Assessing the Vulnerability of Species & Habitats to Climate Change

University of Washington, TNC, WDFW, IDFG, ODFW, NPS, NWF

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University of Washington

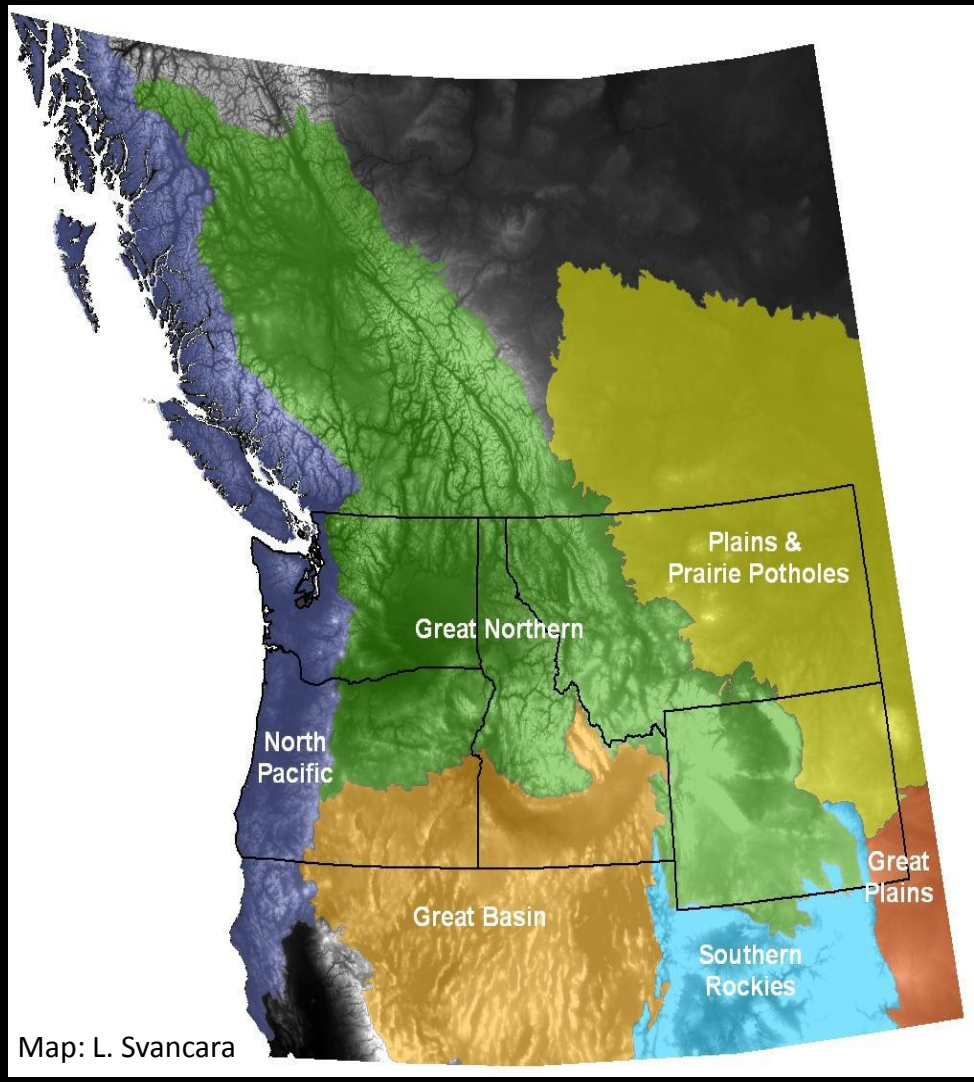
Goals:

Enable prioritization
Facilitate adaptation planning
Build regional partnerships

Study Objectives

- Assess inherent sensitivity to climate-change of **species** and **systems**
- Project potential impacts
- Facilitate adaptation-strategy development and modification of SWAPs

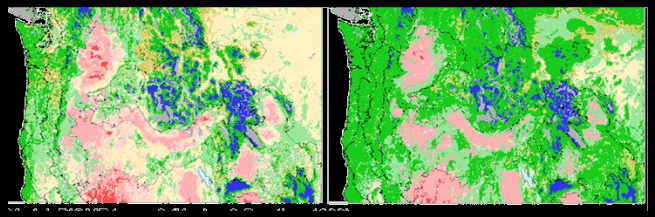
Study Area



Map: L. Svancara

Methods

- Build a database of climate change sensitivities
- Downscale and summarize climate projections
- Project vegetation and animal responses
- Assess impacts on protected areas
- Modify SWAPS
  (WA, OR, and ID FWDs)



Sensitivity Components

Physiological factors

Sensitive habitats

Dispersal abilities

Life history

Generalist/specialist

Relative location

Disturbance regimes

Climate Sensitivity Database

Aegolius funereus

View | Edit | Revisions | Track | Dev load | Dev render

Title: *

Aegolius funereus

Common Name:

Boreal Owl

Enter known common names, one name per line.

