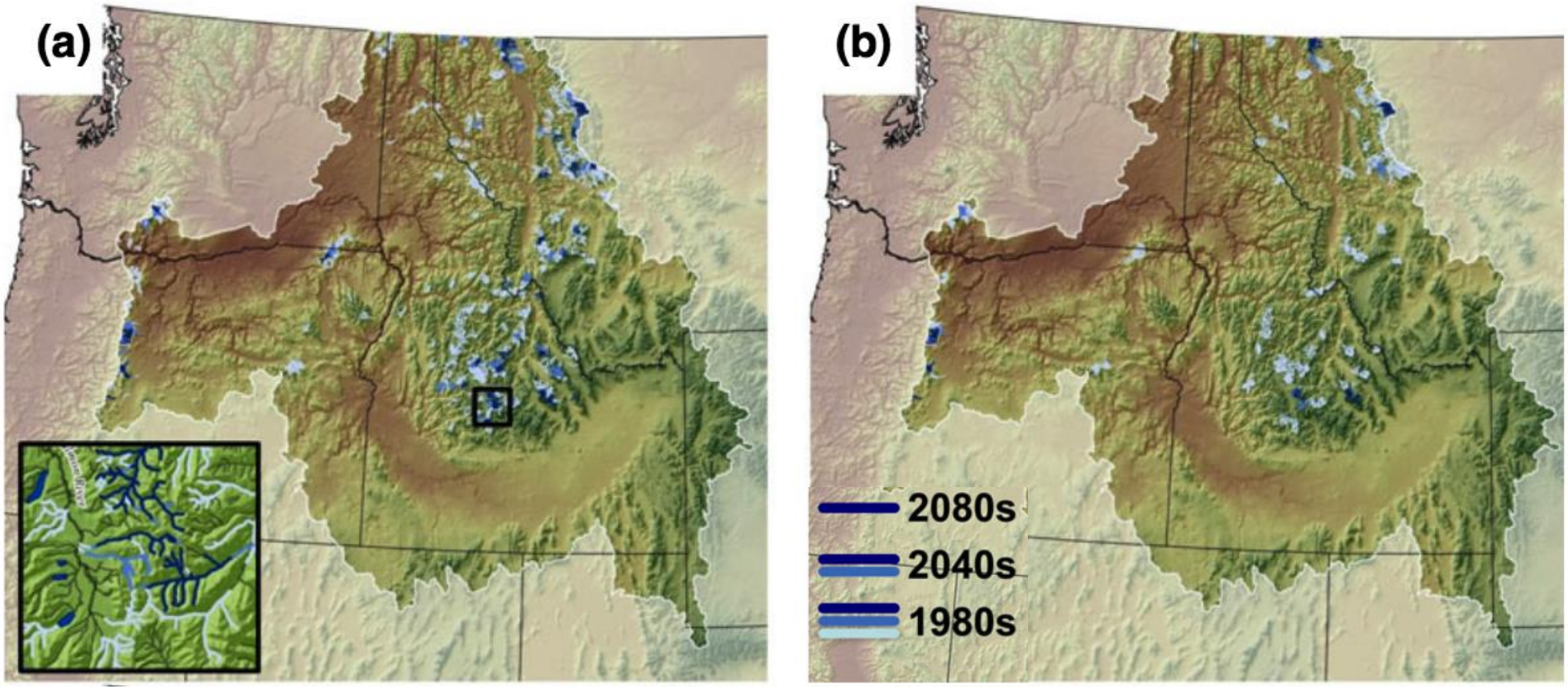
No Presence
Expansion (1 model)
Expansion (2 models)
Contraction (2 models)
Contraction (1 model)
Stable

Climatic Niche Model Projections
Wolverine
GCMs: CGCM3.1 and HadCM3
A2 emissions scenario
2080s

Temporal Corridors



Cold Water Refugia – Climate Shield



No single approach will offer a silver bullet; we need a *process* for aiming silver buckshot

People need to collectively choose priorities based on our:

Conservation goals

Conservation targets

Scale of conservation

Understanding of uncertainty

No single approach will offer a silver bullet; we need a *process* for aiming silver buckshot

Inventory and evaluate the suite of available approaches and datasets

Engage stakeholders to reach consensus around conservation goals, targets, scales, and approaches for identifying priorities

Develop a collective vision of what a conservation network for a resilient Cascadia would look like

Find collaborative, innovative solutions for managing priority landscapes for conservation under climate change

Questions?

mkrosby@uw.edu

COLLEGE OF THE ENVIRONMENT
UNIVERSITY of WASHINGTON

Northwest Climate
Science Center

CLIMATE IMPACTS GROUP

WDFW's Climate Change Response Efforts
Where are we headed?

Lynn Helbrecht
Climate Change Coordinator, WDFW

TWO DIFFERENT WAYS TO THINK ABOUT OUR RESPONSE

"Top Down" Landscape level

Start with the climate impact: How will climate change impact a species or habitat we are concerned about? How should we respond?

FOR EXAMPLE:

- How will climate change affect the distribution of bull trout?
- Will some areas be more resilient than others?
- If yes, how should we act on this information?

"Bottom Up" Project or Objective focused

Start with a decision or action:

- Which actions are sensitive to climate change**?**
- Where is our success potentially at risk because of climate change?

FOR EXAMPLE

- WDFW is responsible for permitting water crossing structures – for fish passage.
- How will peak flows affect structure performance over their lifetime?

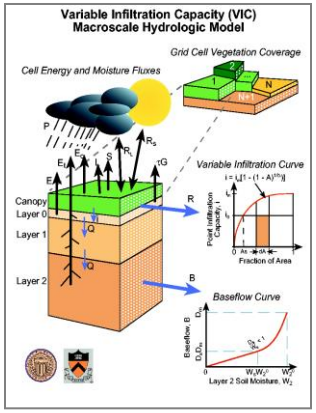
WDFW: responding to the challenge of climate change

SCIENCE
Assessing changes expected to fish, wildlife and their habitats from climate change

CAPACITY BUILDING
Tools, resources, education and training

INTEGRATION
Addressing climate in our core work

COLLABORATION
With agencies, tribes, conservation partners and researchers



Great Northern LANDSCAPE CONSERVATION COOPERATIVE

CLIMATE IMPACTS GROUP

NATIONAL WILDLIFE FEDERATION

NORTH PACIFIC LANDSCAPE CONSERVATION COOPERATIVE

NWCSC Northwest Climate Science Center

WDFW Strategic Goals for Climate Change

- Practice conservation at landscape scales in response to a changing climate
- Be leaders in promoting awareness of impacts on fish and wildlife.
- Explicitly consider risks of climate change in capital investments and resource planning.

DRAFT Agency Policy for Climate Change

Purpose	Establish direction for managing risks to agency investments due to current and future impacts of climate change.
Principles	Adopt eight principles which define a "*Climate Ready*" conservation organization
Policy	It is the policy of WDFW to manage its assets so as to better understand, mitigate and adapt to climate change. WDFW will assess the risks that climate change poses to climate-sensitive investments and modify projects as necessary to minimize those risks.
Activity Areas Covered	A. Strategic Planning B. Resource Planning C. Agency Facilities and Infrastructure D. Land Acquisition E. Land Management F. Grants G. Technical Assistance H. Regulatory Processes I. Reducing Greenhouse Gas Emissions

THANK YOU!