# The Biggest Lab on Campus

Lessons learned from designing a handson course in Restoration Ecology

Dr. Julia Michaels, Reed College



## Reed Magazine

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Aislin Steill '21 checks the batteries and replaces the storage disk in a wildlife camera. PHOTOS BY TOM HUMPHREY

### **SCIENCES**

### The Biggest Lab on Campus

Bio students make exciting discoveries in the Reed canyon—and raise questions for its future.

By Katie Pelletier '03 | May 3, 2021











### Theoretical framework

Restoration Ecology (based on ecological theory, soil science, hydrology, population genetics, conservation biology, etc.)

### **Ecological** restoration

### Social system

Policy and legislation
Land use
Values, attitudes and
preferences
Resources (incl. funding,
labor, economical conditions,
etc.)

### "Restoration toolbox"

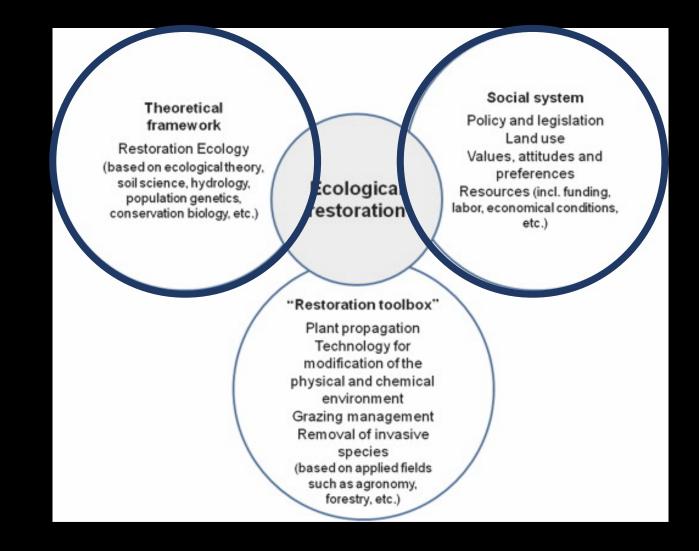
Plant propagation
Technology for
modification of the
physical and chemical
environment
Grazing management
Removal of invasive
species
(based on applied fields
such as agronomy,
forestry, etc.)

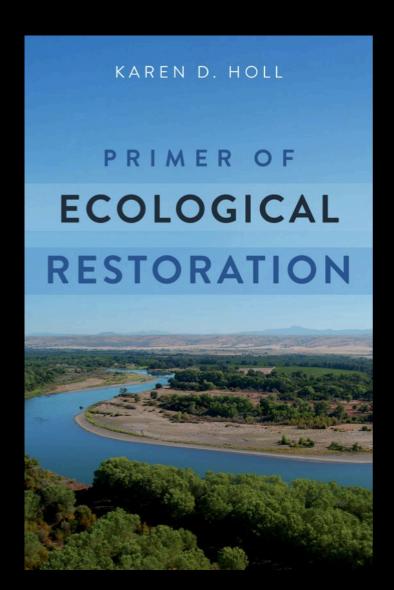


### Course Goals

- Understand how foundational ecological theory can both inform and be informed by restoration
- Field-based data collection, analysis, and hypothesis testing
- Balancing ecological, economic, and social tradeoffs in goal setting
- Science communication

### Lecture:





### SOCIETY FOR ECOLOGICAL RESTORATION

## Foundations of Restoration Ecology

#### SECOND EDITION



Edited by
MARGARET A. PALMER, JOY B. ZEDLER,

### Lab:

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## Unit I: Site History

HOME BIOLOGY 308 ENGLISH IVY FISH LADDER FUNGI MISSOULA FLOODS RESTORATION APPROACHES CROSS-CANYON PIPELINE DEAD TREES

RED CEDAR BIOSWALES SNOWBERRY FISHY BUSINESS FORAGING FUN! THESE AREN'T JUST WEEDS! GREAT BLUE HERON THANKS TO THE BEAVERS

