From Evidence to Action: Integrating Science in Water Policy & Management

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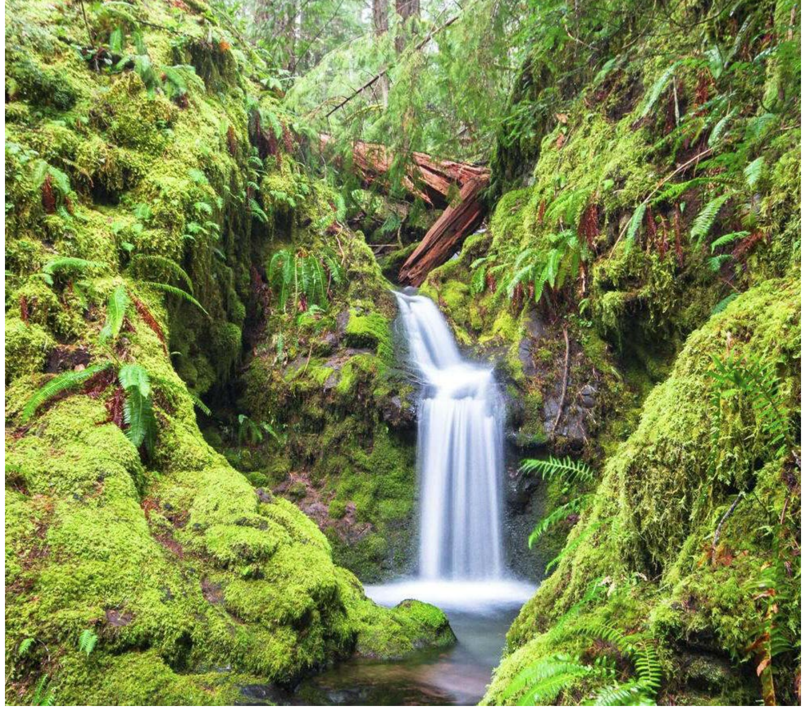
TNC is a global environmental nonprofit working to create a world where people and nature can thrive.



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Governance

Science

Management

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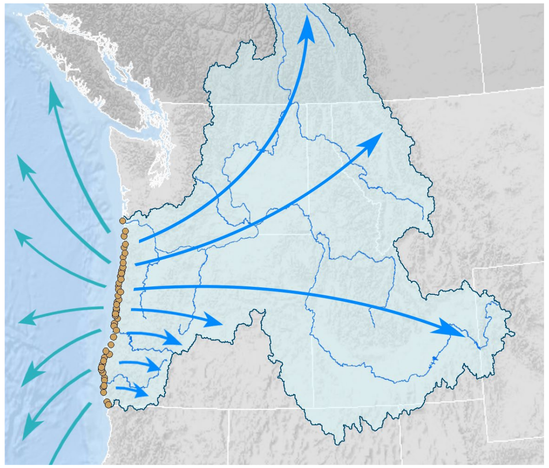
Decision Support



Tide gate optimization

Evidence Base

Mapping the age of groundwater

Conservation Planning

Natural Aquifer Recharge

Water Science in Action

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Optimizing Tide Gate Replacement

Project team : Jena Carter, Jason Nuckols, Shonene Scott, Claire Ruffing

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Decision support for protection, restoration, and working lands

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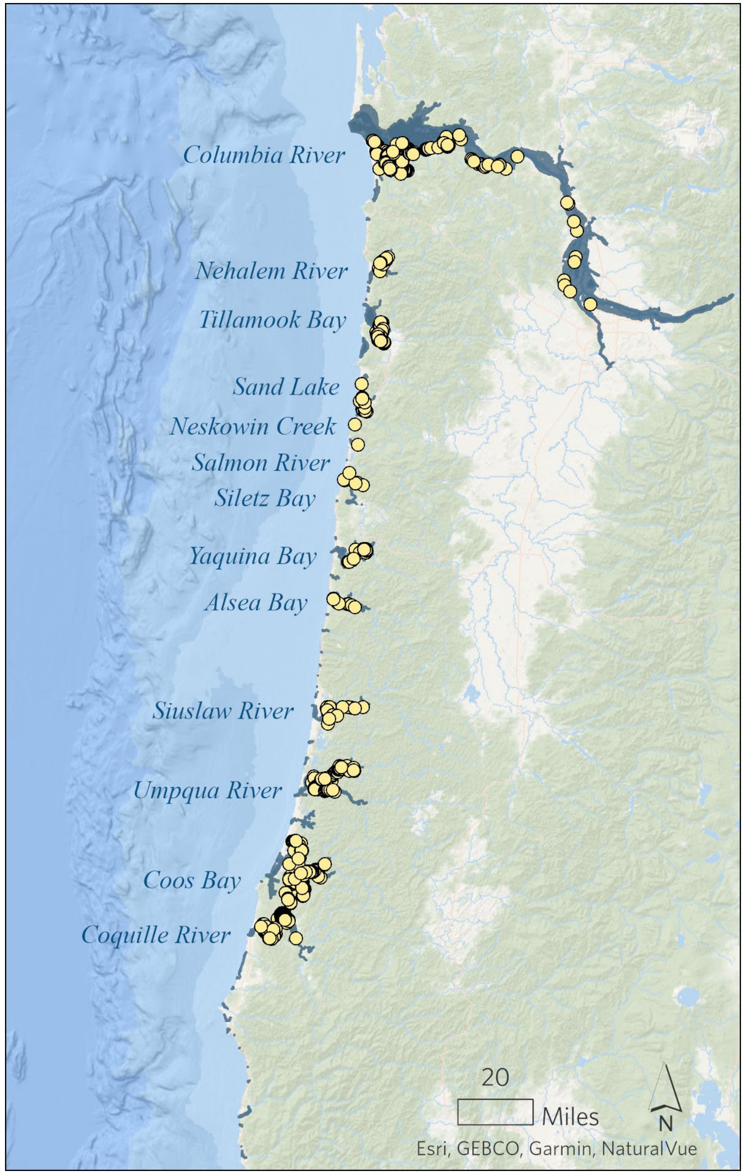
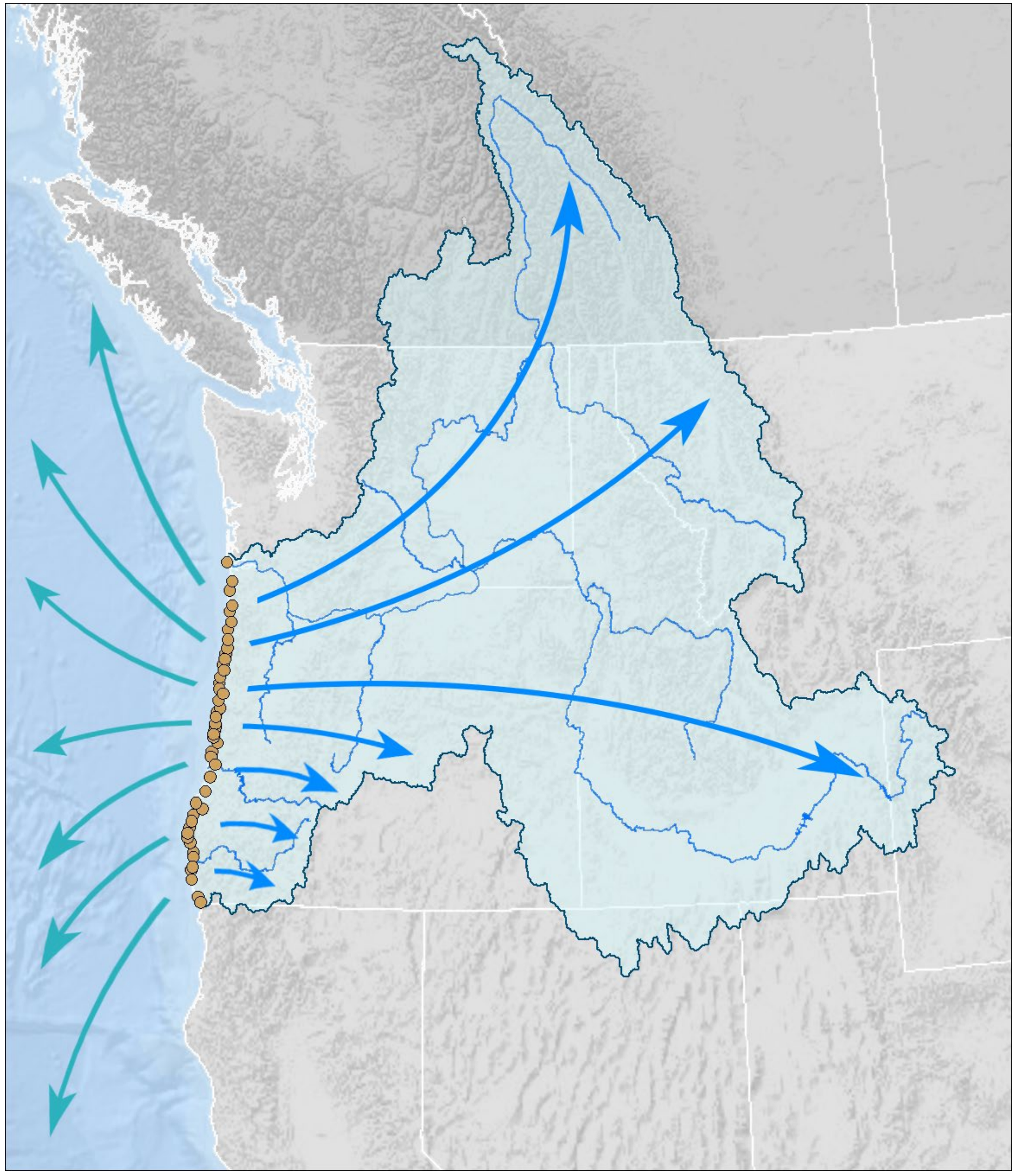
Decision support for protection, restoration, and working lands





