Sagebrush Synthesis: Celebrating Success, Teamwork and Integration

A Team effort – Thank you for your leadership!

Donna Delparte

Jennifer Forbey

Trevor Caughlin

Mapping

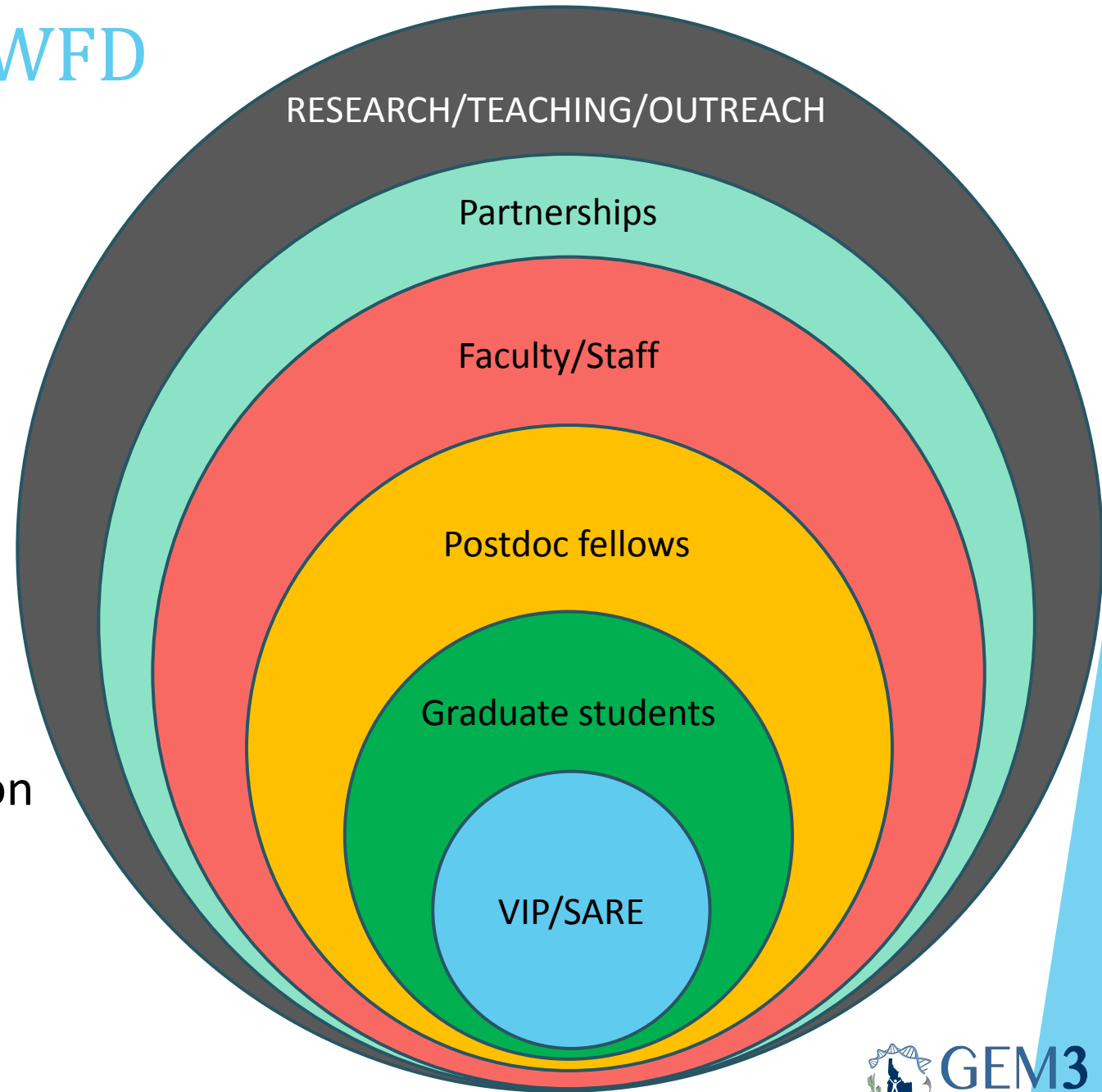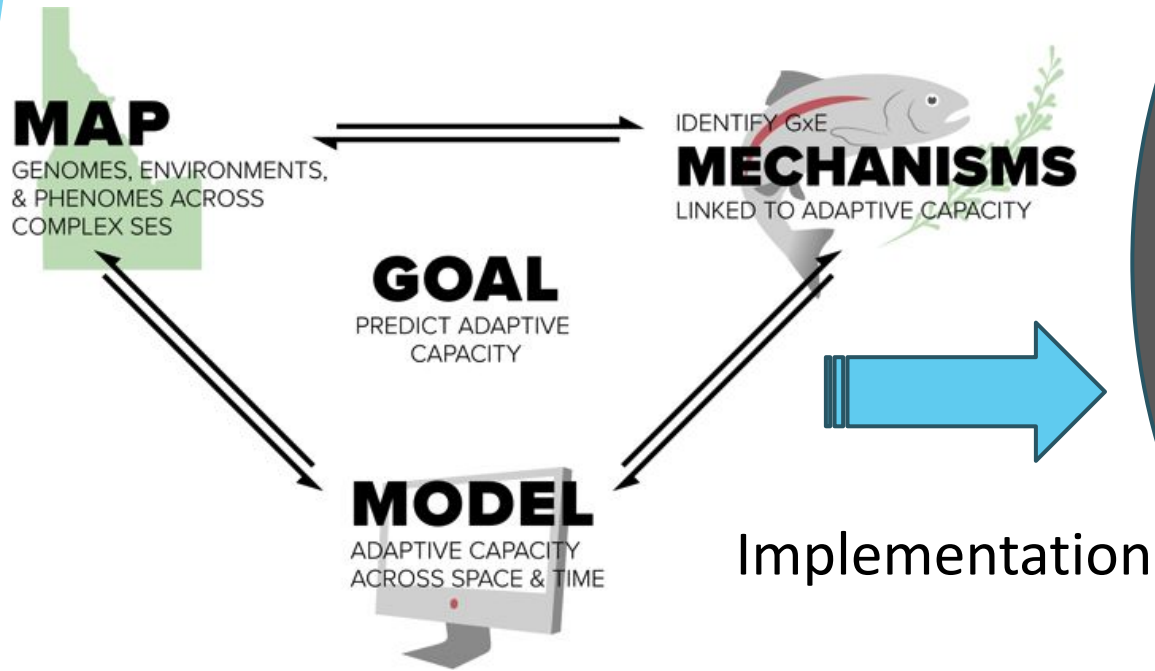**Research & Edu. Integration**