CANYON TREES BOUNCY BRIDGE SALAMANDERS

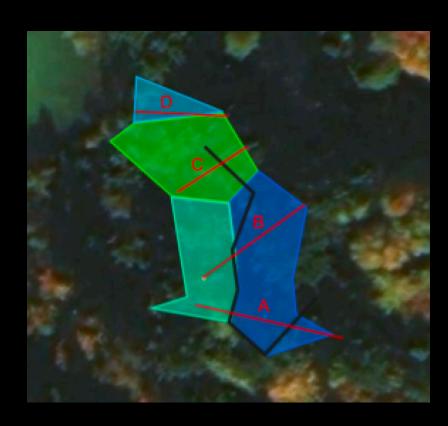


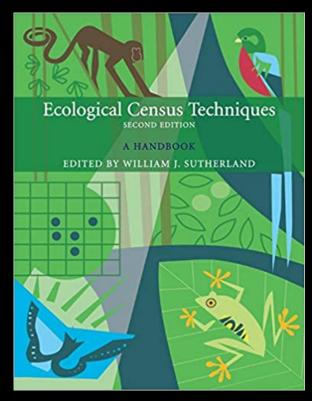
### Unit II: Habitat delineation



# ad College Bybee Bike Path

# Unit III: Monitoring Plan







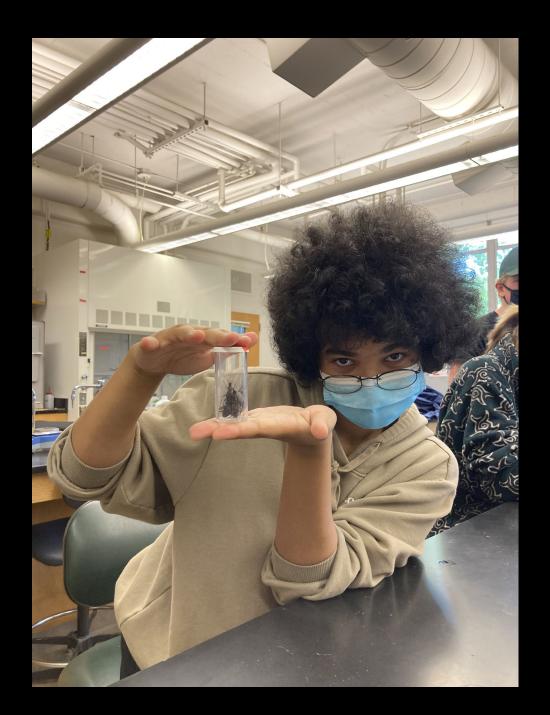




## Unit III: Monitoring







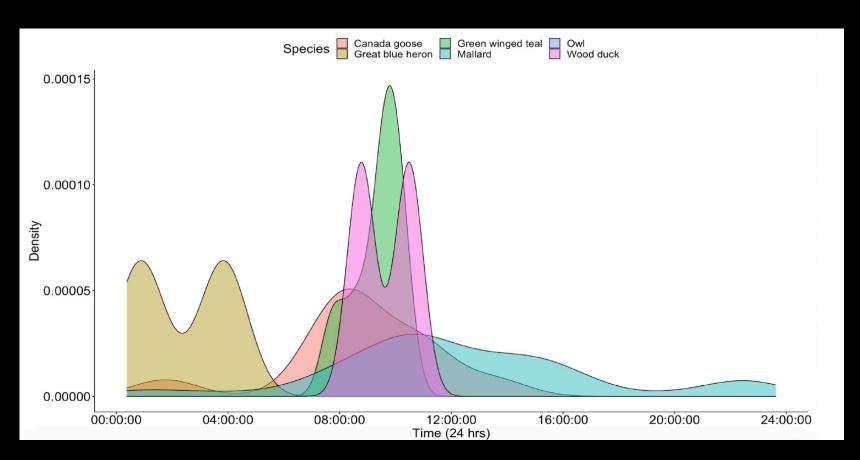


