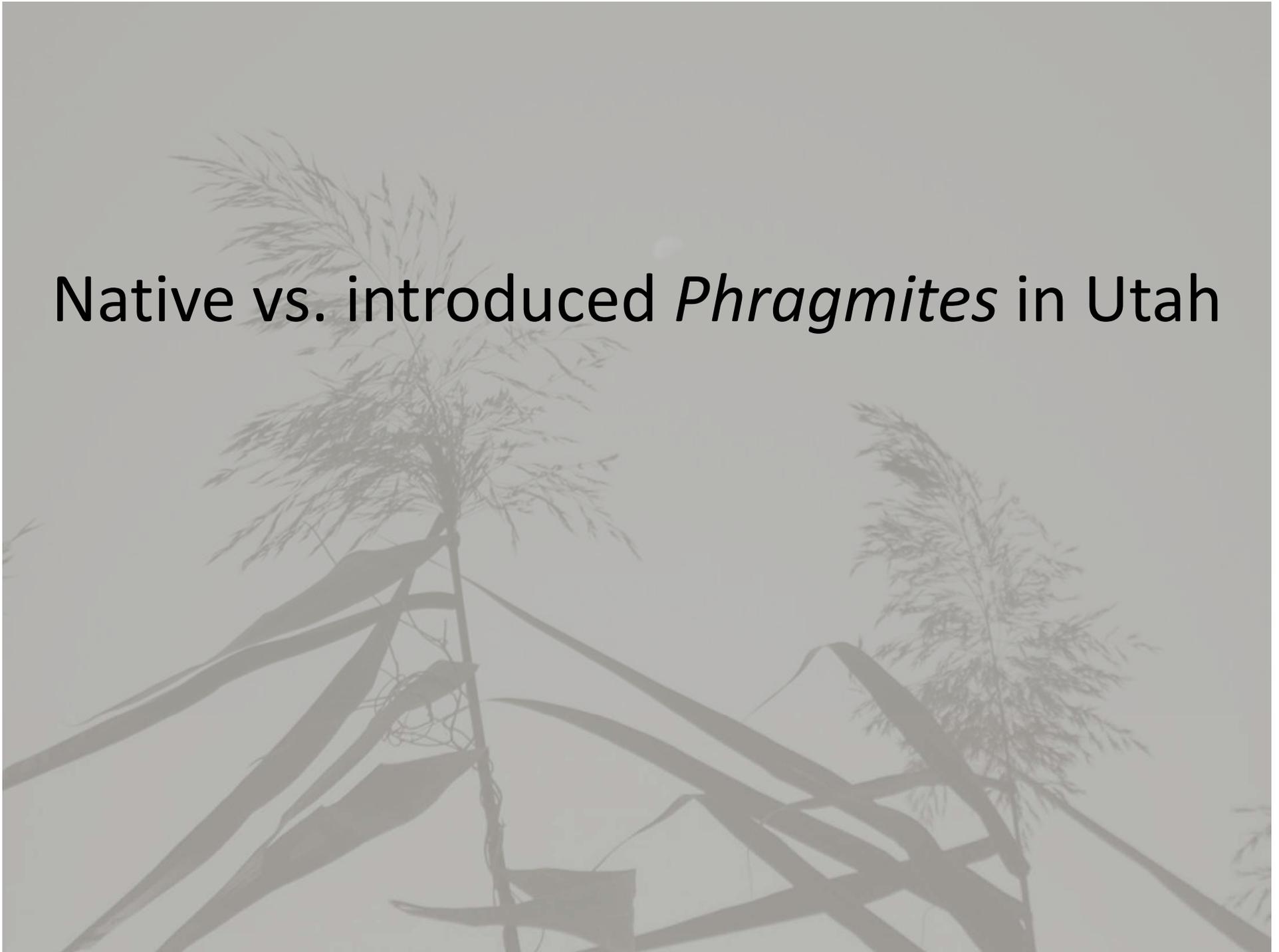


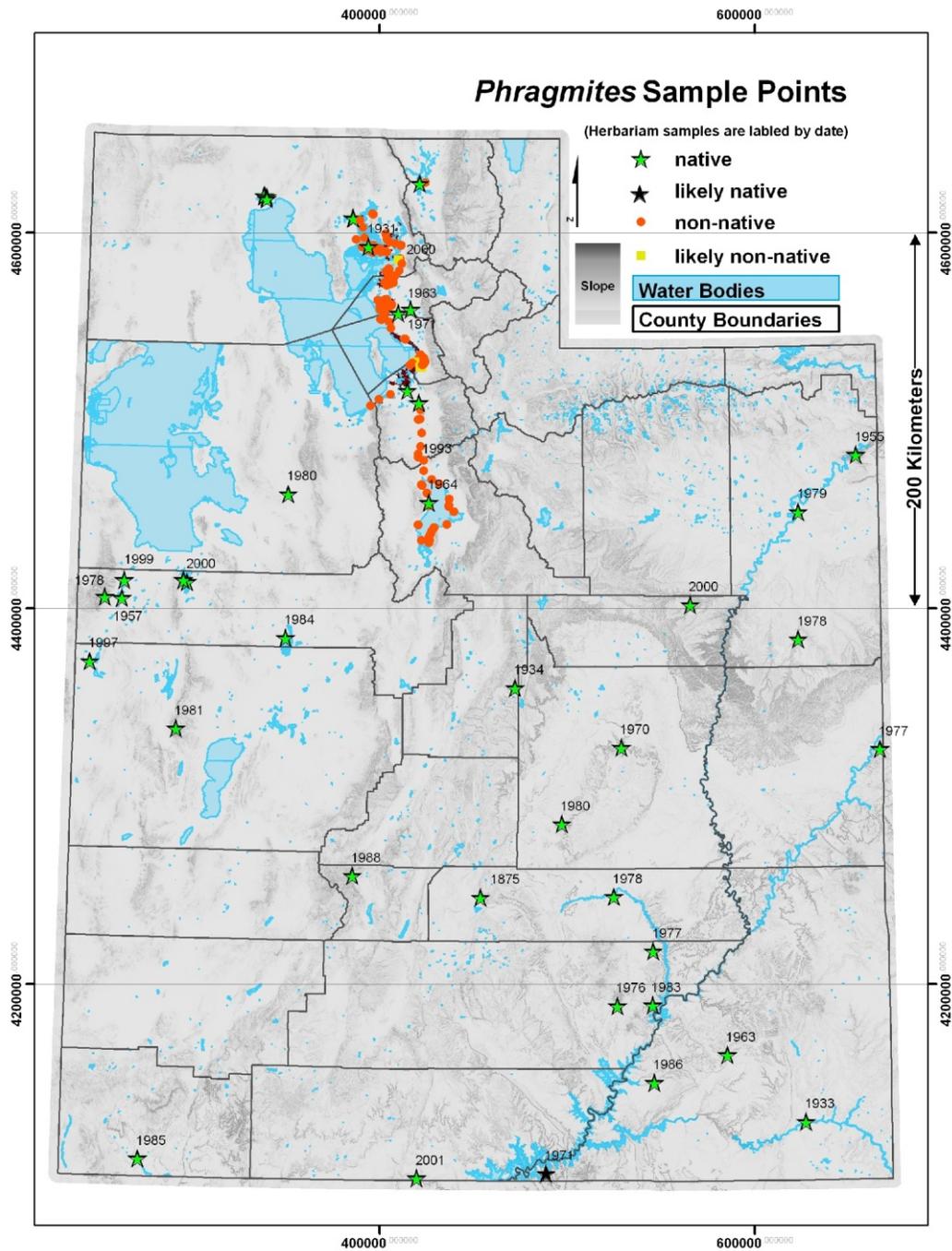
The background of the slide is a grayscale photograph of Phragmites reeds. The reeds are tall and thin, with long, narrow leaves and feathery seed heads. They are set against a light, hazy sky, creating a soft, naturalistic backdrop for the text.

Current extent and future control experiments of invasive *Phragmites* in Great Salt Lake wetlands

**Karin Kettenring
Ecology Center and Department of Watershed Sciences
Utah State University**

Native vs. introduced *Phragmites* in Utah





Native vs. introduced *Phragmites* in Utah

Where do you find introduced *Phragmites*?



Phragmites at Bear Lake

Where do you find introduced *Phragmites*?

Phragmites at the Bear River Refuge



Where do you find introduced *Phragmites*?

Phragmites at Farmington Bay



Where do you find introduced *Phragmites*?



Phragmites at Utah Lake

Where do you find introduced *Phragmites*?



Contaminated fill, Provo, Utah

Where do you find native *Phragmites*?



Fish Springs National Wildlife Refuge, Utah

Where do you find native *Phragmites*?



Near Dinosaur National Monument, Green River, Utah

Where do you find native *Phragmites*?



Recolonizing in restoration, Green River, Utah

Where do you find native *Phragmites*?

A photograph showing a riverbank. In the foreground, there are tall, golden-brown reeds with feathery heads, likely Phragmites. The river is visible in the middle ground, and the background consists of a rocky, brownish cliff face. The sky is bright and clear.

