
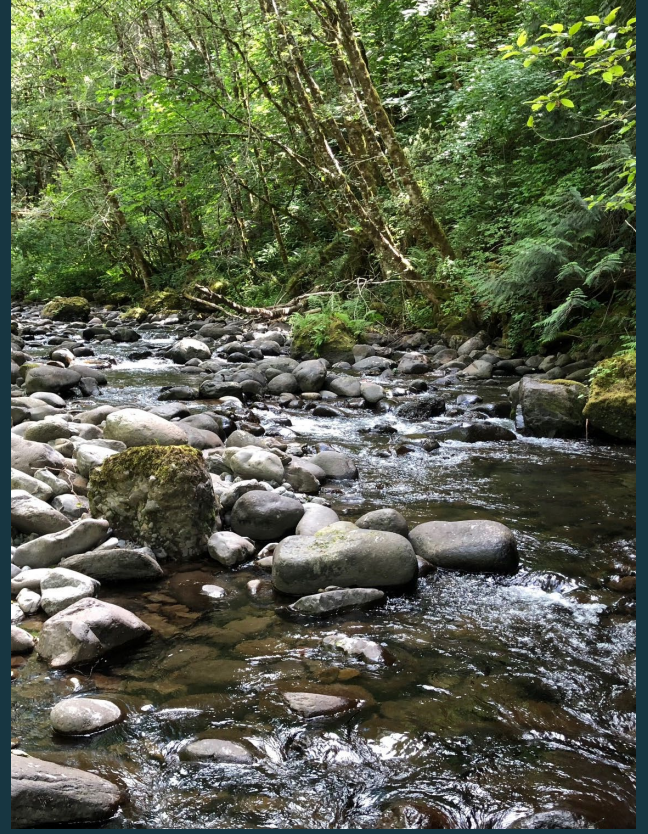
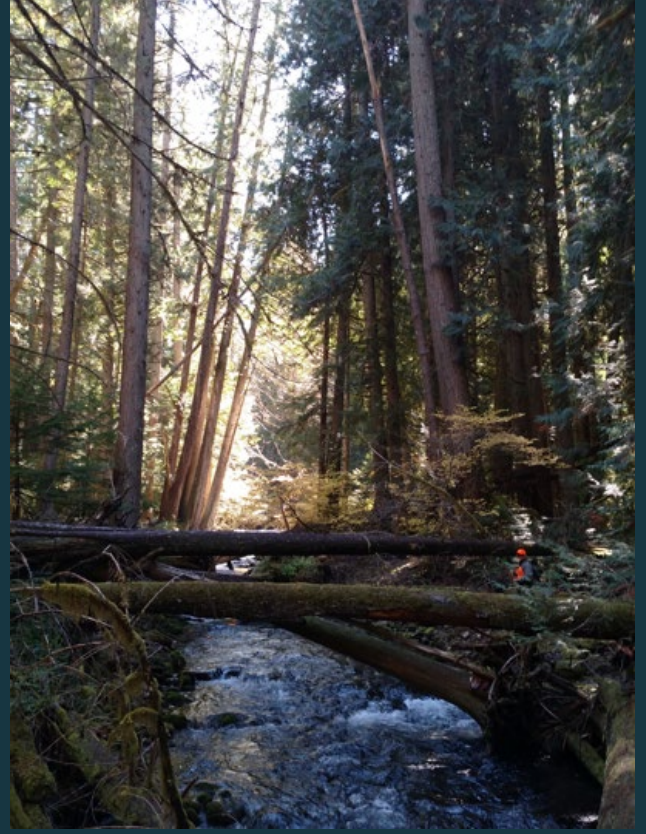


MODELING STREAMFLOW AND TEMPERATURE TO ADVANCE OUR UNDERSTANDING OF THE EFFECTS OF CLIMATE CHANGE

Research, Evaluation, Data, and Decision (REDD) support
Courtney Lynn Zambory (courtney.l.zambory@oregon.gov)

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BACKGROUND

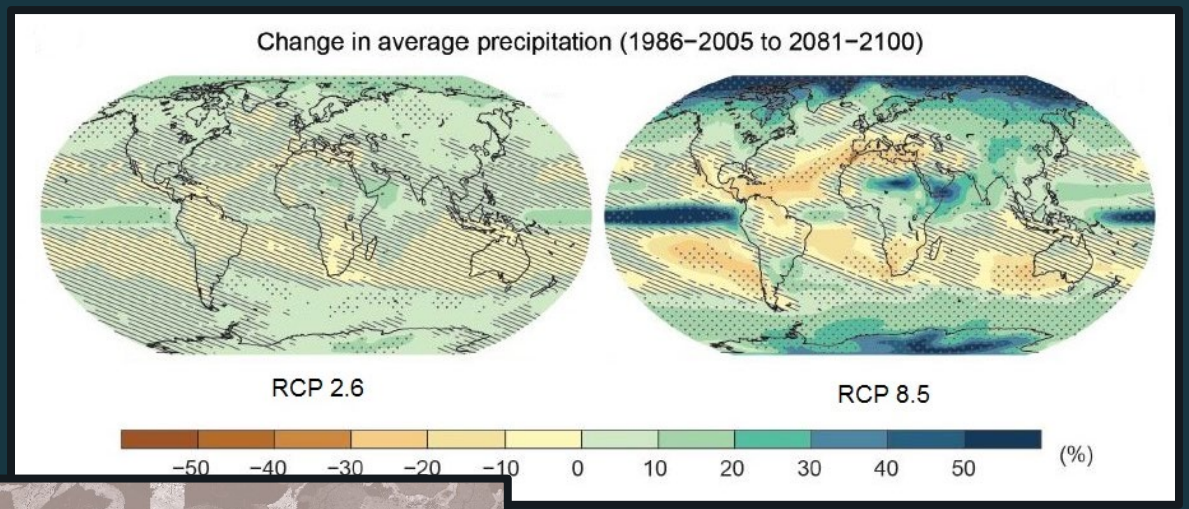
» Changing climate will impact habitat

» Need For:

» Higher resolution instream temperature and flow metrics

» Understanding of what instream conditions fish experience now and in the future

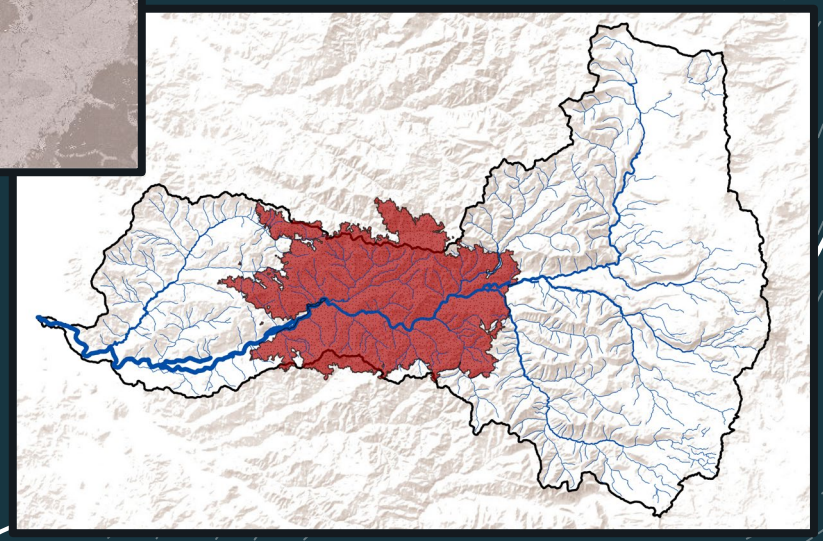
» Information to inform ***proactive*** management



Climate Change

Restoration

Fire



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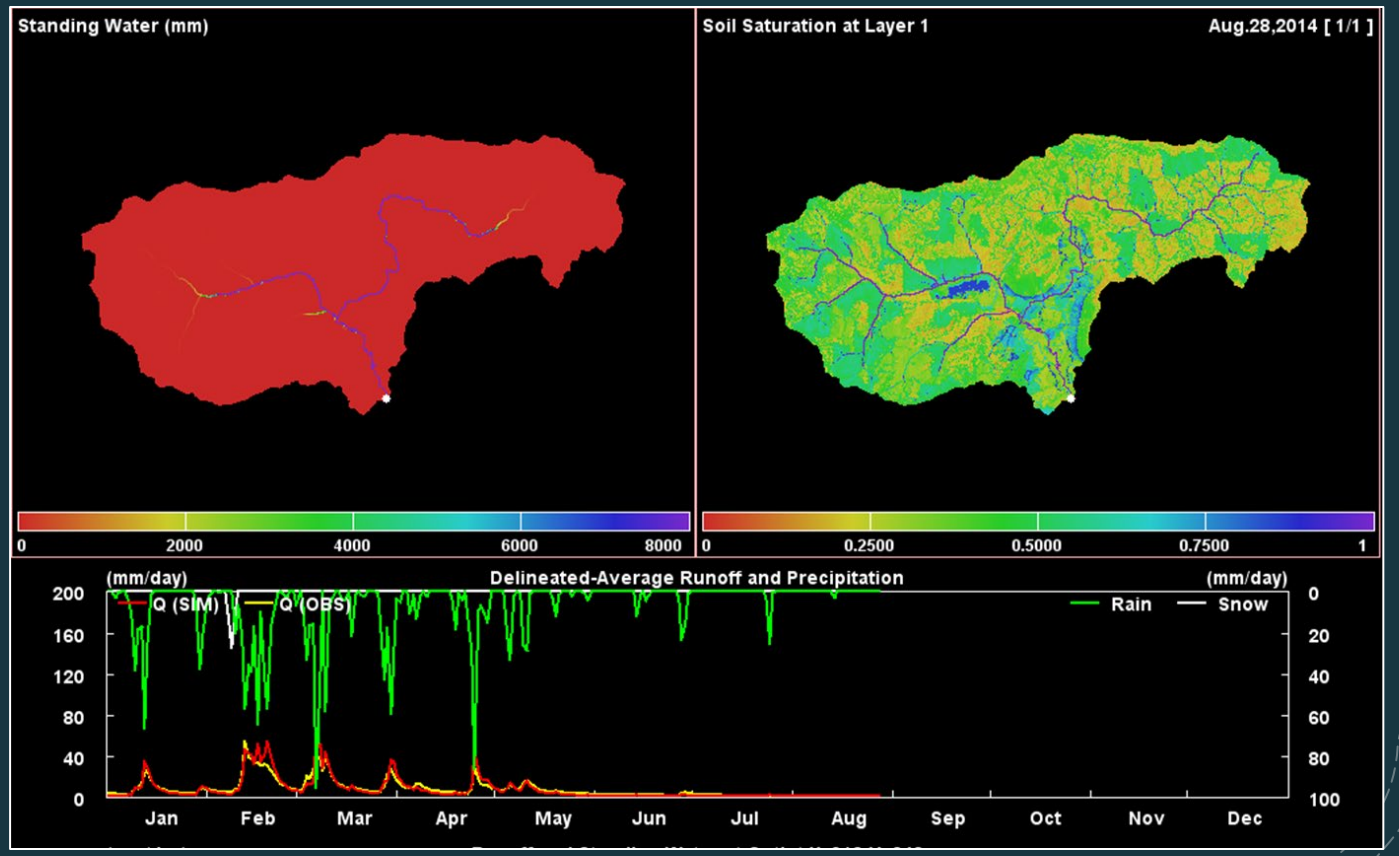
VELMA

» Visualizing Ecosystem Land Management Assessments (VELMA)

