INFEWS: Understanding trade-offs in the Food-Energy-Water Nexus in the Willamette River Basin

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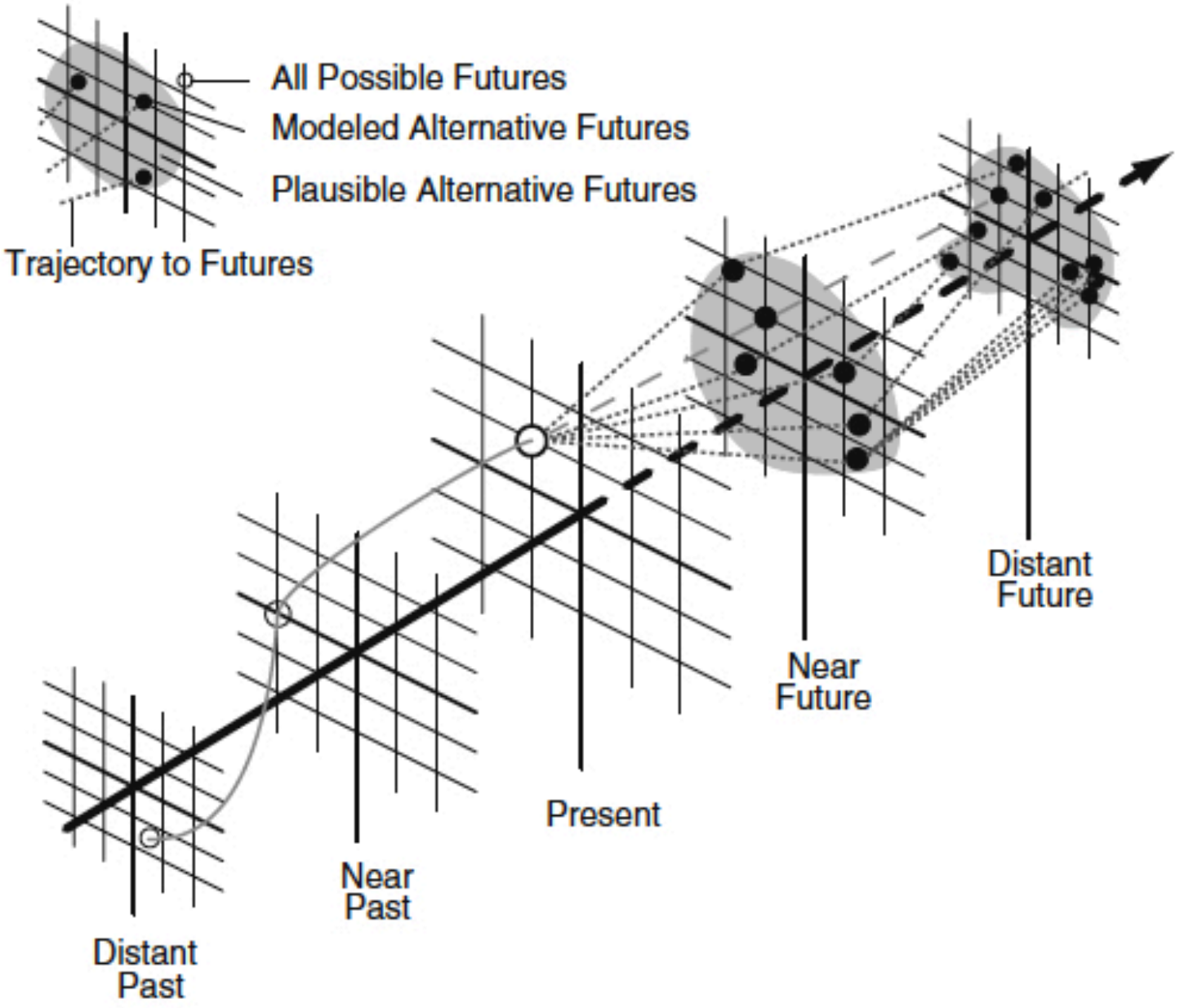
Willamette INFEWS is supported by National Science Foundation grant #1740082.