Price River, Carbon County, Utah

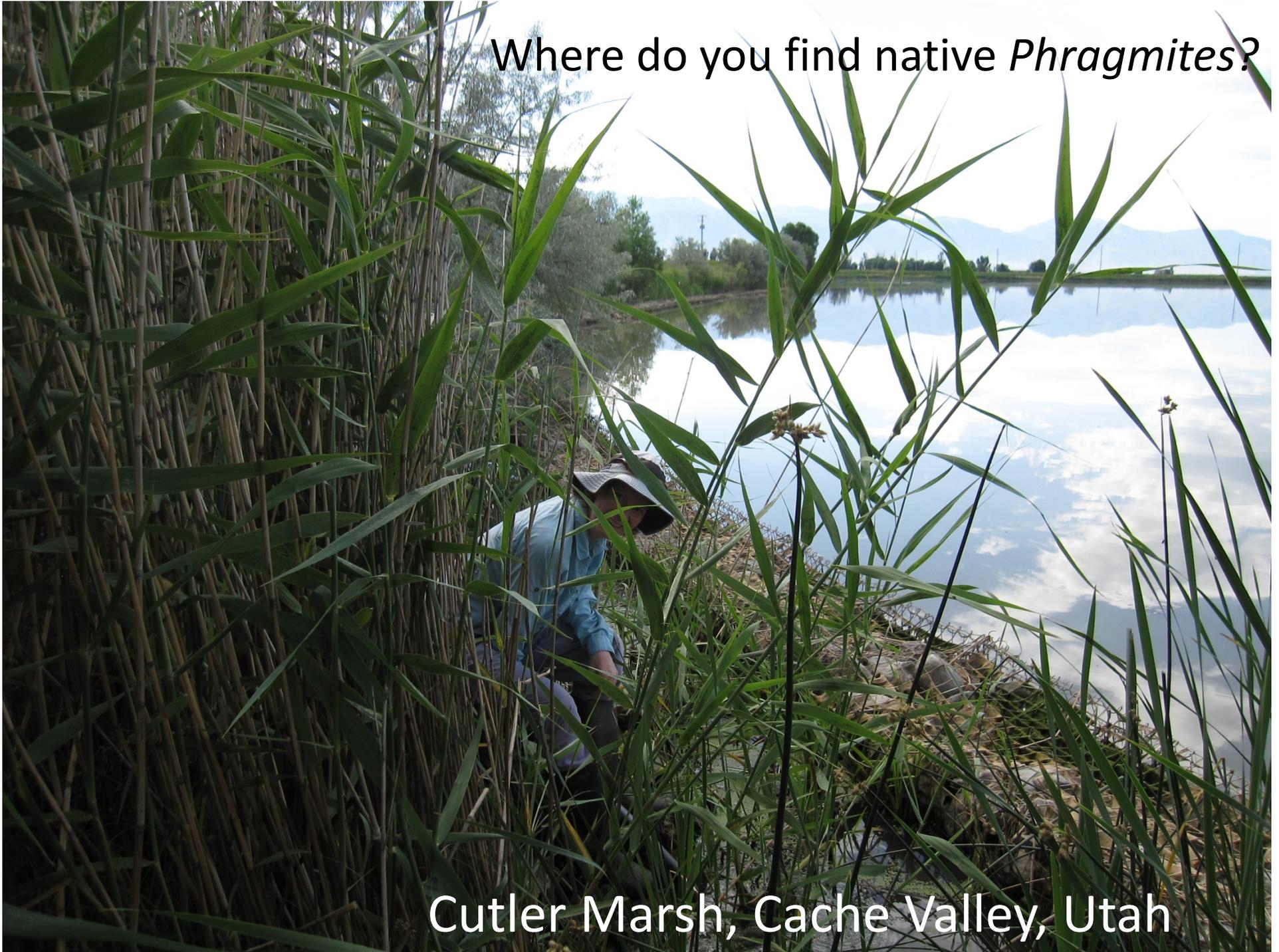
Where do you find native *Phragmites*?

natural springs near highly impacted area, Provo, Utah



Where do you find native *Phragmites*?

Cutler Marsh, Cache Valley, Utah





Why do we care about introduced
Phragmites in Utah?