Modeling

Presentation Focuses on WFD and Integration

Research framework

MAP — GENOMES, ENVIRONMENTS, & PHENOMES ACROSS COMPLEX SES

GOAL — PREDICT ADAPTIVE CAPACITY

IDENTIFY GxE **MECHANISMS** LINKED TO ADAPTIVE CAPACITY

MODEL — ADAPTIVE CAPACITY ACROSS SPACE & TIME

Implementation

RESEARCH/TEACHING/OUTREACH

Partnerships

Faculty/Staff

Postdoc fellows

Graduate students

VIP/SARE

VIP Courses

Kathryn Turner

Sagebrush VIP Course (ISU)
- 17 students, 6 semesters.
- Meta-analysis of plasticity in germination and early life history traits.
- Collaboration with Sterling WMA (IDFG)
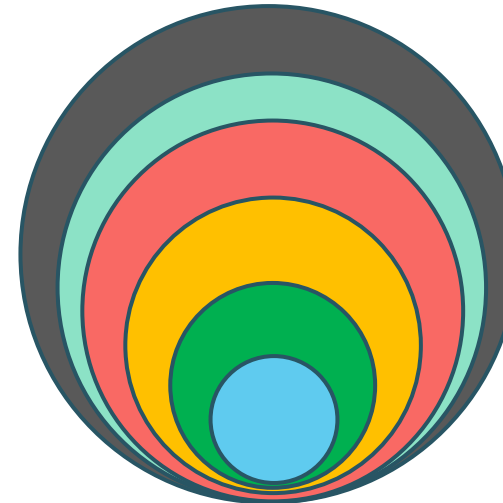
Leonora Bittleston

C3 VIP Course (BSU)
- Now in it's 4th semester
- 36 participants, 14 from CWI, 1 UofI (Molly)

A publication integrating our GEM3 communities

Anthony Melton

Peggy Martinez

PLANT-ENVIRONMENT INTERACTIONS

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RESEARCH ARTICLE | 🔓 Open Access | (cc) (i)

A genotype × environment experiment reveals contrasting response strategies to drought between populations of a keystone species (*Artemisia tridentata*; Asteraceae)

Anthony E. Melton ✉, Kara Moran, Peggy Martinez, Paige Ellestad, Erin Milliken, Walker Morales, Andrew W. Child, Bryce A. Richardson, Marcelo Serpe, Stephen J. Novak, Sven Buerki ✉

VIP – Mia Cinello-Smith (BSU) 🎉

Mia was among the 12 BSU undergraduate researchers across campus

Thank you **Donna Llewellyn** for supporting our students!