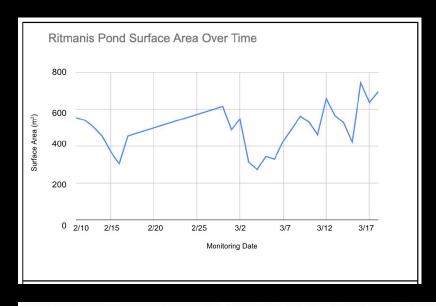


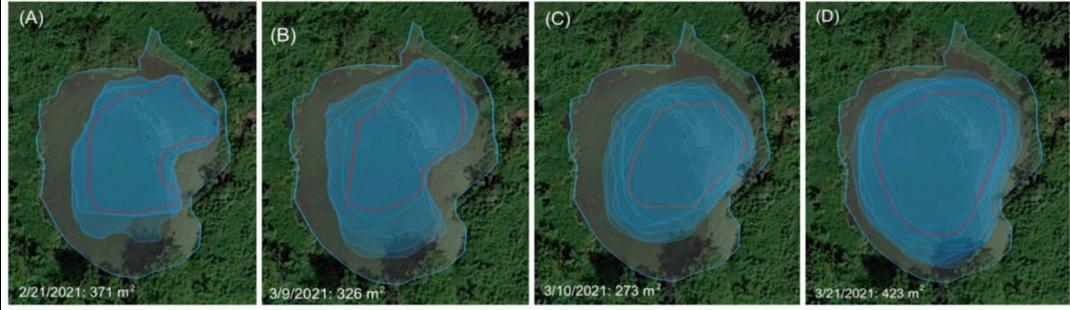




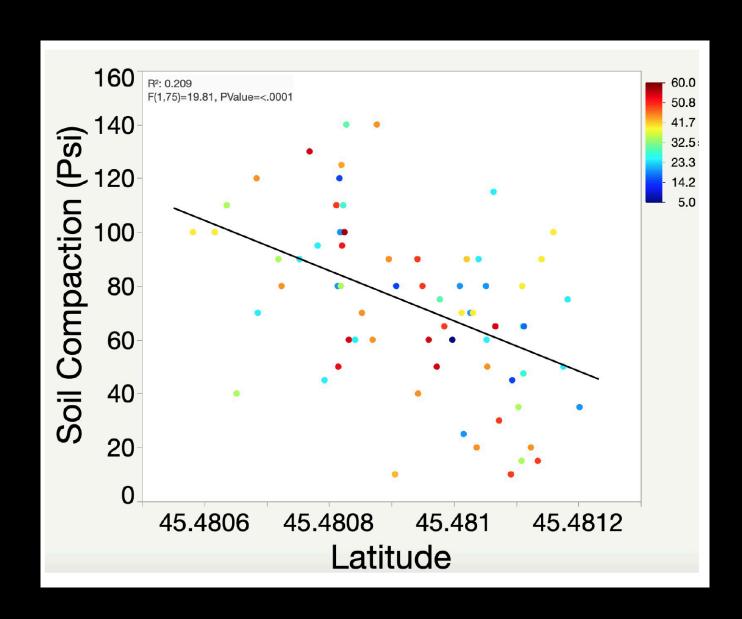


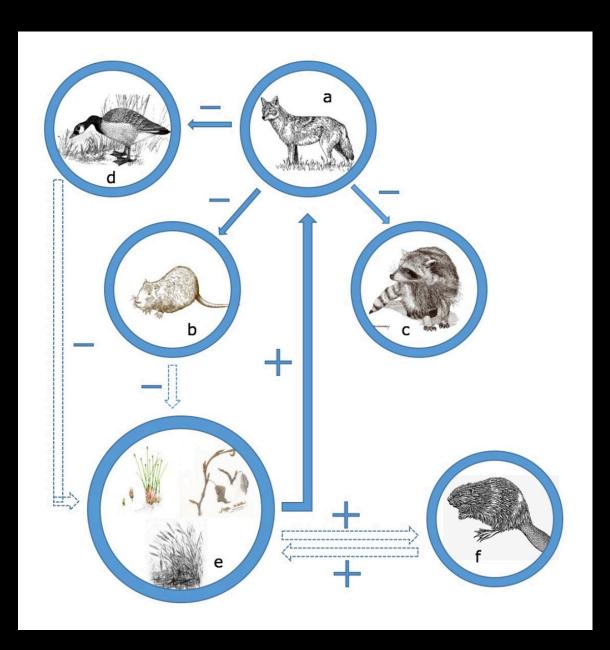






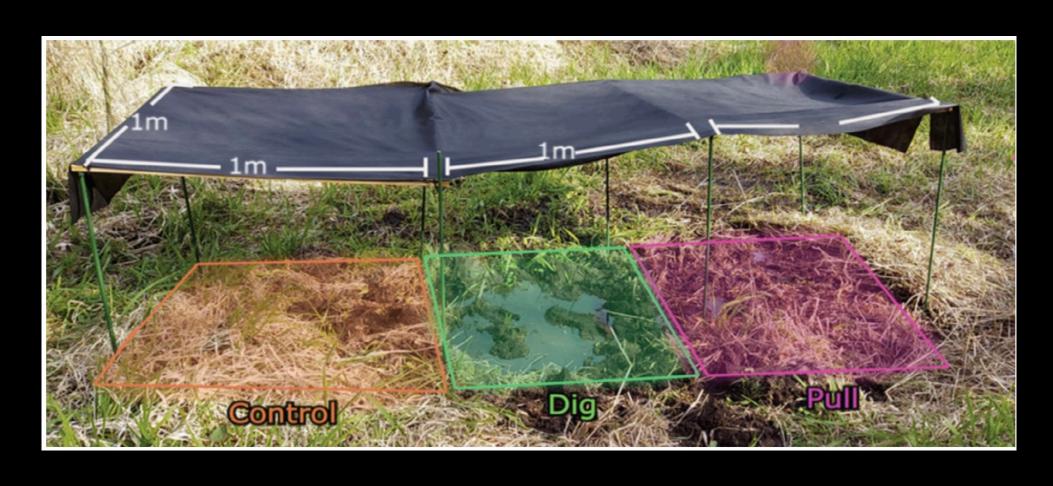
Measured surface of Ritmanis Pond over time. The far outer perimeter marked in blue represents the historical pond perimeter.