Impedes recreation, views, site access

Bear Lake



Impedes recreation



Affects property values

Utah Lake near Saratoga Springs



Fire hazard Threat to air quality



Deseret News



Deseret News



Deseret News

It takes up a lot of water



Impossible to manage – widespread, persistent

Inland Sea Shorebird Reserve



Poor habitat for wildlife

Crowds out other plant species

Poor food source for wildlife

Nearly impossible to move through

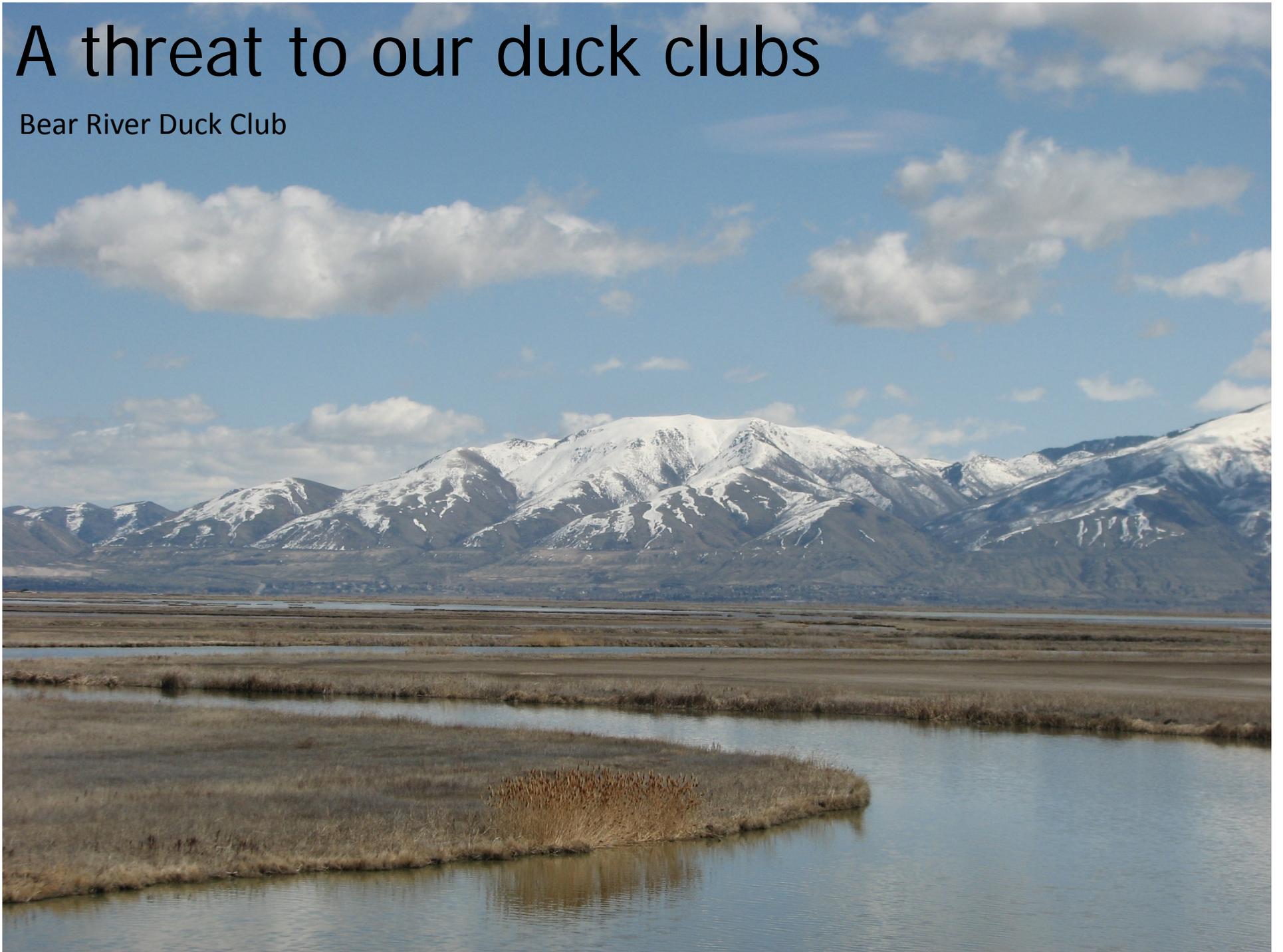


A threat to our state and federal lands



A threat to our duck clubs

Bear River Duck Club



A threat to our migratory birds



Gary Crandall

What are we doing about it?

PaRT - *Phragmites australis* Research Team

We are a group of researchers at USU who are conducting invasive *Phragmites* studies to:

understand its ecology
and
determine the best way to control it



What are we doing about it? *Manager survey*

Survey wetland managers in the Great Salt Lake Watershed to:

- assess how land managers have dealt with *Phragmites* and outline their most successful control methods.
- determine the trade-offs between different *Phragmites* control treatments and what factors may limit control success.
- to aid in the development of a comprehensive invasive *Phragmites* management strategy for our region, including decision-making frameworks.



Karin Kettenring, Eric Hazelton, Kimberly Garvie, Nate Hough-Snee, Zhao Ma

What are we doing about it? *Manager survey*

We have sent surveys to:

- * municipal, county, state, federal government agencies
- * private organizations like the Inland Sea Shorebird Reserve and the many duck clubs on the GSL
- * non profit organizations like The Nature Conservancy

We will have findings summarized by early summer.



