

Understanding and Using New Conservation Planning Tools for Climate Adaptation and Mitigation

<https://adaptwest.databasin.org>

Carlos Carroll, Klamath Center for Conservation Research





Welcome to the AdaptWest Climate Adaptation Data Portal!

AdaptWest is a spatial database designed to help land management agencies and other organizations implement strategies that promote resilience, protect biodiversity, and conserve and enhance the adaptation potential of natural systems in the face of a changing climate.

Climate Data



- Climate Data - North America
- Velocity Data - North America
- Refugia Data - North America
- Exposure-Distance-Based Velocity Data
- Water Balance Data - United States

Species Data



- Velocity Data - Western Hemisphere
- Tree and Bird Refugia - US and Canada

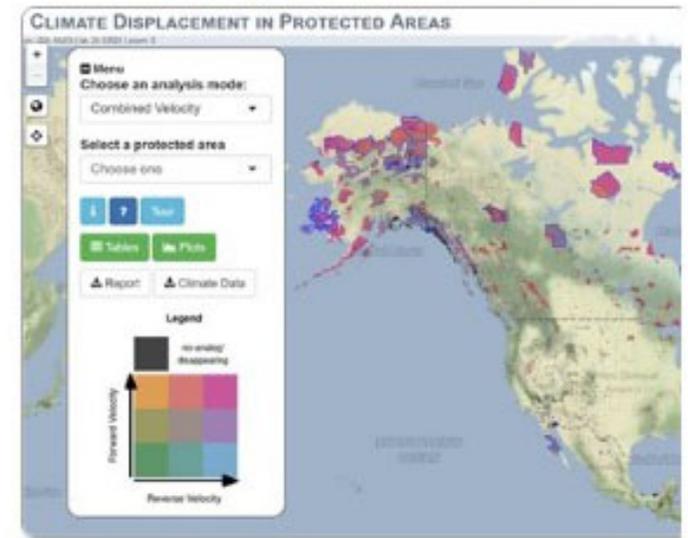
Connectivity and Other Data



- Priority Areas - Western North America
- Wildland Conservation Values

<http://adaptwest.databasin.org>

Climate Displacement Explorer



Explore and summarize current and



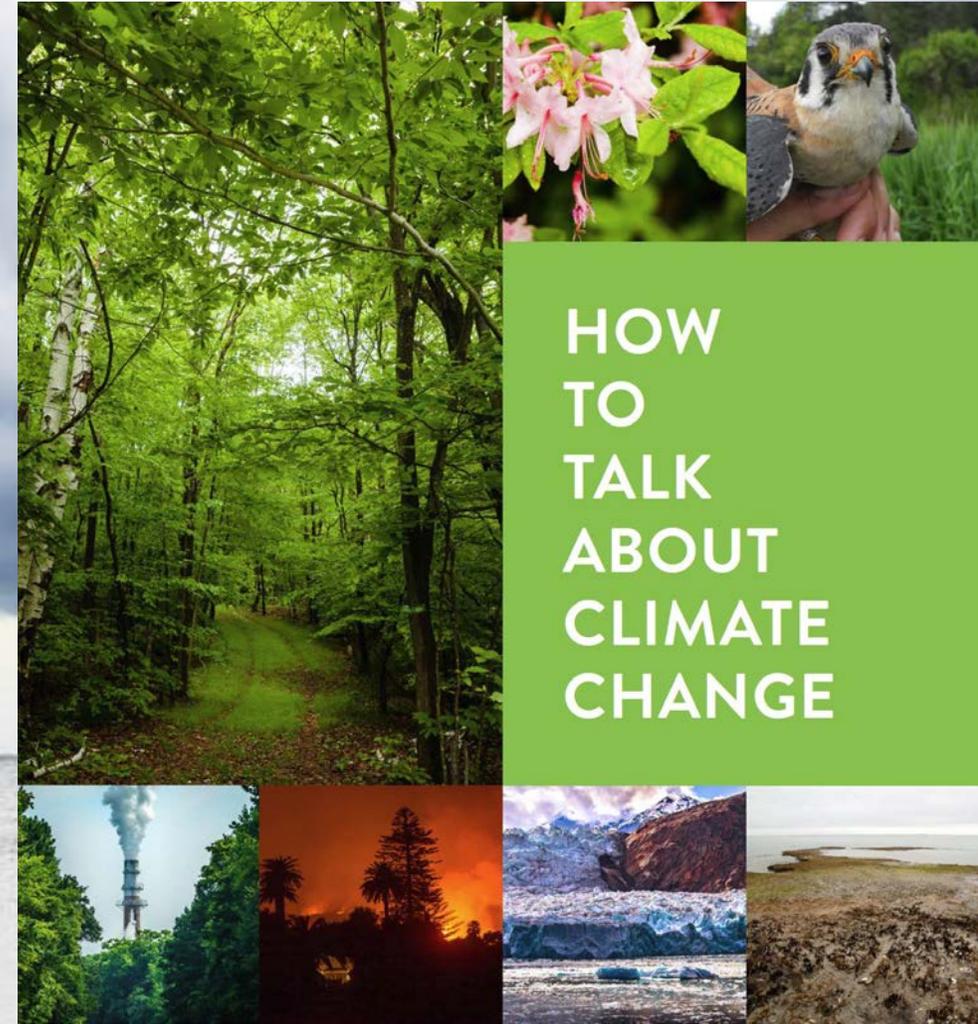
Explore and summarize current and

Generate maps and reports on climate

Challenges to translating climate adaptation knowledge into effective conservation outcomes

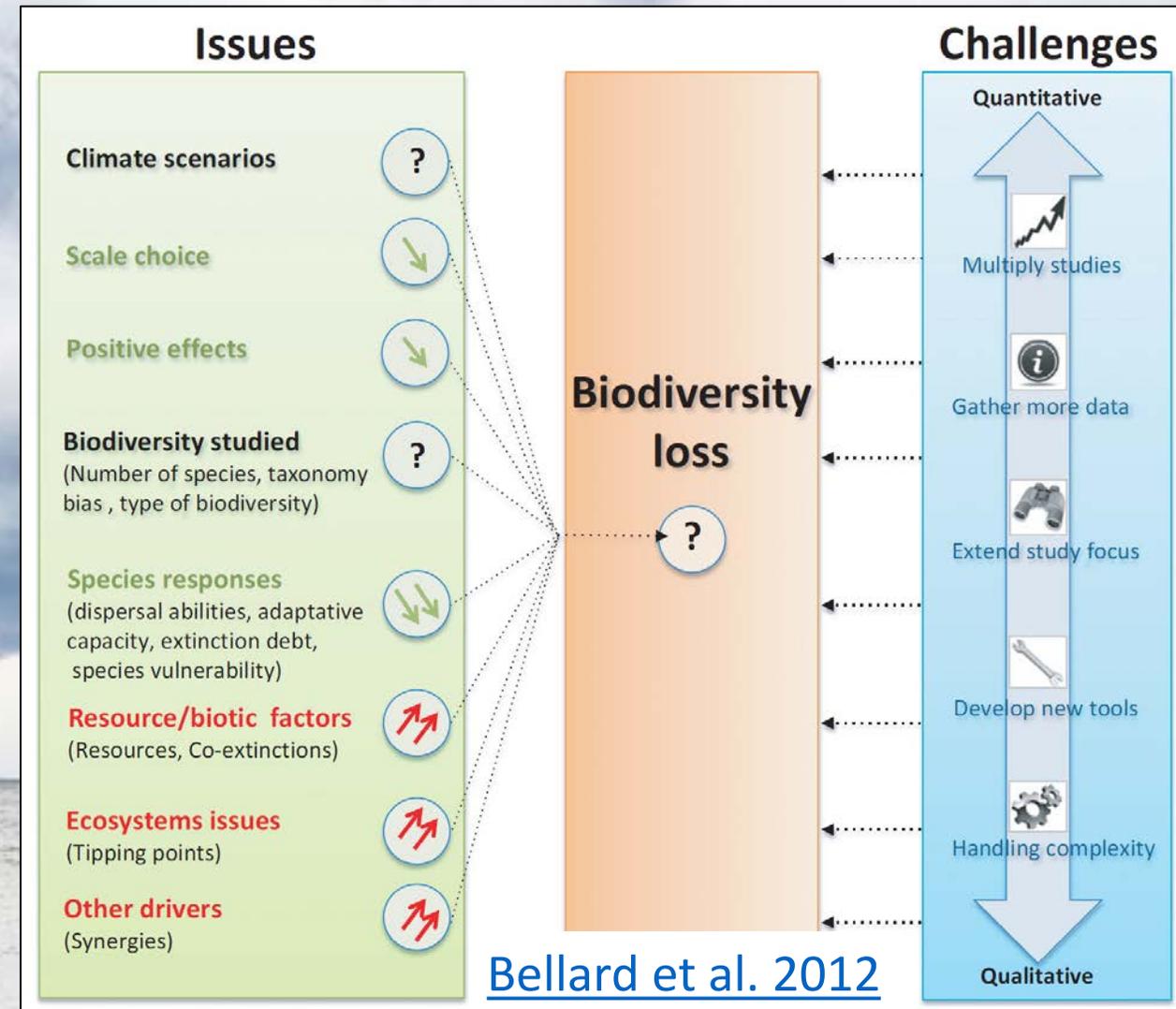
Climate change effects are:

- Conceptually complex;
- Most effects occur in the future;
- Much uncertainty about pace and magnitude of effects;
- Difficult to address at local scale.