SARE students

Stephanie Galla

BSU
- 10 students over 3 summers
- 1 manuscript submitted with a SARE student co-author so far, 2 more in preparation

ISU
- 4 students over 4 summers
- Julianne Nielsen (cheatgrass/sage competition);
- Saige Jeffs (extended; ecological effects of genome size)

UofI
- 8 students

Graduate students – Integrated Research

Lisette Waits & Paul Hohenlohe

Castle Rocks

Molly Garrett – PhD student

-**Teaching**: C3 VIP, conservation genomics workshops and guest lectures, landscape genetics DGS, mentored 2 senior theses

-**Outreach**: 9 oral & 9 poster presentations, symposium co-organizer

-**Publication**: Seaborn et al. 2021

-**Goals reached**: characterization of sagebrush community members; GEM3 Grad Community
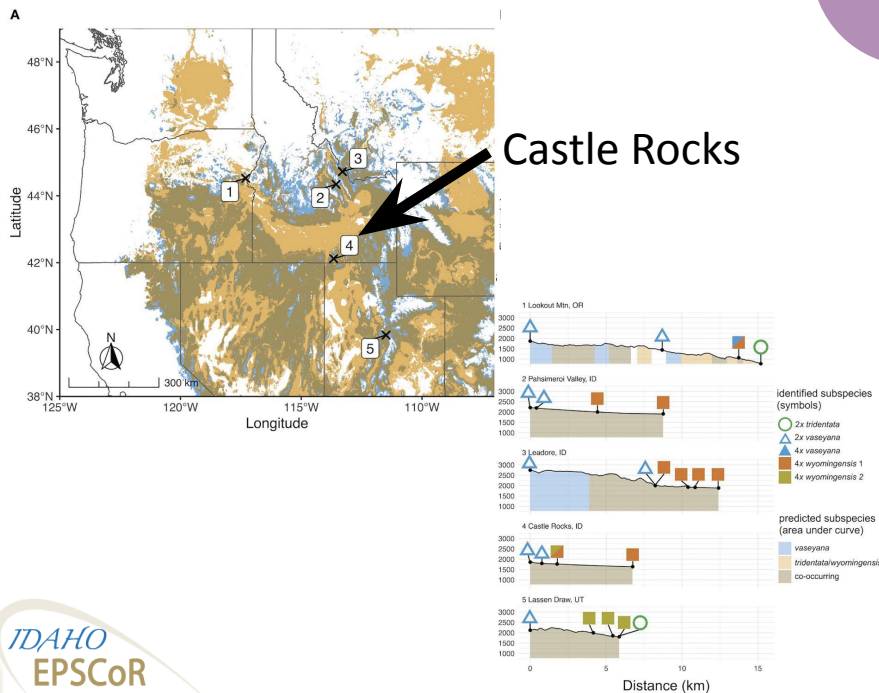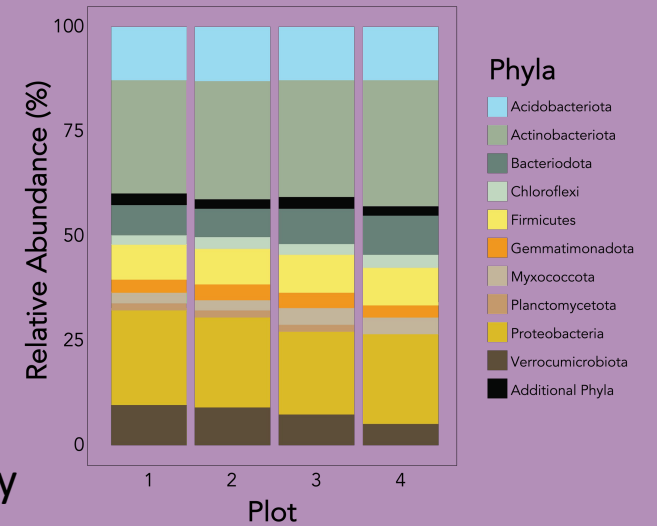
Lukas Grossfurthner – PhD student

-**Teaching**: Floristics & field ecology, data carpentry genomics workshops (3)