What are we doing about it? *Control experiments*

Large stands – 5 acres per treatment

Evaluating the effects of:

- (1) fall glyphosate spray followed by winter mow
- (2) summer glyphosate spray followed by winter mow
- (3) summer cut followed by flooding cut stands

on *Phragmites* and native plants in 5 sites on the GSL – WMAs,
BRMBR, ISSR



Chad Cranney, Karin Kettenring, Eric Hazelton

What are we doing about it? *Control experiments*

Small patches – 0.25 acre per treatment

Evaluating the effects of:

- (1) fall glyphosate followed by winter mow
- (2) summer glyphosate followed by winter mow
- (3) summer mow followed by fall glyphosate
- (4) spring mow, then cover with heavy-duty black plastic

on *Phragmites* and native plants in 5 sites on the GSL – public and private lands



Christine Rohal, Karin Kettenring, Eric Hazelton

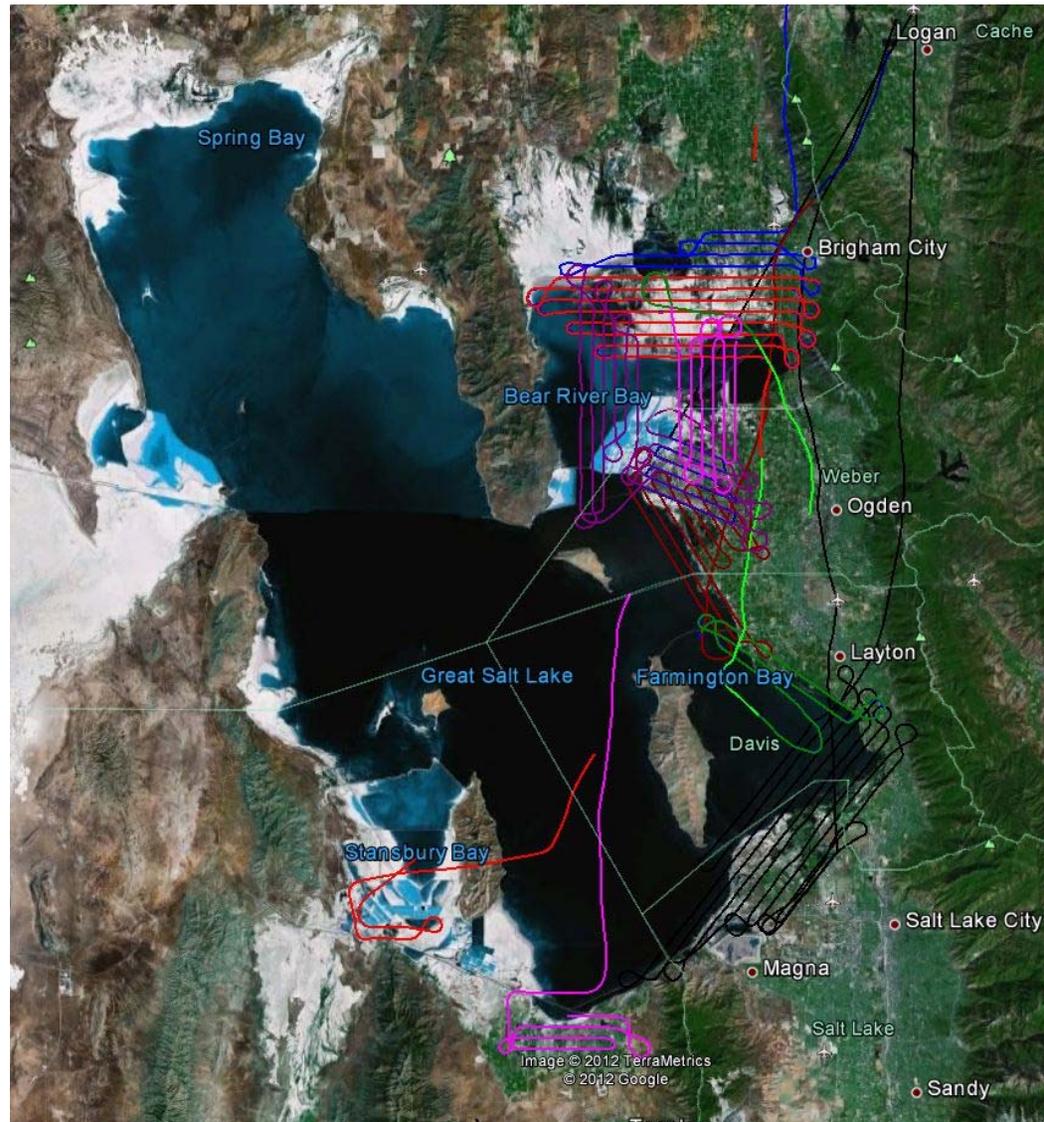
What are we doing about it? *Distribution modeling and prioritizing control*

1. Determining current extent of *Phragmites* around the Great Salt Lake
2. Using species distribution modeling to predict sites susceptible to future invasion
3. Prioritizing areas for control and restoration



