Prioritizing Conifer Removal Treatments to Optimize Greater Sage-grouse Habitat Benefits across the Great Basin

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Sagebrush Ecosystem Program

Outline

- Greater Sage-grouse Response to Conifer Removal Efforts in Northwestern Utah

  - Introduction to Conifer Expansion

  - Section 1: Forecasting Vegetation Composition Responses to Pinyon - Juniper Treatments.

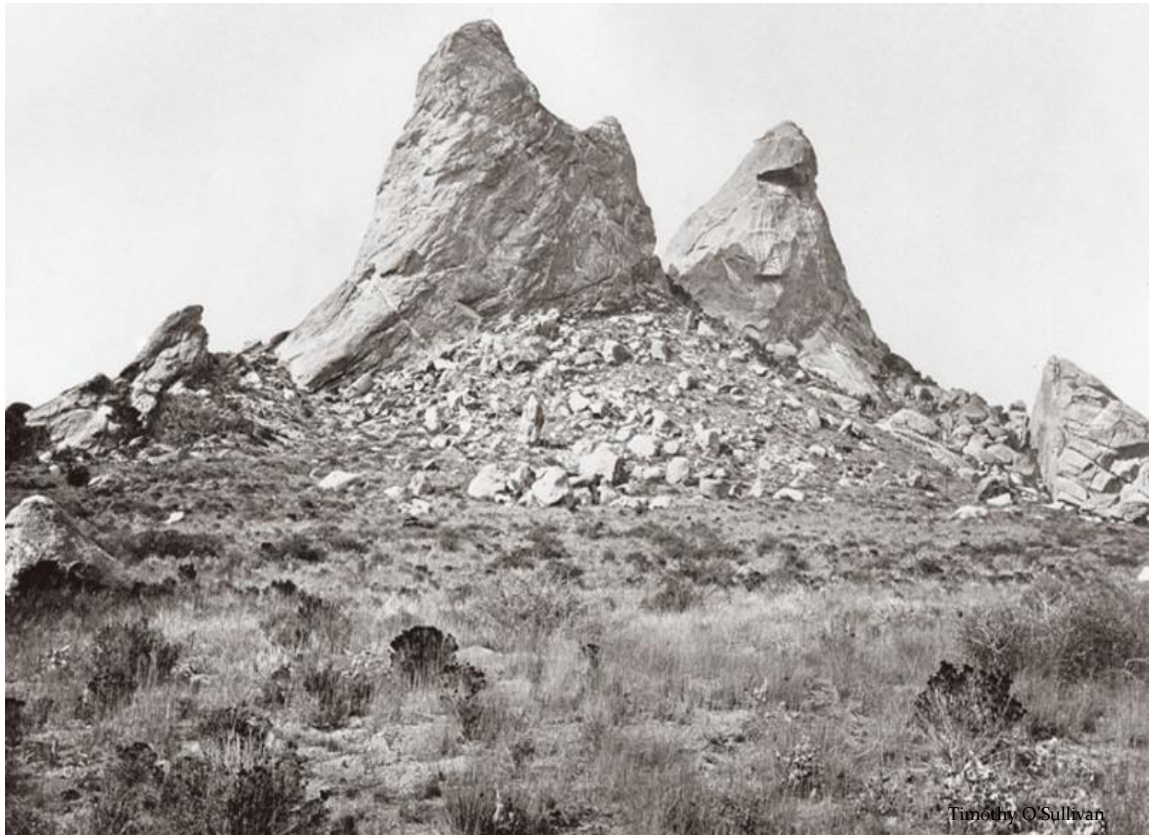
  - Section 2: Prioritizing conifer removal treatments to optimize greater sage-grouse habitat benefits.

  ➢Prioritization Tool: How it works

Conifer Expansion

City of Rocks National Park Southeast Idaho

1868



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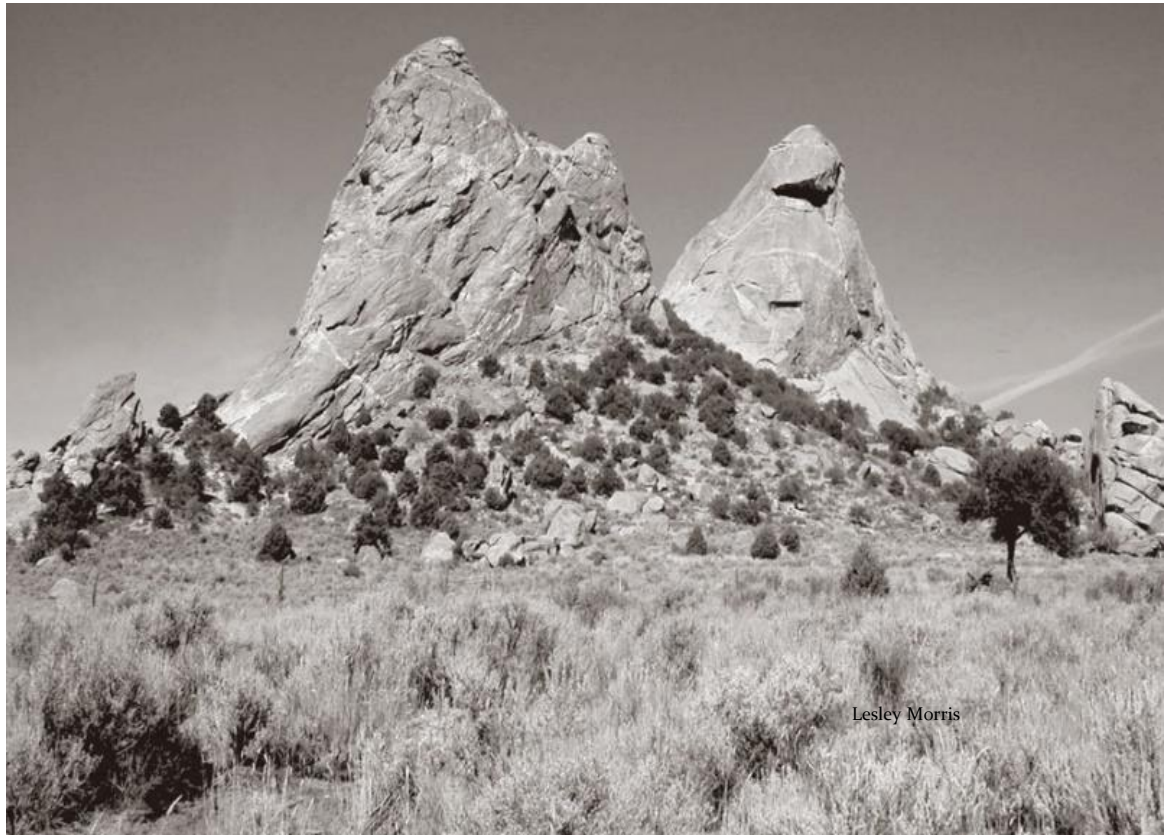
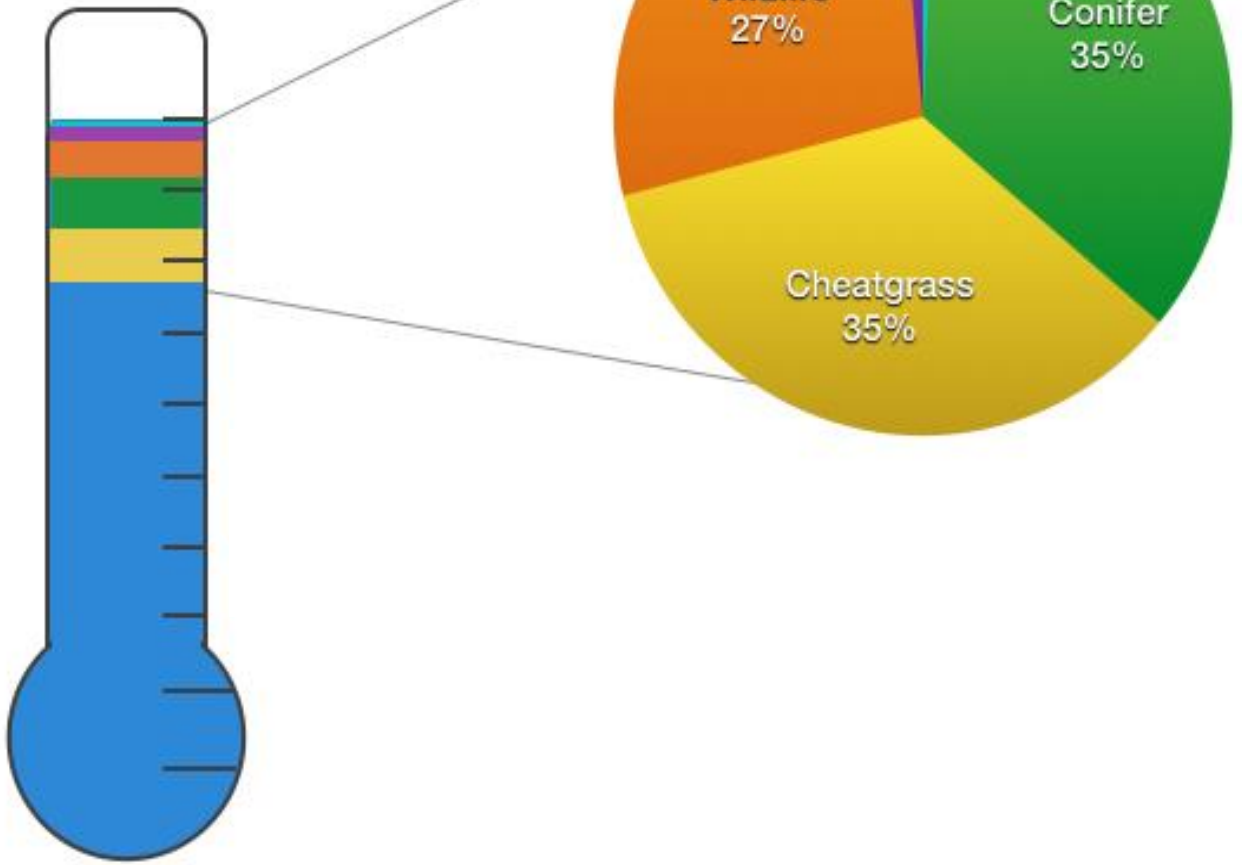
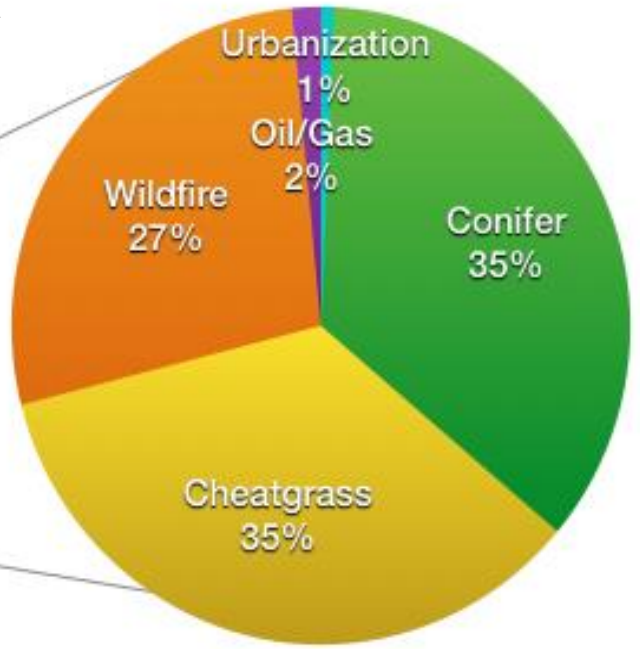