-**Outreach**: 3 international conferences, 1 international seminar

-**Publications**: Grossfurthner et al. 2023; Chen et al. 2022

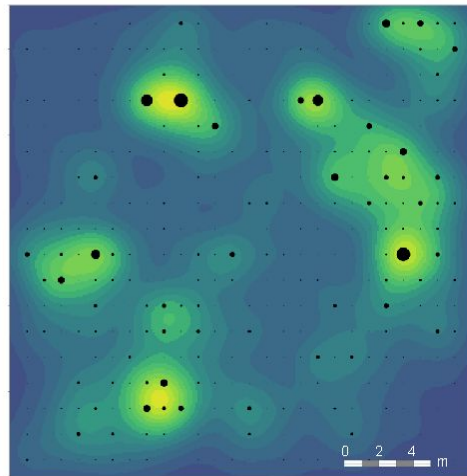-**Goals reached**: genomically confirmed sagebrush subspecies

IDAHO
EPSCoR
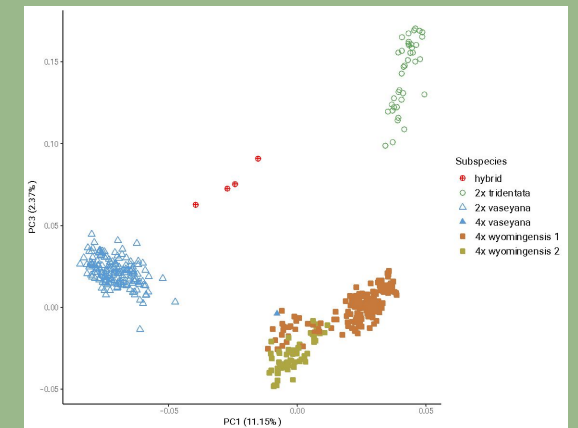
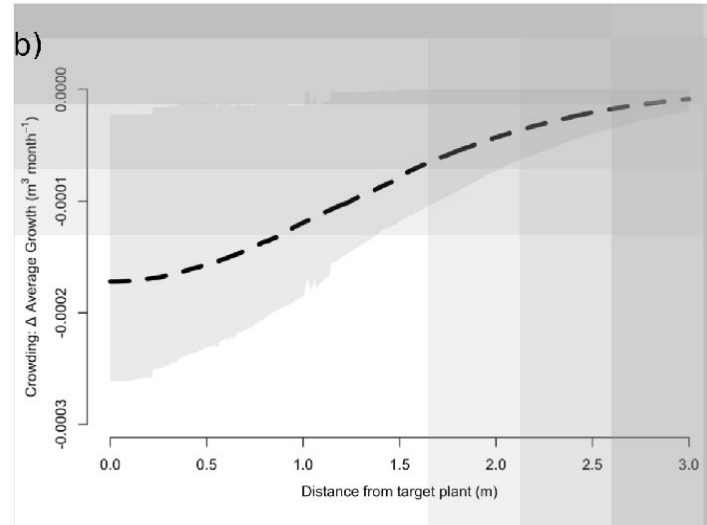# Plant-plant interactions alter outcomes of common garden experiments
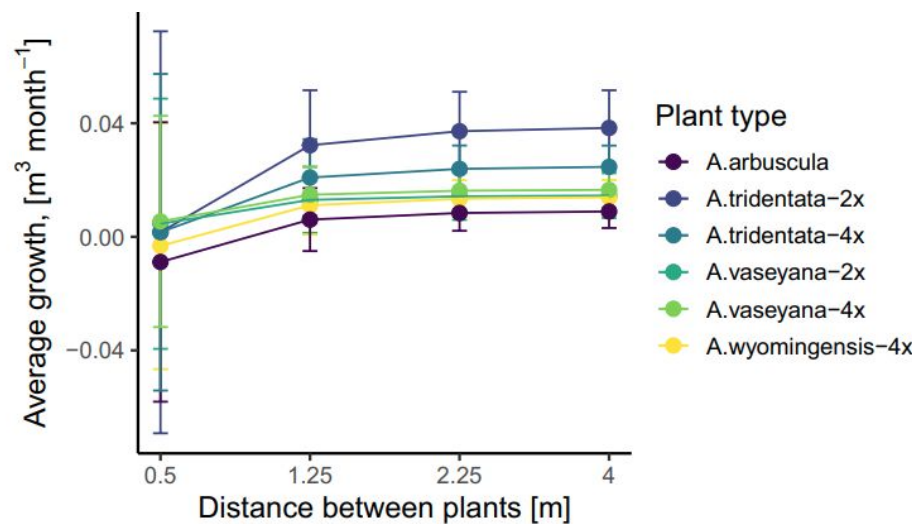
Dr. Andrii Zaiats

Zaiats et al. 2022 *Ecology*

Statistical evidence for spatial competition between sagebrush plants

Ignoring spatial interactions in analyses of demographic data leads to biased results

Zaiats et al. 2022 *Ecology and Evolution*

Graduate students

Spencer Roop – PhD student (ISU)

One World
Botany 2023
Boise, Idaho
July 22-26

Know more about her work:
Lightning Talks
Wednesday,
@12:10 pm PT

Li-COR Prize *(Physiological Section)*

Each year, the Physiological Section presents the Li-COR prize to acknowledge the best presentation made by any student, regardless of subdiscipline, at the annual meeting. The Li-COR prize is presented annually at the BSA Banquet.