Lexine Long, Karin Kettenring

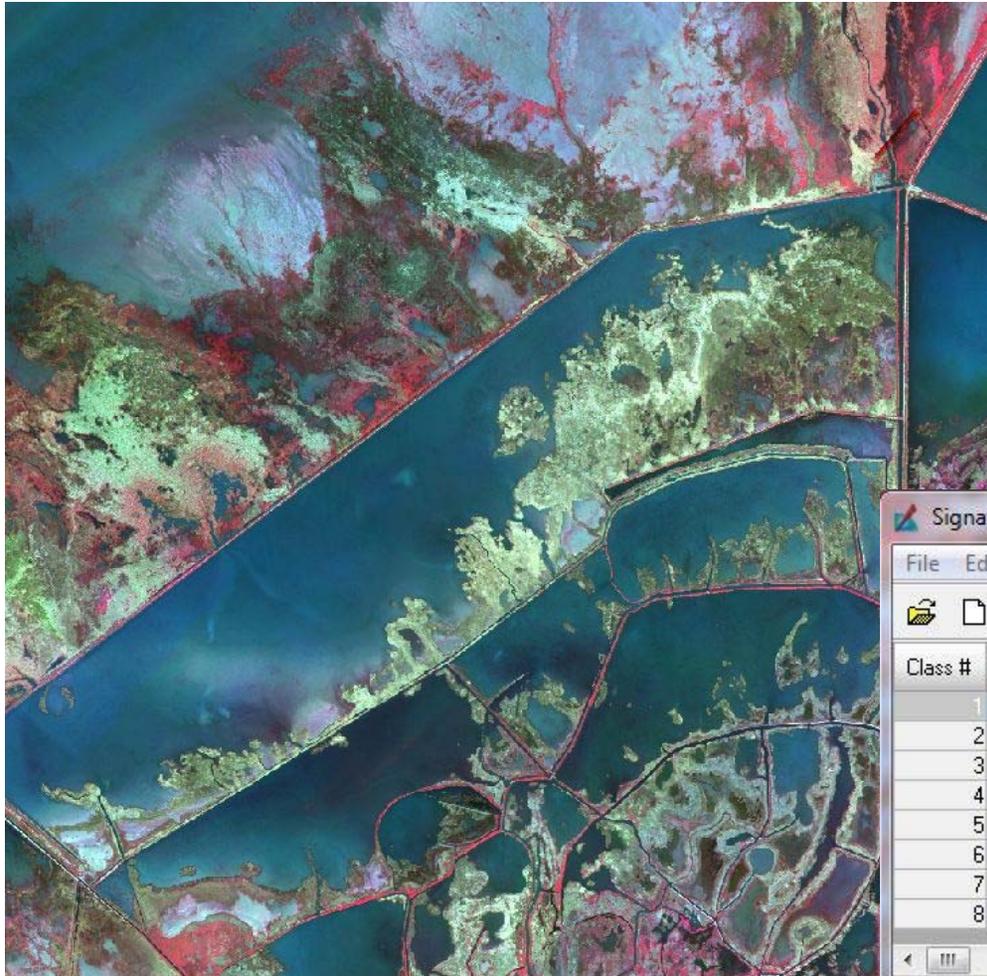
1. Determining current extent of *Phragmites* around the Great Salt Lake



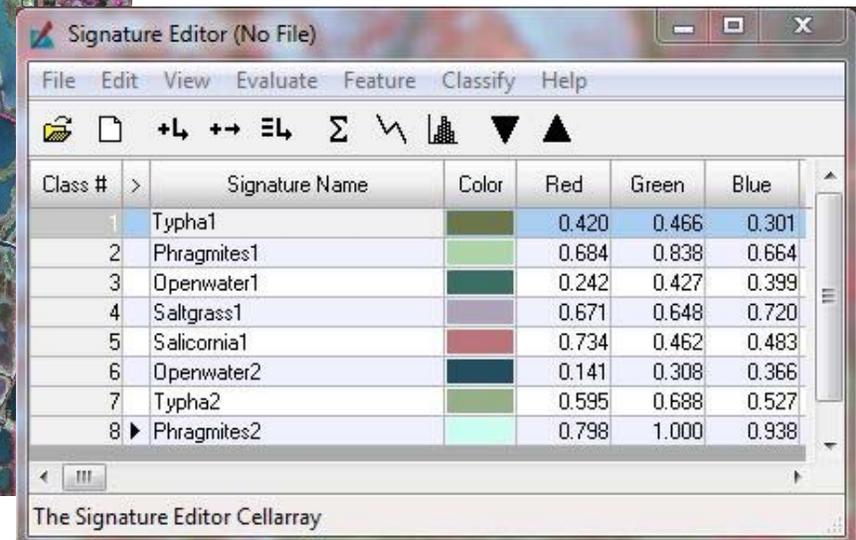
Areas where aerial imagery was collected during 2011

1. Determining current extent of *Phragmites* around the Great Salt Lake

Currently working on classification of imagery:



Vegetation classes:
<i>Phragmites australis</i> (common reed)
<i>Typha</i> spp. (cattail)
Mixed <i>Phragmites</i> / <i>Typha</i>
<i>Distichlis spicata</i> (saltgrass)
Native emergent (bulrushes, sedges)
<i>Salicornia europaea</i> var. <i>rubra</i> (pickleweed)
Mudflat/ playa wetlands
Open water
Upland



Class #	Signature Name	Color	Red	Green	Blue
1	Typha1		0.420	0.466	0.301
2	Phragmites1		0.684	0.838	0.664
3	Openwater1		0.242	0.427	0.399
4	Saltgrass1		0.671	0.648	0.720
5	Salicornia1		0.734	0.462	0.483
6	Openwater2		0.141	0.308	0.366
7	Typha2		0.595	0.688	0.527
8	Phragmites2		0.798	1.000	0.938

2. Predicting sites vulnerable to future *Phragmites* invasion

- Species distribution modeling will be used to determine relationships between the current distribution of *Phragmites* and environmental variables
- This information will be used to create maps identifying areas susceptible to future invasion

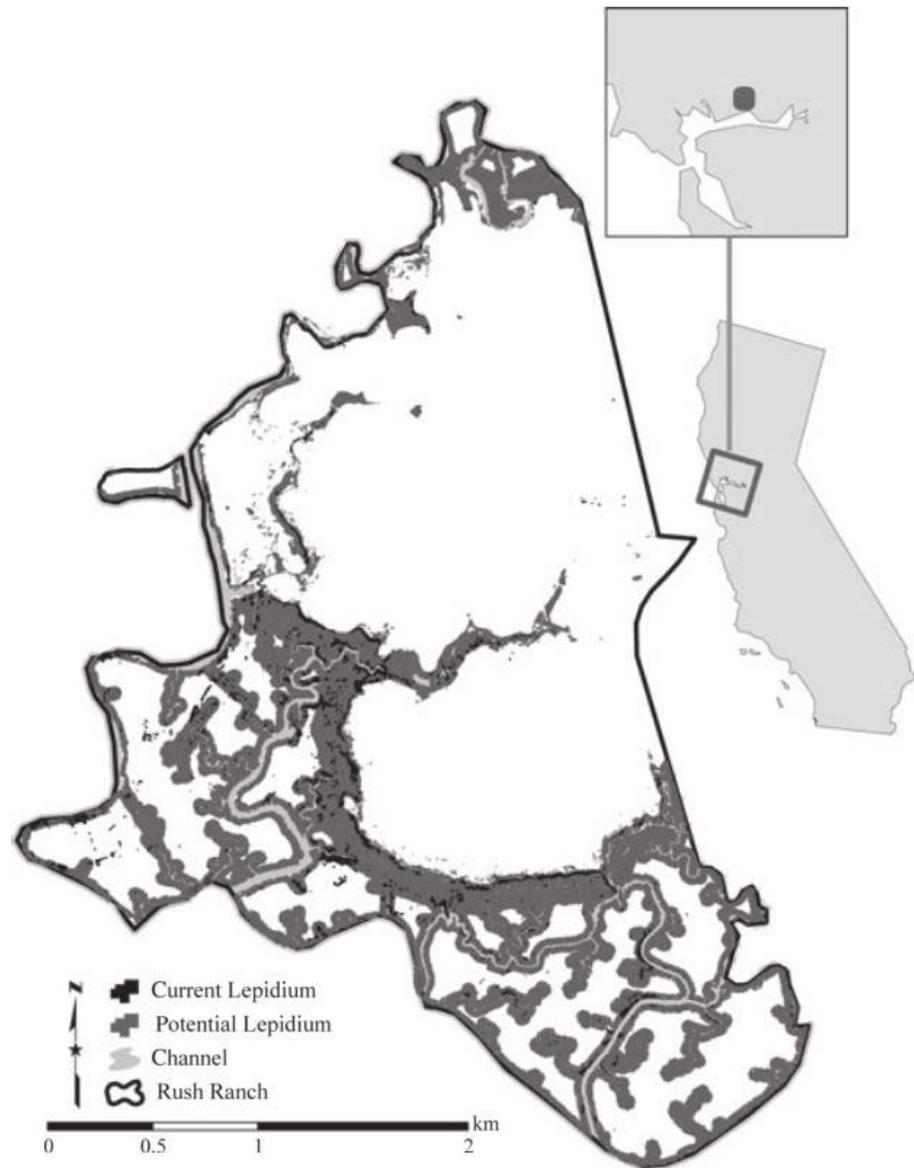


2. Predicting sites vulnerable to future *Phragmites* invasion

Example : Perennial
Pepperweed Habitat
Suitability map



Figure 1 Current and predicted distribution (3-m window topography model) of *Lepidium latifolium* at Rush Ranch (Solano County, California, USA). Potential distribution was mapped as the majority rule of 25 individual classification tree models.