Addressing barriers to use of climate resilience data in planning and management

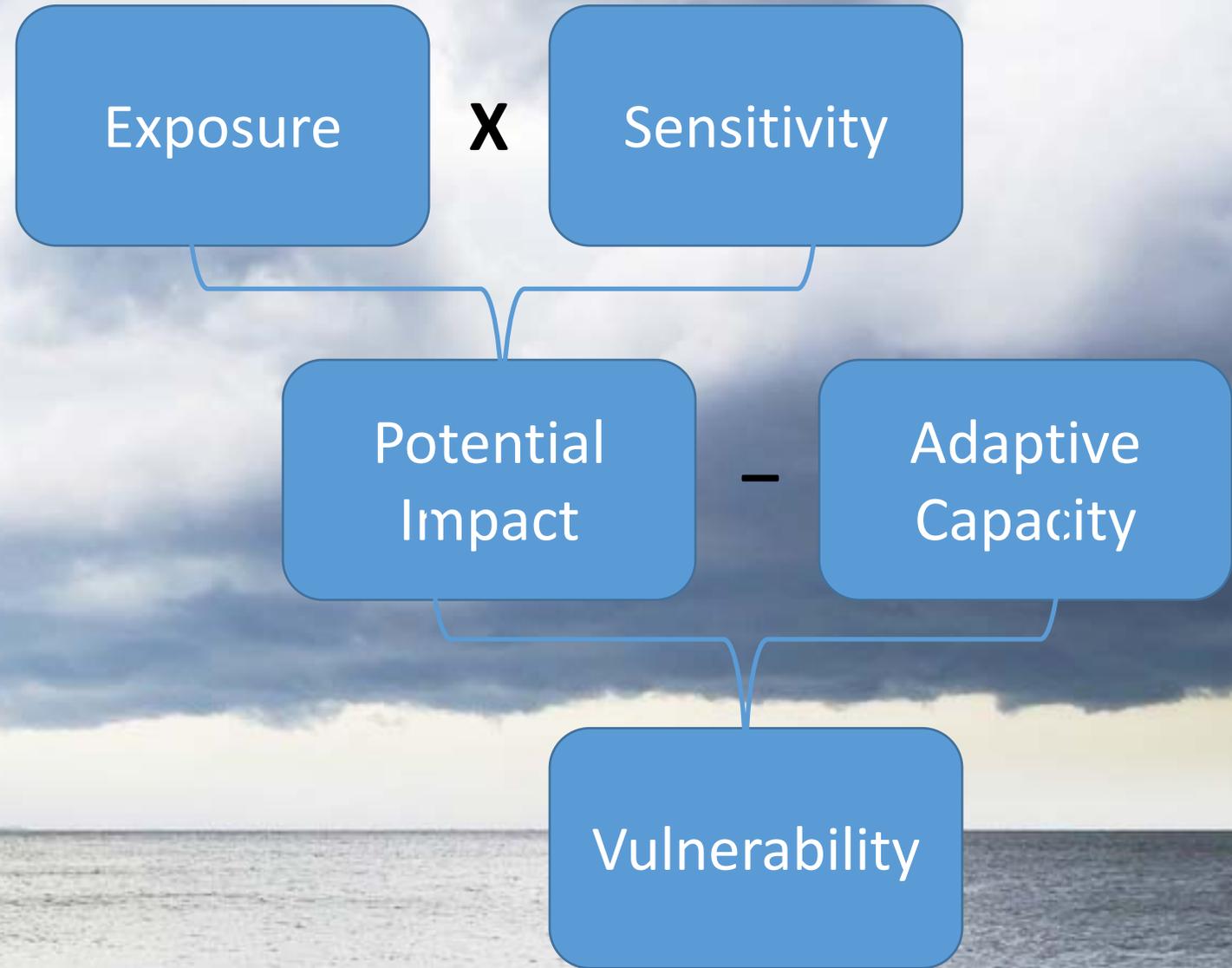
- Increase understanding of link between metric and biotic response;
- Develop tools for managing under uncertainty;
- Increase familiarity with concepts, methods, and practice of planning for climate resilience via case studies



Addressing Landscape-Level Vulnerability to Climate Change

Most of the data considered here are measures of climate **exposure**. Data such as the location of climate refugia for individual species also addresses climate **sensitivity**.

The ultimate goal of landscape-level conservation planning under climate change is to facilitate persistence of species and ecosystem processes by increasing the **adaptive capacity** of the landscape and its ability to support native species and ecosystems into the future.



Three types of applications for AdaptWest spatial data

Prioritization

Vulnerability assessment
(sites or species)

Management
strategies

1. Where are the priority areas to secure biodiversity conservation objectives?



Sites that will stop extinction
Sites are the last samples of ecosystems
Sites that are still functionally intact
Sites that are critical for ecosystem services

2. What are the core threats at these sites?



What is the scope and severity of current and future threatening processes at these sites?
Threats include land and sea transformation, disease, overexploitation, invasive species, climate change, pollution, system modification, agriculture, urbanization etc

3. What are the area-based actions that will achieve long-term conservation outcomes?



Integrate risks, objectives and feasibility assessments of what will likely lead to best outcomes
Activities will range from creating strict protected areas, community and indigenous conservation areas, payment for ecosystem services, etc. Nothing different.

[Watson & Venter 2017](#)



Prioritization



Pathway to Canada Target 1
En route vers l'objectif 1 du Canada

POLITICS | N

Trudeau sets new land and ocean protection targets for 2025

NEWS

Canada's conservation efforts must prioritize areas resilient to climate change, researchers say

New studies show factoring climate change impacts into planning for protected areas can help achieve emission-reduction and biodiversity targets — a move one scientist calls 'hitting the conservation science jackpot'



Ainslie Cruickshank • Jun 8, 2020

7 min read



Nature's 'lifeboats' of biodiversity can protect vulnerable species ... Species that are vulnerable to climate change could be protected in areas dubbed biodiversity 'lifeboats' according to new research. Ecologists an... independent.co.uk



New framework identifies climate change "refugia" in boreal forest A major research project from the University of Alberta outlines pockets of Canada's boreal forest that may give wildlife more time and space to ... canadiangeographic.ca

Key principles of biodiversity conservation

1. Protect species at risk
2. Represent ecosystem diversity
3. Conserve remaining wilderness
4. **Ensure connectivity and resilience**
5. **Preserve climate refugia**

Coristine et al. 2018

 DOI: <https://doi.org/10.1139/facets-2017-0102>

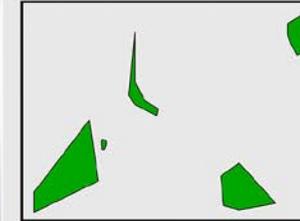
Informing Canada's commitment to biodiversity conservation: A science-based framework to help guide protected areas designation through Target 1 and beyond

Published Online: 14 May 2018 | Views : 2313

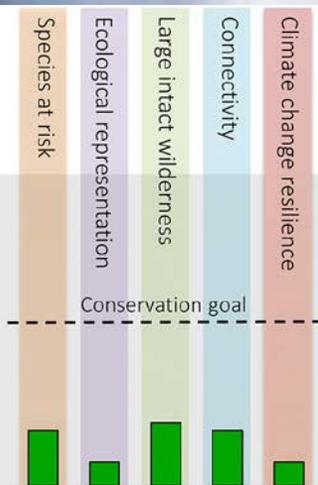
Laura E. Coristine , Aerin L. Jacob, Richard Schuster, Sarah P. Otto, Nancy E. Baron, Nathan J. Bennett, Sarah Joy Bittick, Cody Dey, Brett Favaro, Adam Ford, Linda Nowlan, Diane Orihel, Wendy J. Palen, Jean L. Polfus, David S. Shiffman, Oscar Venter, Stephen Woodley, ... [\(show fewer authors\)](#)

Tools and processes for protected areas planning

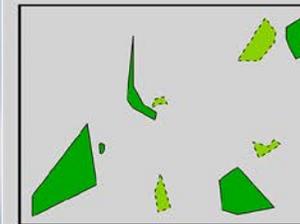
Assess conservation deficit



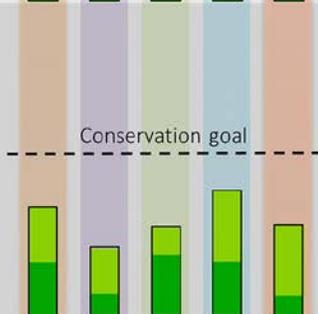
Gap analyses
Spatial analyses (GIS)