Purpose:

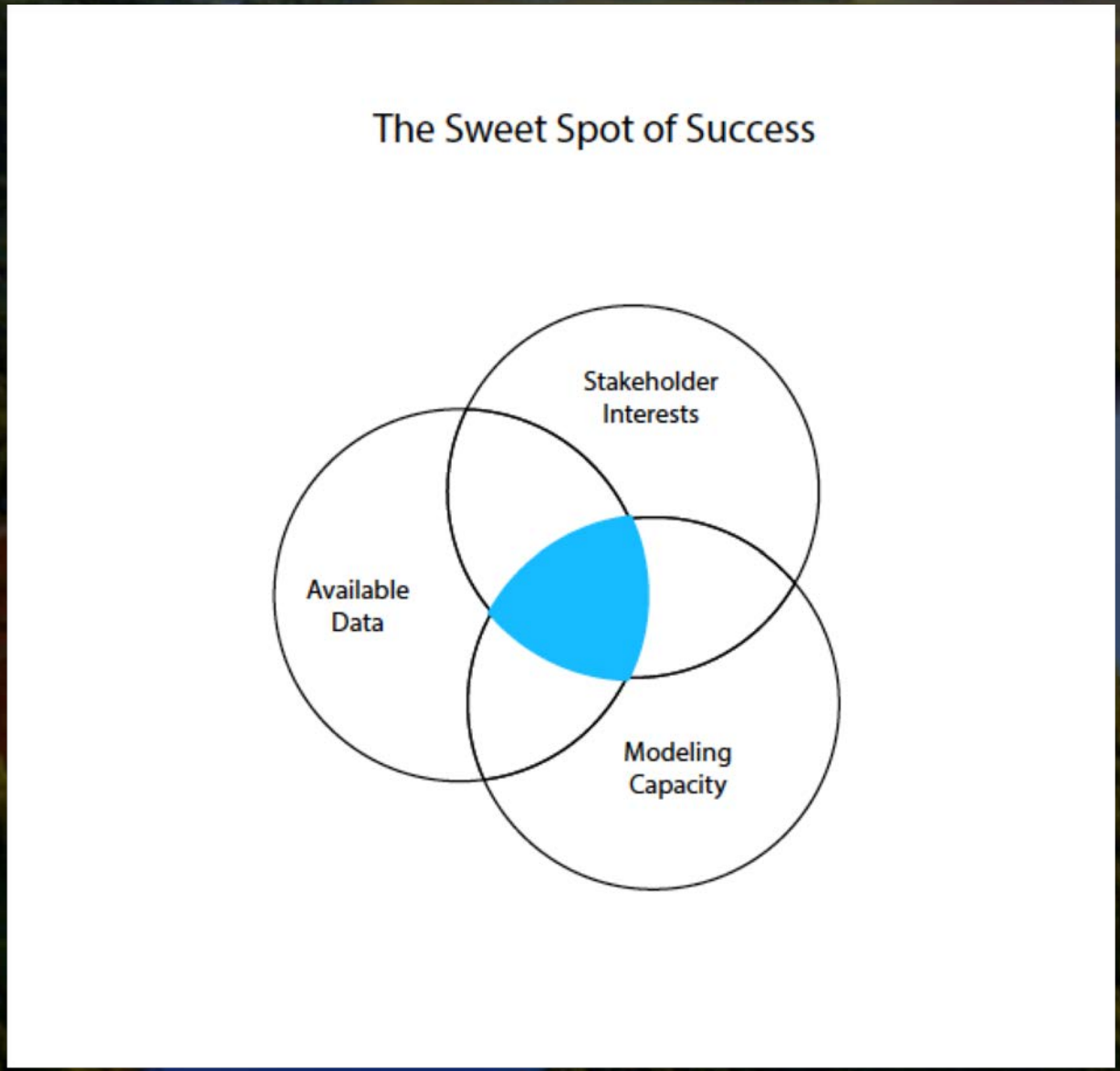
- A 4 year, $2.3 M National Science Foundation-funded project to create and apply a computer model of the Willamette River Basin. It will explore scenarios of tradeoffs and adaptation pathways to help satisfy competing ecological demands while securing food, water and energy for a growing population.

(Scenarios are a way to explore plausible options for the future of a place, an organization or a community, and see what effects each has on things people care about. There are many ways to use them.)