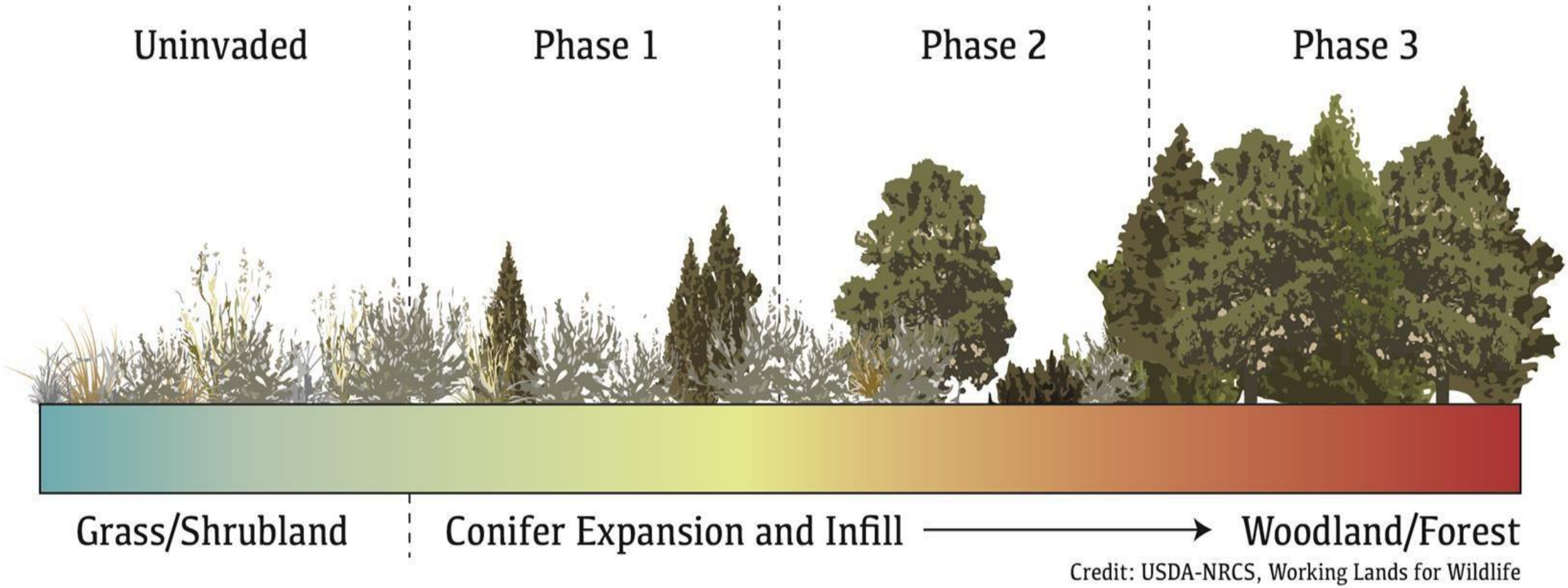
Quantified Threat Analysis

Based on SGMA acreage affected
Utah State Plan 2013





Conifer Encroachment



Conifers & Sage-grouse

- Encroachment
  - Suppressed understory
  - Xeric climate
  - Predator nest/perch sites
  - Lek extirpation
  - Displacement
- Removal
  - Use
  - ...

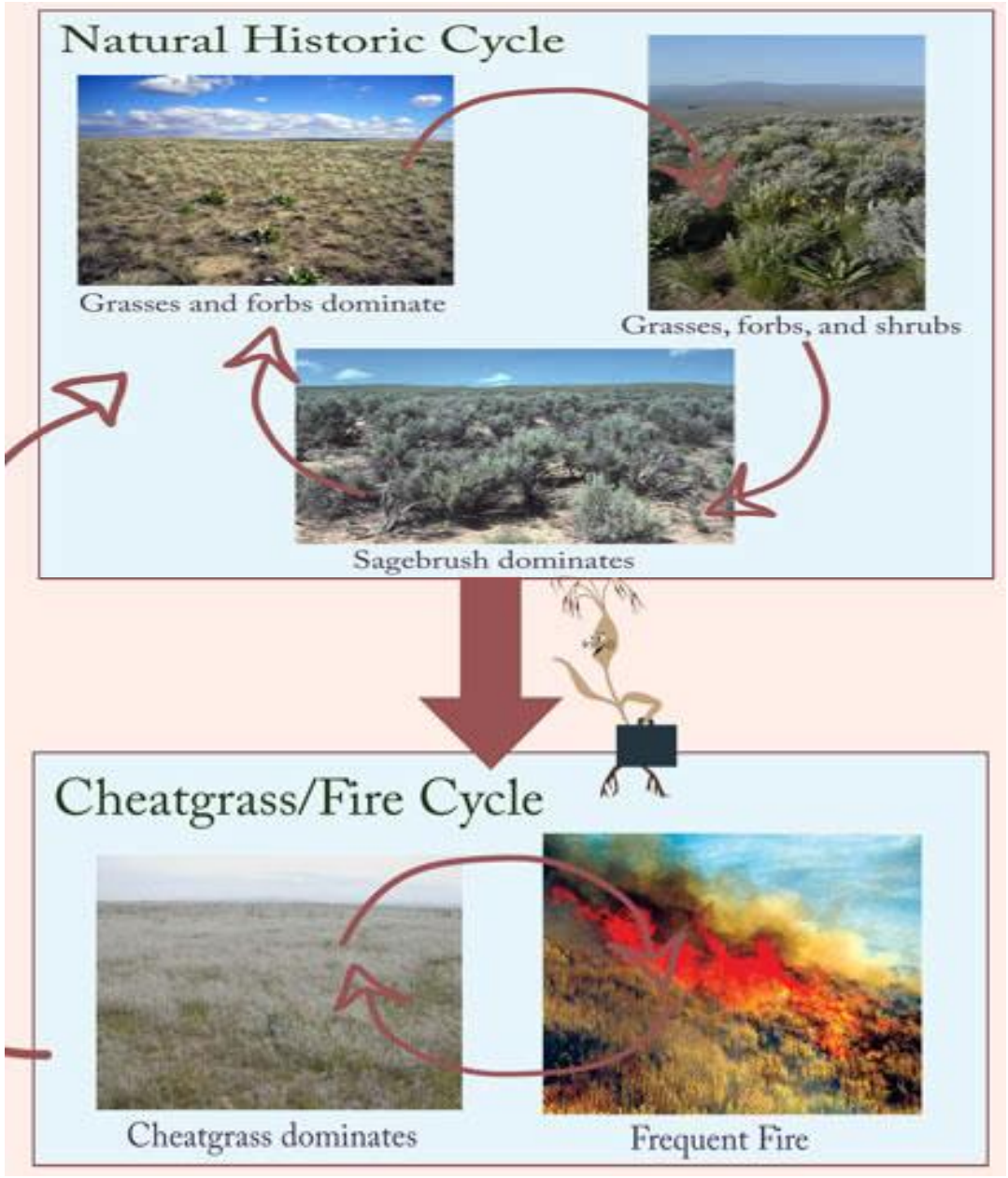
Reasons for conifer expansion:

- Human modifications of native habitat
- Invasive plants
- Shifts in natural fire cycles
- Climate change

Human modifications of native habitat

Invasive Annuals

Shifts in natural fire cycles



Climate Change

Why is sage-grouse response to treatments important?

- Management implications for agencies and landowners within the SMGA
- Critical to demonstrate proper mitigation techniques were used.
- Are treatments worth the time and money?

Utah Sage-grouse Conservation Strategies , 2013.

Objectives

- Develop a prioritization model to predict vegetation composition response to pinyon-juniper treatment.

- Identify if sage-grouse are responding positively to pinyon-juniper removal at the scale of the landscape.

- Make the priority tool interpretable to managers and easy to apply as new treatments are planned across the landscape.