Best Student Oral Presentations
Spencer Roop, Idaho State University, For the Presentation: Quantifying genetic variation in physiology and functional traits in subspecies of big sagebrush (Artemisia tridentata) in a common garden setting. Co-authors: Keith Reinhardt, Matthew Germino, Bryce Richardson

Graduate students – A GEM3 Journey

Carlos Dumaguit (BSU)

SARE fellow

↓

VIP student

↓

MS in Biology 🎉

↓

VIP/SARE mentor

↓

Post-grad. researcher (BSU/ISU)
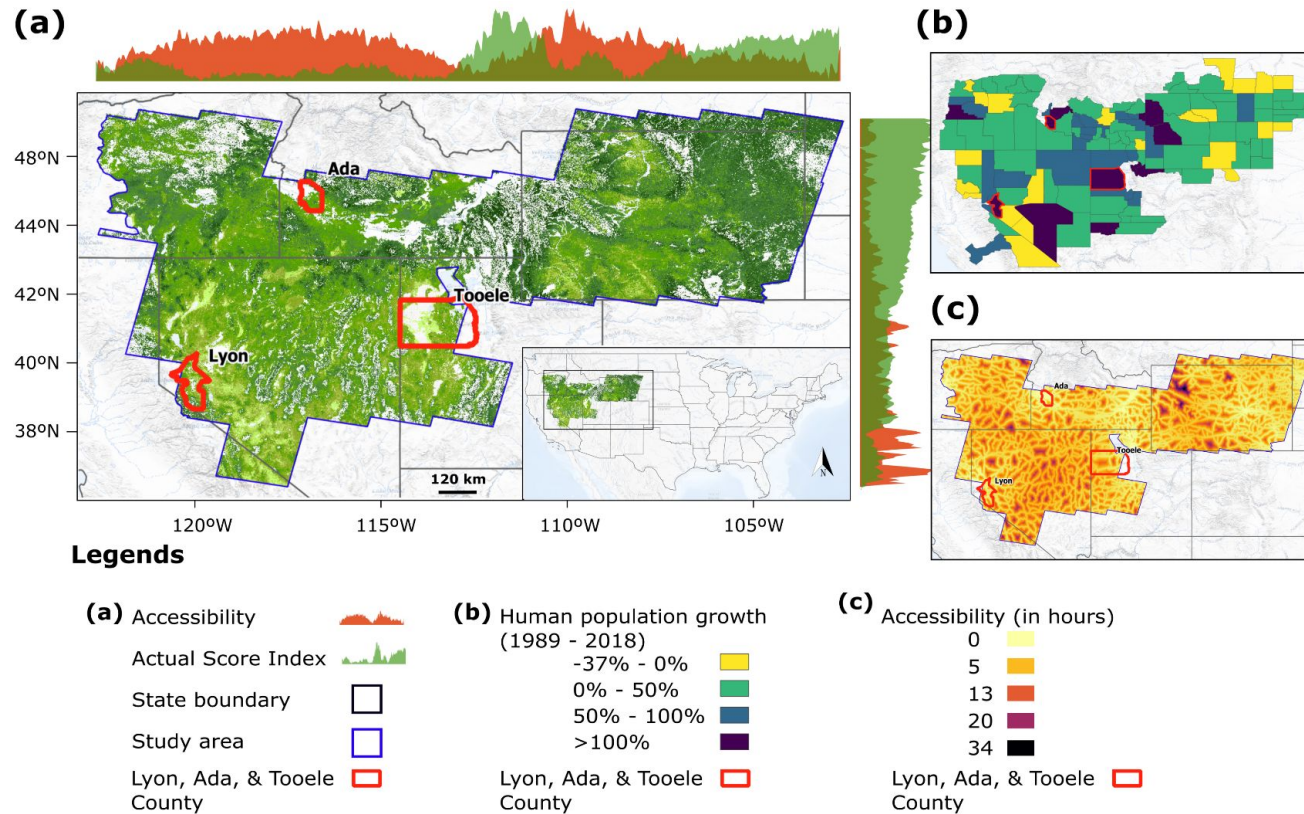
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Ph.D. @ University of Utah

Postdoc fellows – Our connective tissue!