All Possible Futures
Modeled Alternative Futures
Plausible Alternative Futures
Trajectory to Futures
Distant Past
Near Past
Present
Near Future
Distant Future

Role of stakeholders: help guide choices regarding alternative future scenario(s) that reflect your interests, expertise and perspectives

When modeling alternative future scenarios, we seek:



National Science Foundation Goals:

- Intellectual Merit: advancing understanding and knowledge that is in the national interest

- Broader Impacts: contributing to society by applying understanding and knowledge

4 Planned Stakeholder Meetings…2018

- 2018 (today) Input on overall project conception & hypotheses, very early thoughts on plausible scenario options

2018 2019 2020 2021

4 Planned Stakeholder Meetings…2019

- 2019 Feedback on preliminary scenario narratives & proposed evaluative metrics

2018 | 2019 | 2020 | 2021

4 Planned Stakeholder Meetings…2020

- 2020 Feedback on initial scenario results

2018 | 2019 | 2020 | 2021

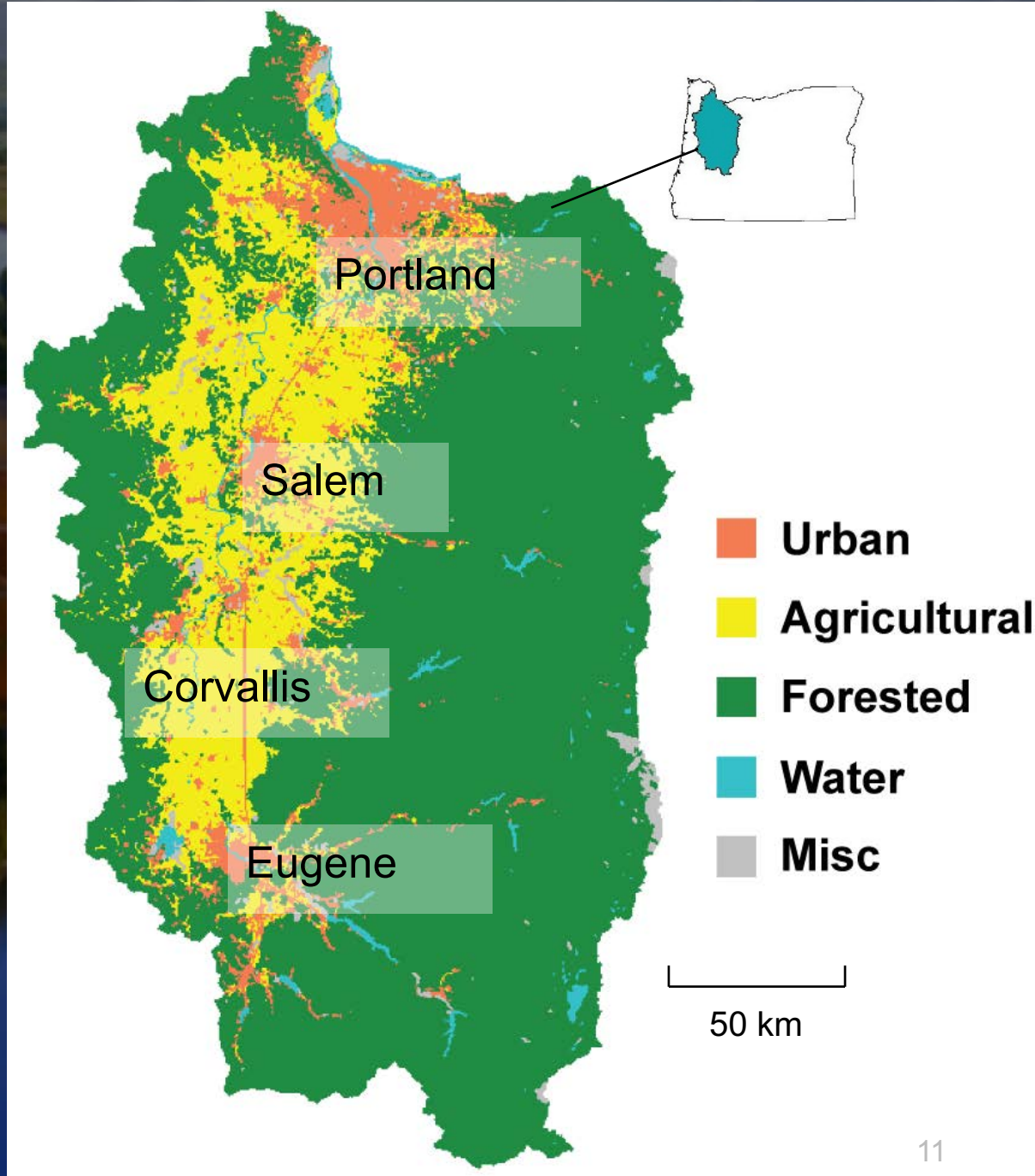
4 Planned Stakeholder Meetings…2021

- 2021 Feedback on project findings and implications for food, energy and water security in the WRB