Study Area: Box Elder SGMA

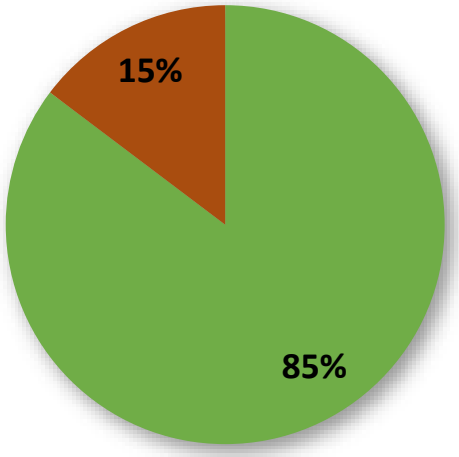
General Habitat

Winter Habitat

Nesting/brood-rearing

Opportunity

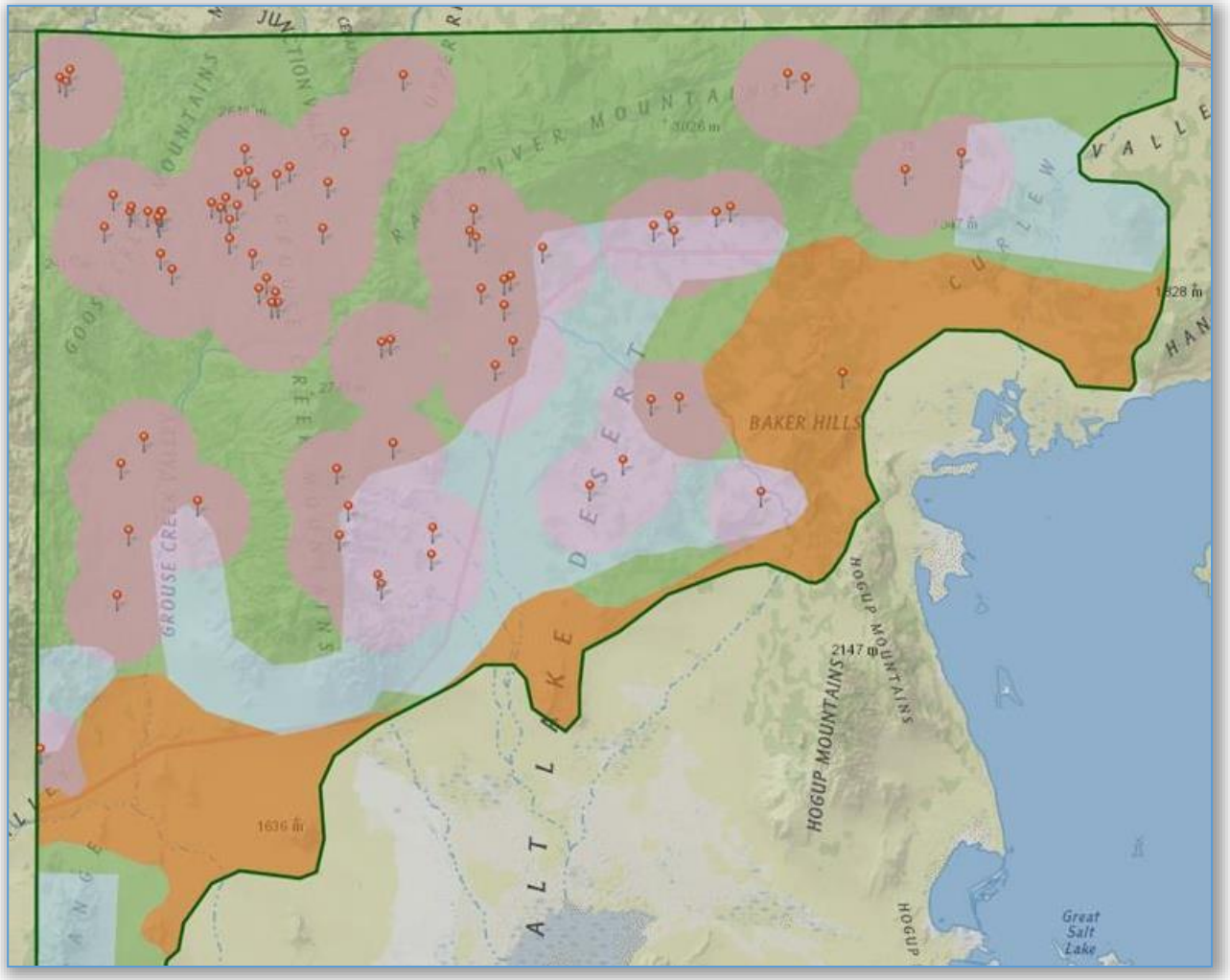
Non Habitat



Habitat

Opportunity Area

Non-Habitat



Data Collection

- From 2016 - 2019, we captured and marked 96 sage-grouse where fitted with GPS rump mounted transmitters and 156 VHF necklace radio transmitters

Forecasting Vegetation Composition Responses to Pinyon - Juniper Treatments in Northwestern Utah

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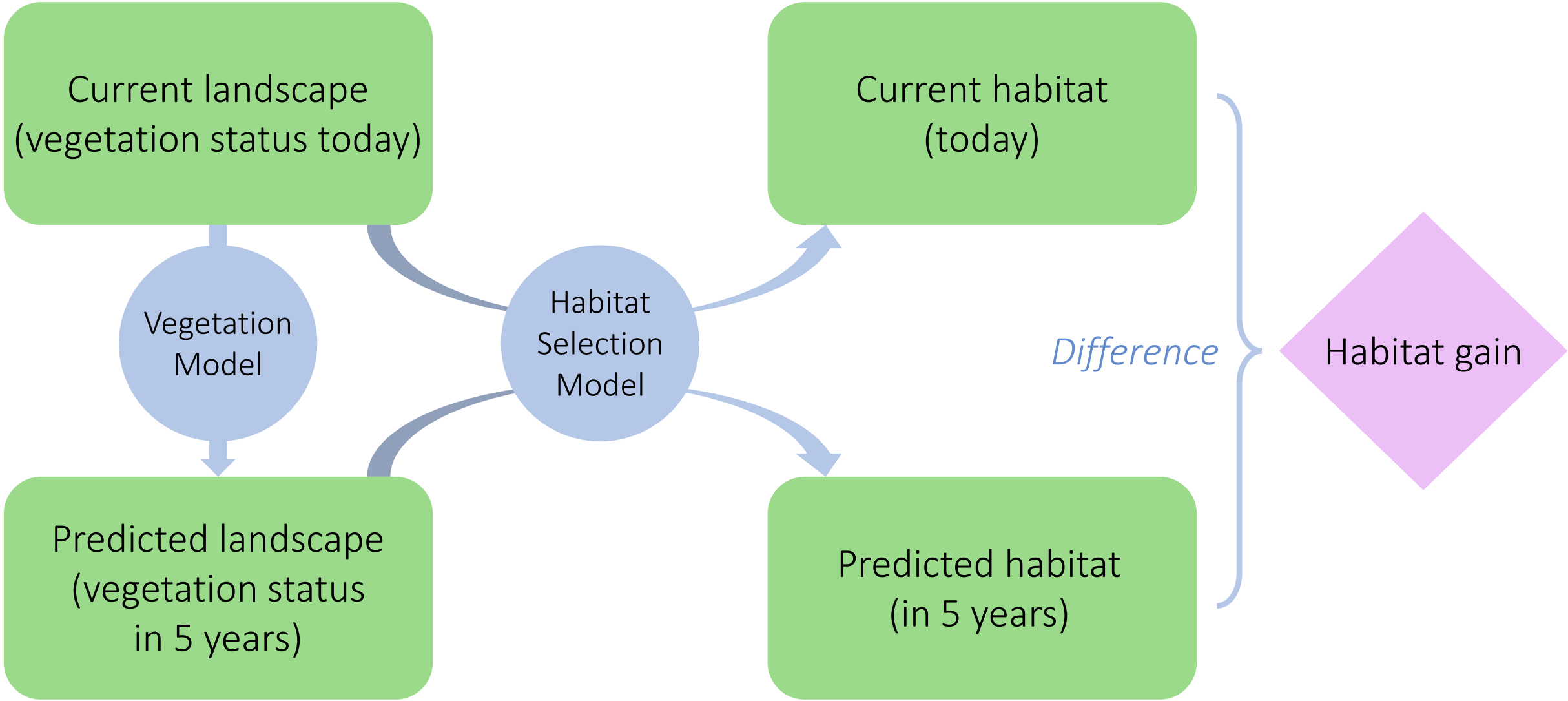
Prioritizing conifer removal treatments to optimize greater sage-grouse habitat benefits in northwestern Utah


Current landscape
(vegetation status today)
Vegetation
Model
Predicted landscape
(vegetation status
in 5 years)
Habitat
Selection
Model
Current habitat
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Predicted habitat
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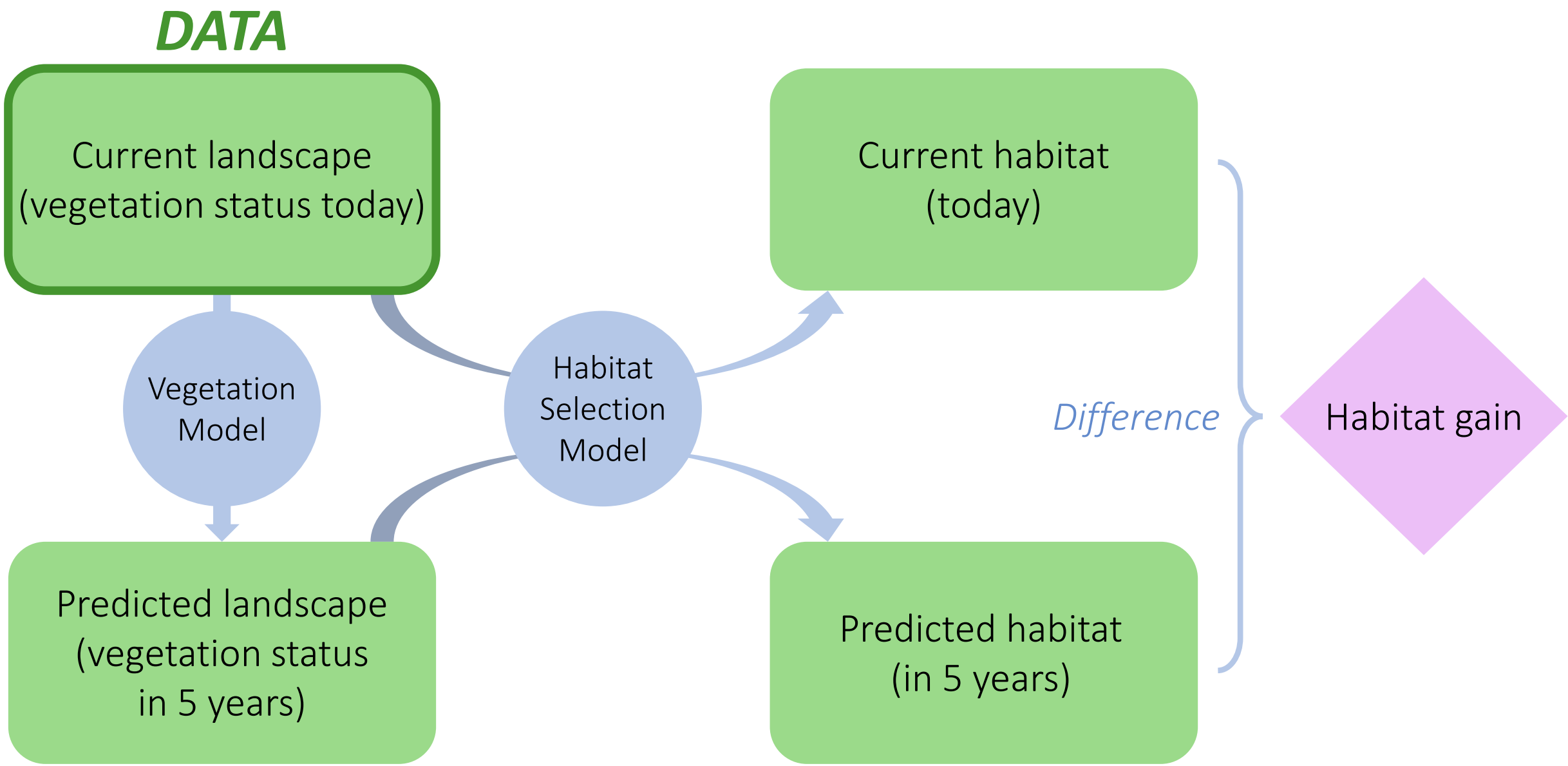
Difference
Habitat gain