Juan Miguel
Requena-Mullor
(BSU)

Regional scale: Population growth negatively impacts rangeland quality

Peter Olsoy (got new job!)
Tuesday, @2:15pm PT

Requena-Mullor et al. 2023 *Landscape and Urban Planning*

Teaching – Workshops

Conservation Genomics Workshops (UofI)
Conservation Genetics Workshop (Idaho Chapter of The Wildlife Society) **(BSU/UofI)**

Morgan Calahan and **Mosope Abanikannda**
Tuesday, @2:15pm PT

Teaching – Authentic Research in the Classroom

ZOOL421 – Mammalogy (BSU), undergrad present field research at mini-conference

Jen Cruz

Amy Ulappa

BIOL4406 – Bioinformatics lab (ISU), using INL Falcon supercomputer to contribute to sagebrush genome annotation (coll. w/ BSU)

Teaching – Revising quantitative ecology curriculum

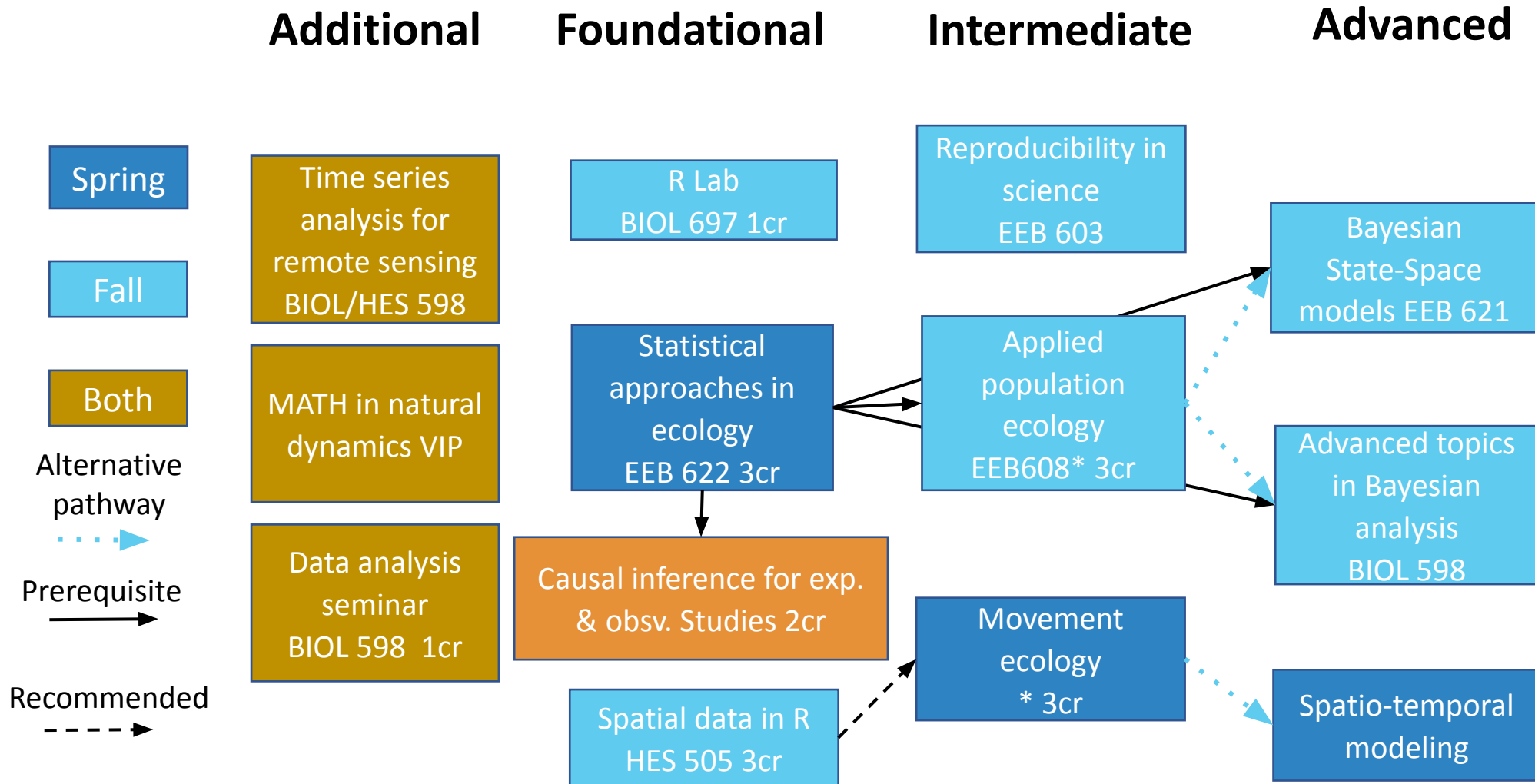Jen Cruz   Matt Williamson   Trevor Caughlin   Allison Simler-Williamson