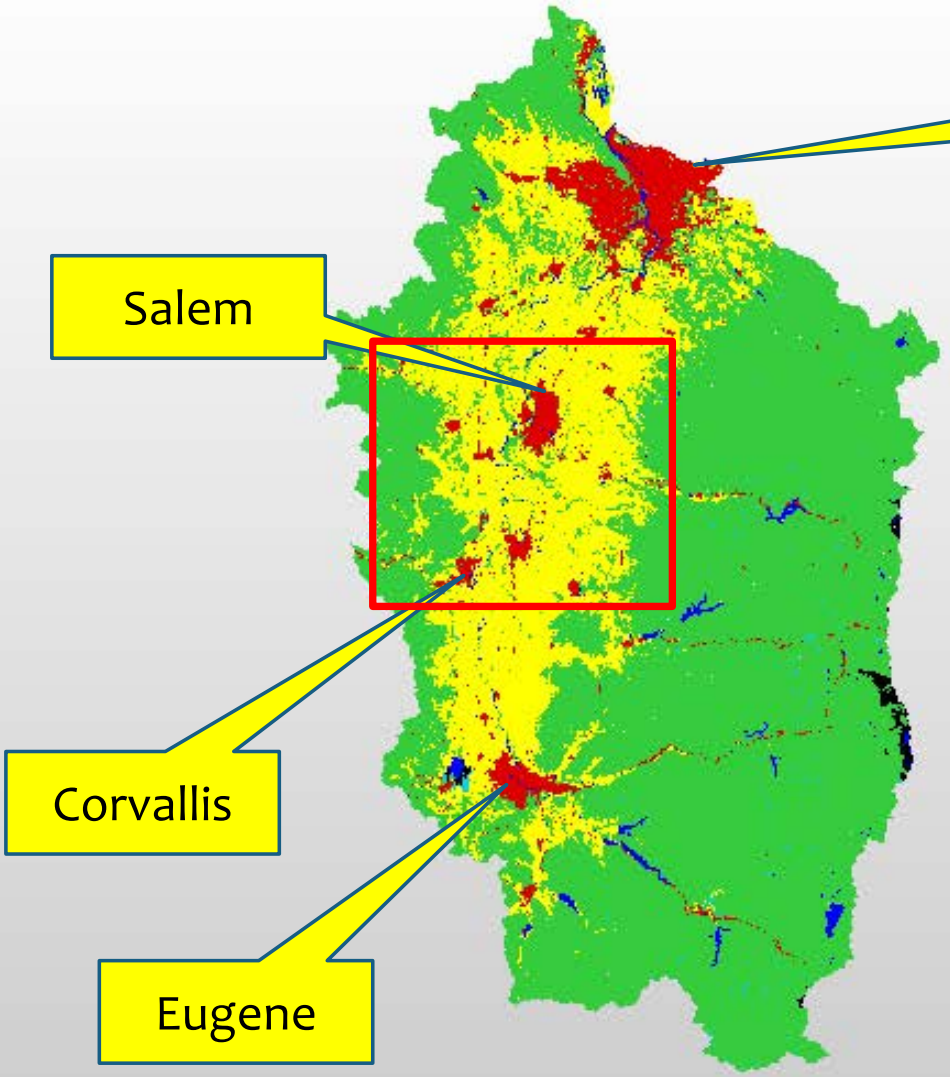
2018 → 2019 → 2020 → **2021**

Willamette Basin:

- 29 728 km^2 (~11,500 mi^2)
- 75% forest + natural vegetation, 20% agriculture, 5% urban, 1.8% water
- ca. 2010 Pop = ~2.4 million, 2060 pop est 4.5 – 6.1 M



Spatial Scale of IDUs for INFEWS Envision (IDU = 'integrated decision unit')