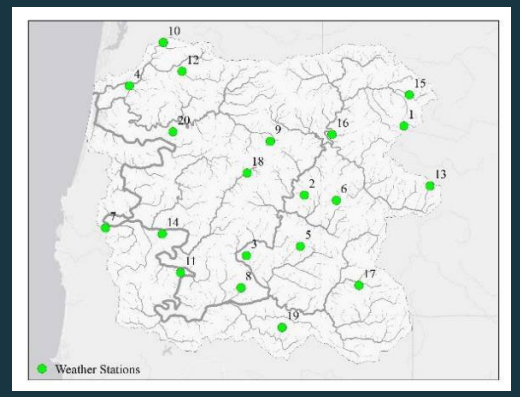
» Ecohydrological model
  » Links terrestrial and aquatic processes

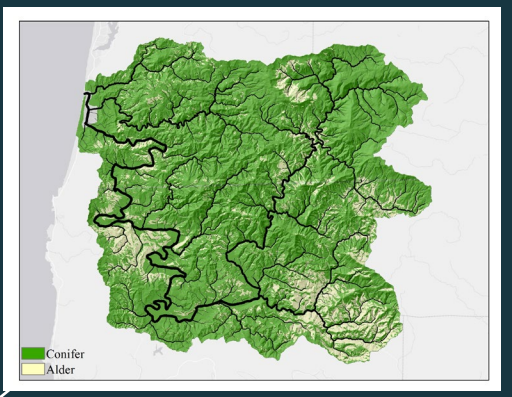
  » "…integrated responses of vegetation, soil, and water resources…"



VELMA

- Accepts publicly available data
- Work together to model hydrological, terrestrial, and biochemical responses