DATA
Current landscape (vegetation status today)
Vegetation Model
Habitat Selection Model
Current habitat (today)
Predicted landscape (vegetation status in 5 years)
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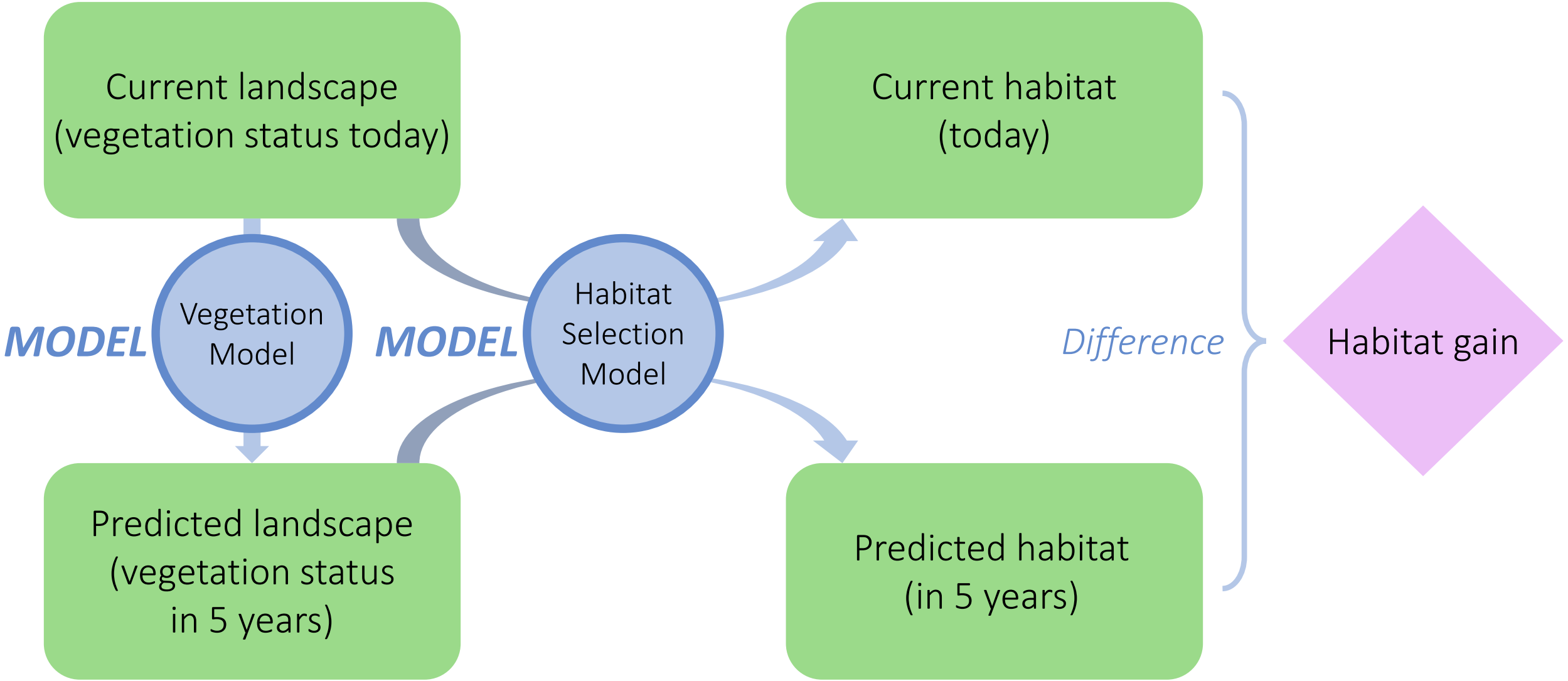
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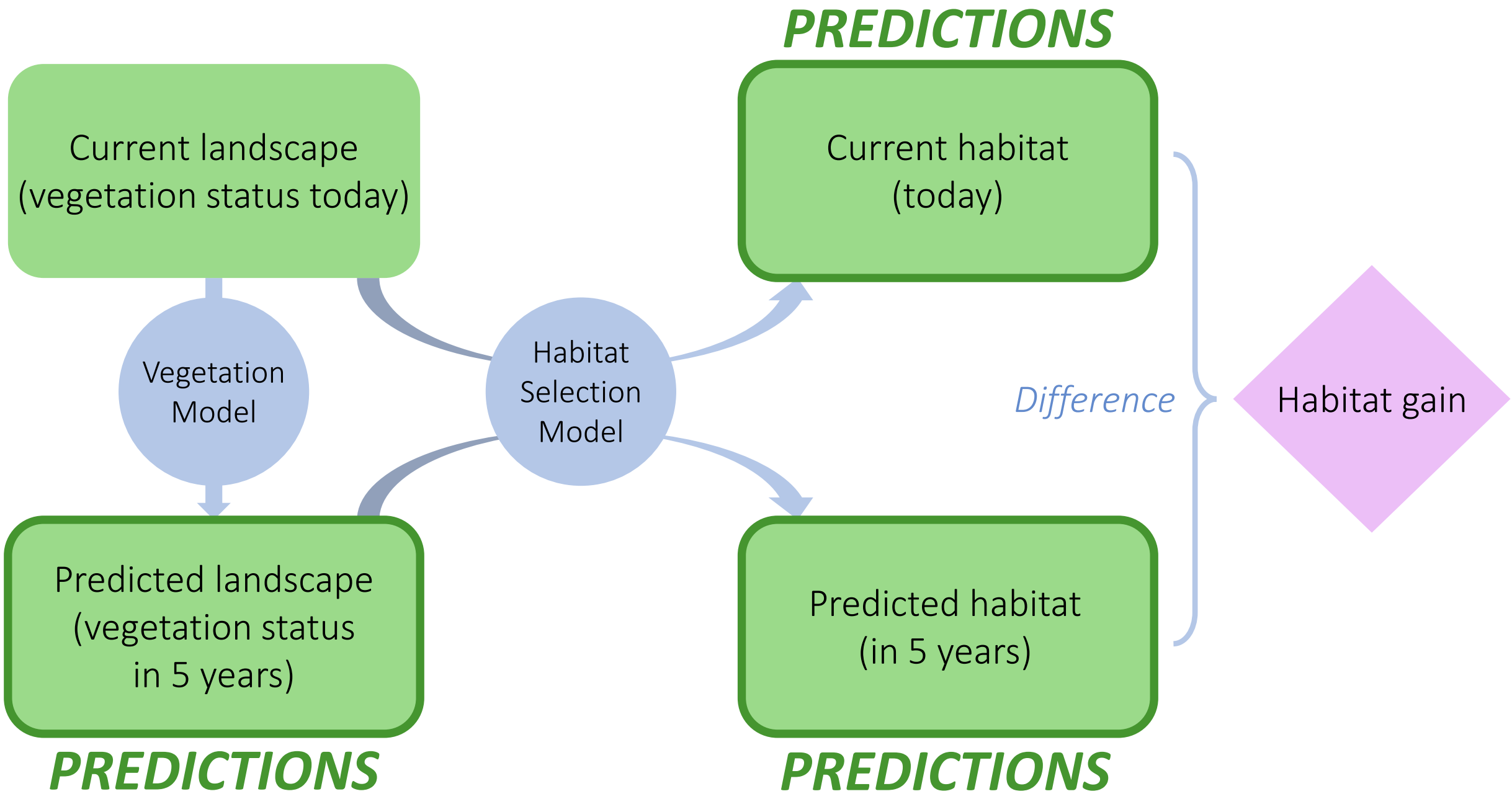
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Predicted landscape (vegetation status in 5 years)
Predicted habitat (in 5 years)
PREDICTIONS
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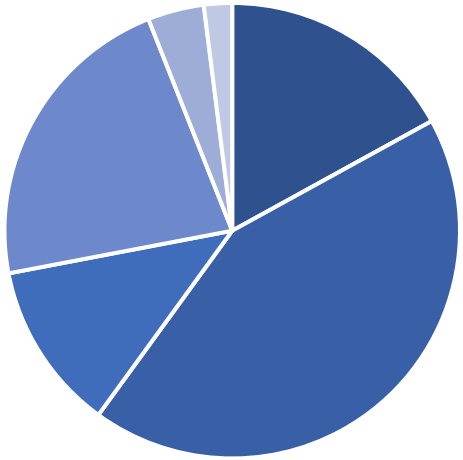
VEGETATION MODEL
Training

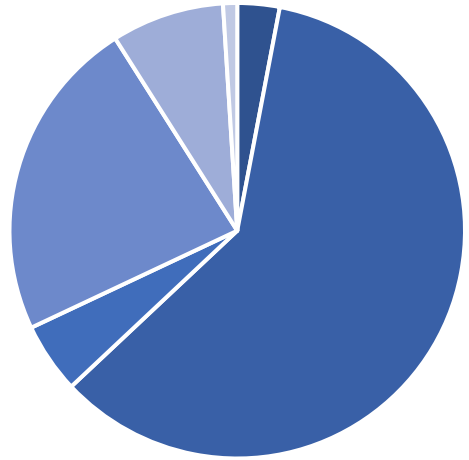
Training data:

- 10 WRI treatments performed between 2008 and 2014 in Box Elder county
- RAP data on vegetation composition in the year prior and 5 years after treatment
- Dirichlet regression to model the effect of treatment

Percent Cover Prior to Treatment



Percent Cover 5 Years Post-Treatment



Trees
Shrub
Annual grasses and forbs
Perennial grasses and forbs
Litter
Bare ground

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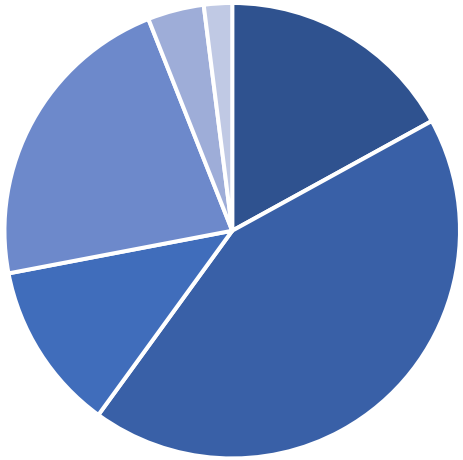
VEGETATION MODEL
Prediction

- Treatments to compare
- RAP data on vegetation composition in the year prior to treatment
- Predict expected vegetation composition 5 years after treatment using Dirichlet model

Percent Cover Prior to Treatment



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Percent Cover 5 Years Post-Treatment