Legend

- Urban
- Forest
- Agriculture

0 50km 100km 150km

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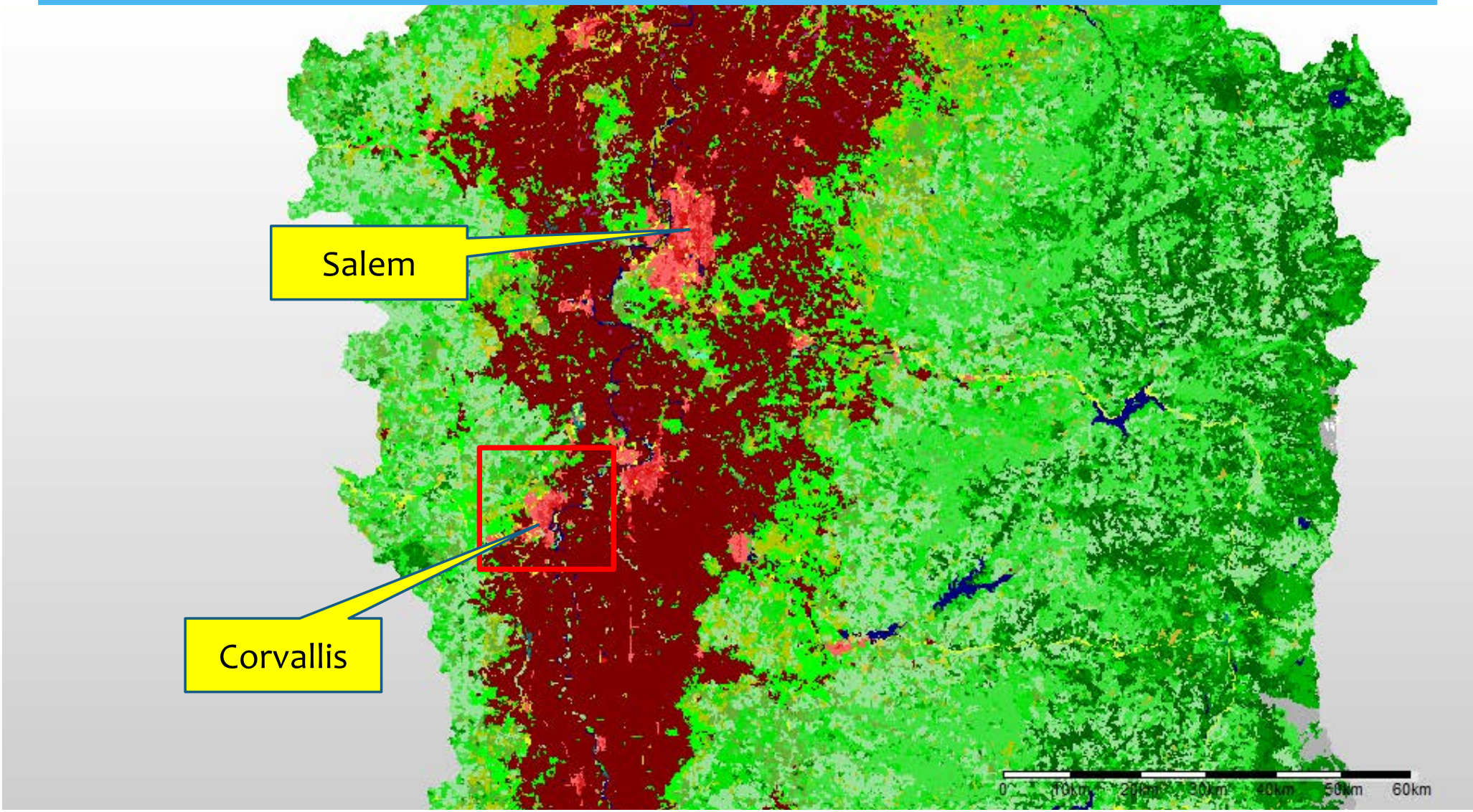