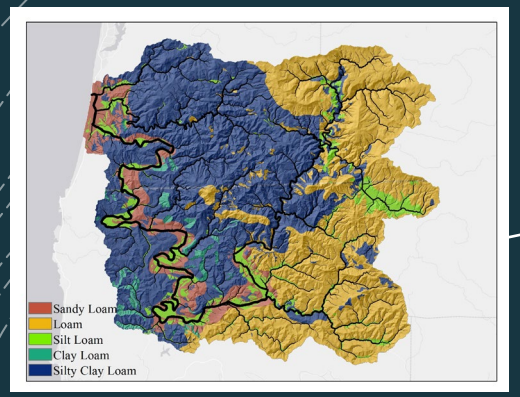




Weather

Elevation

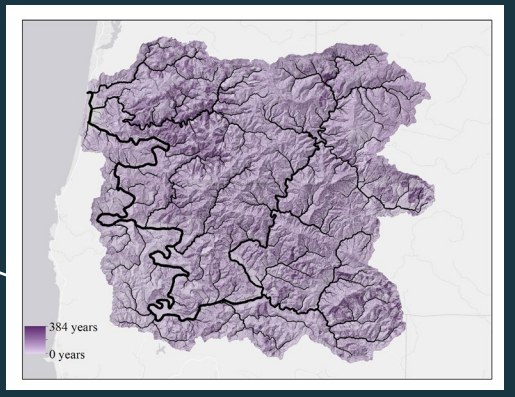
Land cover



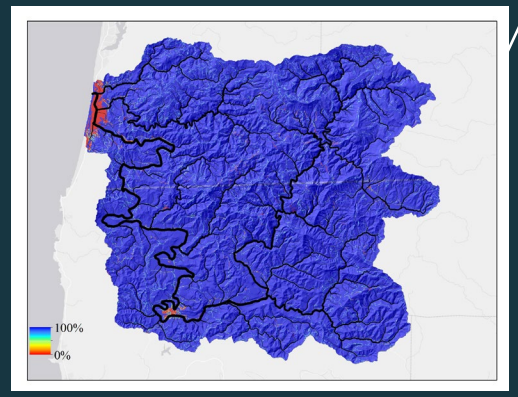
Soil

VELMA

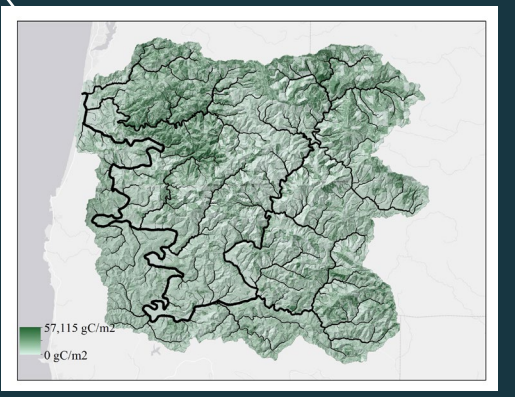
Age



Permeability



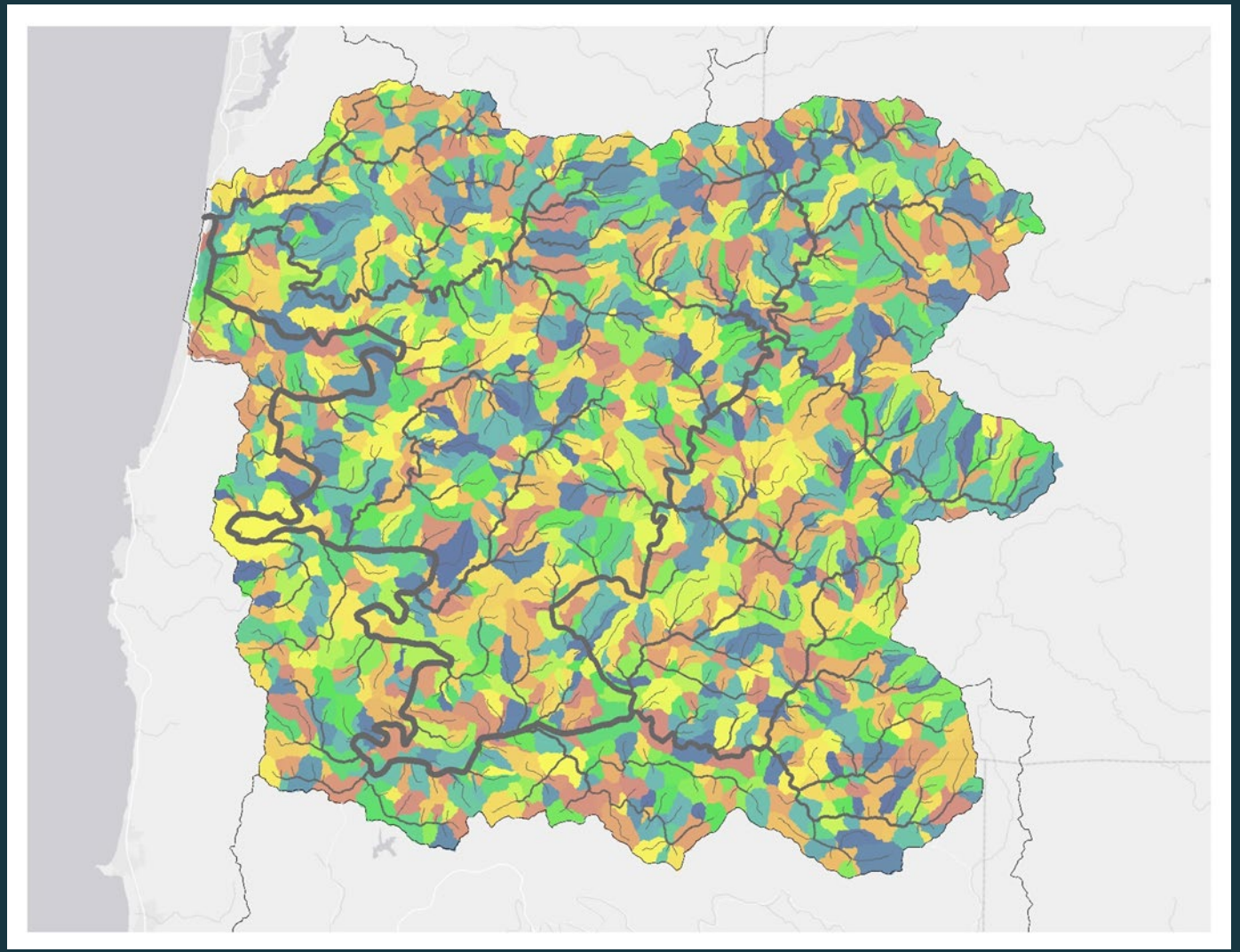
Biomass



OUTPUT RESOLUTION

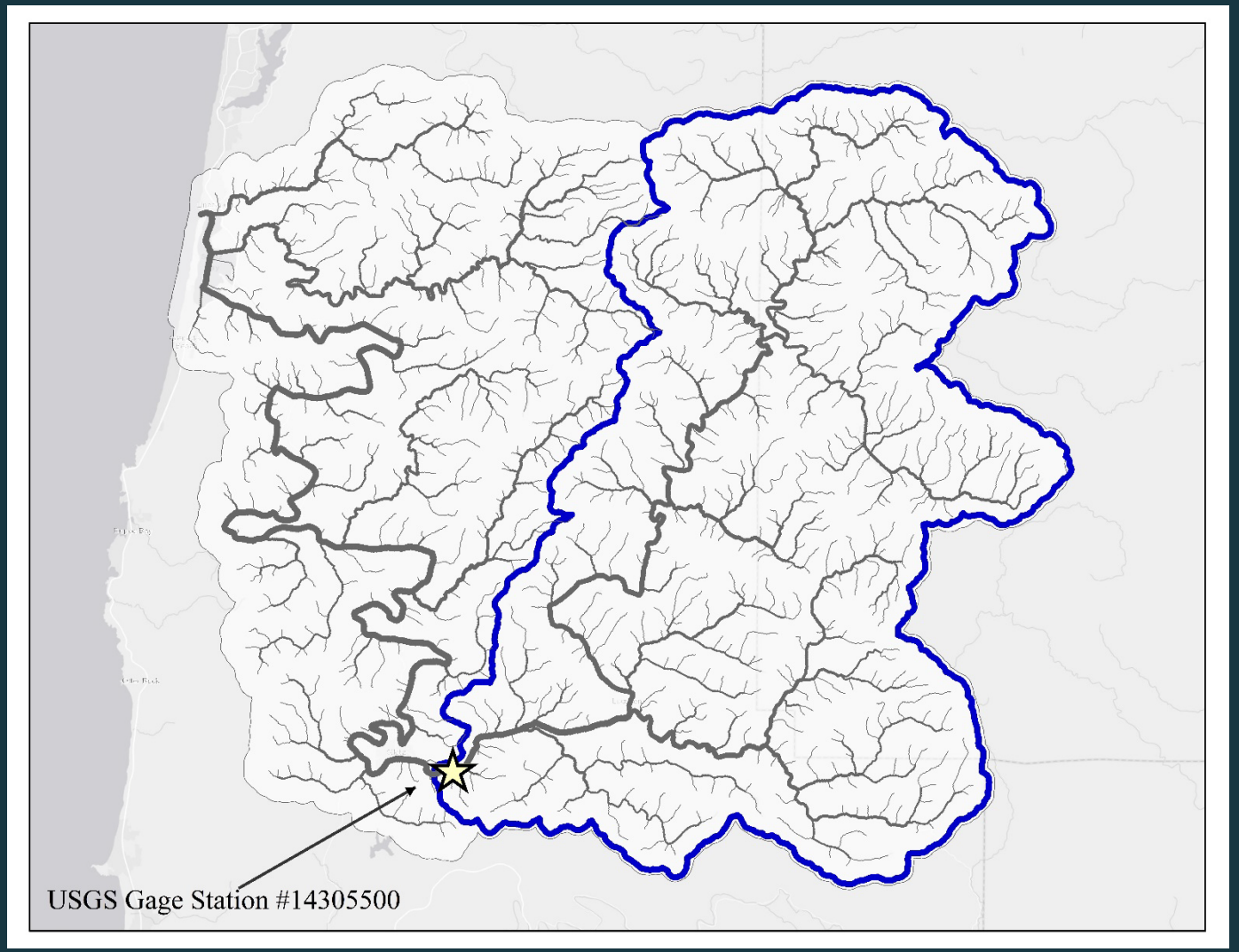
» VELMA outputs are ***daily***, ***reach-level results***