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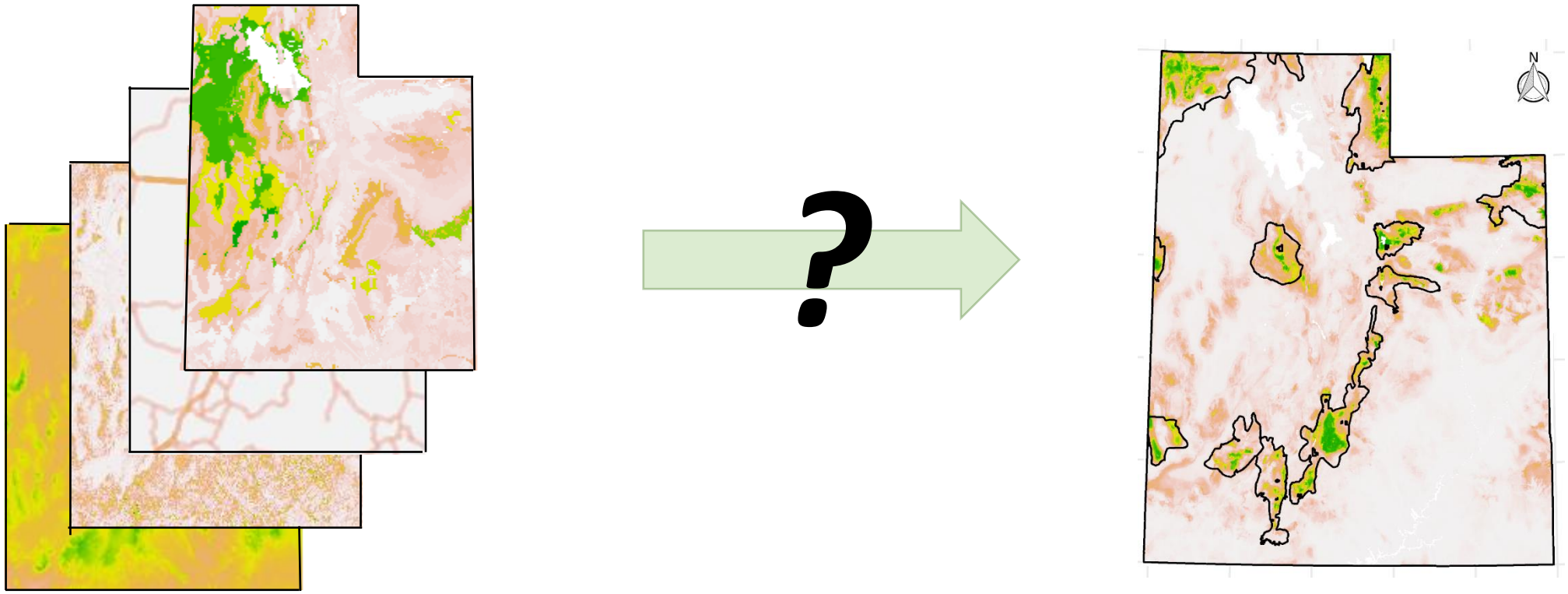
HABITAT MODEL

Training

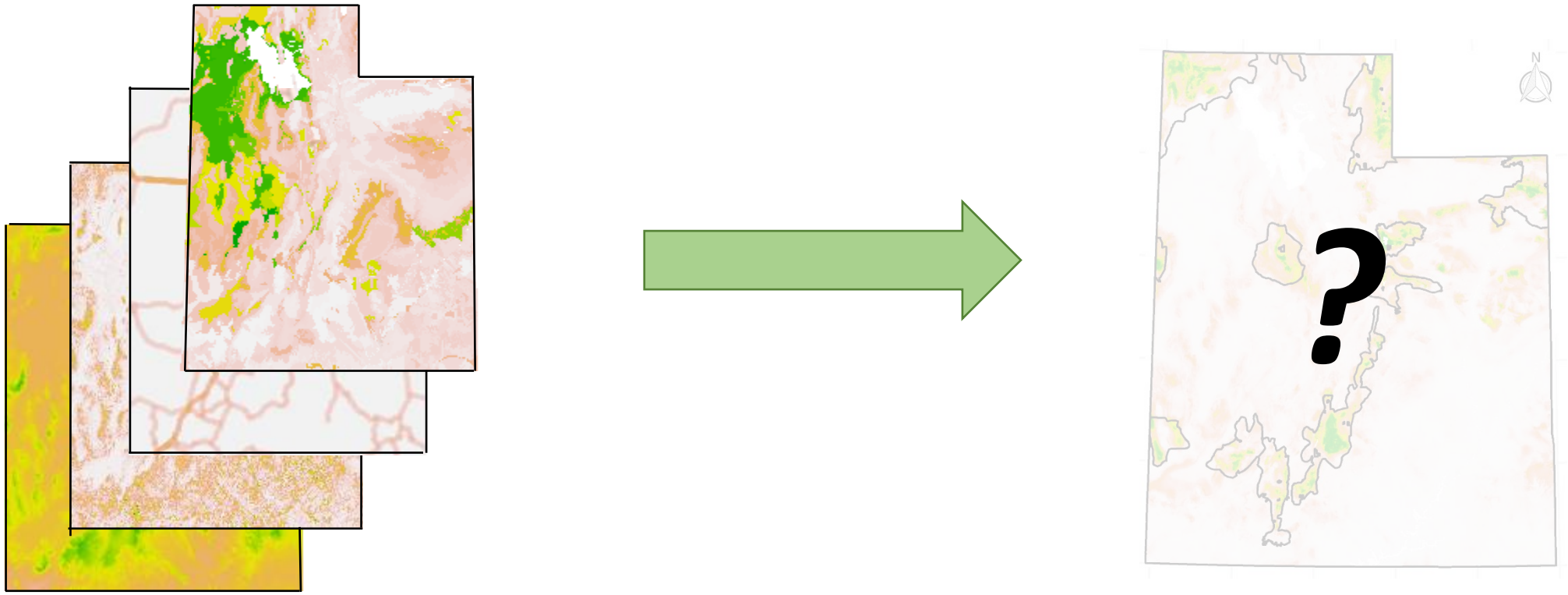
Training data:

- Sage-grouse GPS tracking data state-wide (> 500,000 locations)
- Environmental predictors: shrub cover, tree cover, forb cover, elevation, slope, aspect, mesic habitat, distance to roads, transmission lines…
- Resource Selection Function (RSF) developed by Dr. Michel Kohl



HABITAT MODEL
Prediction

- Input data: output of the vegetation model for the candidate treatments
- Predicted vegetation composition 5 years after treatment
- Predict habitat selection using a RSF



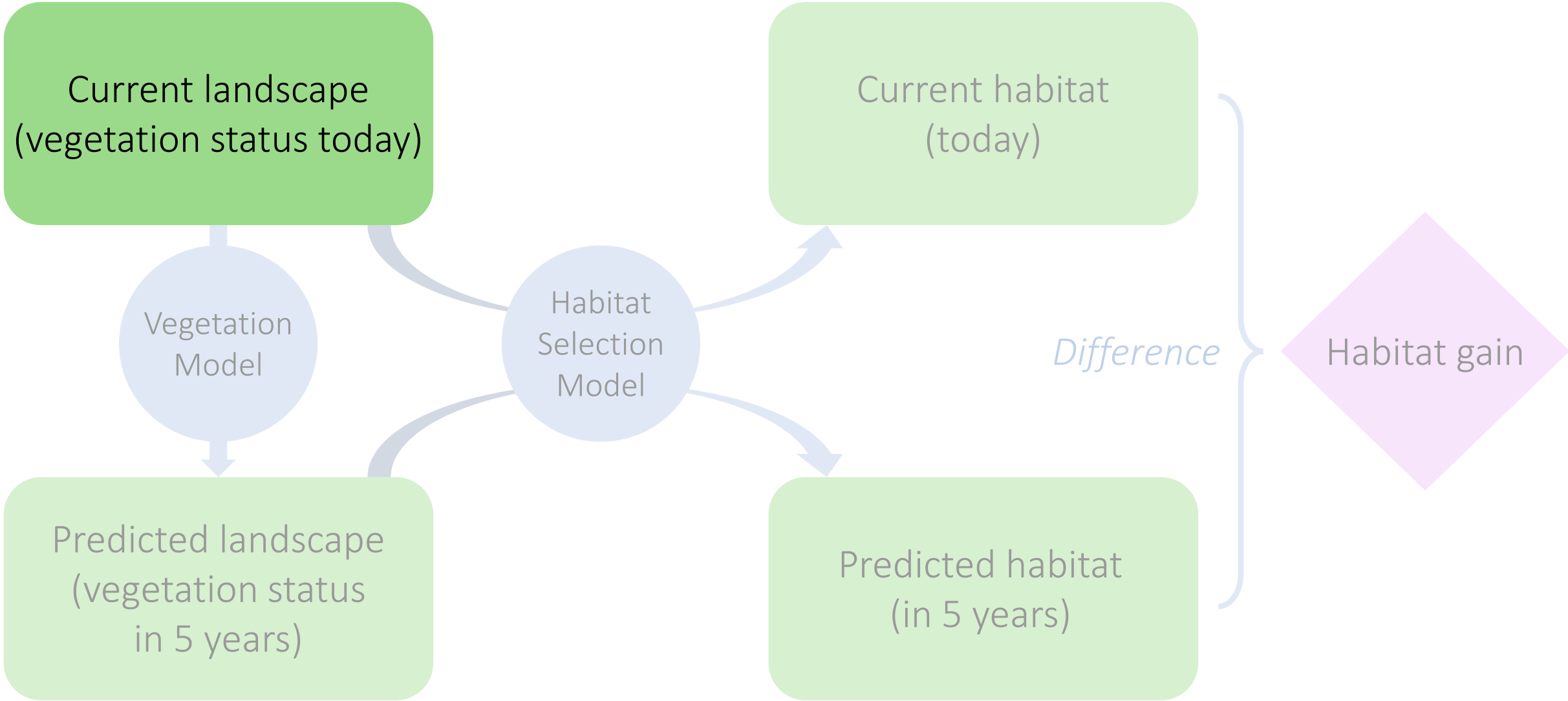
PRIORITIZATION TOOL

Demonstration

PRIORITIZATION TOOL
Demonstration

Let’s pretend it’s 2017, and we want to choose where to invest our money to do conifer treatments in 2018 in Box Elder County.