🎉 Teamwork for the benefit of our student community 🎉

Teaching – Revising quantitative ecology curriculum

Additional **Foundational** **Intermediate** **Advanced**

Spring

Fall

Both

Alternative pathway
········▶

Prerequisite
──────▶

Recommended
— — — ▶

Time series analysis for remote sensing BIOL/HES 598

MATH in natural dynamics VIP

Data analysis seminar BIOL 598 1cr

R Lab BIOL 697 1cr

Statistical approaches in ecology EEB 622 3cr

Causal inference for exp. & obsv. Studies 2cr

Spatial data in R HES 505 3cr

Reproducibility in science EEB 603

Applied population ecology EEB608* 3cr

Movement ecology * 3cr

Bayesian State-Space models EEB 621

Advanced topics in Bayesian analysis BIOL 598

Spatio-temporal modeling

Research Outputs at a Glance

Publications: 41

Presentations: 26

Data records: 57

Andrew Child
Wednesday, @3pm PT

May not include all summer products
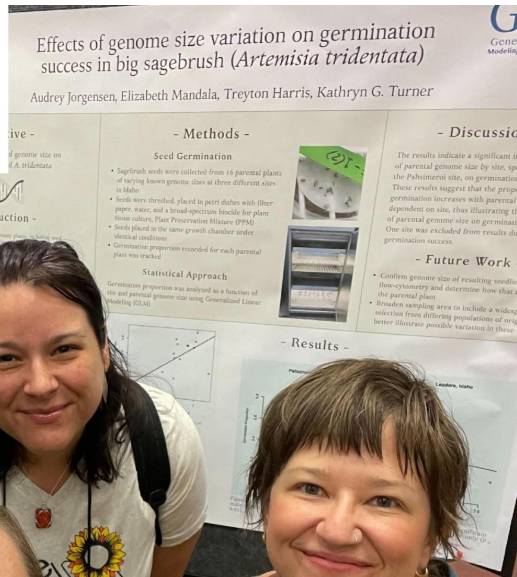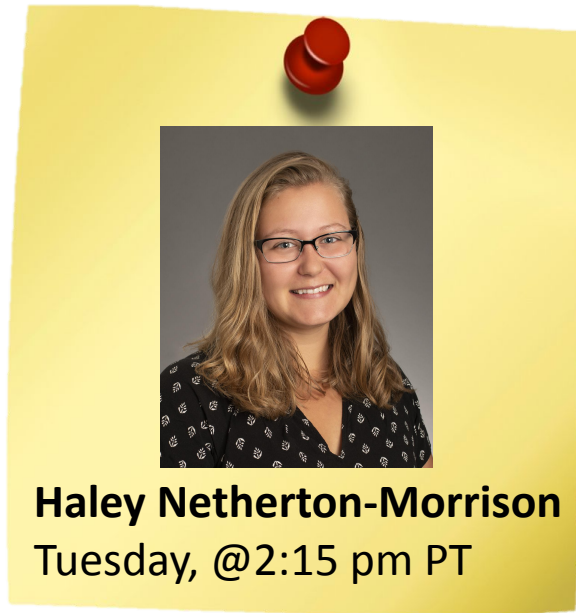
Outreach – Conferences Summer Highlights