» Downstream reaches consider upstream processes



CALIBRATION AND VALIDATION

» Compare modeled daily flow results to corresponding daily USGS gage data



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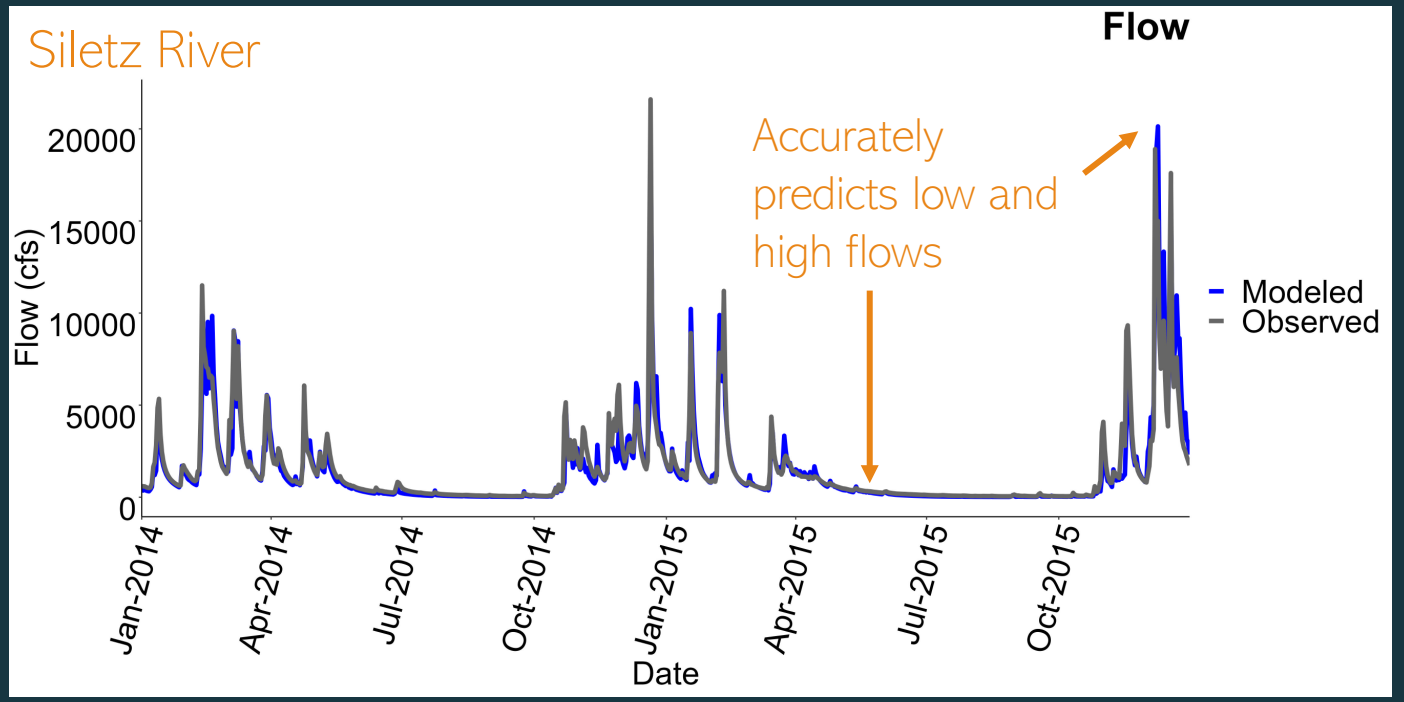
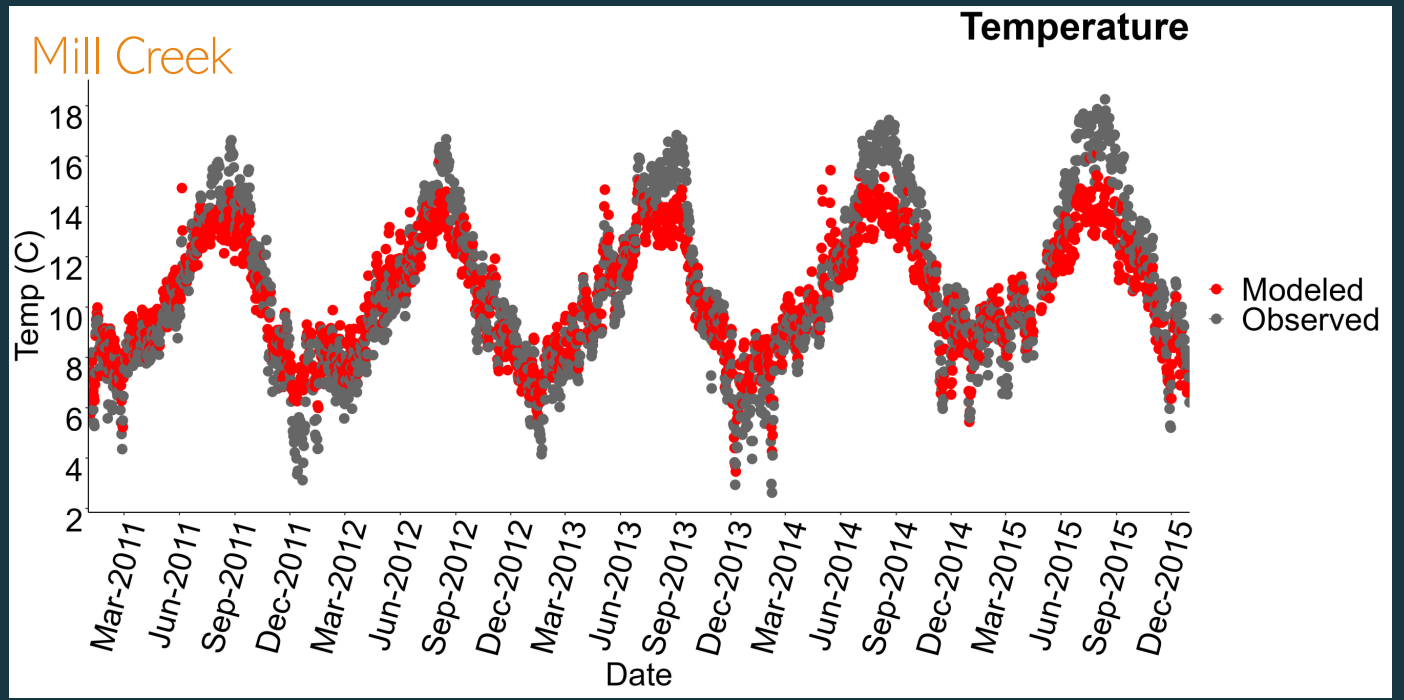
MODEL PERFORMANCE REFLECTIVE OF MEASURED VALUES