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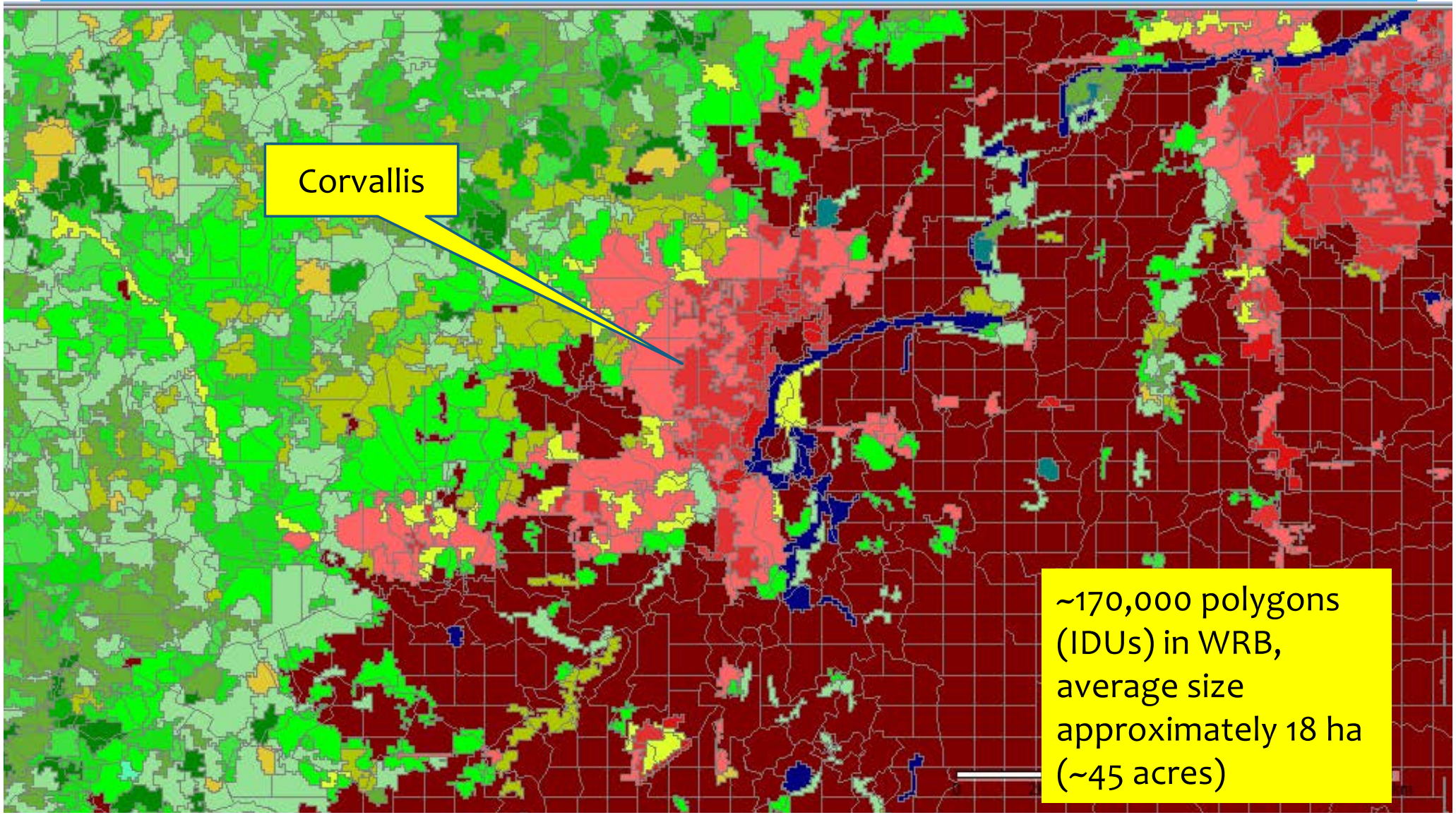
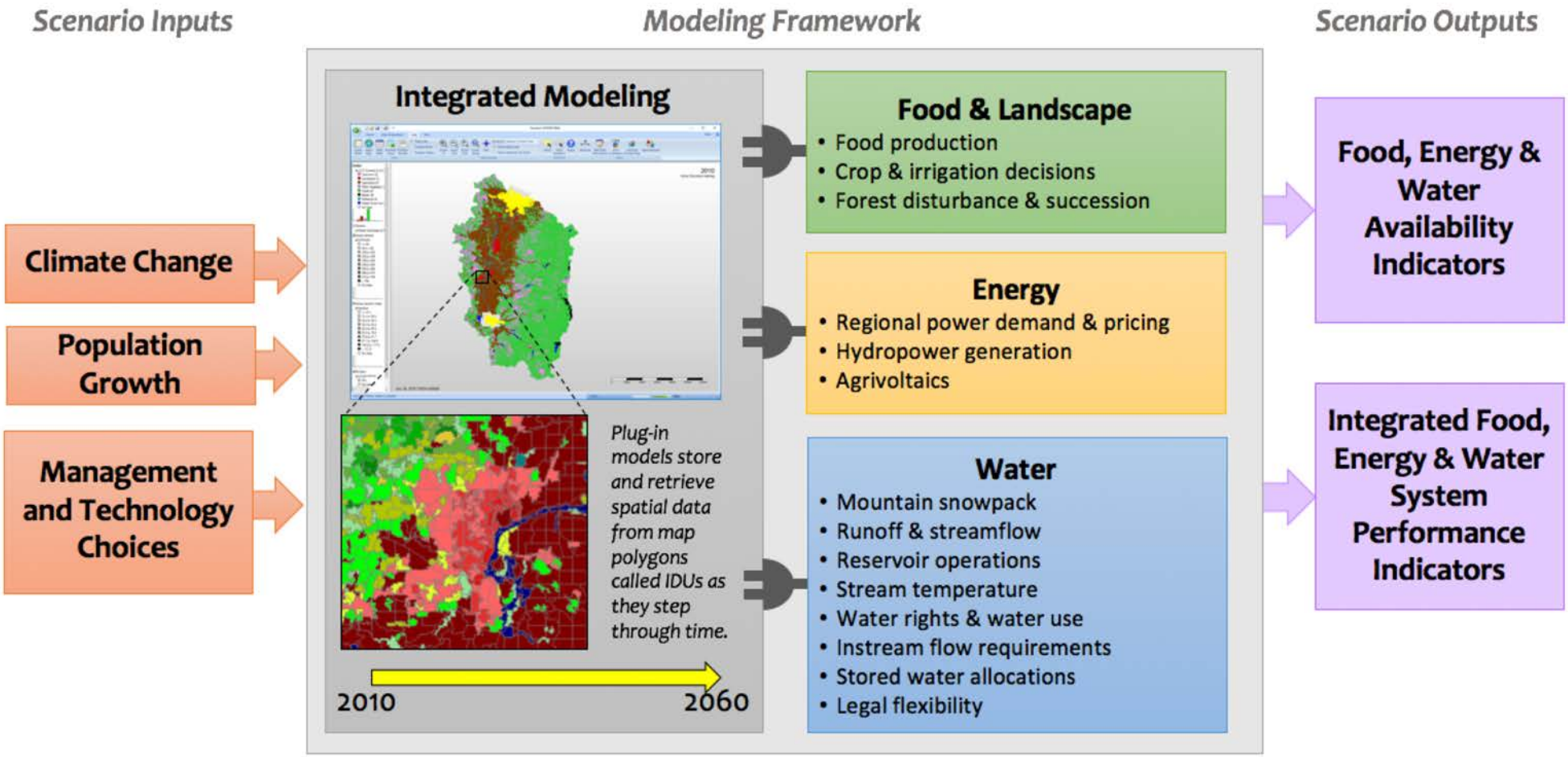