Identify candidate sites



Spatial analyses (GIS)
Spatial statistics



Consider human dimensions and governance



Immediacy of threats

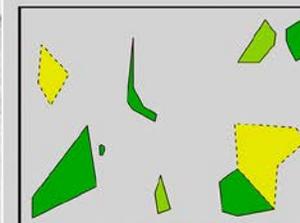


Opportunity-cost

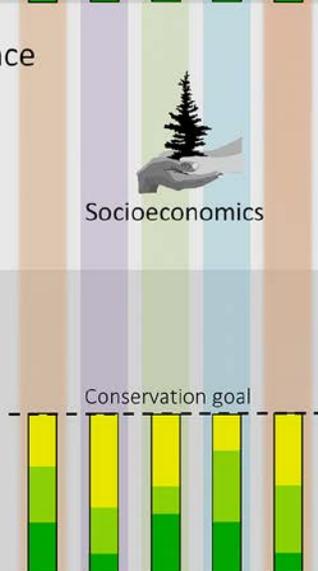


Socioeconomics

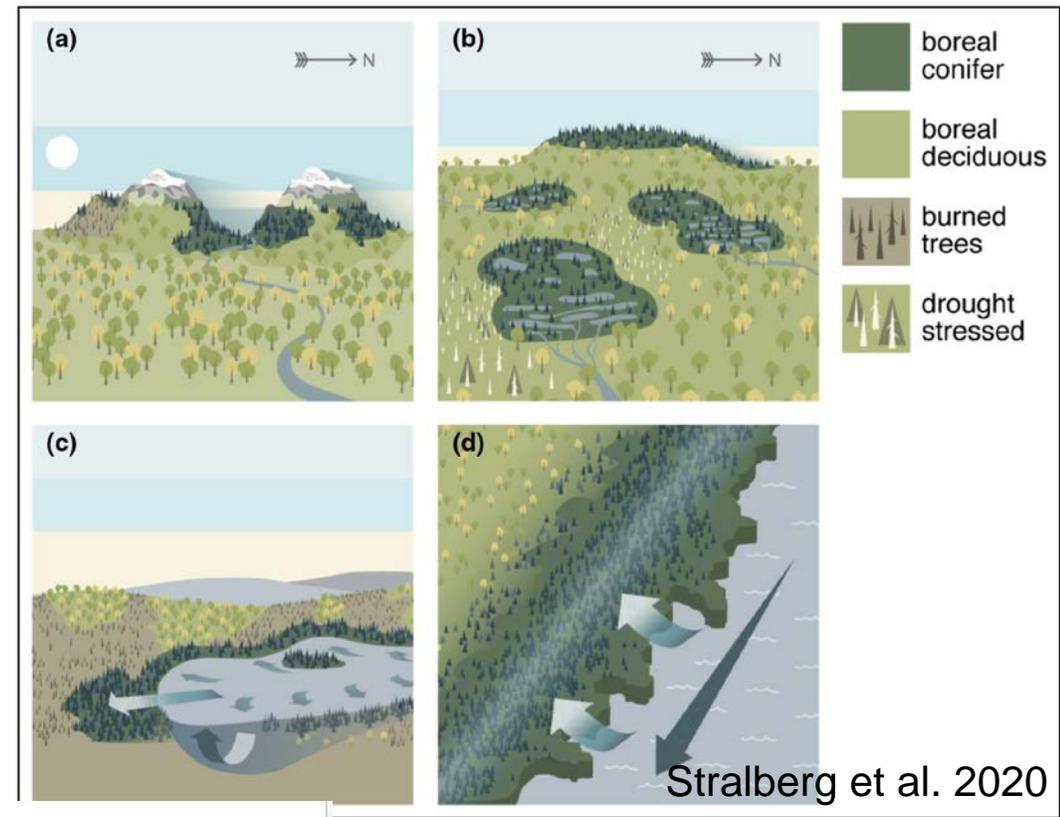
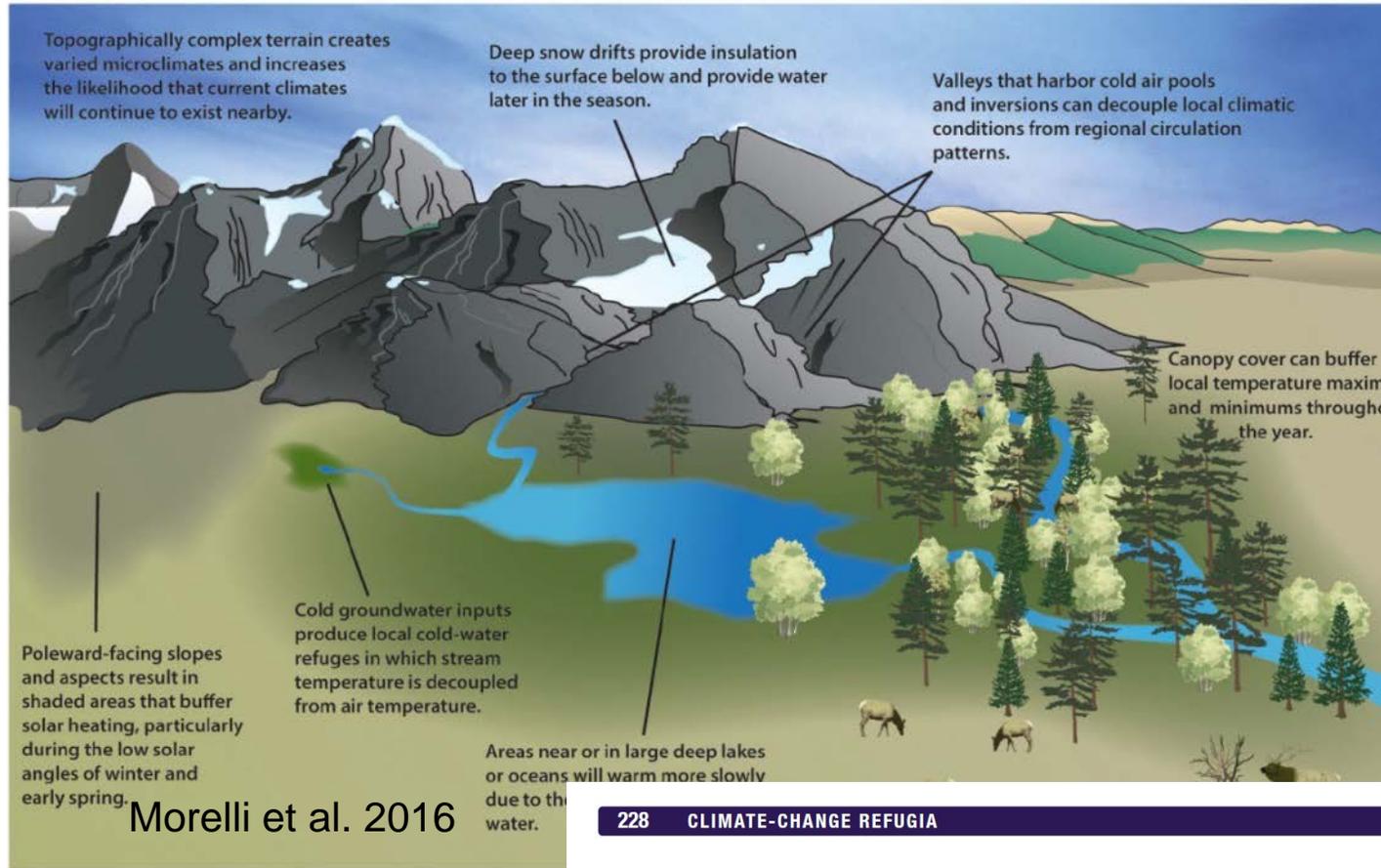
Develop new protected areas



Tools for systematic conservation planning
Stakeholder input
Governance type



Climate refugia (areas of species persistence under climate change) are created by different landscape processes



Climate-change refugia: biodiversity in the slow lane

Toni Lyn Morelli^{1†}, Cameron W Barrows², Aaron R Ramirez³, Jennifer M Cartwright⁴, David D Ackerly⁵, Tatiana D Eaves⁶, Joseph L Ebersole⁷, Meg A Krawchuk⁸, Benjamin H Letcher⁹, Mary F Mahalovich¹⁰, Garrett W Meigs⁸, Julia L Michalak¹¹, Constance I Millar¹², Rebecca M Quiñones¹³, Diana Stralberg¹⁴, and James H Thorne¹⁵

Supporting refugia in the boreal biome (Figure 1): (a) mountains, and peatlands, (c) major lakes, and (d) oceanic coastlines. Areas

Refugia span a range of spatial scales

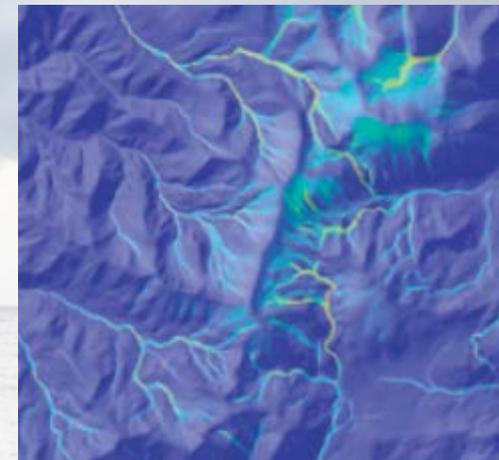
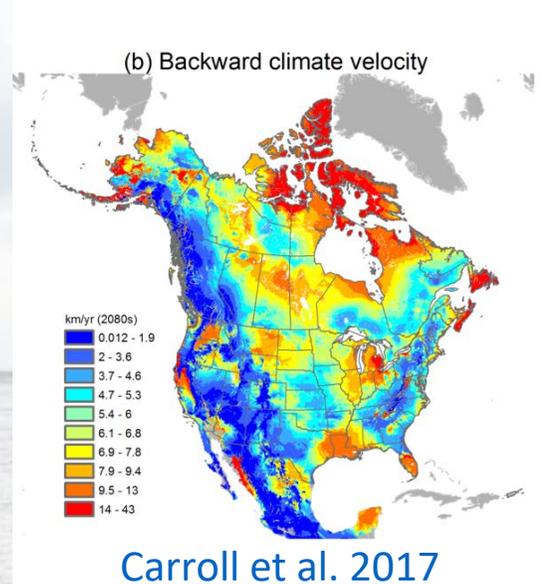
Refugia characteristics