This Species is Completed

- Taxonomy
- Dispersal Ability
- Disturbance Regimes
- Generalist/Specialist
- Physiology
- Life History Information
- Habitat
- Ecological Climate Effects
- Subjective ranking
- Menu settings
  Not in menu
- Revision information
  New revision
- Comment settings
  Read/Write
- URL path settings
  Alias: species/aegolius-funereus
- XML sitemap
  Inclusion: Default (included)
  Priority: Default (0.5)

Average annual dispersal distance:

- N/A
- >100 km
- 75-100 km
- 50-75 km
- 25-50km
- 5-25km
- 1-5km
- <1km

Confidence in average annual dispersal distance:

2 Medium-Low

Do barriers to dispersal exist?:

2

Are there landscape elements that would prevent this species from moving in response to climate change? Some examples of such barriers are given in the checklist below.

Confidence in barriers to dispersal exists:

4 Medium-High

Specific dispersal distance, (if known) and dispersal type (juvenile, adult, etc.):

Please select all general types of barriers to dispersal that apply:

http://courses.washington.edu/ccdb/drupal

Part II:

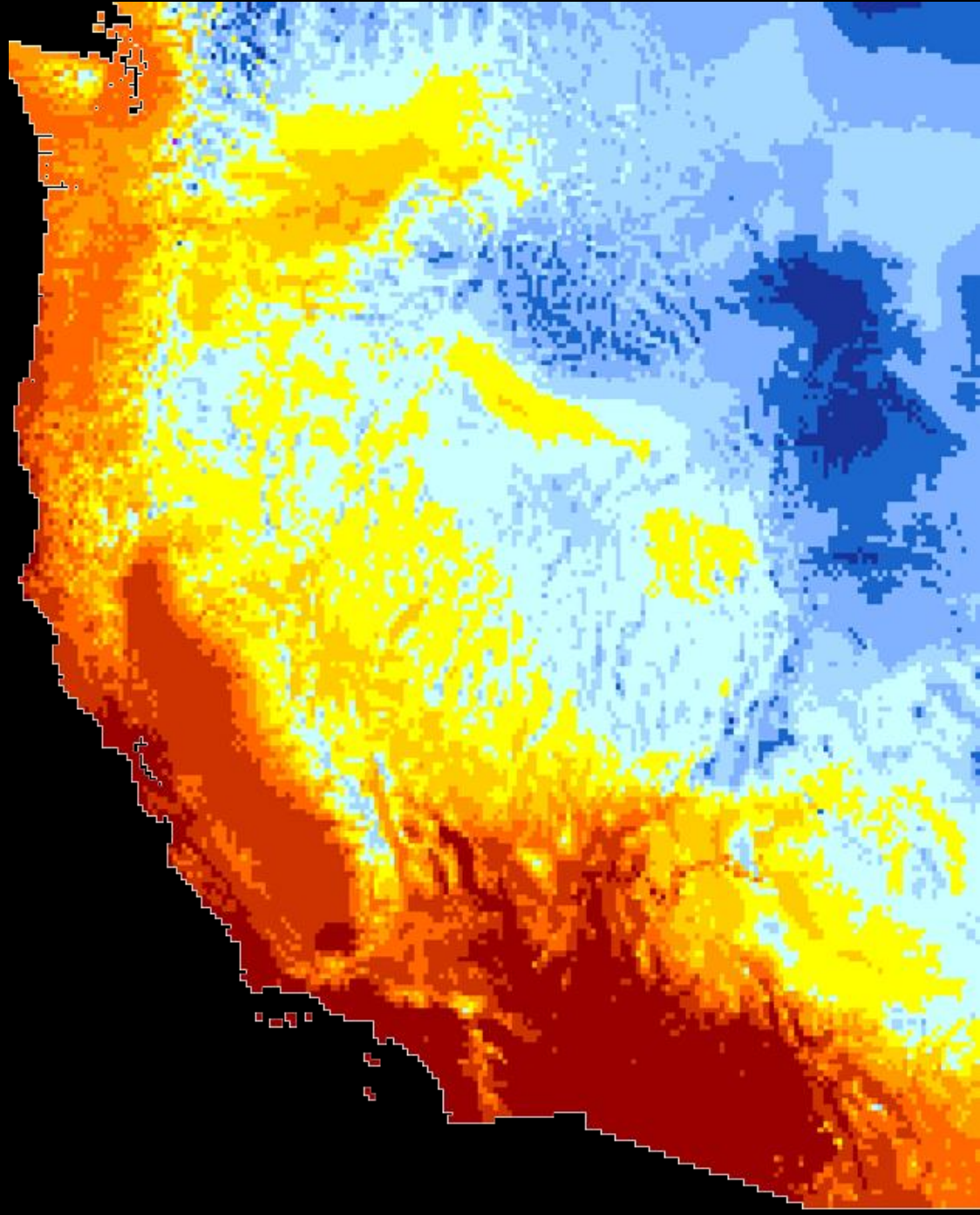
Future Climate Projections

Climate Data

General circulation model (GCM) simulations

At least 6 GCMs

2 emissions scenarios
(A2, A1B)