Step 1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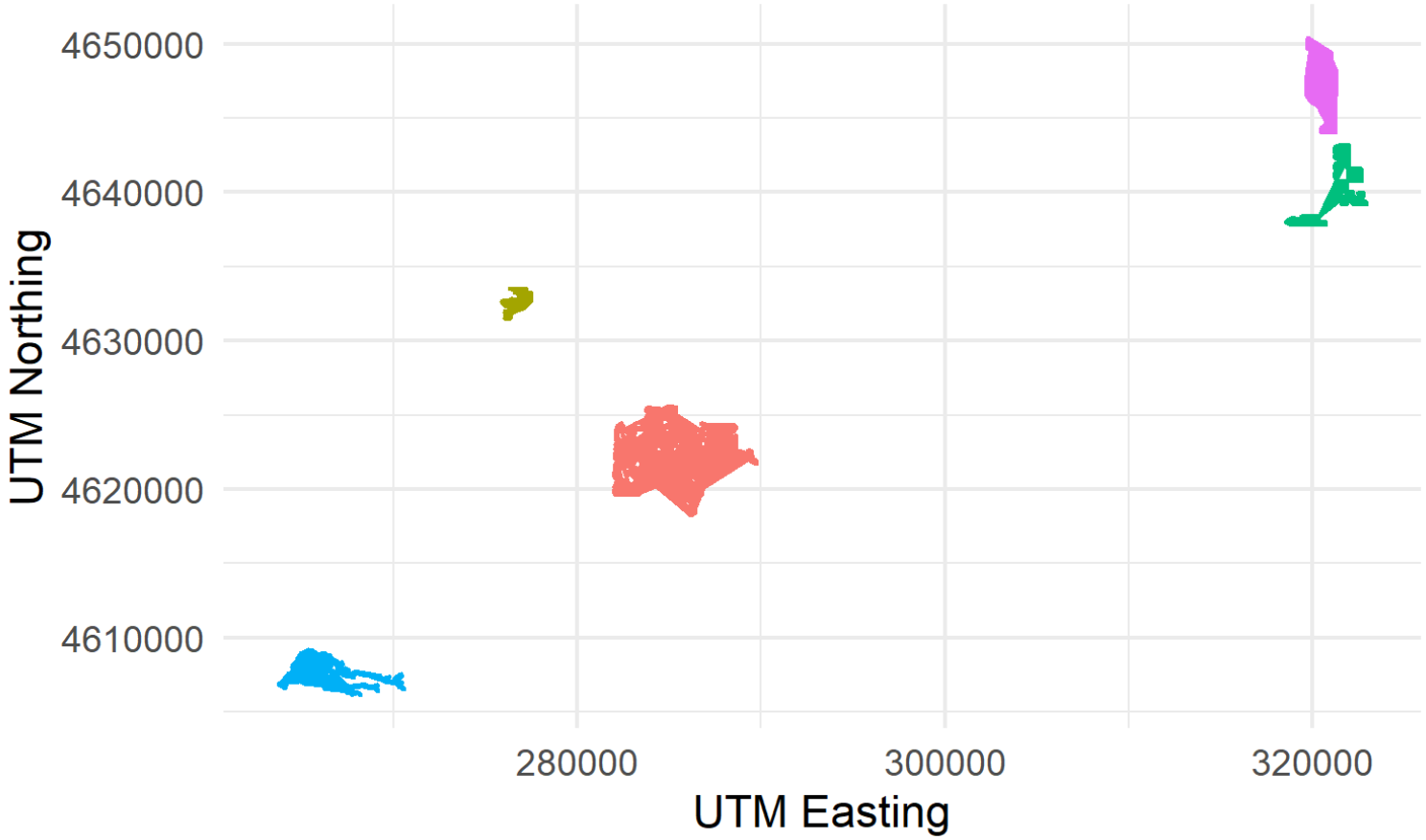
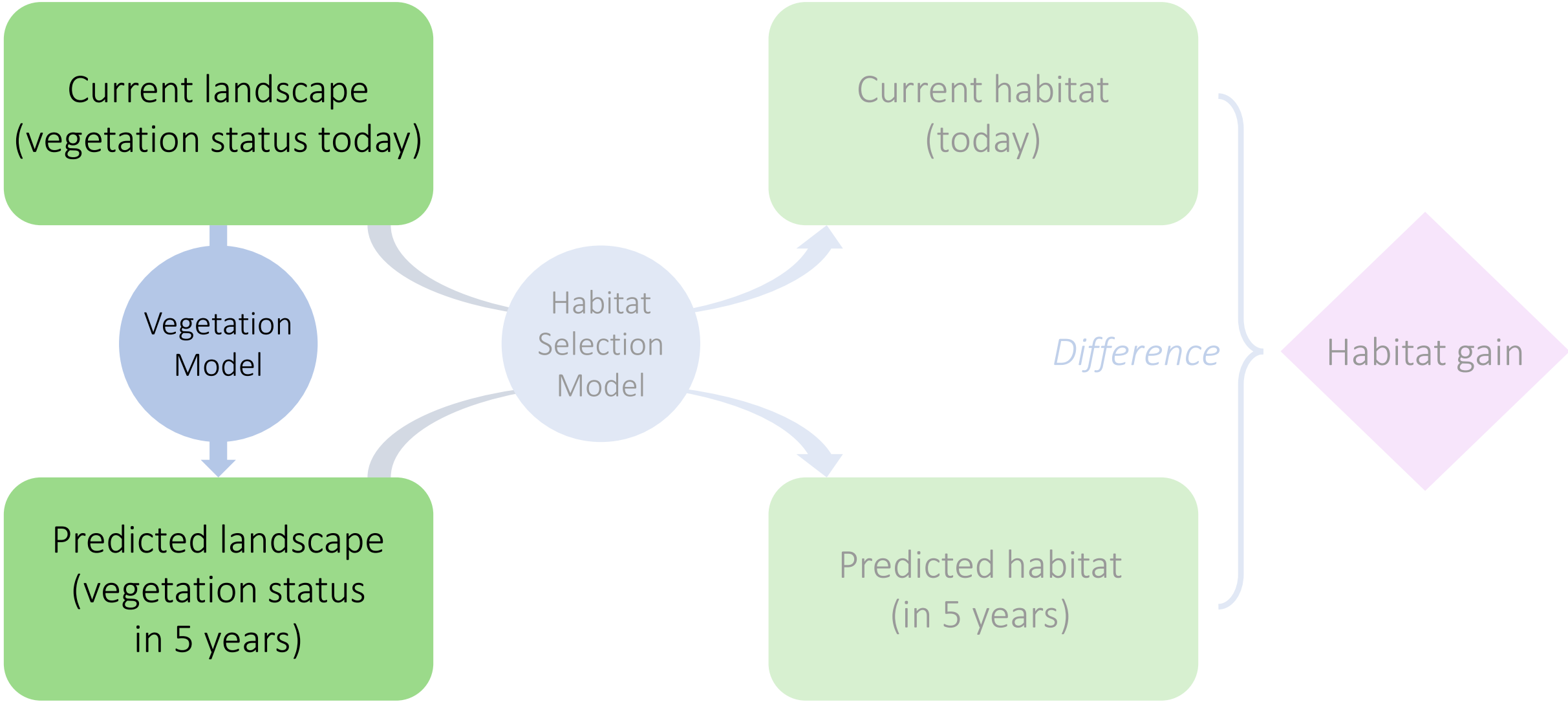
PRIORITIZATION TOOL Demonstration

Step 1: Choose candidate treatments

- Keg Springs Bullhog
- Road Canyon
- Cedar Creek
- Crystal Hollow
- Warm Spring Hills



Step 2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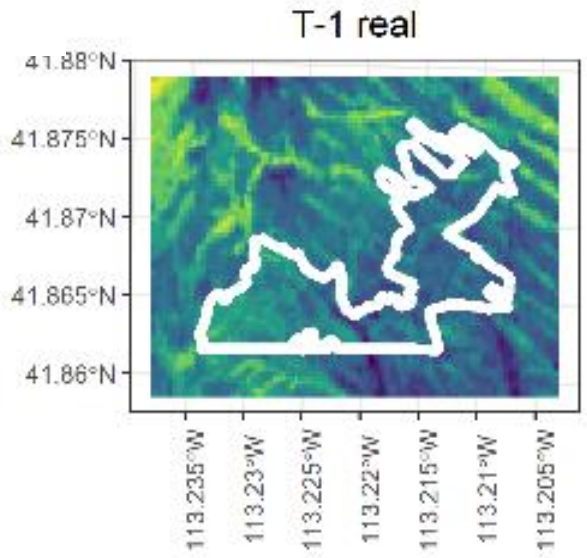
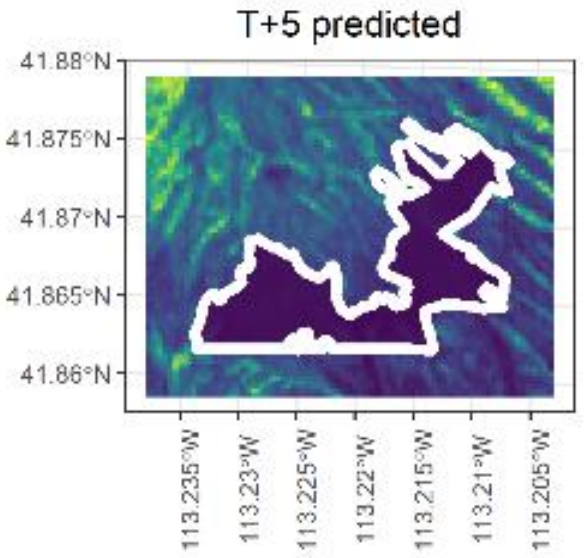
PRIORITIZATION TOOL
Demonstration

Step 2: Predict vegetation in 2023 based on current (2017)





PRIORITIZATION TOOL
Demonstration

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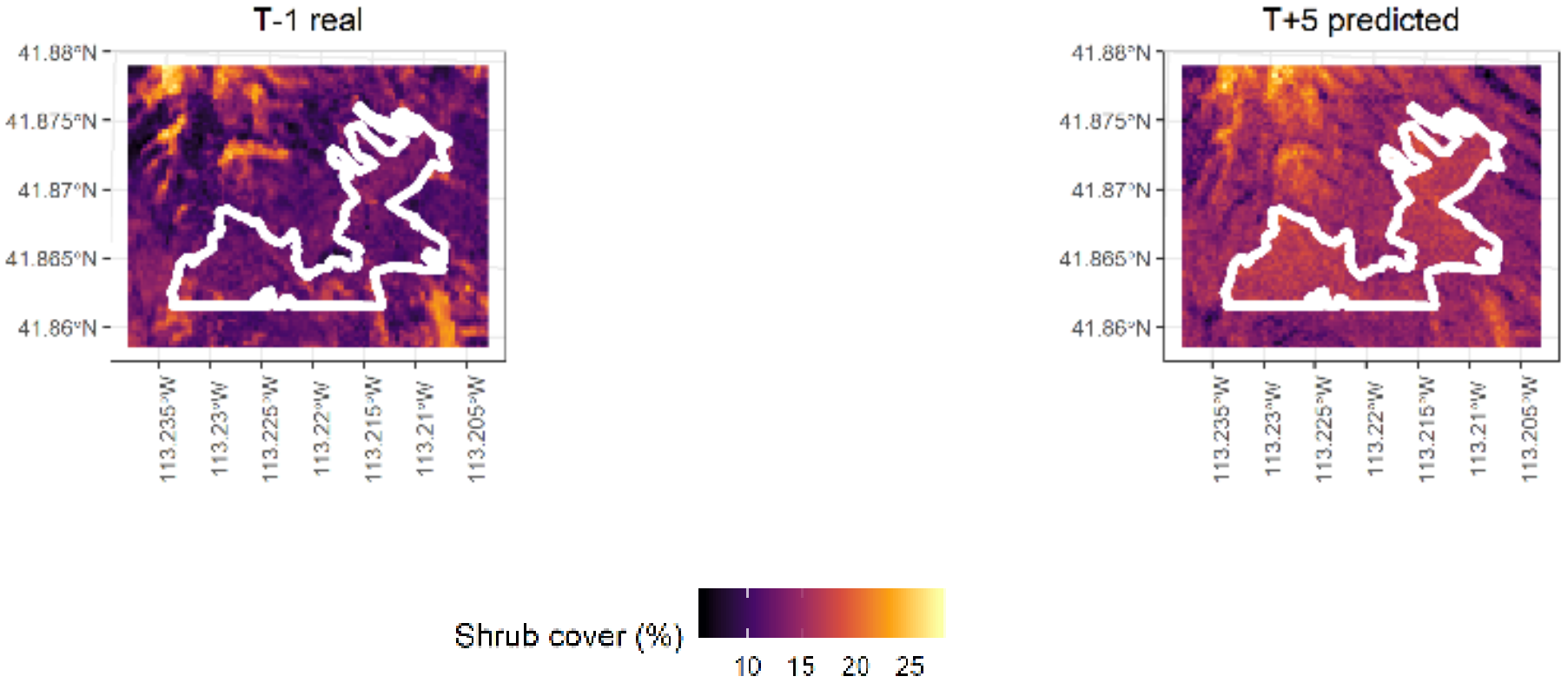