Turner lab at Botany, July 2023

Bittleston lab at ESA, August 2023
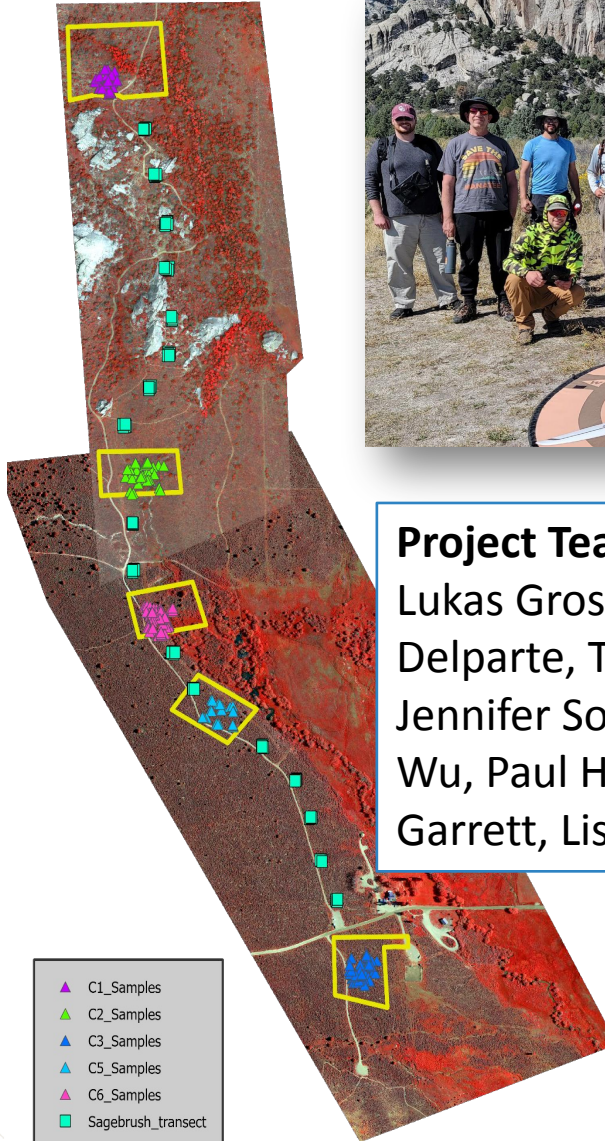
Haley Netherton-Morrison
Tuesday, @2:15 pm PT
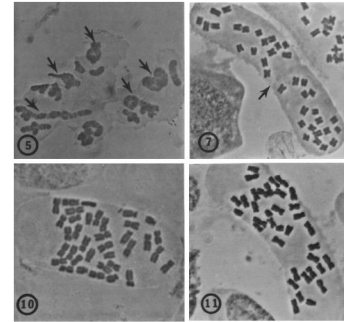
Integration – Castle Rocks Connects the Ms and Teams

Mapping

2 km Transect – 10 band UAS imagery

- ▲ C1_Samples
- ▲ C2_Samples
- ▲ C3_Samples
- ▲ C5_Samples
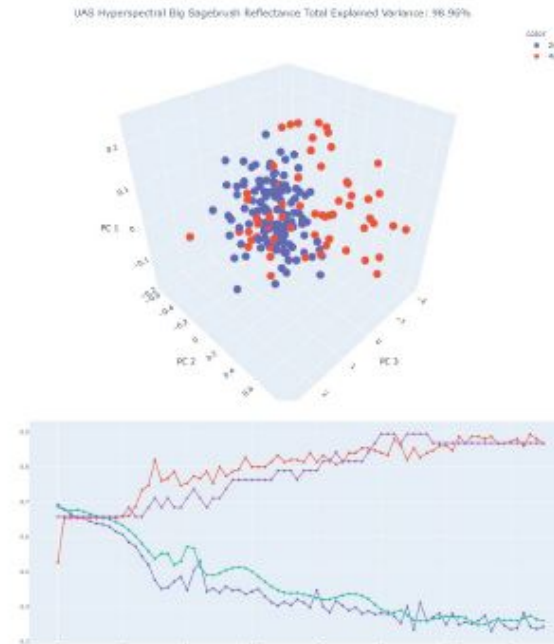- ▲ C6_Samples
- ■ Sagebrush_transect

Project Team: Kyle Paulekas, Lukas Grossfurthner, Donna Delparte, Trevor Caughlin, Jennifer Sorensen Forbey, Di Wu, Paul Hohenlohe, Molly Garrett, Lisette Waits

Donna Delparte (ISU)

Mechanism & Modeling

Deep Learning Model for Ploidy Image Classification

UAS Hyperspectral Big Sagebrush Reflectance Total Explained Variance: 98.99%

UAS Hyperspectral Deep Learning Model:

Accuracy: 86.84
Loss: 0.32

	Precision	Recall	f-1 Score
1.2n	0.00	0.00	0.00
2.4n	1.00	0.34	0.51

Deep learning box - We are in the early stages of building a deep learning modle to predict big sage-brush ploidy. Currently our model is hindered by an un-balanced data causing all diploid samples to be falsely identifed as tetraploid.

Figure 5. (Top) PCA of spectral values pulled from hyperspecteral imagery of sampled big sagebrush. (Bottom) Train and loss graph from deep learning model training.

GEM3 Seed Grant Awards – Upcoming talks

Josh Grinath (ISU)
Tuesday, @3pm PT

Allison Simler-Williamson (BSU)
Tuesday, @3pm PT

Leonora Bittleston (BSU)
Wednesday, @1pm PT