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Which tide gates and culverts should be replaced to maximize habitat gains?

Decision support for protection, restoration, and working lands

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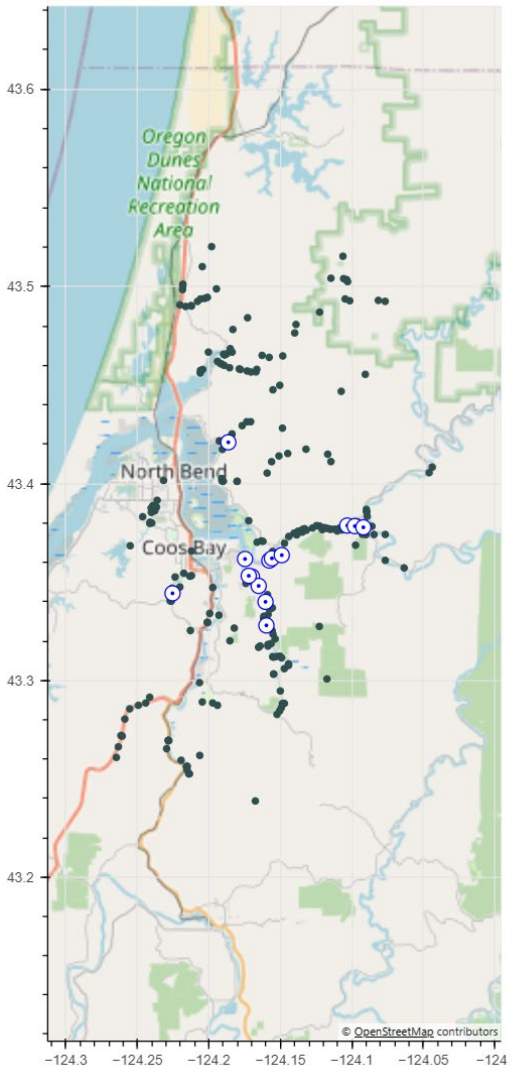
Which tide gates and culverts should be replaced to maximize habitat gains given a limited budget?

Tide Gate Optimization

Home Help Start Output Download

Oregon Coast

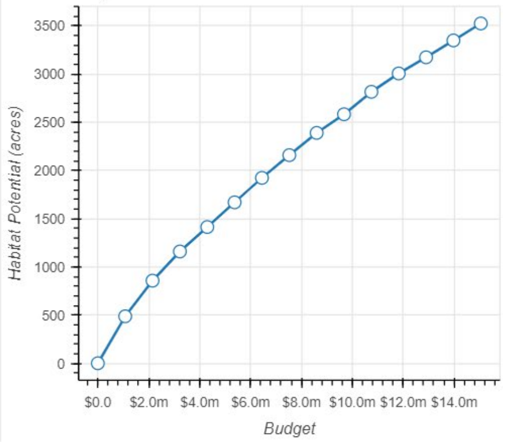


Optimization Complete

Regions: Coos; **Targets:** Inund; **Climate:** Current; **Budgets:** $1.075M to $15.05M

ROI Curves

Inund



Budget Summary

Budget	Net Gain	# Barriers	Inund
$0	0.0	0	0.0
$1,075,000	0.3	4	487.3
$2,150,000	0.5	7	857.1
$3,225,000	0.6	14	1159.6
$4,300,000	0.8	18	1413.2
$5,375,000	0.9	15	1669.1

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Which restoration projects will support the highest densities of juvenile salmon?

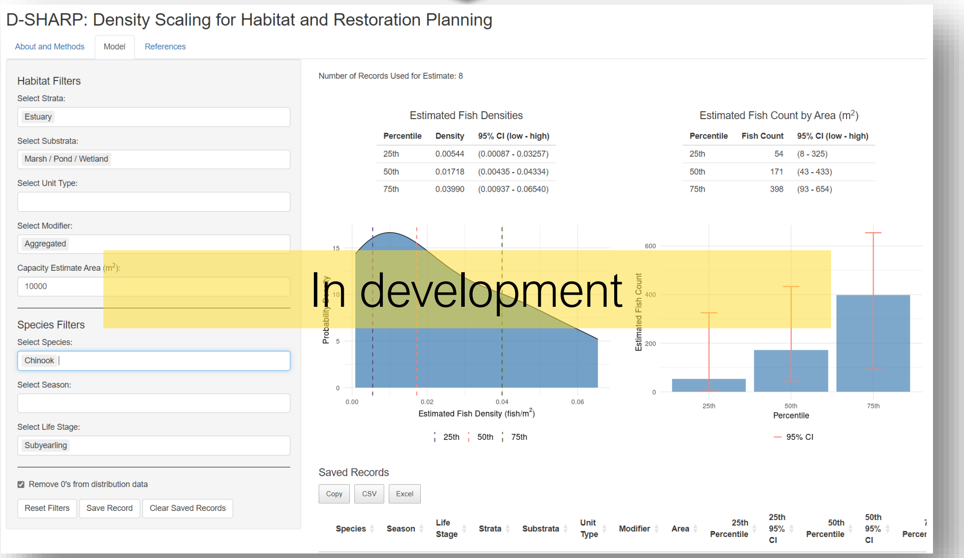

Estuaries and Coasts (2023) 46:1046–1066
https://doi.org/10.1007/s12237-023-01185-y