Macro-scale

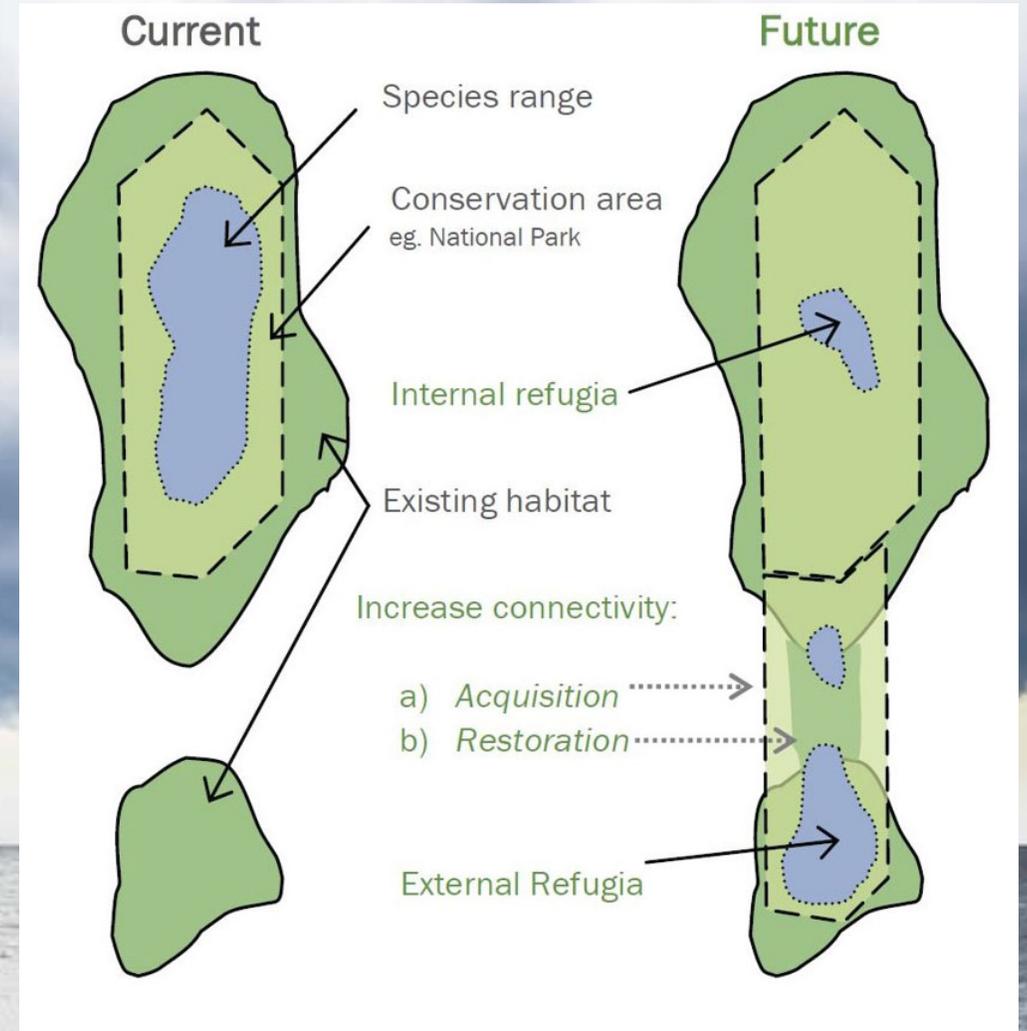
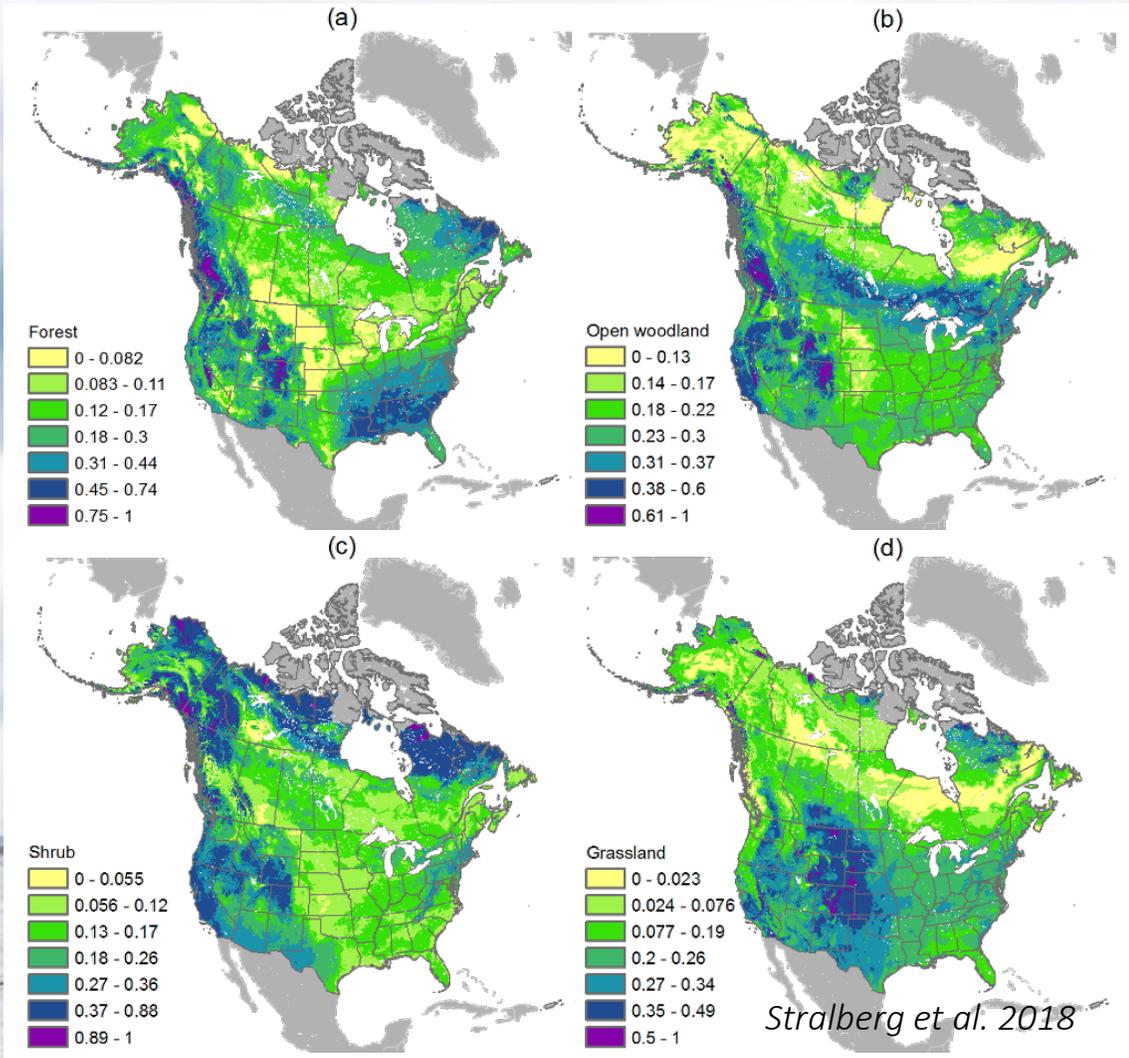
Long-term