INFEWS Envision Modeling Framework

Willamette INFEWS Approach



Fall 2018 Caveats

- **The model is necessarily limited in what it can do**. While one of the most holistic basin water resources models in existence, there are many processes and levels of detail that it cannot and will not be able to represent.

- As the modeling moves forward, **there may (almost certainly will) be surprises**.

- We seek your guidance in prioritizing what, among the many important topics in the WRB, we should focus on.

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Hypotheses

1) Forest management → increases snowpack accumulation and retention → increases natural water storage → reduces wildfire

2) Climate change, population, renewables, regulations → alter reservoir operations for flood control, power generation, water supply, and water quality

3) Photovoltaic panels → shade crops → conserve local groundwater

4) Utilization of discretionary authorities in existing law/policy → impacts the FEW nexus

5) Urbanization → shifts water demands from agricultural toward urban uses → increases river water temperatures

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Poster Presenters and Topics:

Dave Conklin/Maria Wright – Overall model framework
Dave Rupp – Selecting climate change scenarios
Anne Nolin – Maximizing snowpack retention
Chad Higgins/Majdi Abou-Najm - Agrivoltaics
Adell Amos/Doug Quirke – Maximizing instream flows
Chris Enright/Cynthia Schwartz – Urban expansion & aquatic habitat
Jordan Kern/Joy Hill – West Coast electricity market dynamics
Simona Denaro/Greg Characklis – Solar challenges & opportunities in the Willamette Basin

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