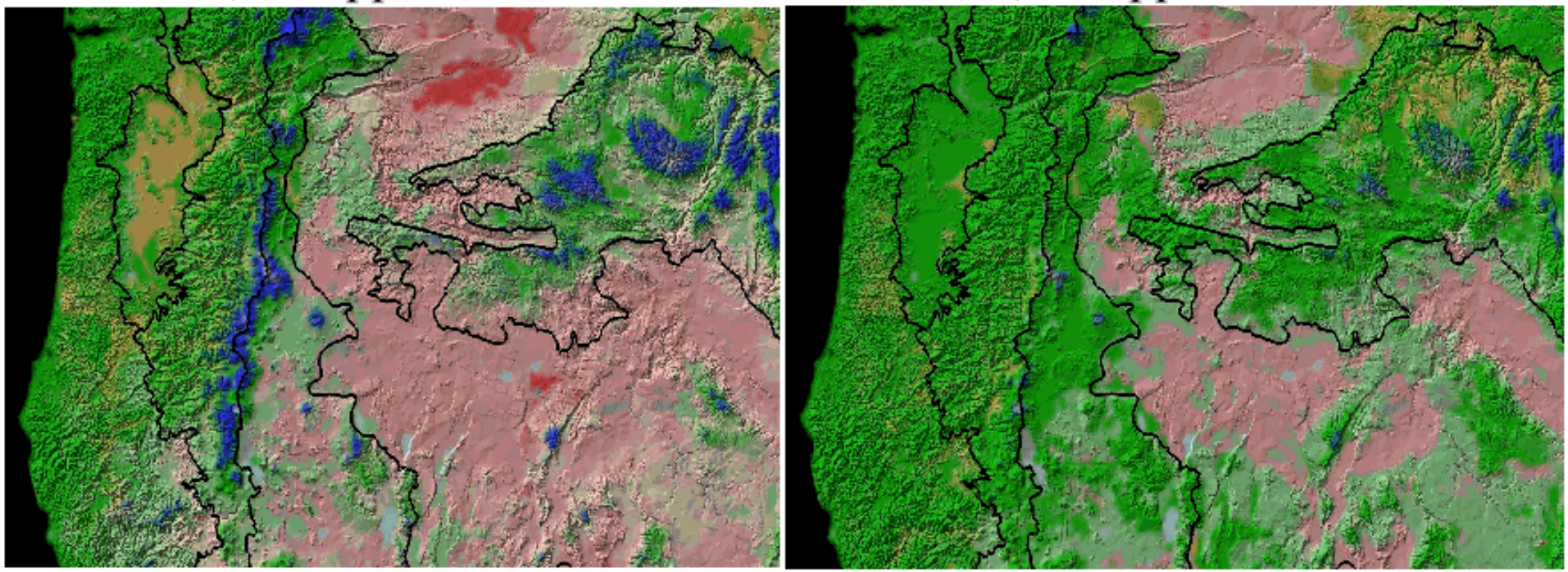
Part II:

Future Vegetation Projections

Simulated Biomes

1951-1980, 340 ppm CO_2

2050-2059, 554 ppm CO_2



Environmental Change Research Group, Dept. of Geography, Univ. of Oregon. Model: BIOME4, ver. 2 (J. O. Kaplan and I. C. Prentice)

- Subalpine forest and tundra
- Closed forest
- Open forest/woodland
- Prairie woodland
- Grassland
- Steppe
- Shrubland
- Desert/semi-desert shrubland
- Water
- Areas with no soil data

Part IV:

Animal Range Shift Projections

Modeling potential range shifts

Current ranges – modeled as functions of current climate & vegetation

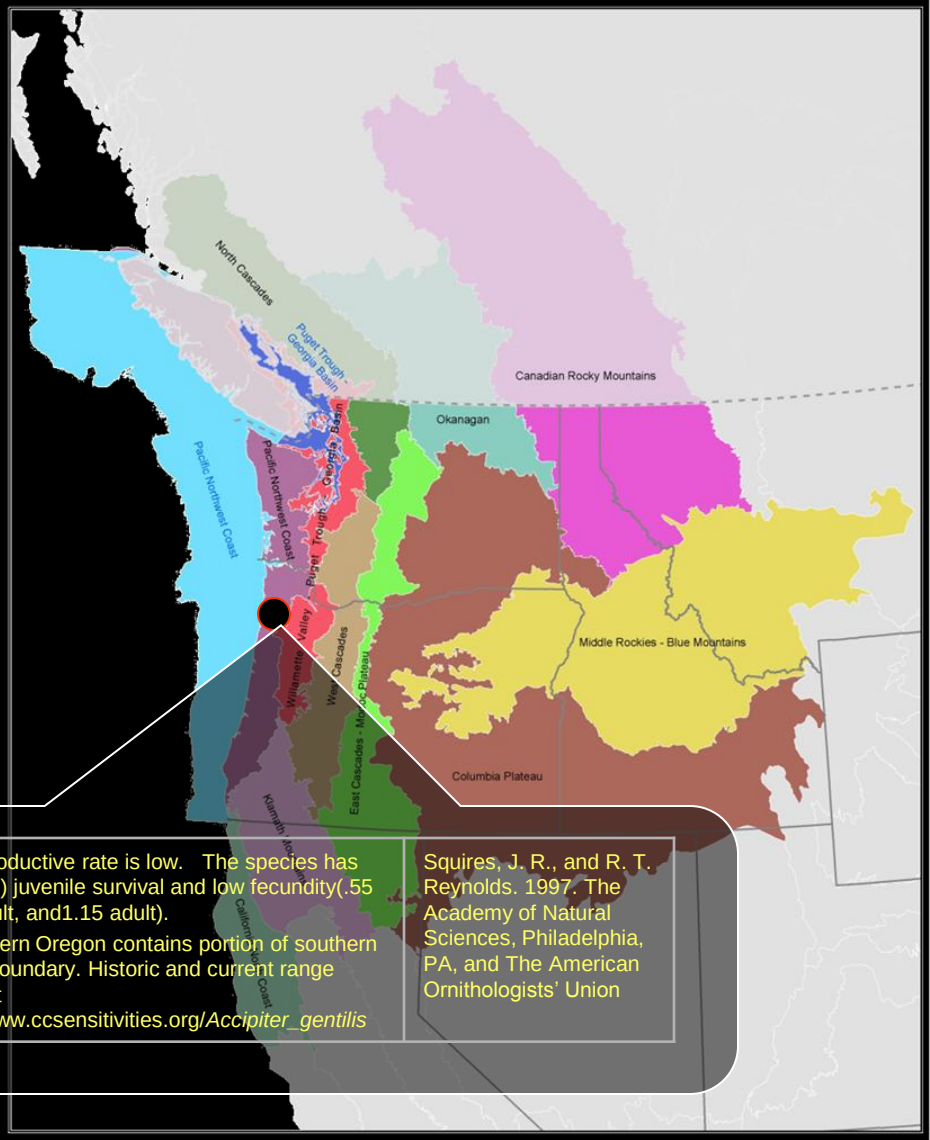
Future ranges – modeled using projected future climate & vegetation

Northern Goshawk (HADCM3 A1B)