» Compared modeled with observed data on the landscape

» Observed data are from USGS gages and Thermistors





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HOW DOES THIS INFORM MANAGEMENT OF OUR RESOURCES?

1. Understand
2. Predict
3. Mitigate/Minimize

HOW DOES THIS ASSIST MANAGEMENT OF OUR RESOURCES?

1. Understand

   » Provide spatially continuous data across watersheds to better understand our landscape as it currently stands

   » Allow us to look backward in time to understand how habitat conditions affected salmonid populations

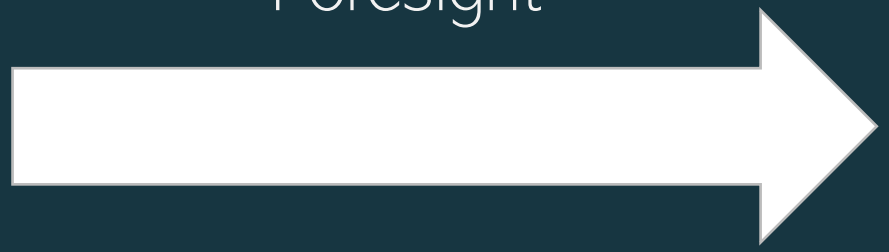
Hindsight

HOW DOES THIS INFORM MANAGEMENT OF OUR RESOURCES?

1. Understand

2. Predict
   - » E.g., Quantify how various climate scenarios will affect stream temperatures and flows in the future

Foresight



PREDICTING THE IMPACT OF CLIMATE CHANGE

» We use 10 climate models to provide daily *precipitation* and *temperature* from 2065-2095

1. CanESM-2
2. CCSM4
3. CNRM-CM5
4. CSIRO-Mk3-6-
5. GFDL-ESM2M
6. MIROC5
7. HadGEM2-CC
8. HadGEM2-ES
9. inmcm4
10. IPSL-CM5-MR

» River Management Joint Operating Committee (RMJOC)

» We use the RCP 8.5 emissions scenario

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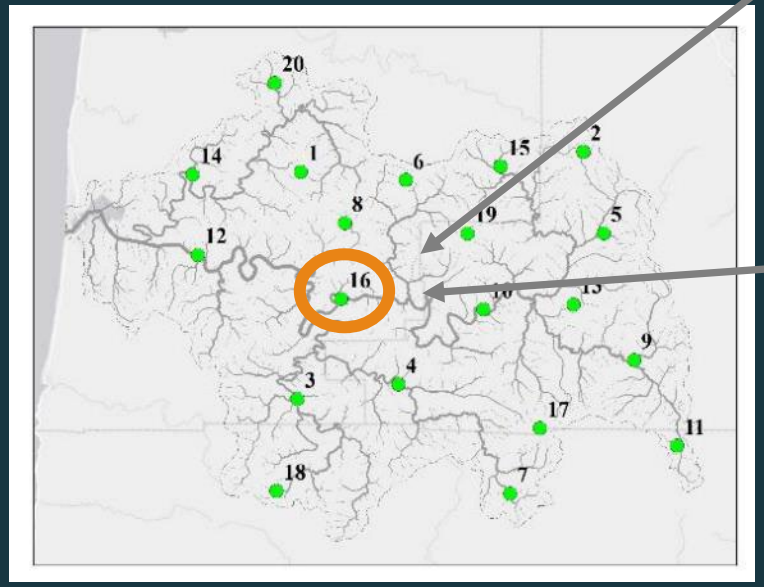
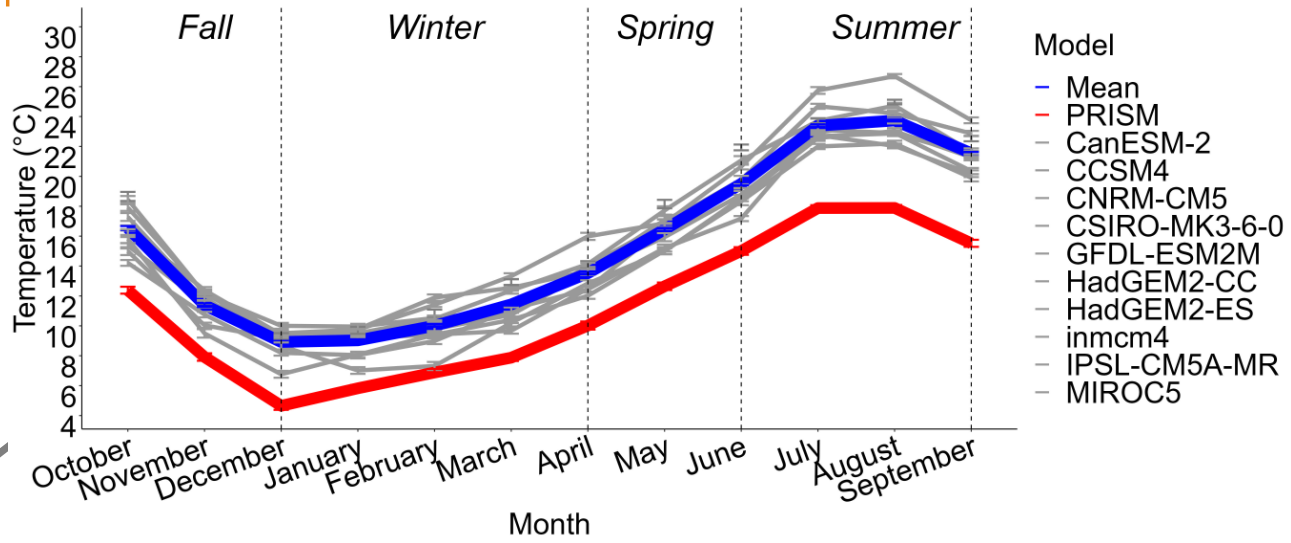
CLIMATE MODEL INPUTS TO VELMA

