California's Changing Climate

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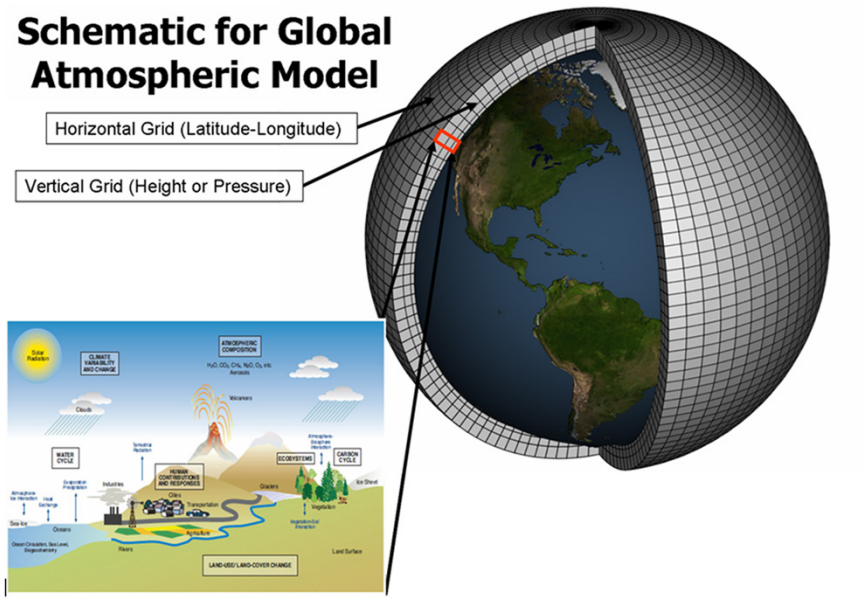
Outline

- **Climate Models, Emissions Levels and Climate Exposure**
- **State and Regional climate trends and projections**
- **Role of climate science in decision making**

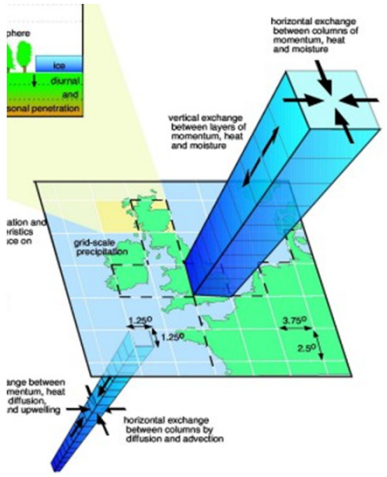
Climate Models, Emissions Levels and Climate Exposure