Check for updates

Estimating Juvenile Salmon Estuarine Carrying Capacities to Support Restoration Planning and Evaluation

Jason Hall[1] · Phil Roni[1] · Kai Ross[1] · Meghan J. Camp[1] · Jason Nuckols[2] · Claire Ruffing[2]

Received: 17 June 2022 / Revised: 3 February 2023 / Accepted: 6 February 2023 / Published online: 27 February 2023



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Mapping the Age of Groundwater in Oregon

Project team: Zach Freed, Claire Ruffing

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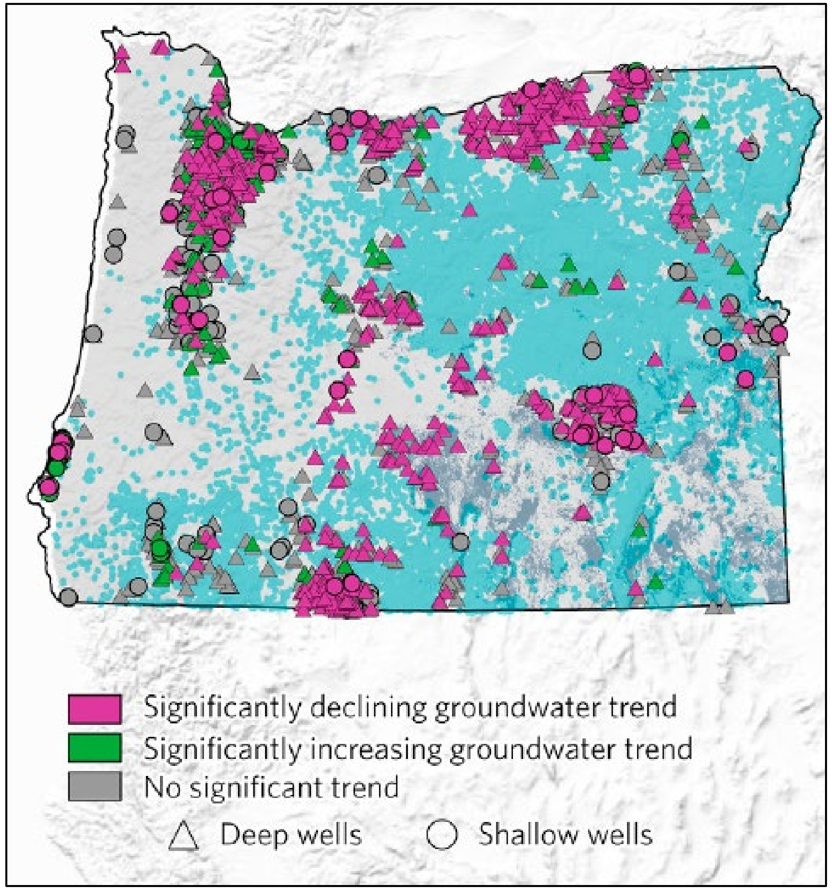
Evidence Base

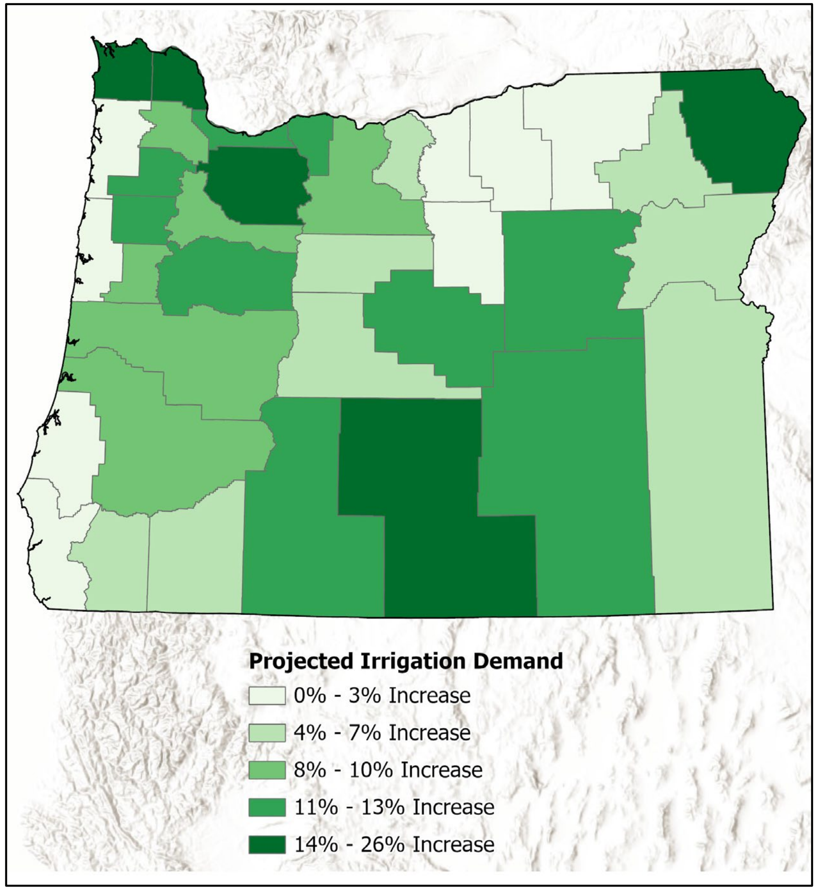
Study objective:

Understand ***renewability*** and ***climate resilience*** of Oregon's aquifers using ***isotopes*** as an indicator

Saito et al. 2022



OR Water Resource Dept. 2015



Groundwater is not being used sustainably

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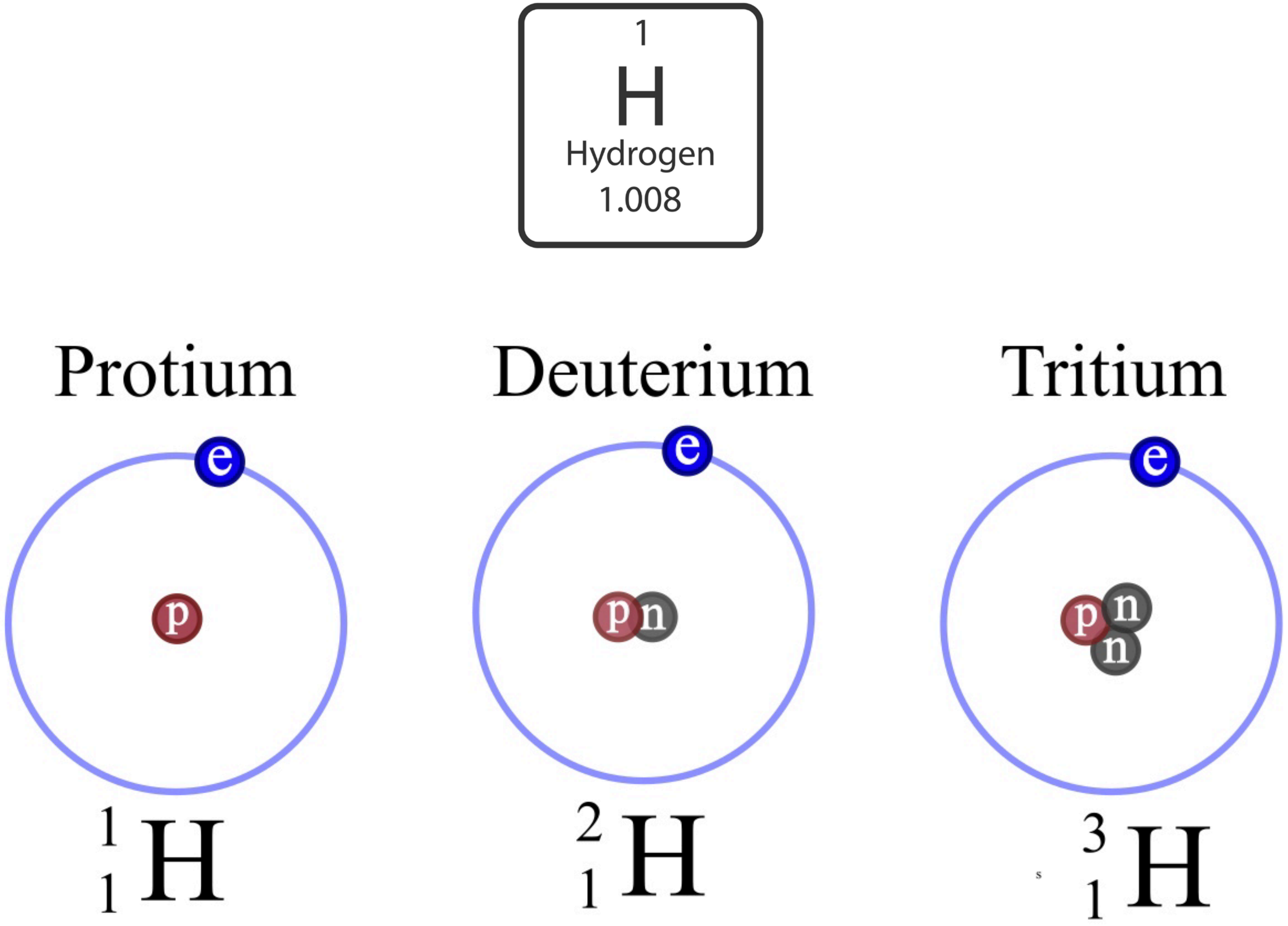
Isotope 101