3. Prioritizing areas for *Phragmites* control

- Information from Phases 1 & 2 will be used to create a prioritization framework based on factors such as:
 - Stand size
 - Proximity to other infestations
 - Ease of access to site
 - Etc.



3. Prioritizing areas for *Phragmites* control

- Prioritization example

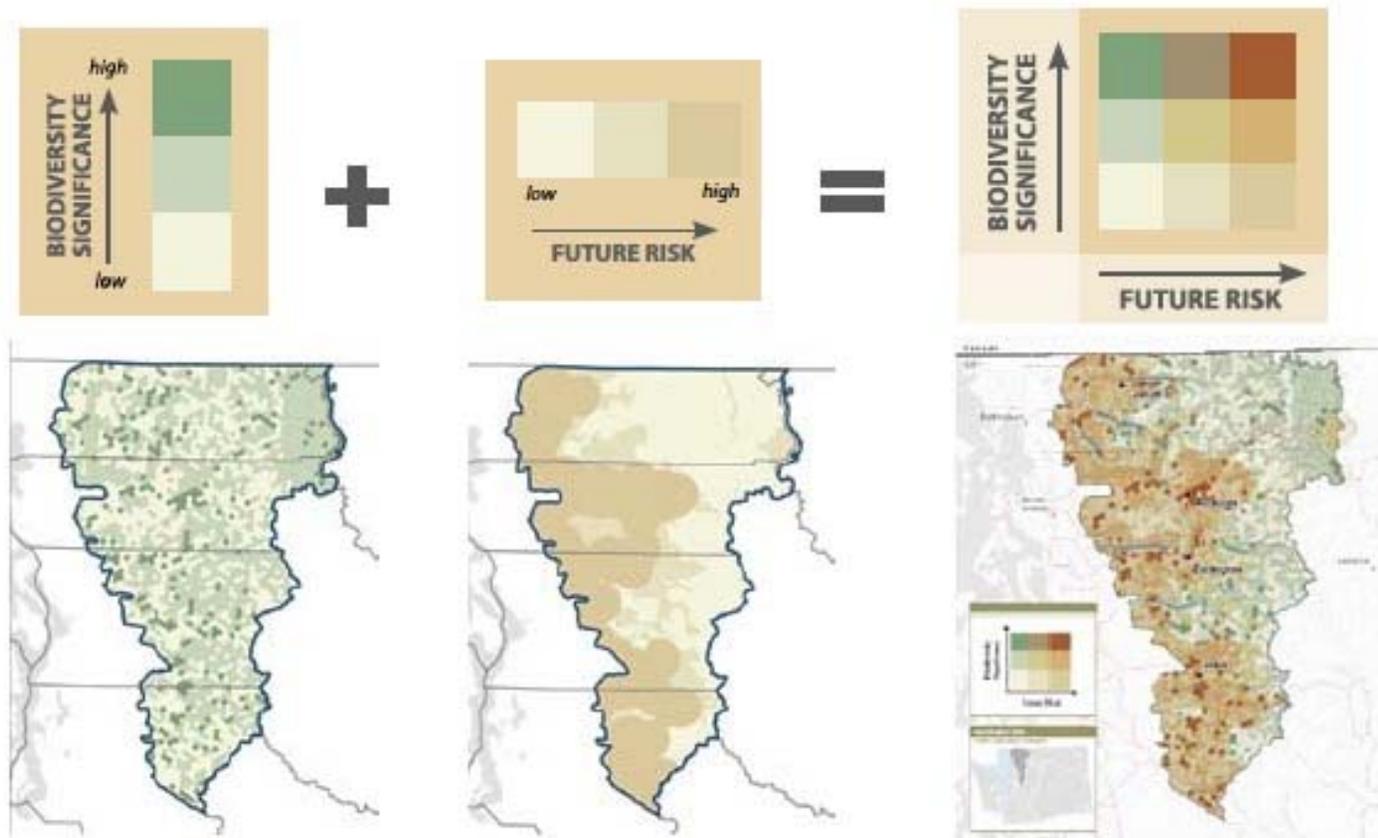


Figure 6. Biodiversity Conservation Opportunity maps. The one at the right is created by combining maps of biodiversity significance (left) with maps of future risk (center). This example shows the North Cascades ecoregion.

QUESTIONS?
karin.kettenring@usu.edu
435.797.2546

Funding provided by:

UT Division of Forestry, Fire & State Lands
Environmental Protection Agency
UT Division of Water Quality
Utah Waterfowl Association
Utah Wetlands Foundation
Community Foundation of Utah
Kennecott Utah Copper Charitable Foundation
Southshore Wetlands & Wildlife Management, Inc.
Utah Agricultural Experiment Station