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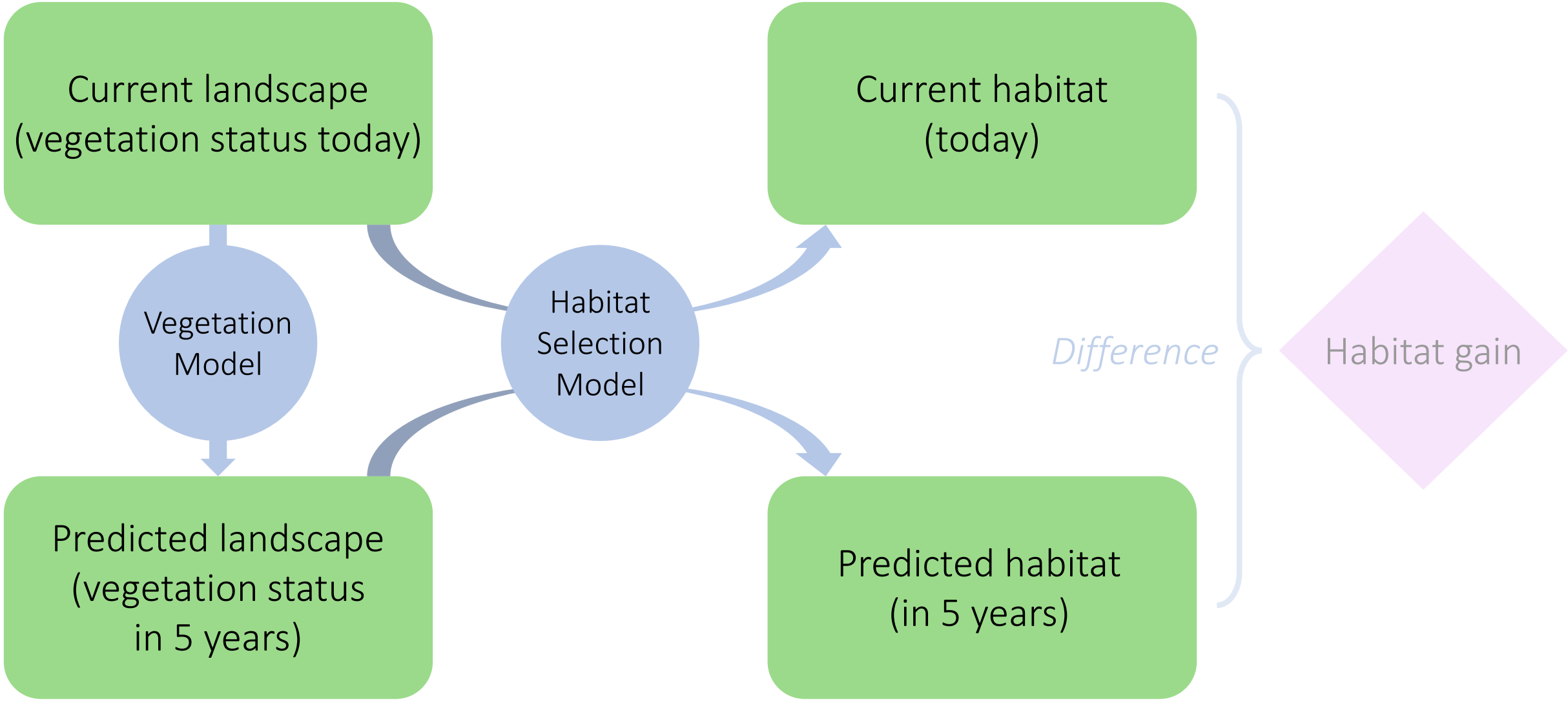
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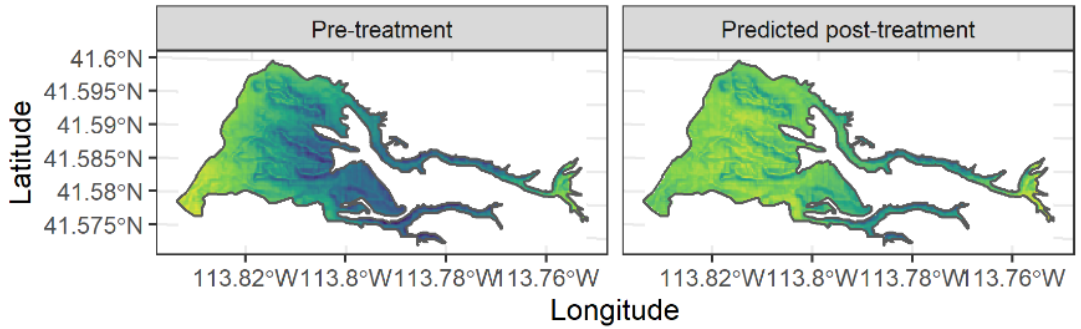
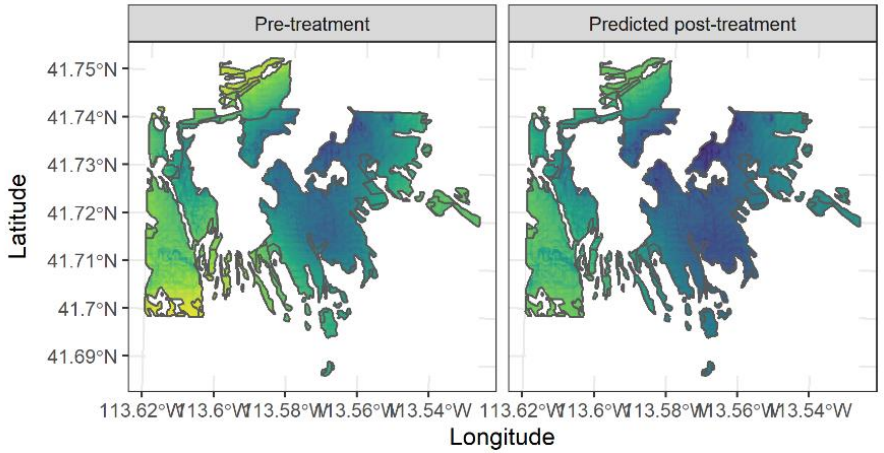
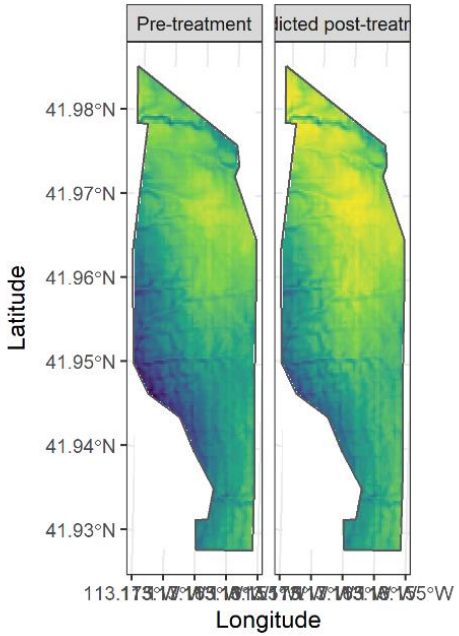
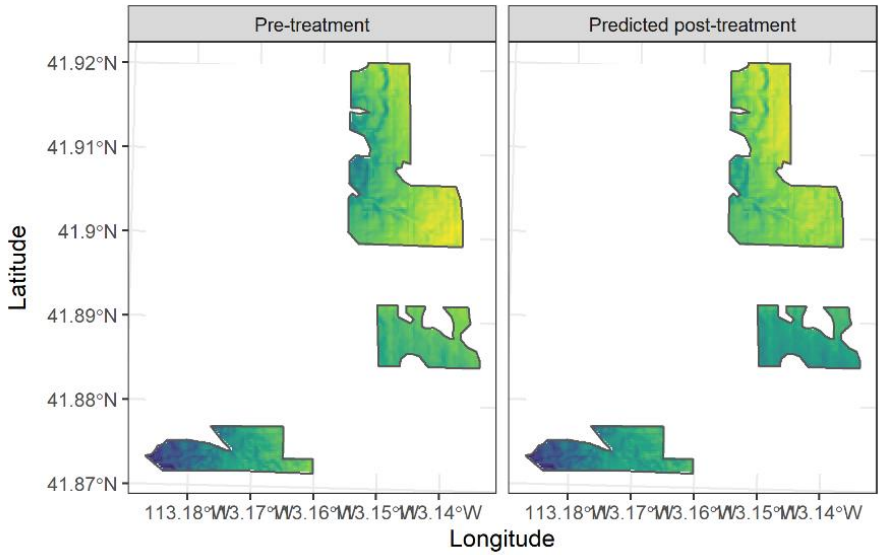
PRIORITIZATION TOOL Demonstration