Study objective:

Understand ***renewability*** and ***climate resilience*** of Oregon's aquifers using ***isotopes*** as an indicator



https://terpconnect.umd.edu/~wbreslyn/chemistry/isotopes/isotopes-of-hydrogen.html

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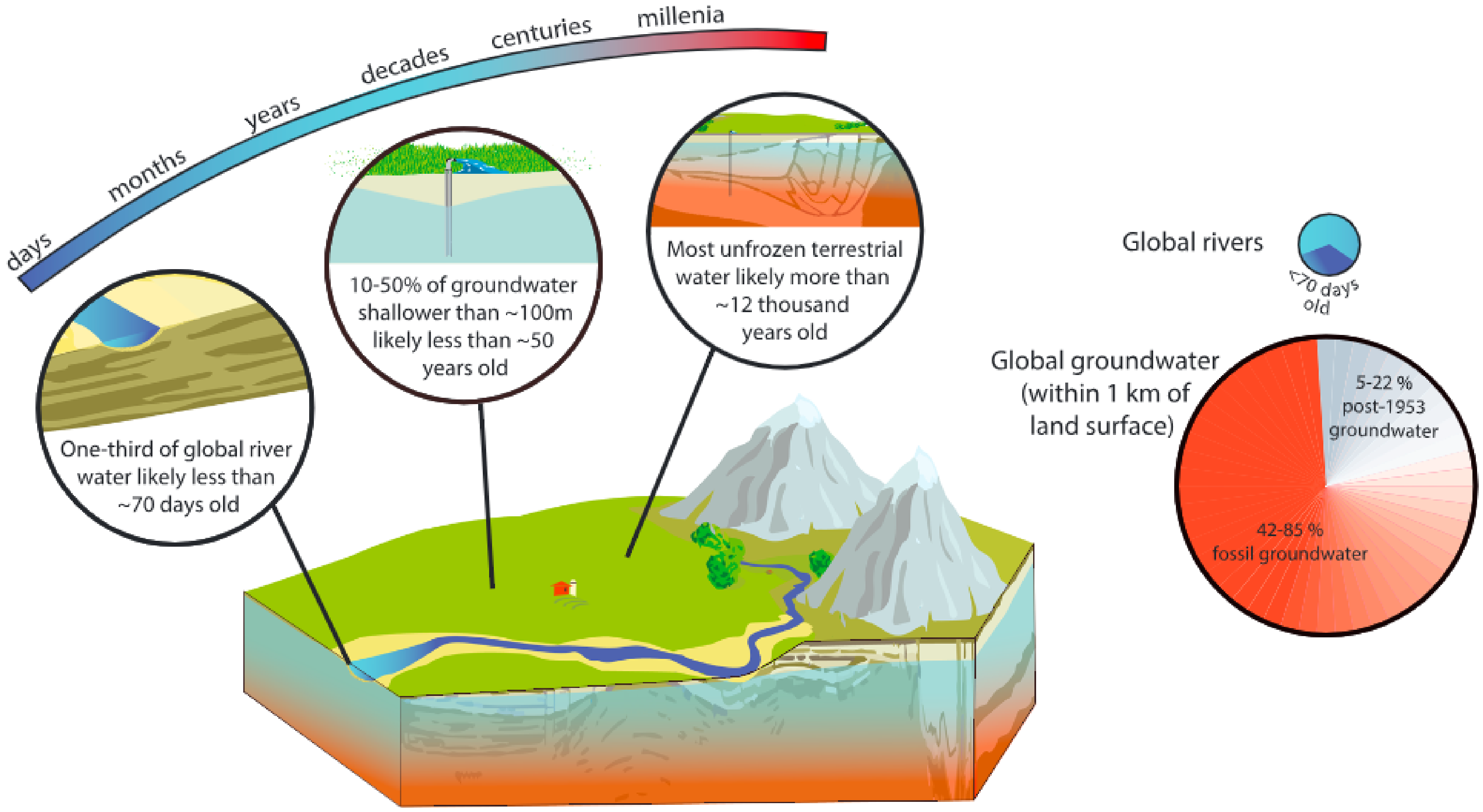
Isotopes provide clues for interpreting hydrogeological mechanisms