Micro-scale

Transitional

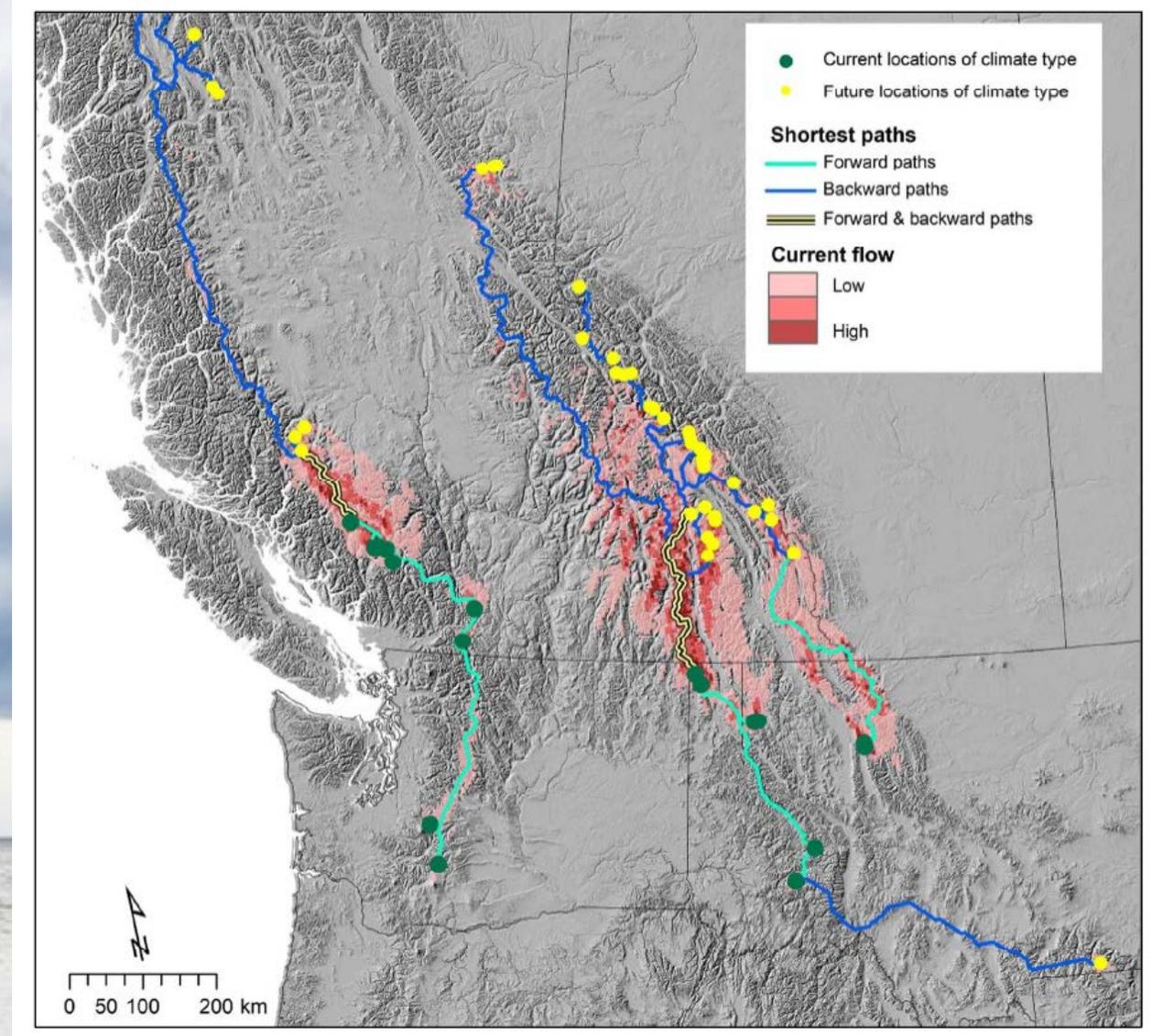
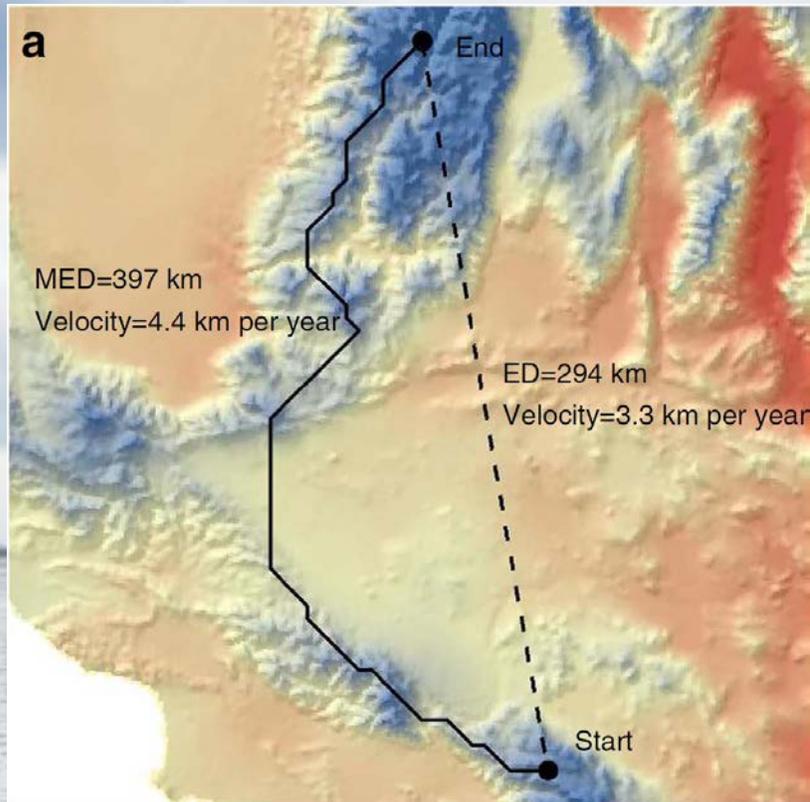


Climate refugia and climate connectivity areas are related: “External refugia” are newly suitable areas that are connected and accessible to dispersers



Climatic connectivity - protecting areas needed for movement in response to climate change

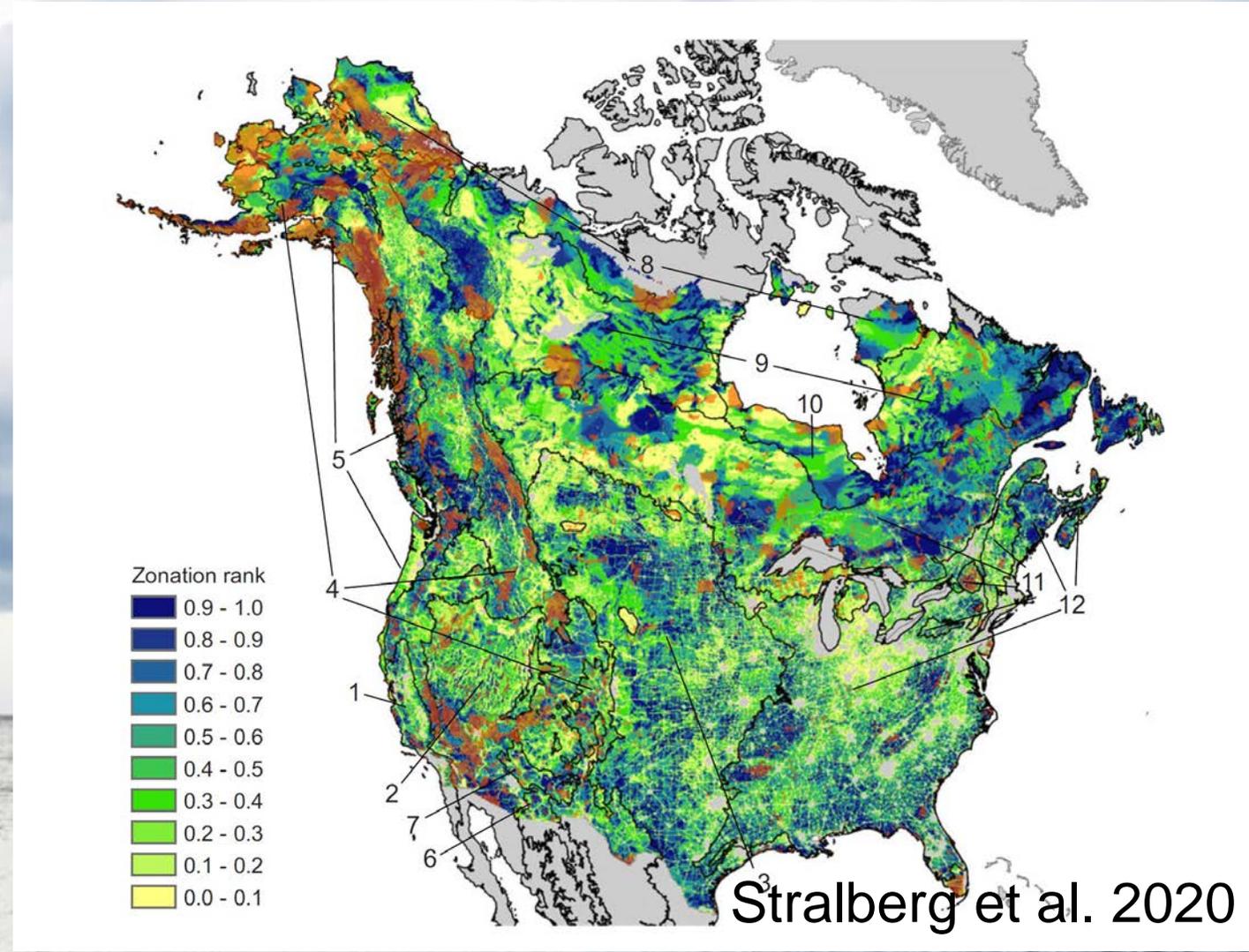
The persistence of many species under climate change will depend on areas that facilitate dispersal to newly climatically suitable habitat.



Priority areas based on refugia and corridors

Combining data on:

- Climate-based refugia
- Species refugia
- Microrefugia
- Corridors



Three types of applications for AdaptWest spatial data

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Vulnerability assessment

Management strategies

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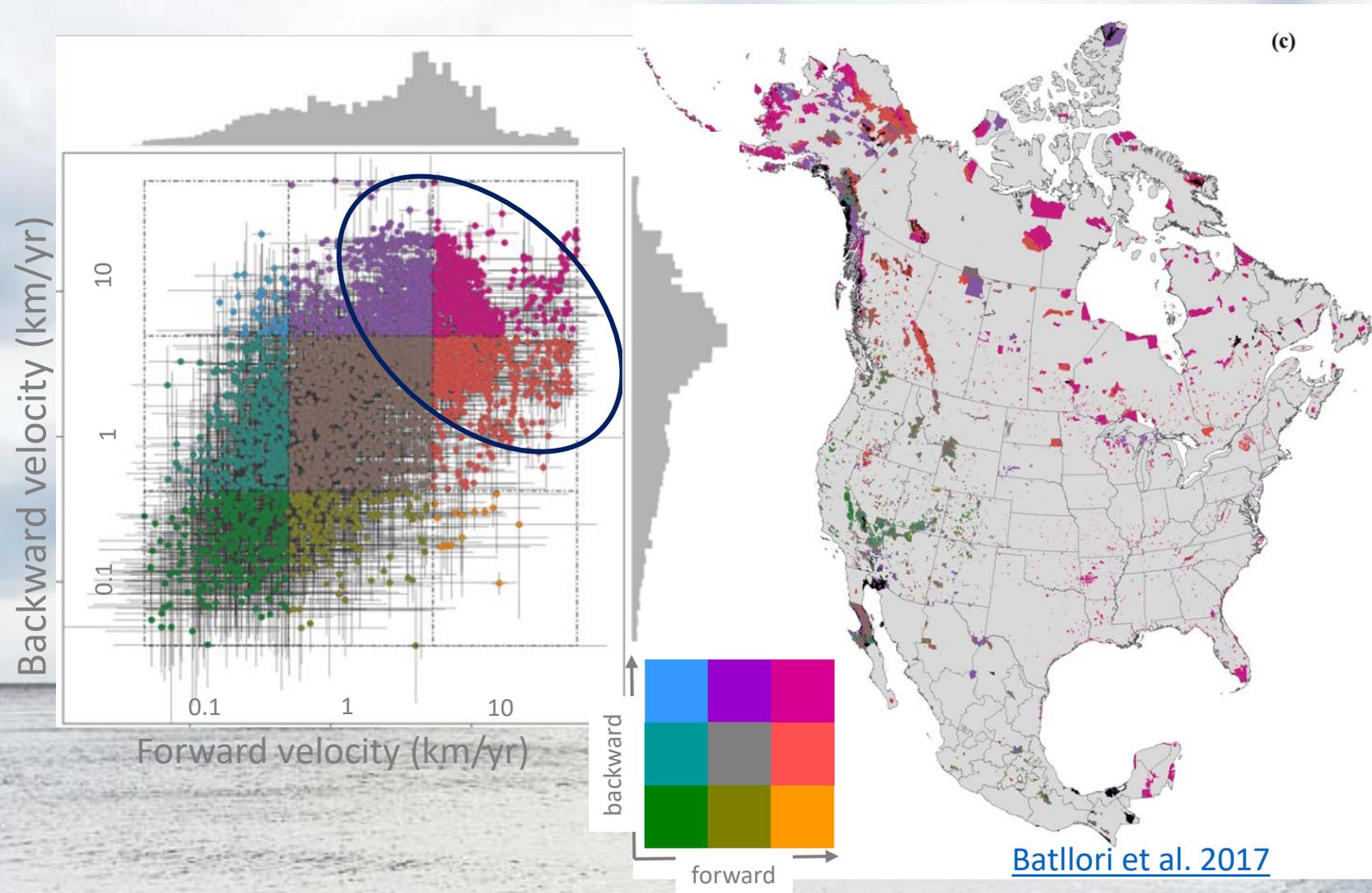
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Activities will range from creating strict protected areas, community and indigenous conservation areas, payment for ecosystem services, etc. Nothing different.

[Watson & Venter 2017](#)

Majority of North America's protected area network exposed to very high rates of climate displacement



Choosing management approaches based on an area's conservation value and vulnerability

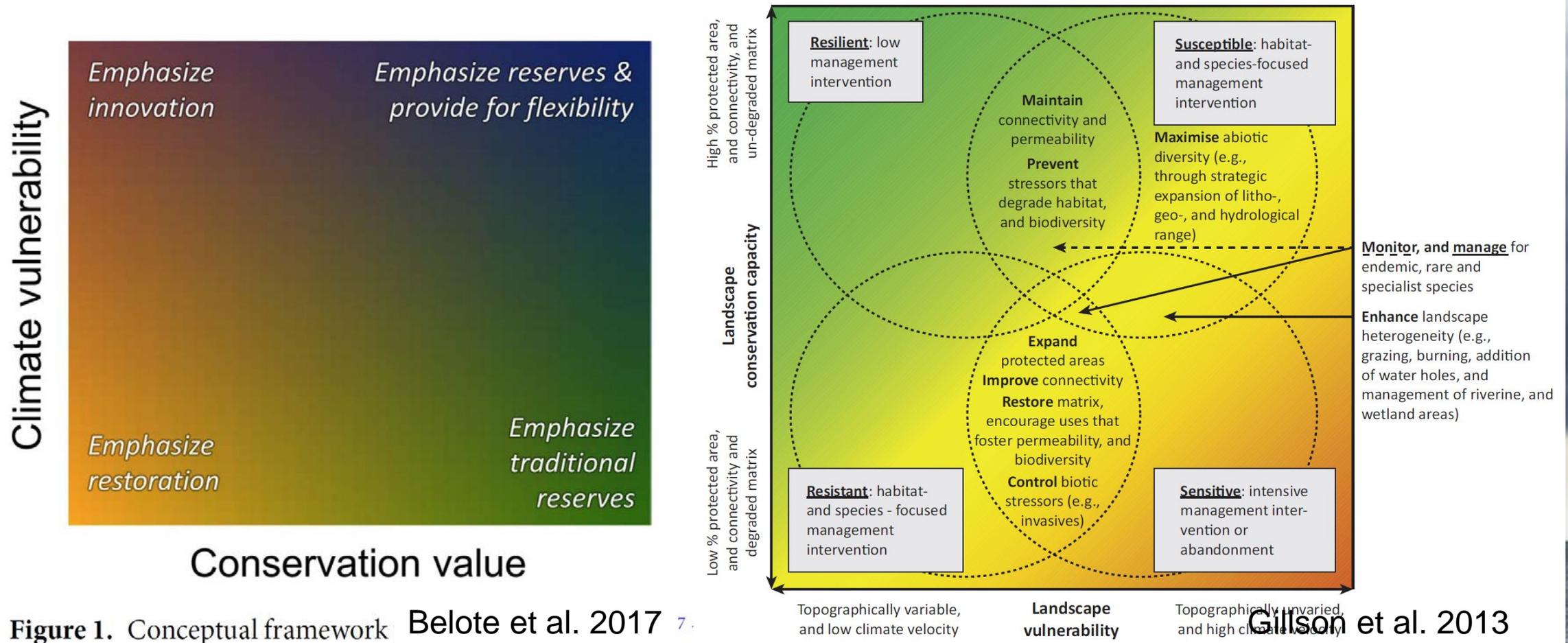
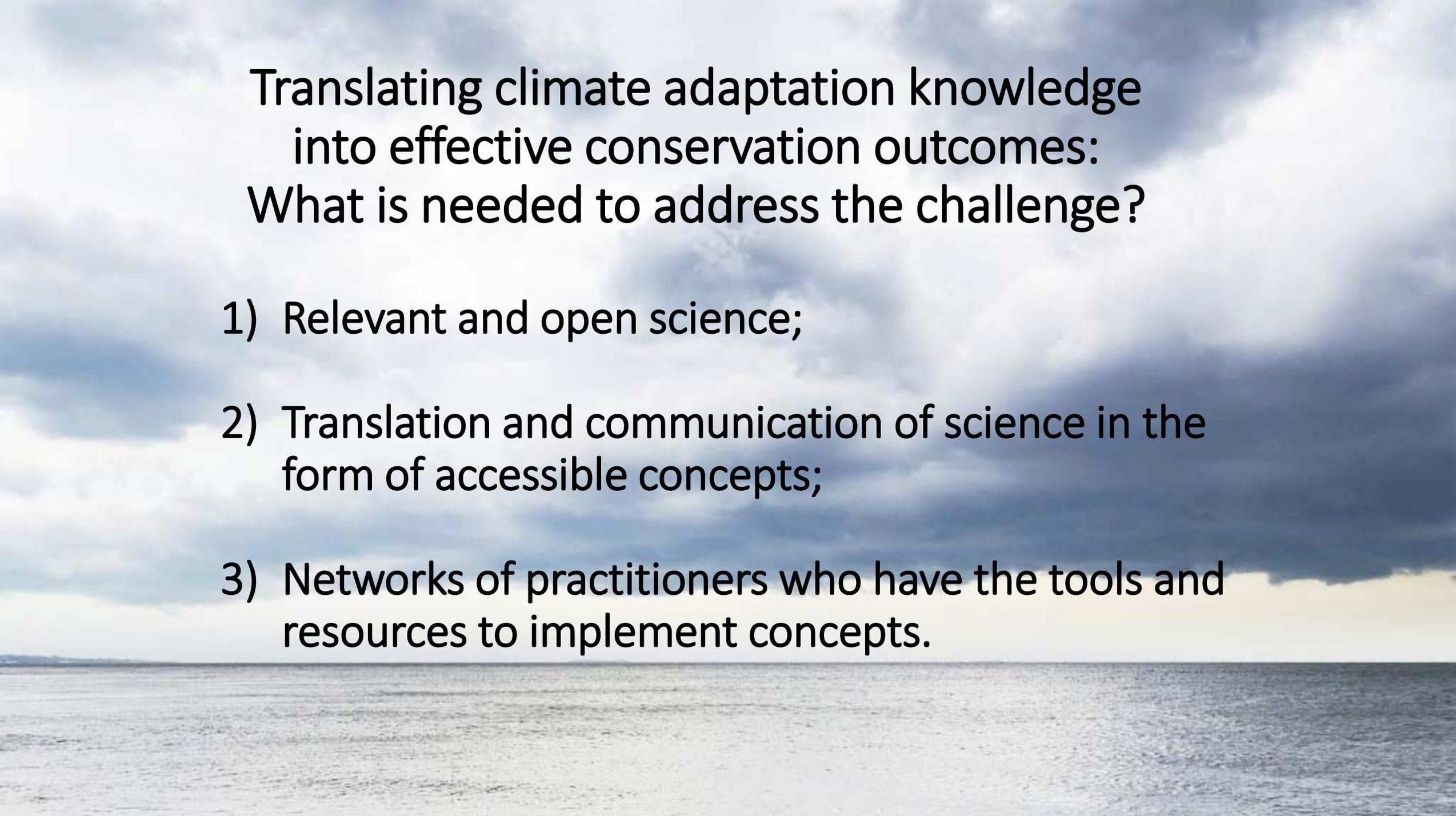


Figure 1. Conceptual framework Belote et al. 2017 7.