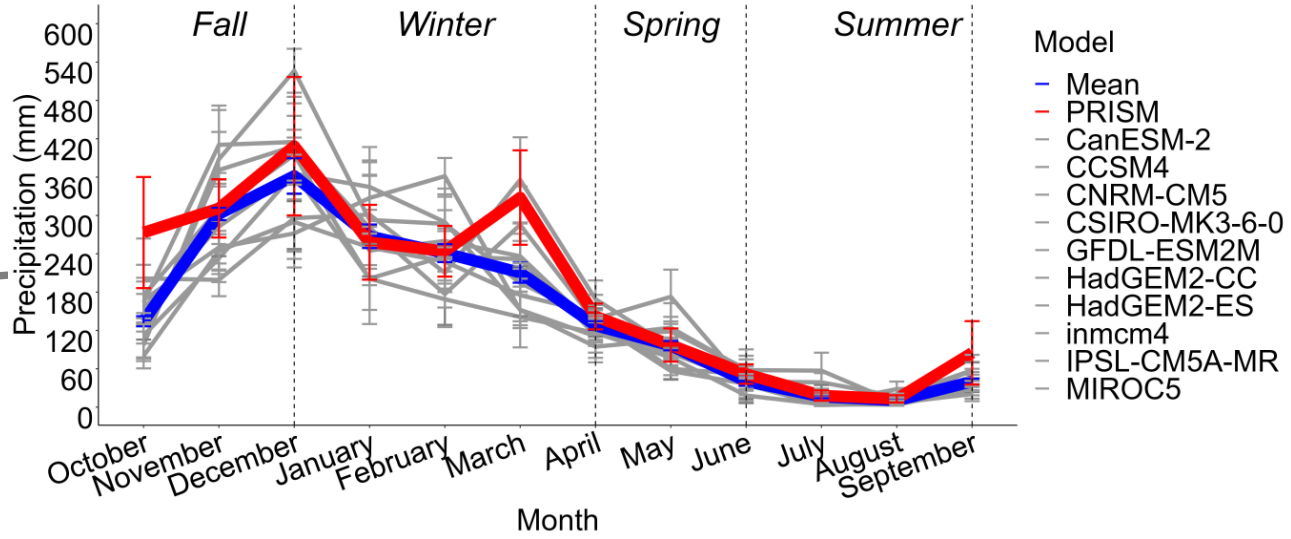
- Variability among climate model predictions on the Oregon Coast



All climate models predict year-round increases in temperature



Substantial variation in seasonal precipitation predictions among models



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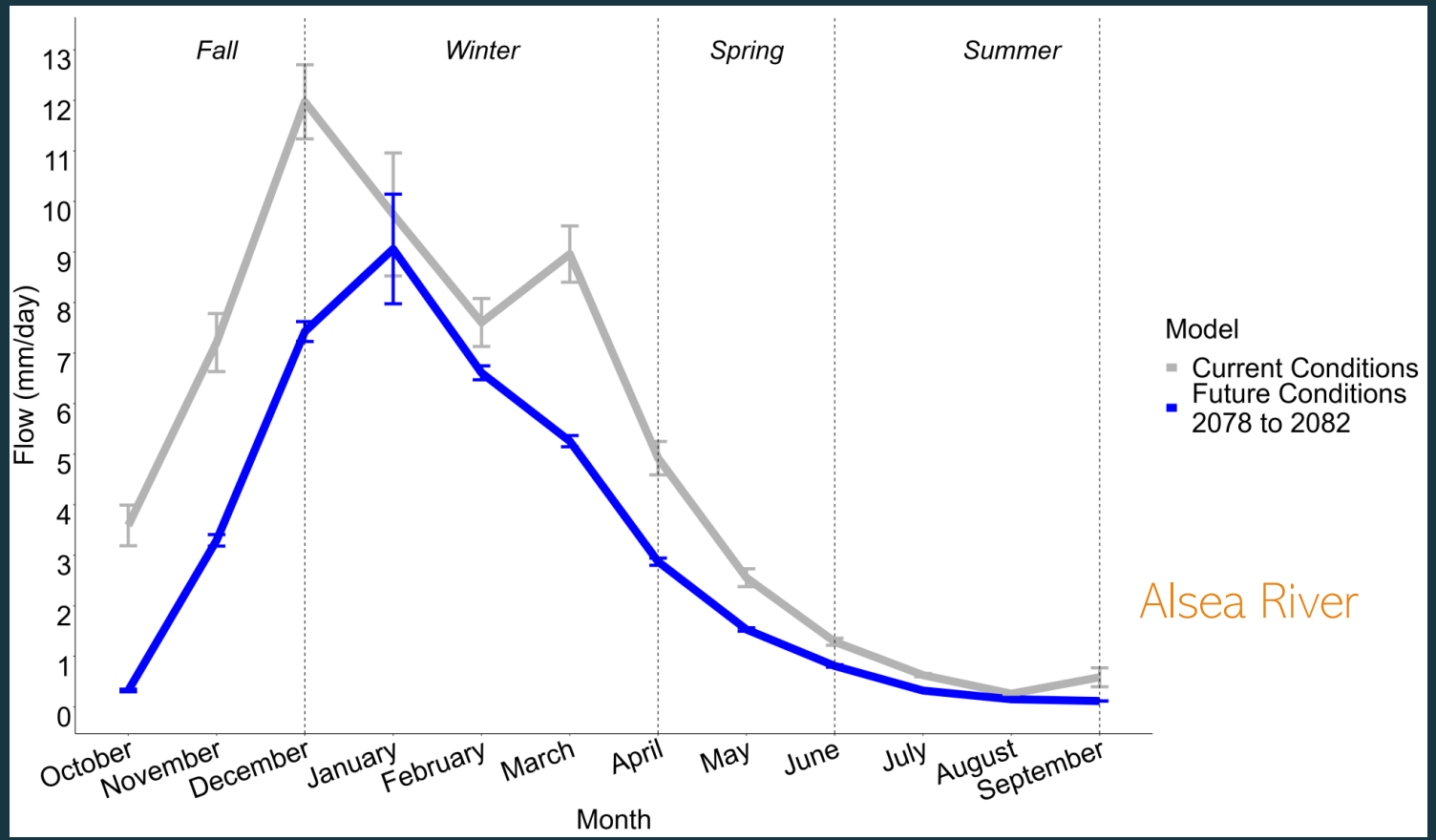
VELMA PROJECTS FLOW WILL DECREASE