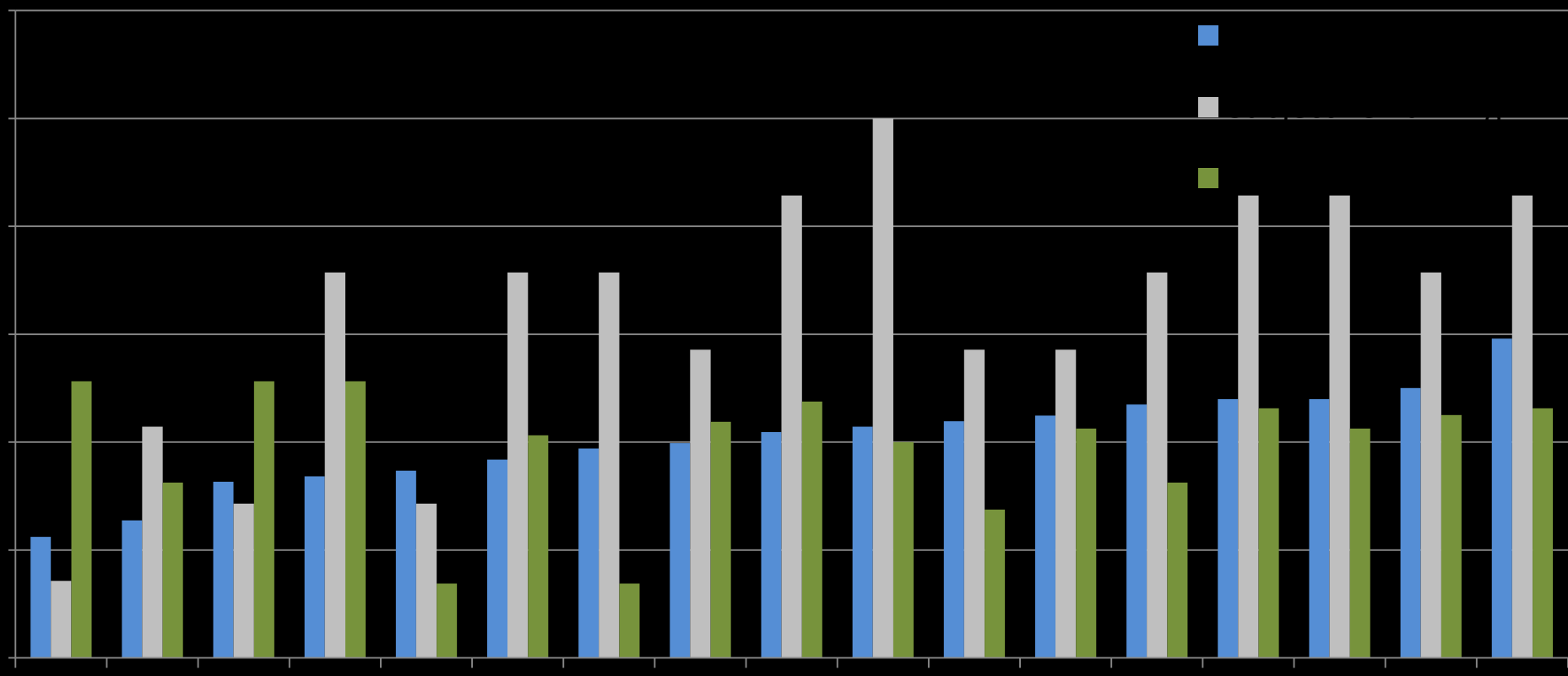
stable
expansion
contraction

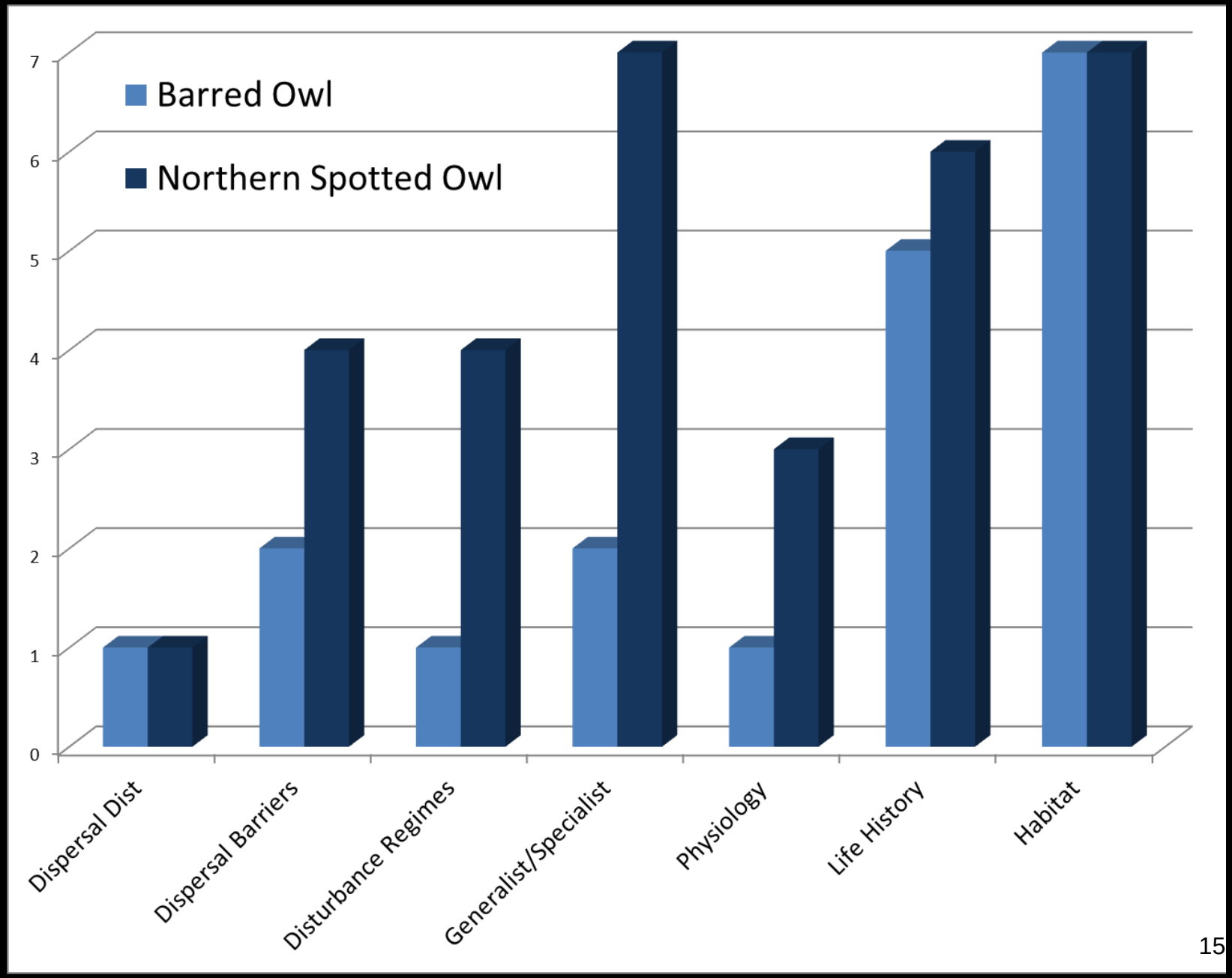
Products will include