Gillson et al. 2013

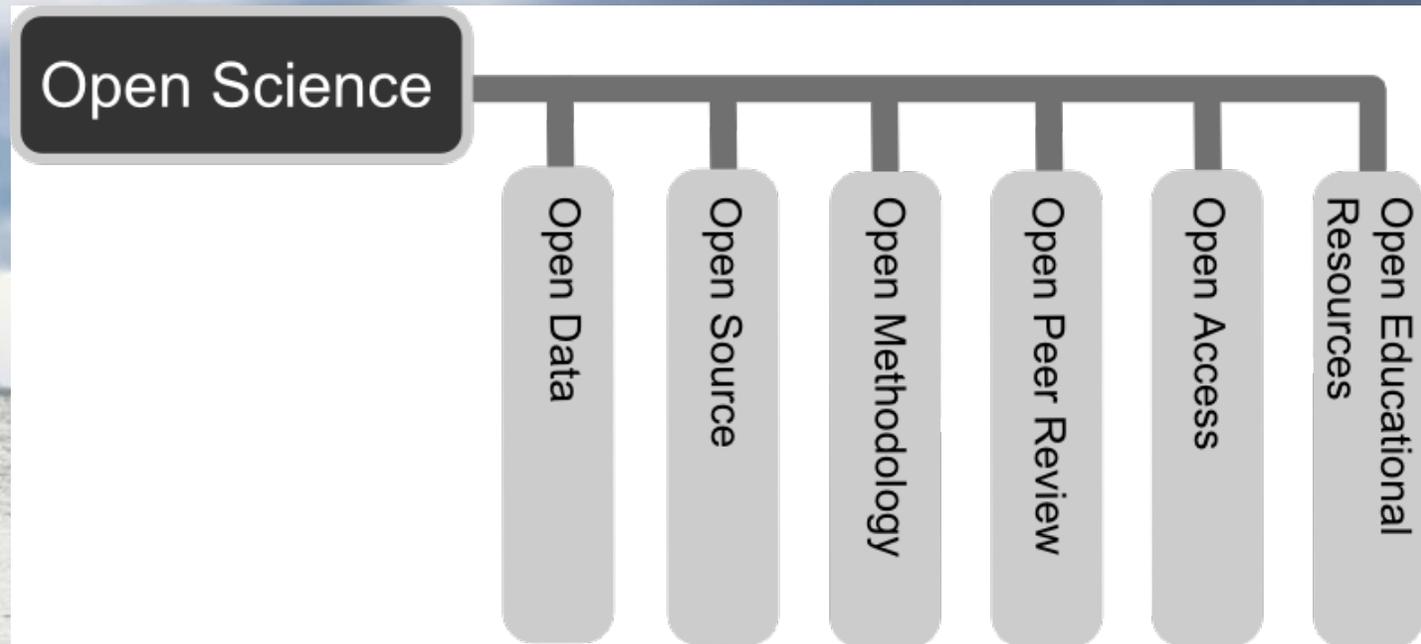


Translating climate adaptation knowledge
into effective conservation outcomes:
What is needed to address the challenge?

- 1) Relevant and open science;
- 2) Translation and communication of science in the form of accessible concepts;
- 3) Networks of practitioners who have the tools and resources to implement concepts.

Why are web apps useful?

- Lower barriers to data access
- Increase comprehension of data
- Provide extensible, open-source alternative to proprietary GIS software



AdaptWest Climate Resilience Data Explorer

Welcome to the AdaptWest Climate Resilience Data Explorer. AdaptWest is a spatial database designed to help land management agencies and other organizations implement strategies that promote resilience, protect biodiversity, and conserve and enhance the adaptation potential of natural systems in the face of a changing climate.

The goals of this Climate Resilience Data Explorer are to:

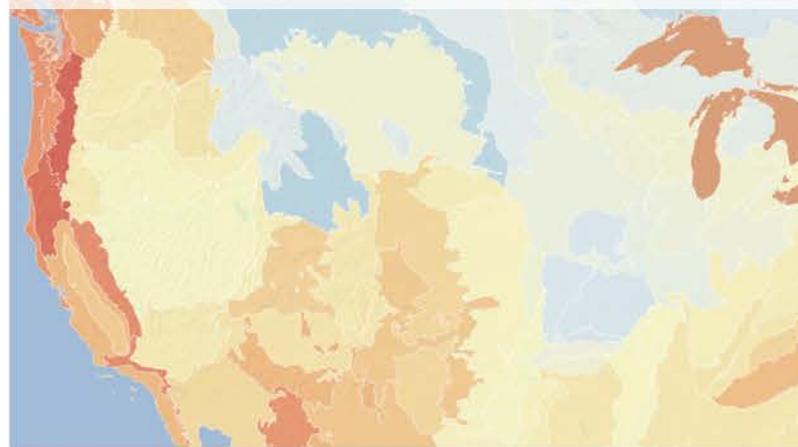
- Familiarize users with climate resilience concepts;
- Explore information resources that can help conservation practitioners enhance climate resilience and connectivity and address climate change threats in the context of regional planning;
- Support conservation management that increases the adaptive capacity of the landscape and its ability to support native species and ecosystems into the future by protecting areas which play a key role in facilitating climate adaptation and mitigation.

This viewer was developed through collaboration between:

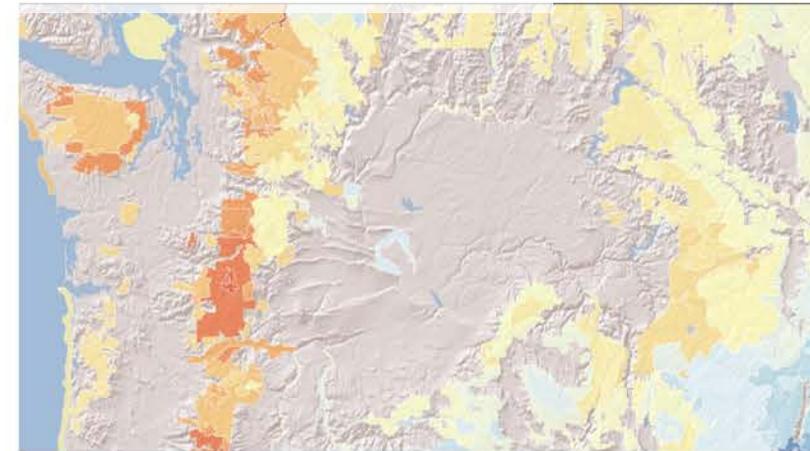
Justin Beckers (Canadian Forest Service, Natural Resources Canada)
 Carlos Carroll (Klamath Center for Conservation Research)

All data displayed in this tool are freely-available at <http://adaptwest.databasin.org>.

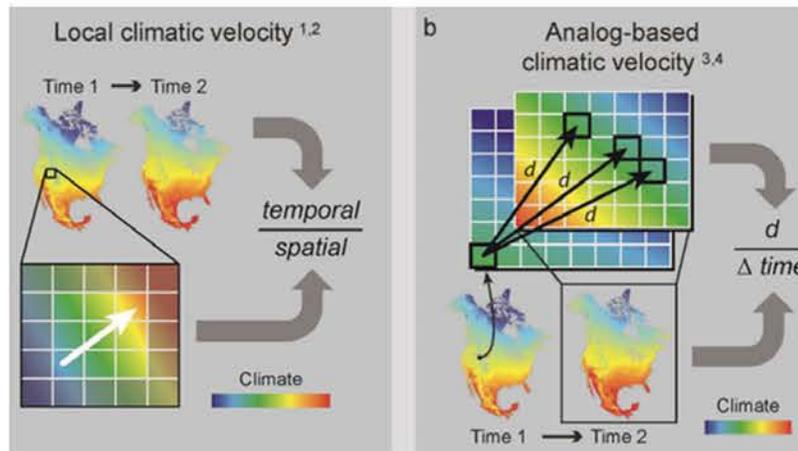
Development of this application was supported by:



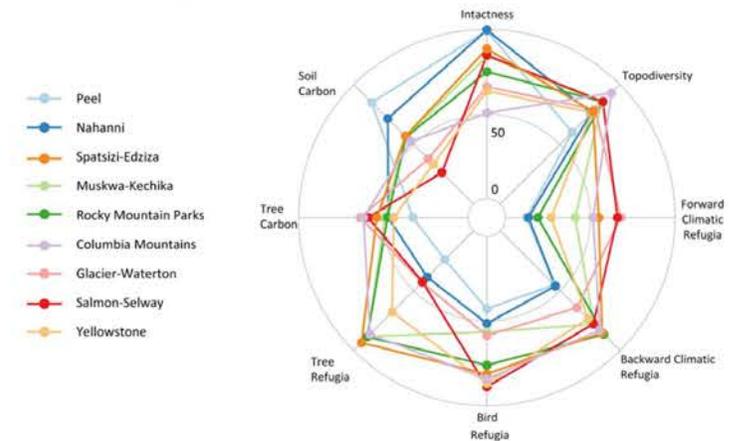
Climate Metrics Explorer – Explore and summarize climate resilience data by watershed.



Protected Area Explorer – Explore and compare the climate vulnerability and resilience of North America's protected areas.



Climate Metrics Tour – Learn about the concepts and methods underlying key climate resilience metrics.



Protected Area Tour – Learn about key climate resilience metrics via a comparison across the major protected areas of the Yellowstone-to-Yukon region.