## Unit IV: Management Trials







### RITMANIS POND RESTORATION PLAN



Prepared by the Reed College Spring 2021 BIO308 Restoration Ecology Class

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**Figure 1.** Map of emergent wetland habitat unit indicating the priority/first large scale canary grass removal in orange. Areas known to be heavily trafficked by coyotes are in green.

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Data Collection and Analysis of regrown biomass																																																					
Formulate plans for large scale removal																																																					
Recruit volunteer labor																																																					
Monitor spring water quality and levels																																																					
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Large scale canary grass removal																																																					
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Measure stage 2 growth	П		$\neg$		$\dashv$			$\neg$	$\neg$	$\neg$	$\neg$	$\neg$			T		Τ				$\top$	$\top$					П	$\neg$	$\neg$	一	$\neg$	$\top$							$\neg$	$\neg$				Τ		П			$\top$	T	$\top$	$\top$	
Measure stage 3 growth	П	$\dashv$	$\dashv$	$\dashv$	$\dashv$	$\dashv$	$\dashv$	$\neg$	$\dashv$	$\dashv$	$\top$	$\dashv$	$\top$		$\top$	T	$\top$	T	T	$\top$	T	$\top$	T	$\top$					$\dashv$	$\dashv$	$\dashv$	$\top$	$\top$	$\top$	T	$\top$			$\neg$	$\dashv$	十	$\top$	$\top$	$\top$	$\top$	П			$\top$	T	$\top$	$\top$	$\top$
Remove new invasive growth			$ \top $								1		$\top$			T		T		T	T		T								1		$\top$	T									T	T							T		
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Adjustments as necessary	П										_	_	1	1	1	Ι.	1	Τ.	Ţ.	1	1	1	Ţ.											T.	1									T.	L			_	1				1.

Table 1. High Co	ost Budget		
Experimental Monitoring			\$110
Labor	6hr/week student lab time	\$0	\$0
Biomass measurement tools	2x Long Garden Shears, Scale	2x ~\$30, \$50	\$110
Canary Grass Removal			\$18,960
Labor for canary grass removal	~2802m^2 dense canary grass, ~450 hrs	\$15/hour per laborer, \$25/hr per crew leader	\$18,000
Expert Consulting	Zac Perry/Grounds crew/someone from Bio Dept./outside consultant	\$100/hour	\$400
Tools required for removal	shovels, gloves, wheelbarrows	3 x \$80 Wheelbarrow, 8 x \$35 Flat Shovels, 8 x \$5 Gardening Gloves	\$560
Native Plantings			\$10,266
Labor for live stake propagation	~1,400m^2 to plant, ~40 hrs	\$15/hr per laborer, \$25/hr per crew leader	\$800
Labor for rooted plantings	~1,400m^2 to plant, ~117 hrs	\$15/hour per laborer, \$25/hr per crew leader	\$4,670
Tall mannagrass	88	\$6-8 per plant	\$704
Slough sedge	88	\$6-8 per plant	\$704
Beaked sedge	88	\$6-8 per plant	\$704
Fruited bulrush	88	\$6-8 per plant	\$704
Pacific willow	44 cuttings, ~15 hours	\$15/hour per laborer	\$660
Sitka willow	44 cuttings, ~15 hours	\$15/hour per laborer	\$660
Pacific ninebark	44 cuttings, ~15 hours	\$15/hour per laborer	\$660



	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Removal of ivy, blackberry, and other invasive growth	(zones 9, 10, 1) fall/winte	(zones 8, 7, 6, 3) fall/winter	(zones 5, 4, 2) fall/winter	(zones 11, 12, 13) fall/winter		
Prevent reestablishment of ivy, blackberry, and other invasive growth through monitoring and removal					(all zones) fall/winte	(all zones) fall/winter
Plant understory species	spring	spring	spring	(✓) *as needed	(✔) *as needed	(✔) *as needed
Plant saplings (ie. Douglas fir)	spring					
Consult with Stakeholders	1	1	✓	✓	✓	✓
Continued monitoring for	✓	✓	✓	(✔)	(✔)	
implementation of trail				*trail creation*	*trail creation*	

### Final product: Stakeholder Roundtable

• Dec 9<sup>th</sup>, 2021 9-10 am via Zoom

• See you there!