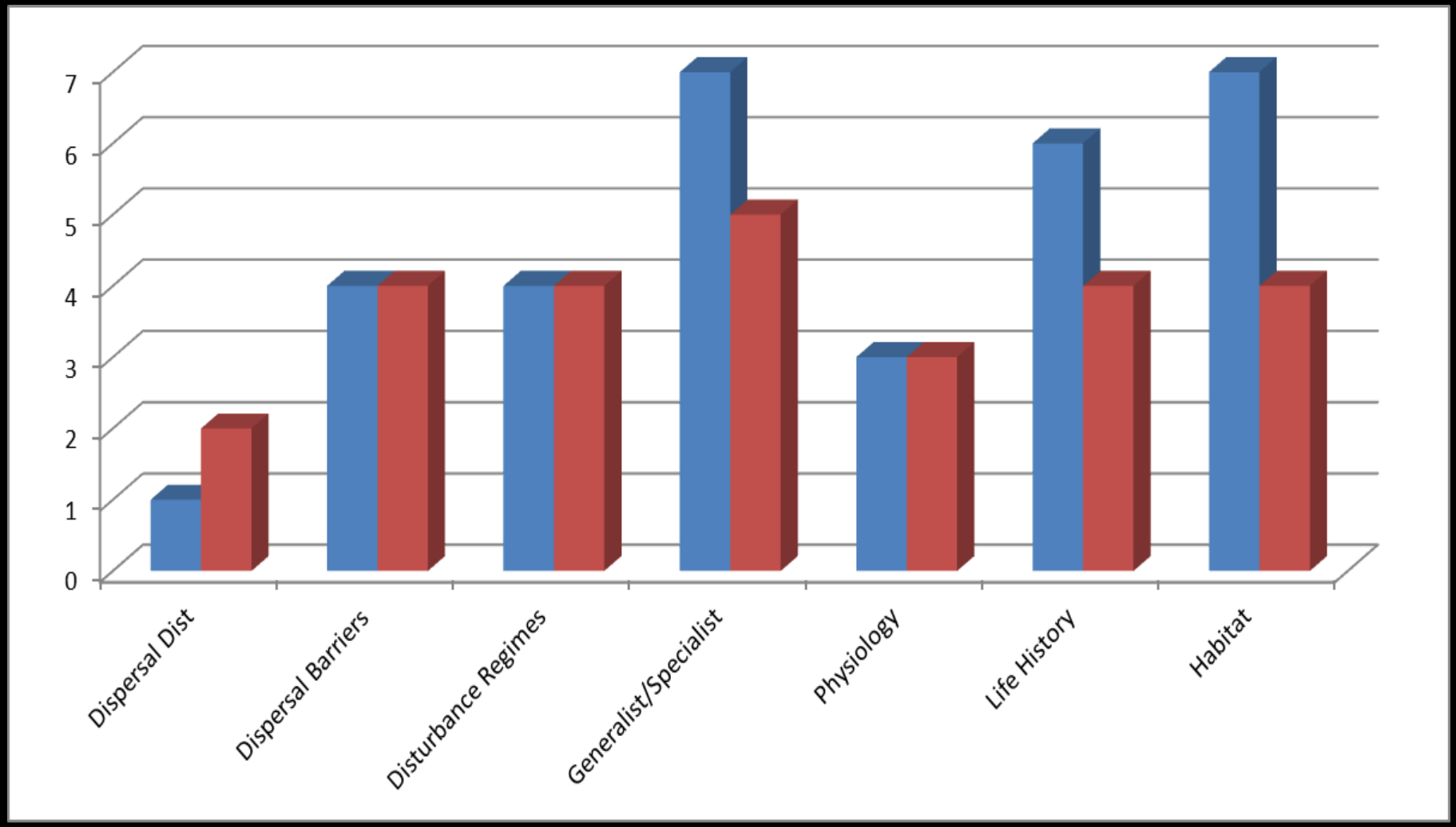
- Searchable, spatially referenced climate change sensitivity database