Jasechko 2019

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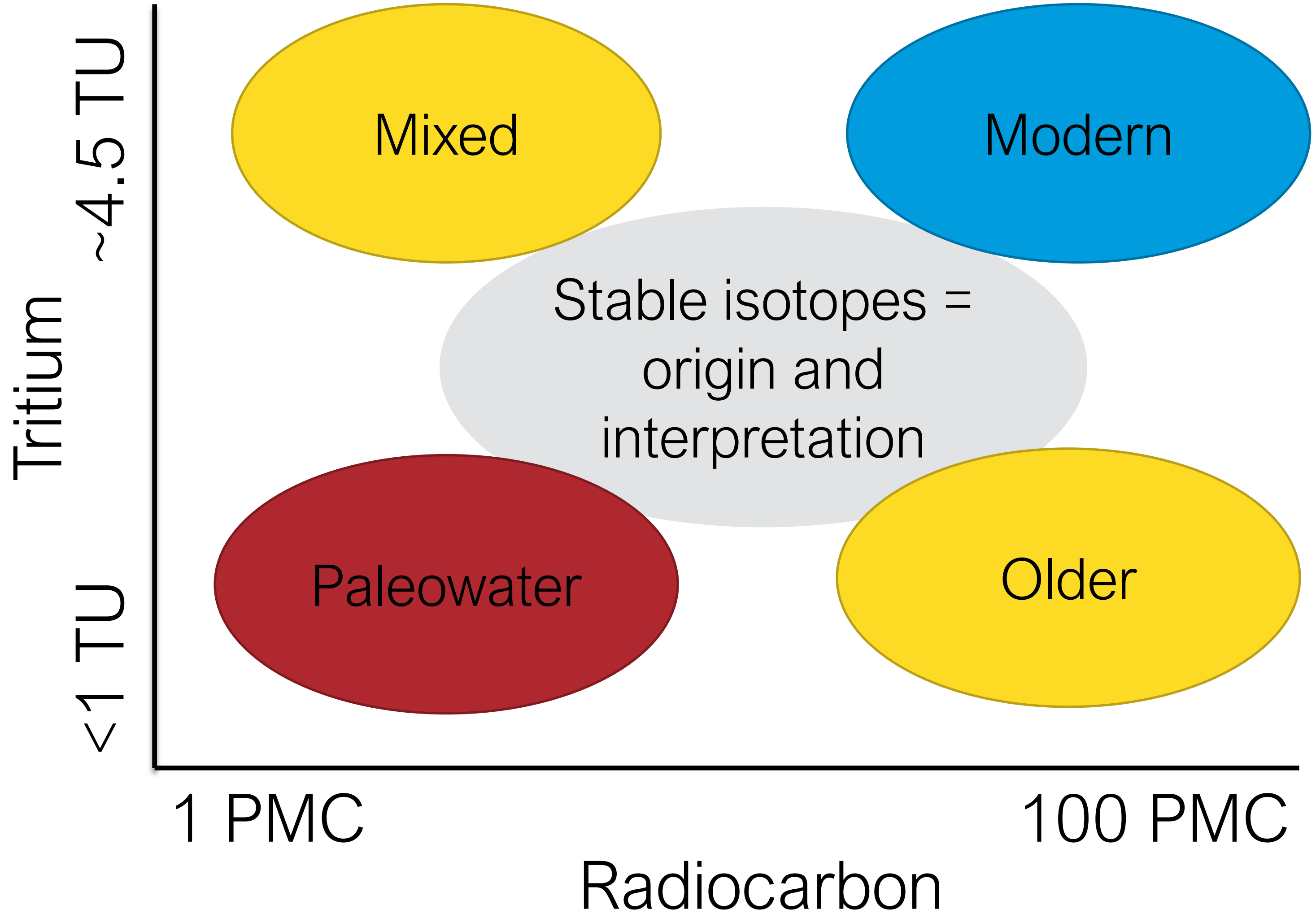
Putting the clues together….

Tritium
- Measured in tritium units (TU)
- Half life = 12.3 years
- Period of Record ~ 1953

Radiocarbon
- Measured in % modern carbon (PMC)
- Half life = 5730 years
- Period of record ~ 50 kya

Stables
- H^2
- O^{18}
- C^{13}



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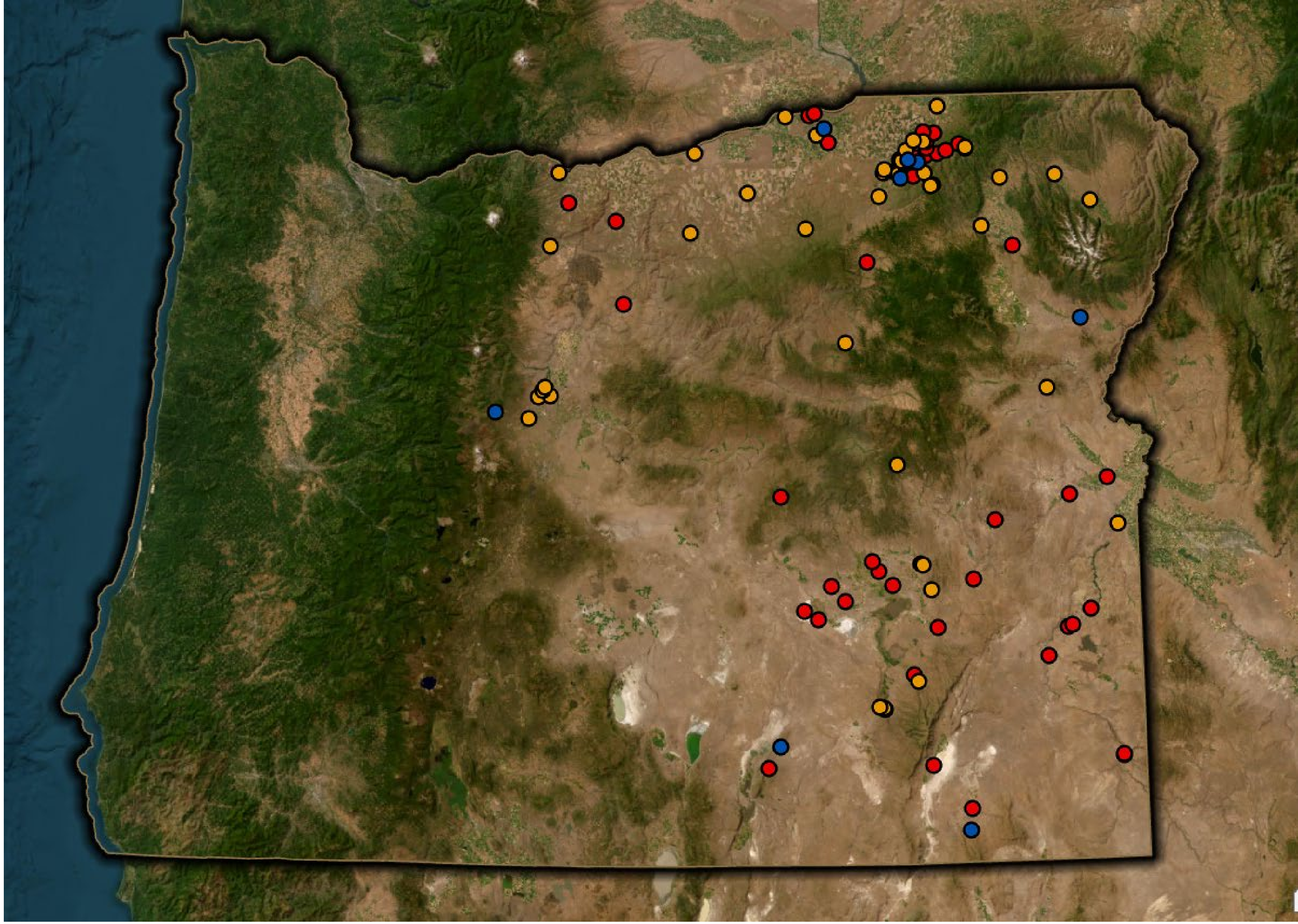
98 samples from existing studies

- Modern
- Old/Mixed
- Paleowater



Study goals:

- Statewide coverage by focusing on areas that are representative water
- Which communities and ecosystems in Oregon rely on modern groundwater, and which ones rely on fossil water?