» All 10 models were averaged monthly to generate “future conditions”

» Changes in flow are variable and seasonal



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HOW DOES THIS INFORM MANAGEMENT OF OUR RESOURCES?

1. Understand

2. Predict

3. Mitigate/Minimize
   - » Scenario Modeling
     - » Conduct proactive restoration and mitigation modeling
     - » Identify and protect areas with potential climate change resilience

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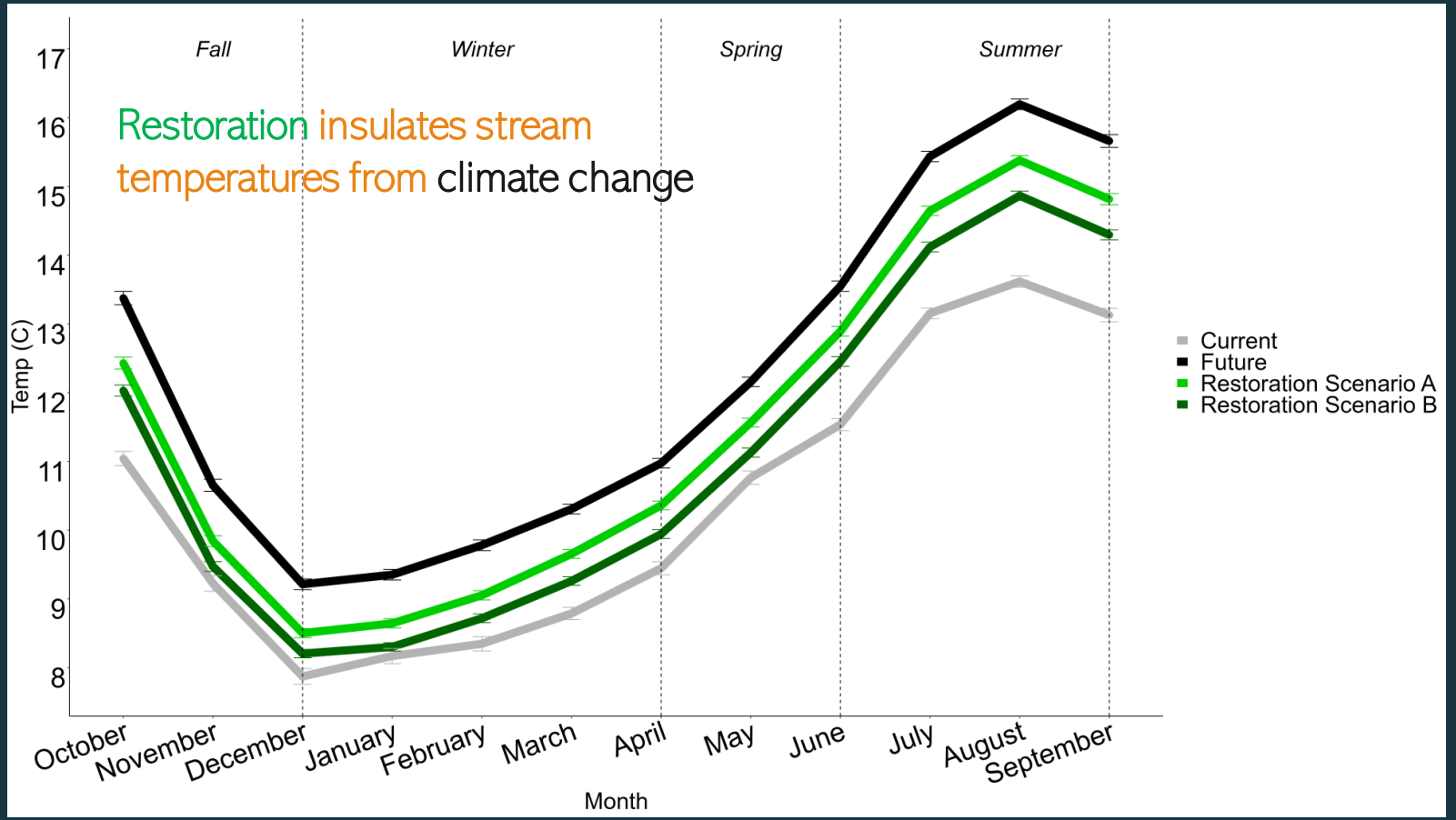
PLANNING EXAMPLE

» Incorporating restoration scenarios

» Riparian plantings may mitigate future temperature increases



https://willamettewatertrail.org/map/blue-ruin-island/

SUMMARY

» *Only a part of a wider ODFW Temperature Monitoring Proposal*

» What will instream conditions be under future climate conditions?

» We can proactively plan for mitigation

» How do/will fish populations respond to changing habitat conditions?

QUESTIONS?

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