Northern Goshawk *Accipiter gentilis*	6	2	7	1	0	2	7	1. Reproductive rate is low. The species has low (.33) juvenile survival and low fecundity(.55 sub-adult, and1.15 adult). 2. Western Oregon contains portion of southern range boundary. Historic and current range maps at http://www.ccsensitivities.org/*Accipiter_gentilis*	Squires, J. R., and R. T. Reynolds. 1997. The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union




Barred Owl
Northern Spotted Owl
0
1
2
3
4
5
6
7
Dispersal Dist
Dispersal Barriers
Disturbance Regimes
Generalist/Specialist
Physiology
Life History
Habitat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Dispersal Dist
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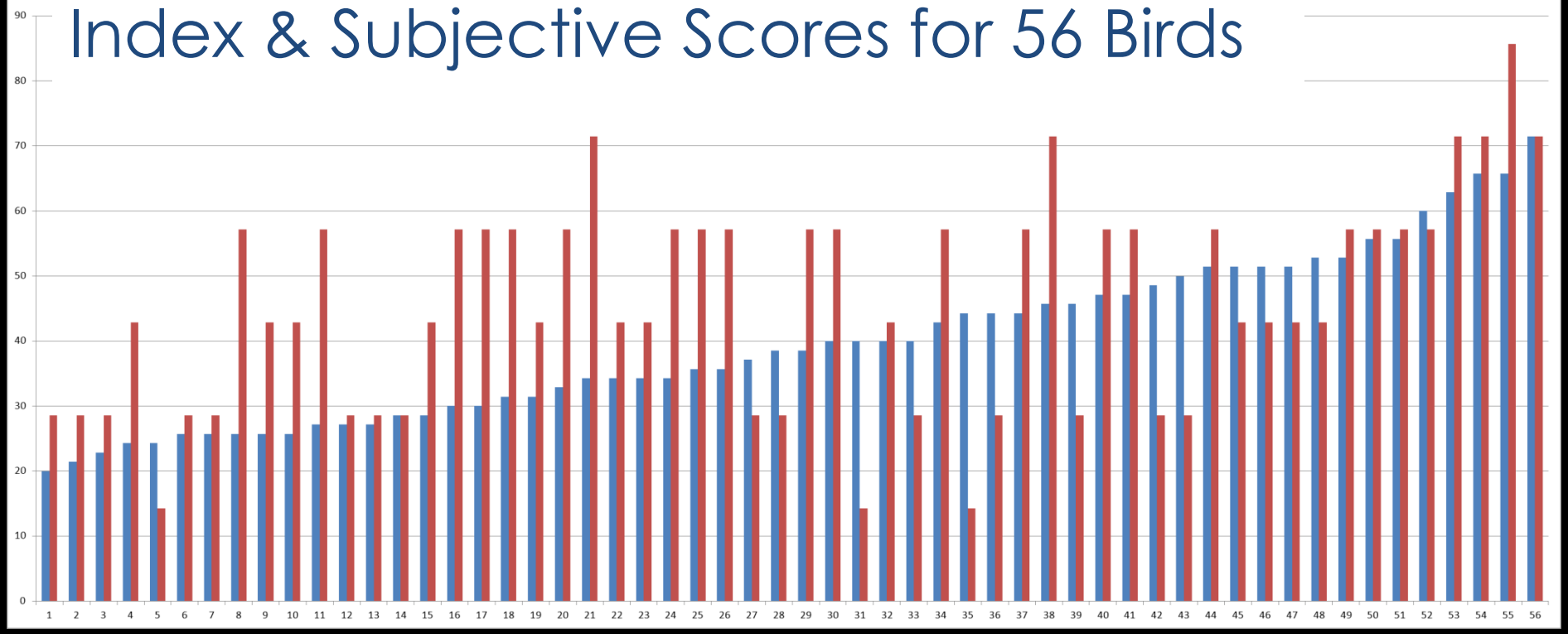
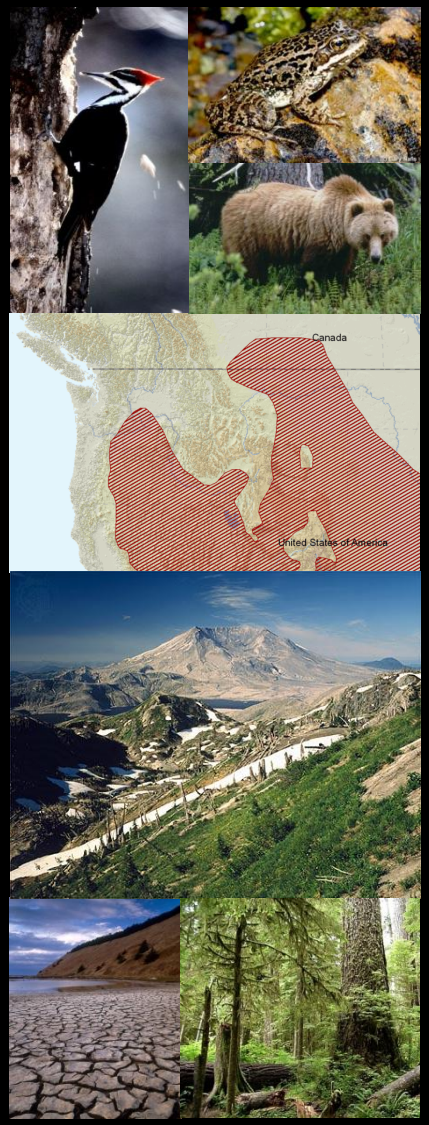
Index & Subjective Scores for 56 Birds