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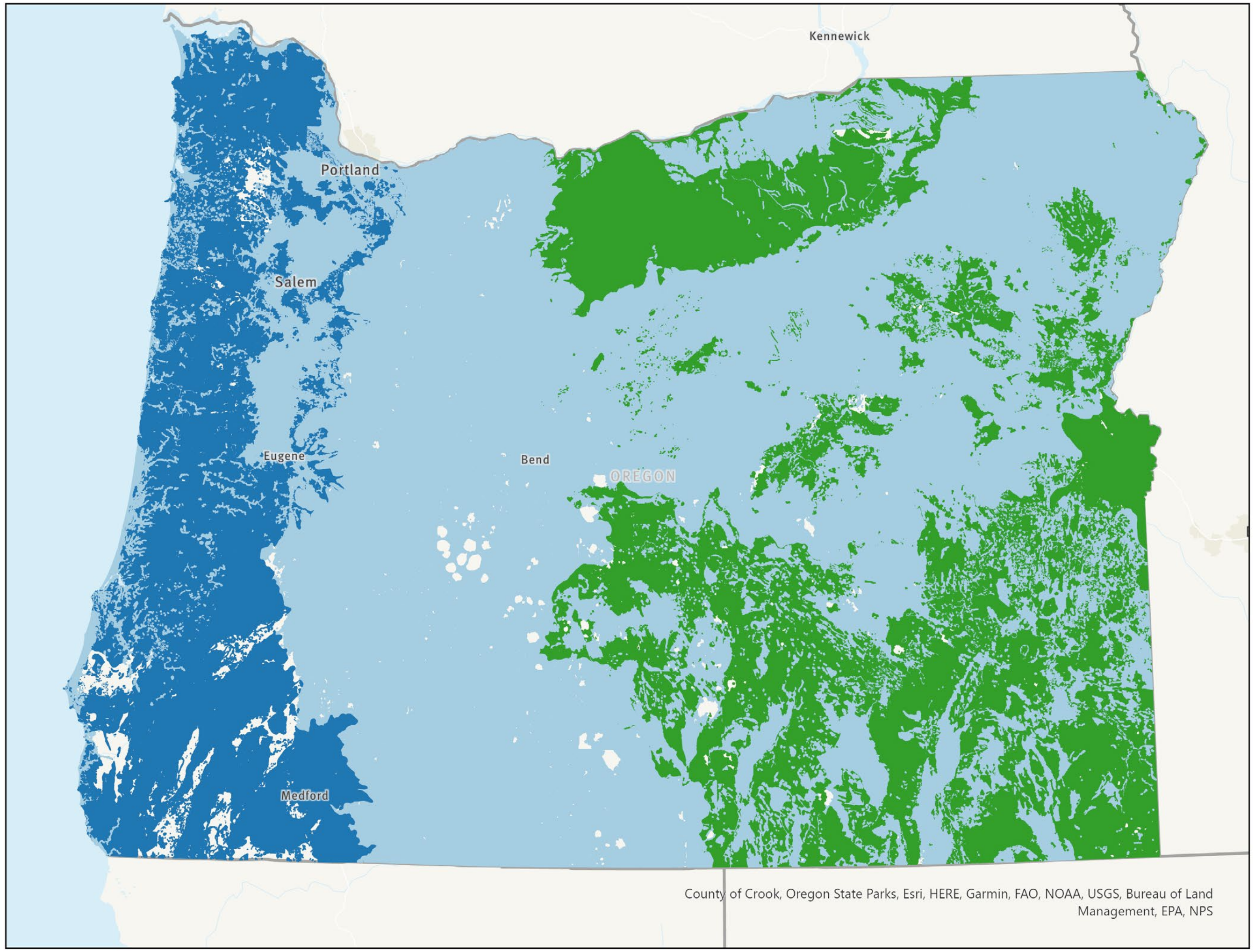
Sampling plan

- Target priority geographies
  - -“Deep” well
  - -“Shallow” well
  - -Spring
- Prioritize wells w/in ± 20% of median depth

No Existing Data | Some Existing Data | Existing Data



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Progress so far…

- 108 samples
  - 75 wells
  - 33 springs
- 48 sites with results

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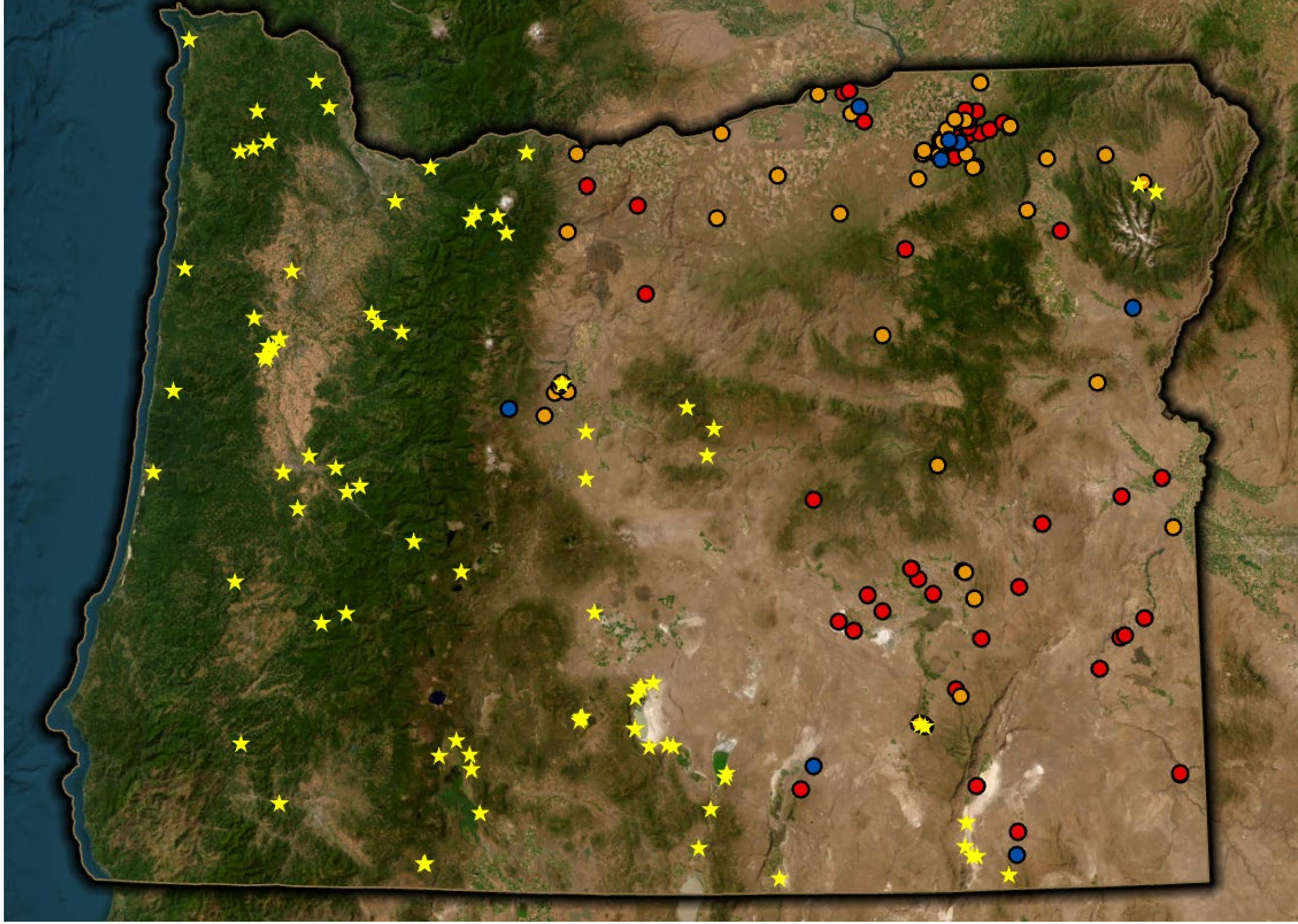
98 samples from existing studies

- Modern
- Old/Mixed
- Paleowater

★ Sites sampled for this study



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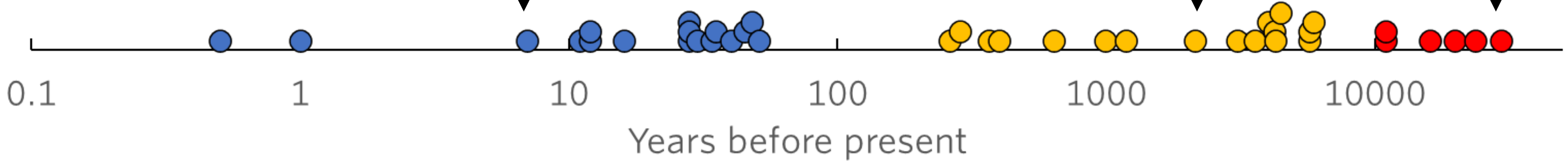
Preliminary Results