App facilitates assessment of vulnerability, refugia value, and carbon storage role

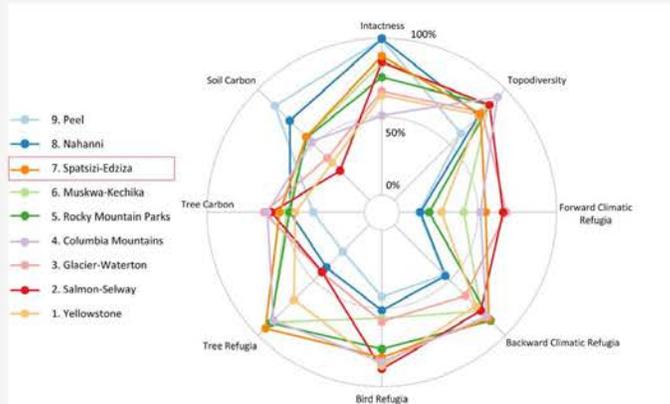
7. Spatsizi and Mount Edziza parks

Spatsizi and Mount Edziza parks form part of the "Sacred Headwaters" region, which encompasses the sources of three important rivers of coastal BC and Alaska - the Skeena, Nass and Stikine.

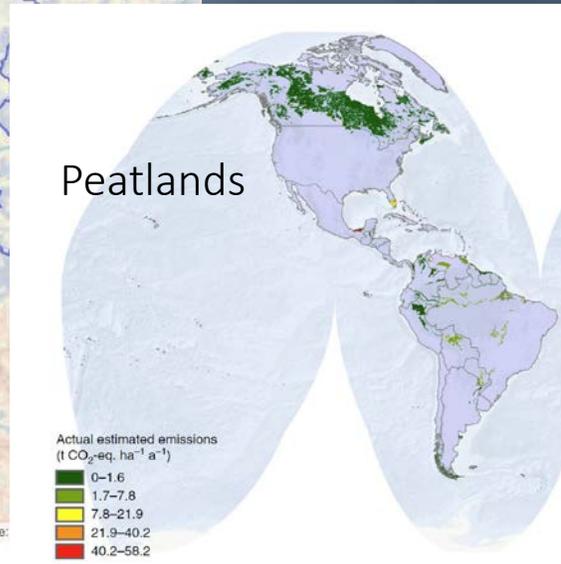
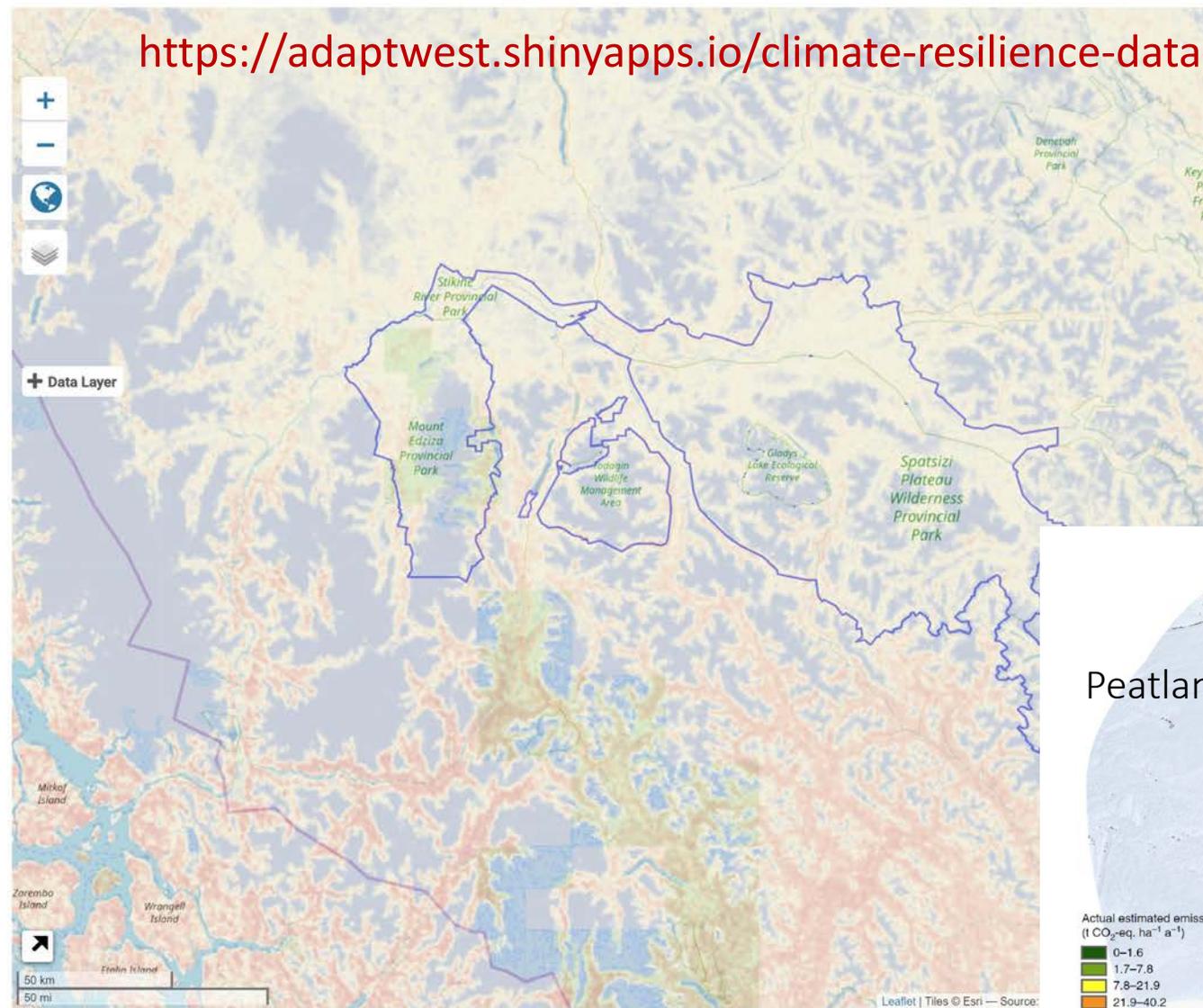


Mount Edziza. Photo credit: Wikimedia

The starplot for this area shows high values for macrorefugia based on both climate (backward velocity) and species models. The high topodiversity of the region provides a high potential for microrefugia. The area also encompasses important climate corridors, and forms a key linkage between coastal and interior ecosystems. Unlike protected areas to the north and east, this region has a low potential to protect soil carbon.



<https://adaptwest.shinyapps.io/climate-resilience-data-explorer/>



App modules and their purpose

AdaptWest

Welcome to the AdaptWest, a spatial database designed for organizations implementing conservation, biodiversity, and conservation systems in the face of climate change.

The goals of this Climate Resilience Data Explorer are:

- Familiarize users with the data
- Explore information and data to help practitioners enhance their ability to address climate change
- Support conservation planning and capacity of the land and ecosystems to address climate change and their role in facilitating climate change adaptation

This viewer was developed by Justin Beckers (K) and Carlos Carroll (K).

All data displayed in this viewer is available at <http://adaptwest.databank.ca>

Development of this application was supported by the Canadian Forest Service.



App module

• Explorers



Purpose

View & map data

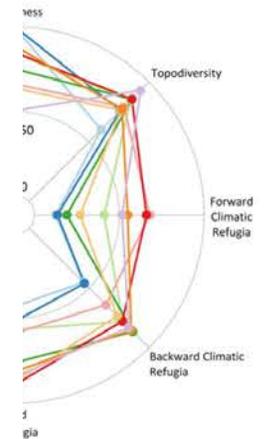


and compare the climate resilience of America's protected areas.

• Tours



Understand data



to key climate resilience major protected areas of the Yellowstone-to-Yukon region.

• Reports



Summarize data

Uses of AdaptWest App reports

- Stand-alone documents
- Text and images for use in other documents
- Interactive maps

<https://adaptwest.shinyapps.io/climate-resilience-data-explorer/>

Climate Resilience Metric Report

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Climate Resilience Metric Report for Thaidene Nënë

This report contains the data tables and figures for Thaidene Nënë. The report has been generated by a customized application based on the AdaptWest Climate Resilience Data Explorer web-application

<https://adaptwest.databasin.org/pages/climate-resilience-data-explorer>

developed by Beckers and Carroll (Beckers J, Carroll C. 2020. AdaptWest climate resilience data explorer. doi: [10.5281/zenodo.3824538](https://doi.org/10.5281/zenodo.3824538)). Additional features and capabilities may be developed and the format of this report and the application layout may change in the future.

For further information and citation refer to: Carroll C, Noss RF. 2020. Rewilding in the face of climate change. *Conservation Biology* (Early View). doi: [10.1111/cobi.13531](https://doi.org/10.1111/cobi.13531).

App development was supported by:

- [AdaptWest](#) (with support from the [Wilburforce Foundation](#)).

Introduction

Conservation planners and practitioners increasingly wonder how they should revise conservation strategies in the face of the unprecedented threat to biodiversity from climate change. One key step is to consider the relatively consistent spatial patterns that characterize the “geography of climate exposure and resilience”. These patterns are often generated by the interaction of global climate systems with regional topography, but may also be influenced by biogeographic processes and other factors. A qualitative understanding of these patterns can help planners craft conservation strategies that are more resilient to uncertainty regarding the future intensity of climate change.

Available in pdf, docx & html formats

Building Communities of Practice: Networks of researchers and practitioners of adaptation science



Putting Adaptation Solutions in the Hands of Northern Parks and Protected Areas Practitioners
Canadian Parks Council Climate Change Working Group Northern Adaptation Workshop



NORTHWEST BOREAL
Landscape Conservation Cooperative

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For more information:

- Visit <http://adaptwest.databasin.org>
- Follow [@adaptwest](https://twitter.com/adaptwest) on Twitter for updates on newly available data and webinars
- Virtual symposium: Innovative Approaches for Identifying and Managing Climate-change Refugia, Thu, July 30 7:30 AM - 9:30 AM PDT More info @ <http://scbnorthamerica.org/>

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