Climate Sensitivity Database status as of May 25th, 2011

	completed by author?								
type	yes	almost	no	duplicated	missing	mistaken?	to be deleted?	Total	%
amphibian	14	5	15	7	0	0	0	41	6.0
annelid	0	0	1	0	0	0	0	1	0.1
arachnid	0	0	1	0	0	0	0	1	0.1
bird	106	7	12	6	0	0	1	132	19.2
crustacean	0	0	2	1	0	0	0	3	0.4
fish	2	2	71	8	0	0	0	83	12.1
fungi/lichen	0	0	33	0	0	1	0	34	4.9
insect	2	2	26	2	0	0	0	32	4.7
mammal	6	11	34	8	1	0	0	60	8.7
mollusc	1	2	57	0	0	0	0	60	8.7
plant	4	9	217	4	0	0	0	234	34.0
reptile	1	0	6	0	0	0	0	7	1.0
blank	0	0	0	0	0	0	0	0	0
Total	136	38	475	36	1	1	1	688	100
%	19.8	5.5	69.0	5.2	0.1	0.1	0.1	100	

Spatial Vulnerability



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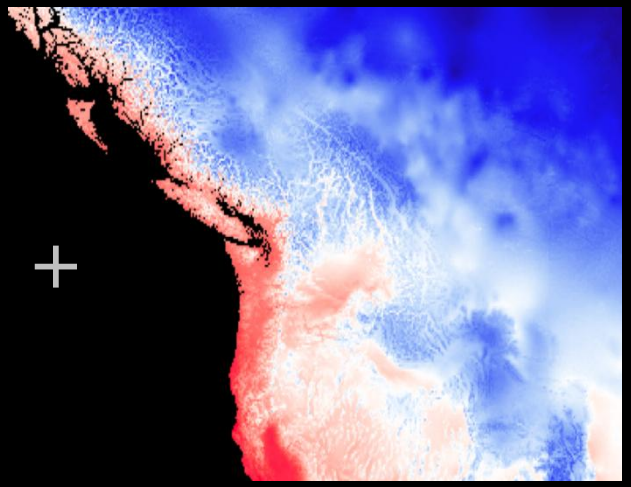

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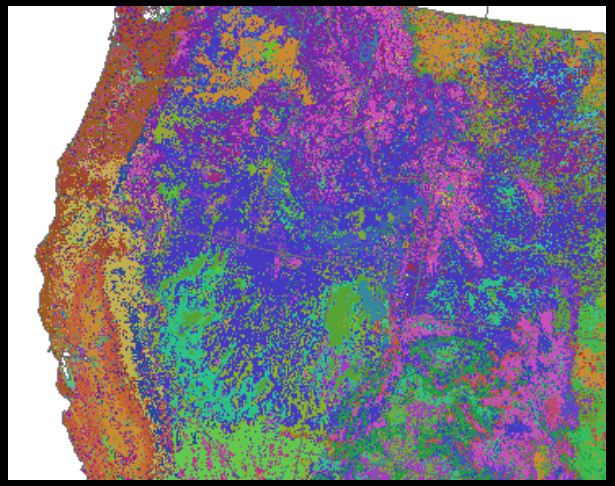

Vulnerability assessments

Pacific Northwest U.S.

University of Washington, TNC, WDFW, ODFW, IDFW, NPS

United States

Linda Joyce, Curtis Flather, and Marni Koopman

USFS and National Center for Conservation Science and Policy

Massachusetts

Hector Galbraith, Manomet Center for Conservation Sciences

Southwestern U.S.

Carolyn Enquist, The Nature Conservancy

Multi-region

Bruce Young, NatureServe

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