Sycan Marsh Preserve
1.71 Tritium Units
1 PMC
(C14 Age = Modern)

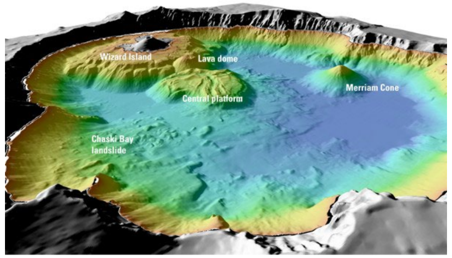
Ochoco Nat'l Forest
0.12 Tritium Units
0.77 PMC
(C14 Age = 2,140 yrs)

Borax Lake Preserve
0.5 Tritium Units
0.025 PMC
(C14 Age = 29,600 yrs)



Putting it into perspective…

Missoula Floods
and megafauna



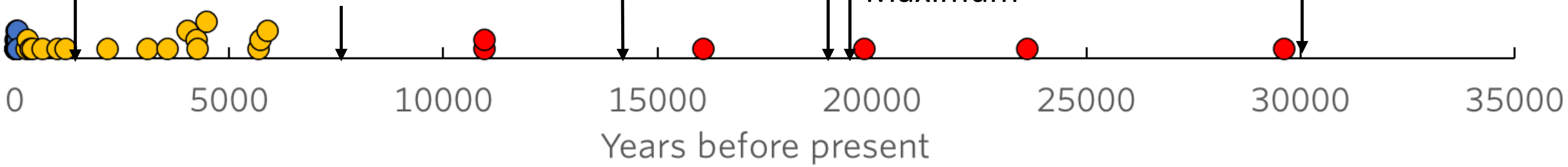
First evidence of
human settlement
near Burns, OR

European
settlement

Collapse of
Mount Mazama

Last Glacial
Maximum

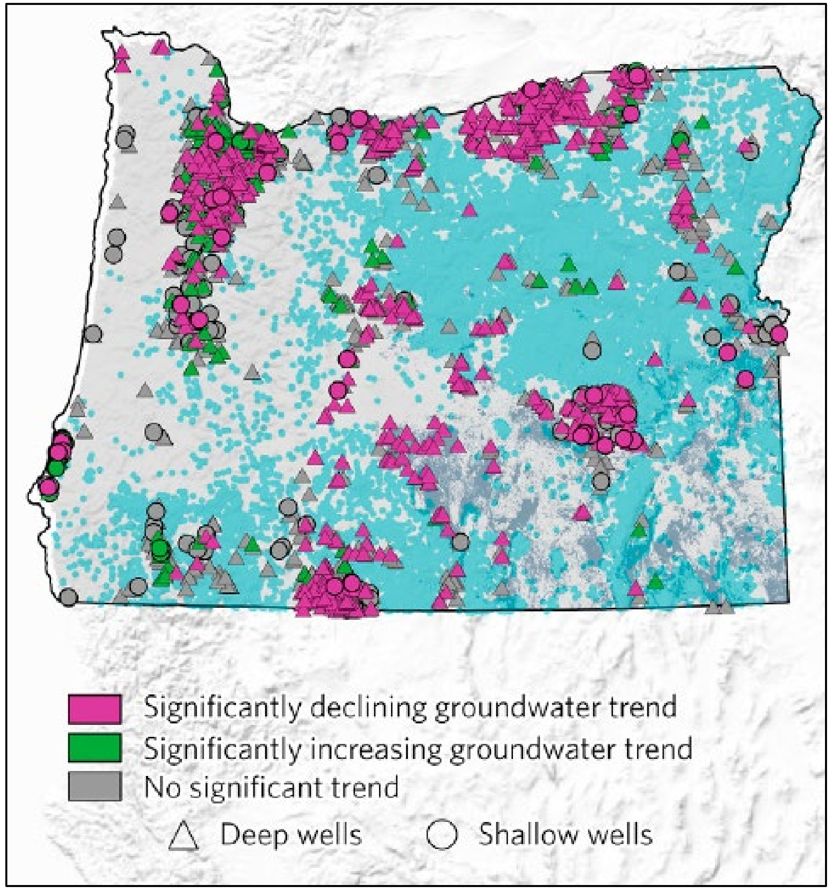
Dogs domesticated



Evidence Base

Using evidence to modernize statewide water management and protections.

Saito et al. 2022



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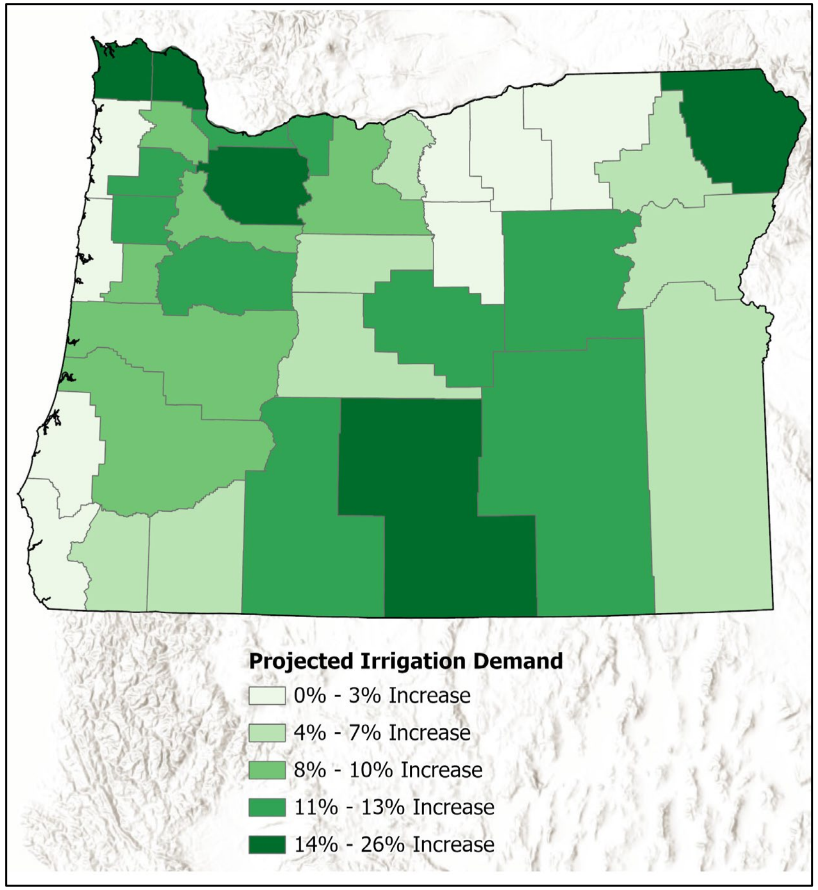

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Opportunities for managed aquifer recharge