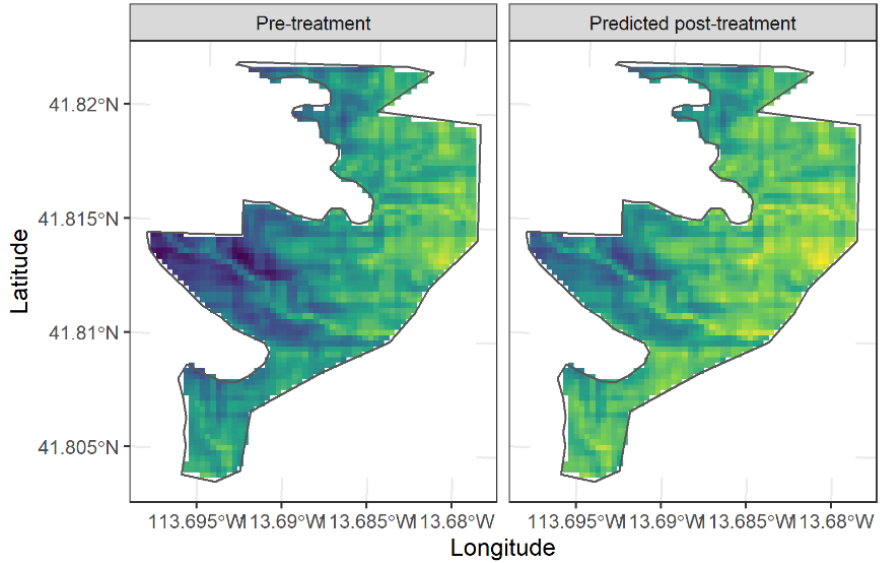
Step 3: Predict habitat in 2017 and 2023



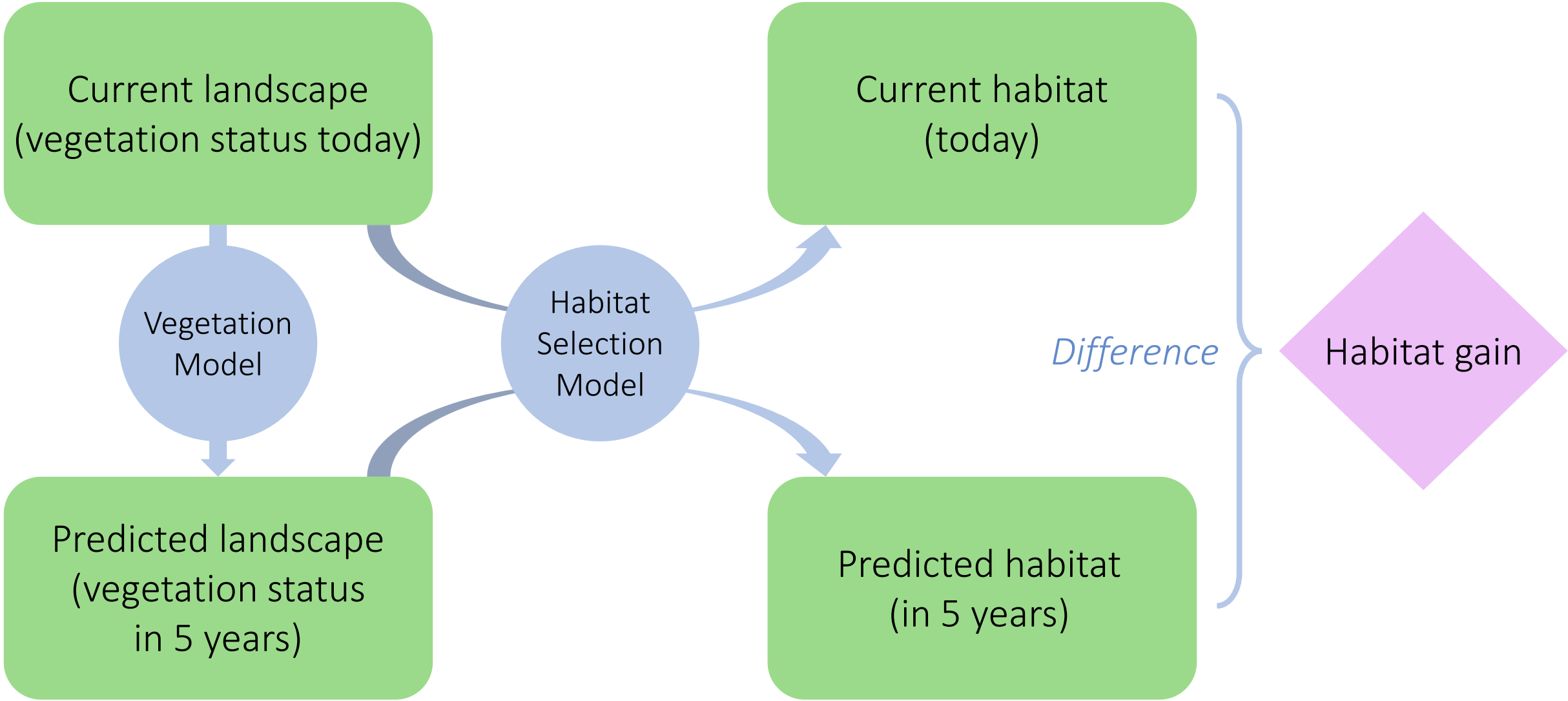








Step 4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PRIORITIZATION TOOL Demonstration

Step 4: Compare habitat gain as a result of treatment

- **Relative Selection Strength**: how much more likely sage-grouse will select for habitat the way it looks in 2023 compared to what it looked like in 2017 (sum across whole landscape)

- **Incorporate costs**: trade-off between habitat gained and money spent

PRIORITIZATION TOOL Demonstration

Step 4: Compare habitat gain as a result of treatment

Treatment	Nesting habitat gain	Summer habitat gain	Total habitat gain	Total hab. gain per $
Keg Springs Bullhog	5791.71	606.42	6398.14	0.20
Road Canyon	877.73	47.65	925.38	0.04
Cedar Creek	2679.23	-864.93	1814.30	0.01
Crystal Hollow	-28.07	-1370.97	-1399.04	-0.02
Warm Spring Hills	-8949.31	-15059.13	-24008.44	-0.02

PRIORITIZATION TOOL Demonstration

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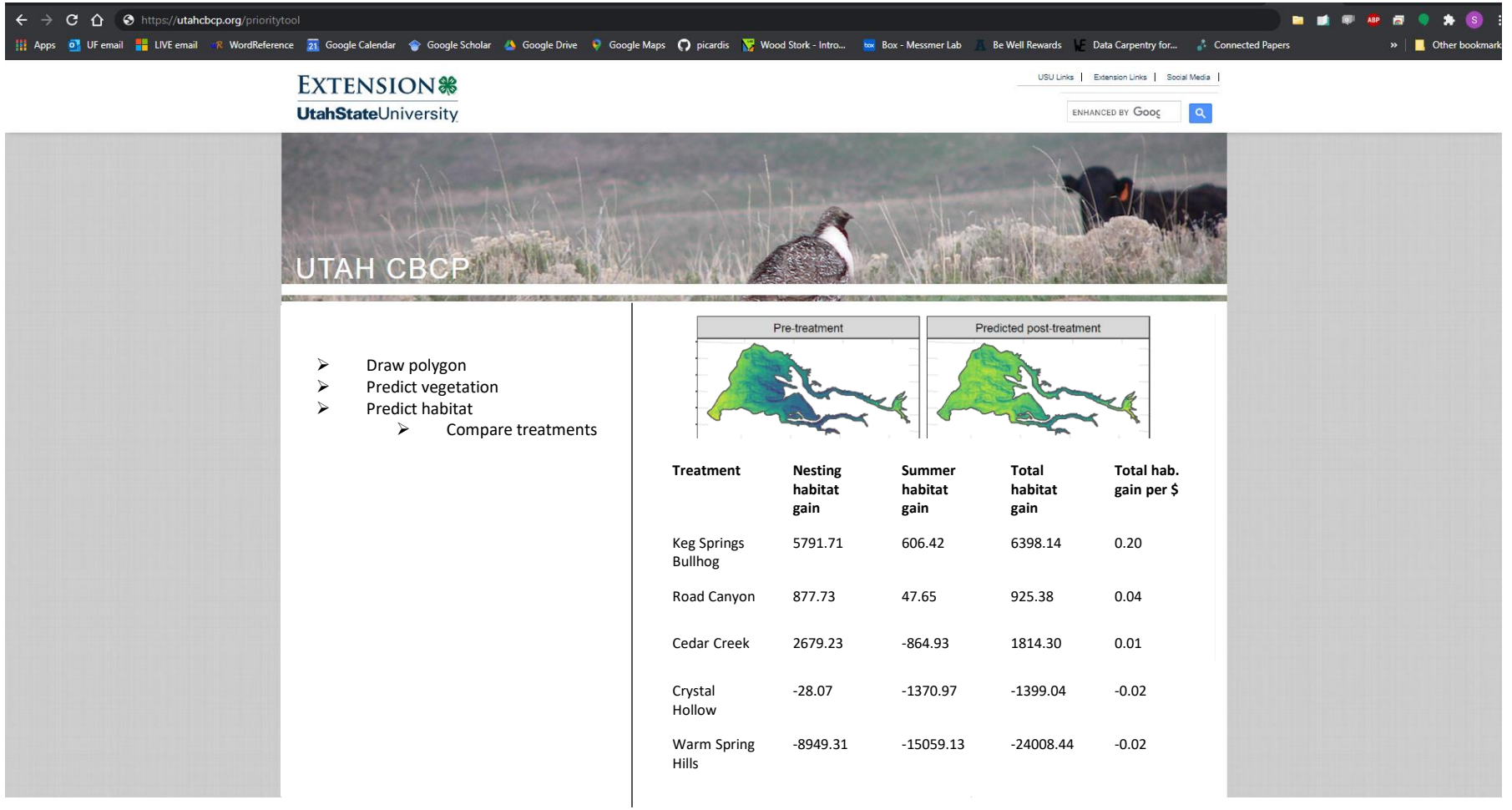
PRIORITIZATION TOOL

Next Steps

PRIORITIZATION TOOL

next steps

- Web-based interactive tool for treatment prioritization



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Expected Outcomes

Utah's Watershed Restoration Initiative

Utah DNR Wildlife Resources

National System of Public Lands — U.S. Department of the Interior Bureau of Land Management

Berryman Institute

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Enhancing Local Governance through Community-based Conservation within the West Box Elder Coordinated Resource Management Group

Enhancing Local Governance through Community-based Conservation within the West Box Elder Coordinated Resource Management Group

West Box Elder CRM

CRM's Response to Conservation Issues

Questions

Our Partners

PLPCO
PUBLIC LANDS POLICY COORDINATING OFFICE

PACIFICORP

The Nature Conservancy
Protecting nature. Preserving life.™

Utah CHUKAR AND WILDLIFE FOUNDATION

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES
UtahStateUniversity

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

BERRYMAN INSTITUTE
Resolving Human-Wildlife Conflicts

DESERET LAND and LIVESTOCK

Berry Petroleum Company

PHEASANTS forever
The Habitat Organization

Sportsmen for Fish & Wildlife

UTAH FARM BUREAU

SIX COUNTY ASSOCIATION OF GOVERNMENTS

IDAHO FISH & GAME

SAGE GROUSE INITIATIVE

UTAH RECLAMATION MITIGATION AND CONSERVATION COMMISSION

S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES
UtahStateUniversity
REMOTE SENSING/GIS LABORATORY

UTAH DNR
WILDLIFE RESOURCES

State of Utah
School and Institutional
Trust Lands Administration