Project team: Jason Nuckols, Melissa Olson, Claire Ruffing

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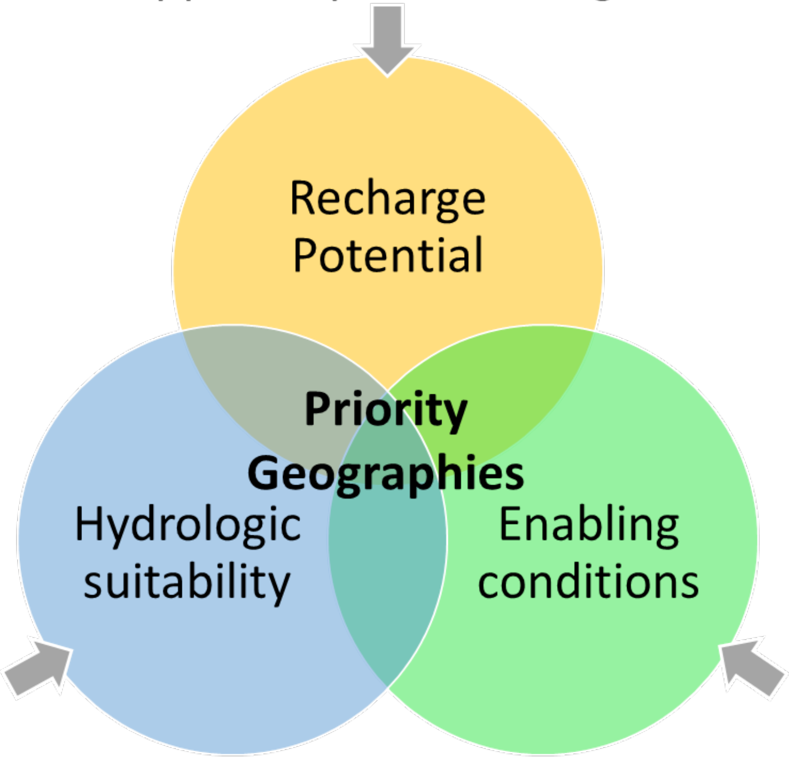
Conservation planning for water supply solutions

1. Where are there physical conditions that are most likely to support aquifer recharge?



2. Where are there hydrologic conditions that are most likely to aquifer recharge?

3. How do priority enabling conditions overlap with suitable recharge areas?

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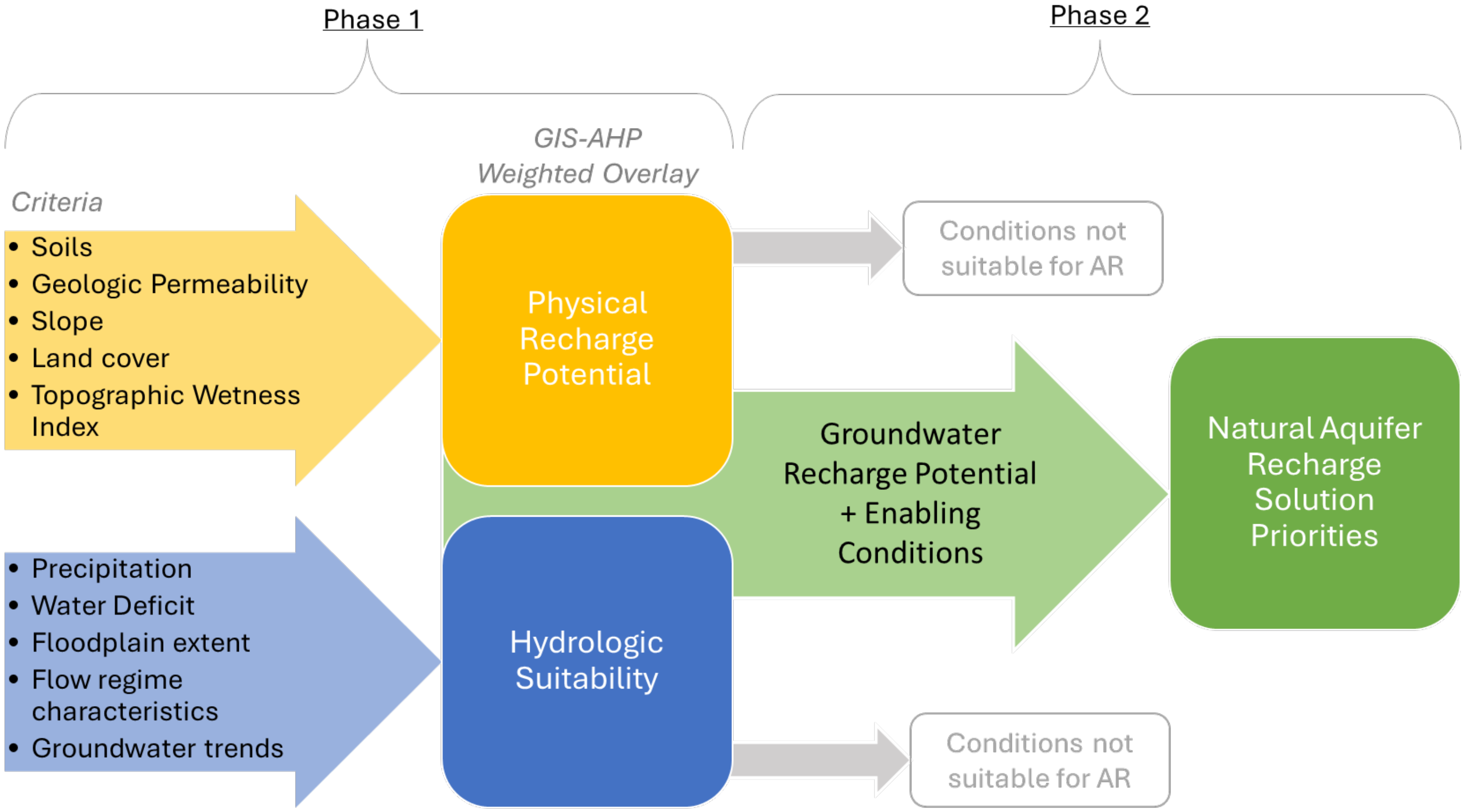

Conservation planning for water supply solutions

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Conservation planning for water supply solutions

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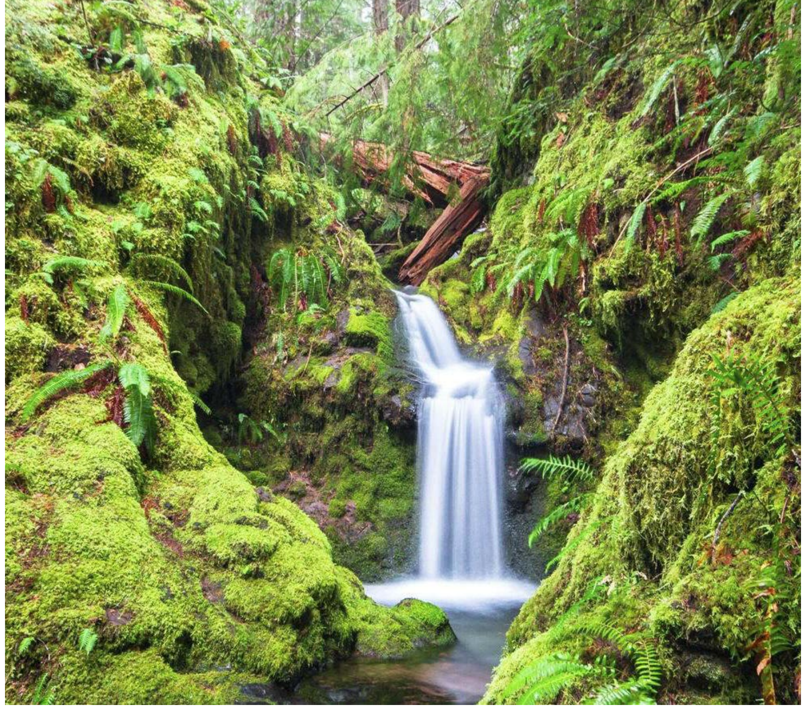
TNC in Oregon’s water priorities:

- Incentivizing sustainable water use
- Providing novel science for management
- Building partnerships for a secure water future



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Thank you!

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