IPCC Reviews the science and trends

Global Climate Modeling Groups Model

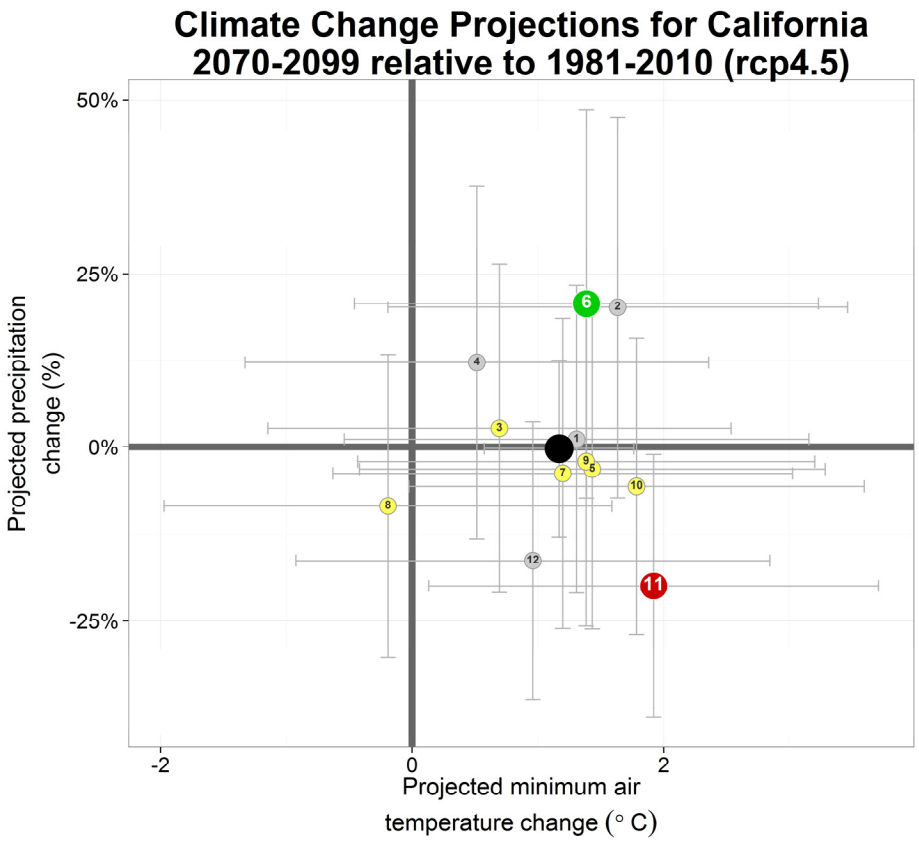


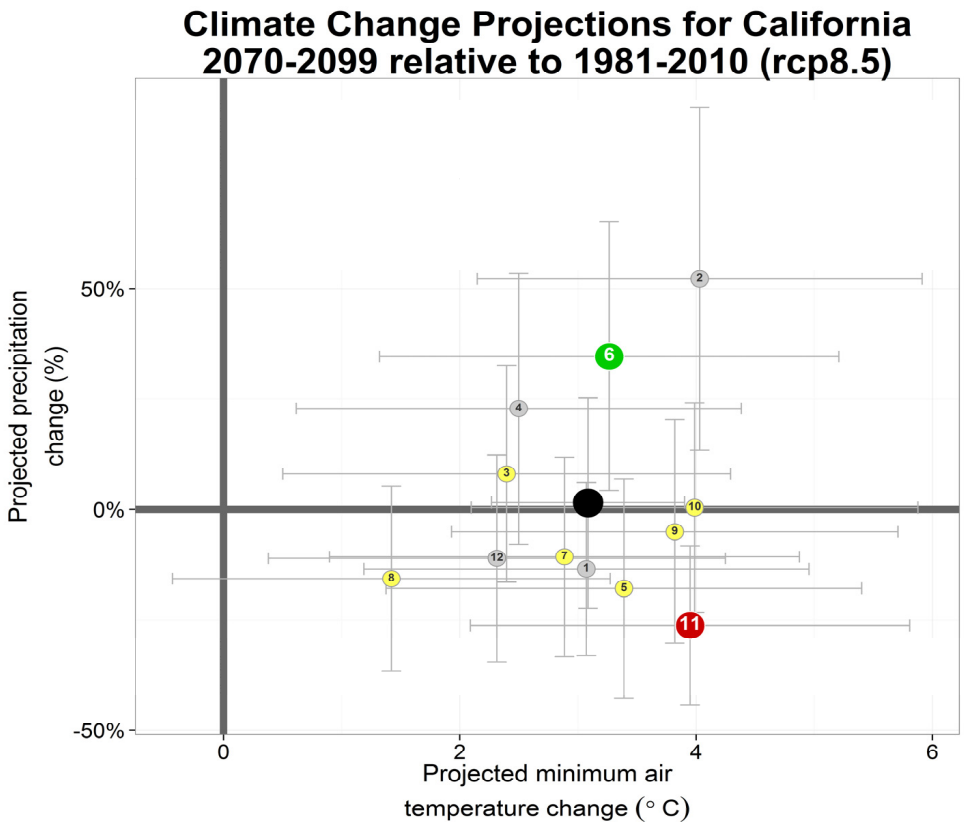
People Downscale GCMs

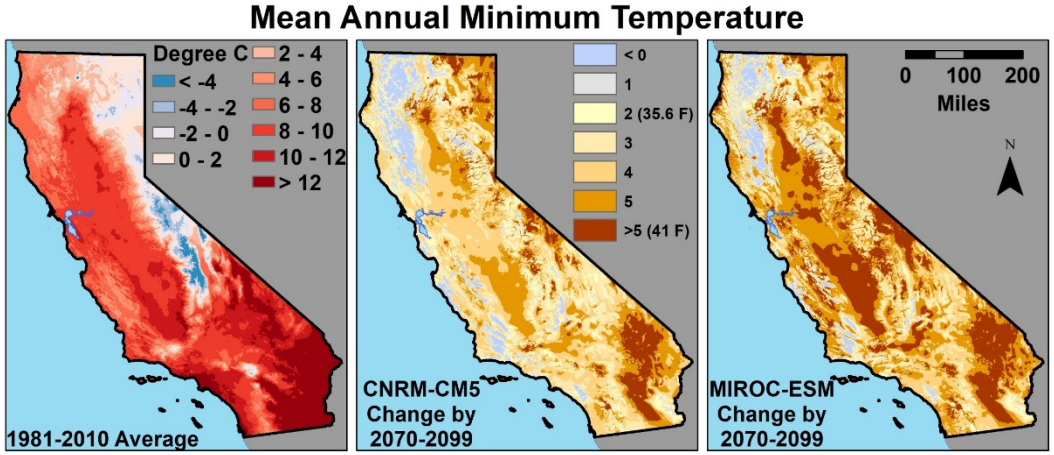


Governments and People Use for Planning and Action

State-wide scan of climate change models projections for California







Average Temperature Warming in California

Scenario	2046-2065 Mean and *likely* range	2081-2100 Mean and *likely* range
RCP4.5	2.5 F (1.6 – 3.6)	3.2 (2 – 4.7)
RCP8.5 (Current Rate of Emissions)	3.6 F (2.5 – 4.7)	6.6 F (4.4 to 8.2)

Climate Change Definitions

Different ways to measure/project climate change

We can ask how will conditions shift, and where will current conditions persist?

Climate Velocity – the distance and speed that a set of climate conditions will move under projected futures.

Place-based Climatic Exposure – The level of change in climate conditions at a specific location.

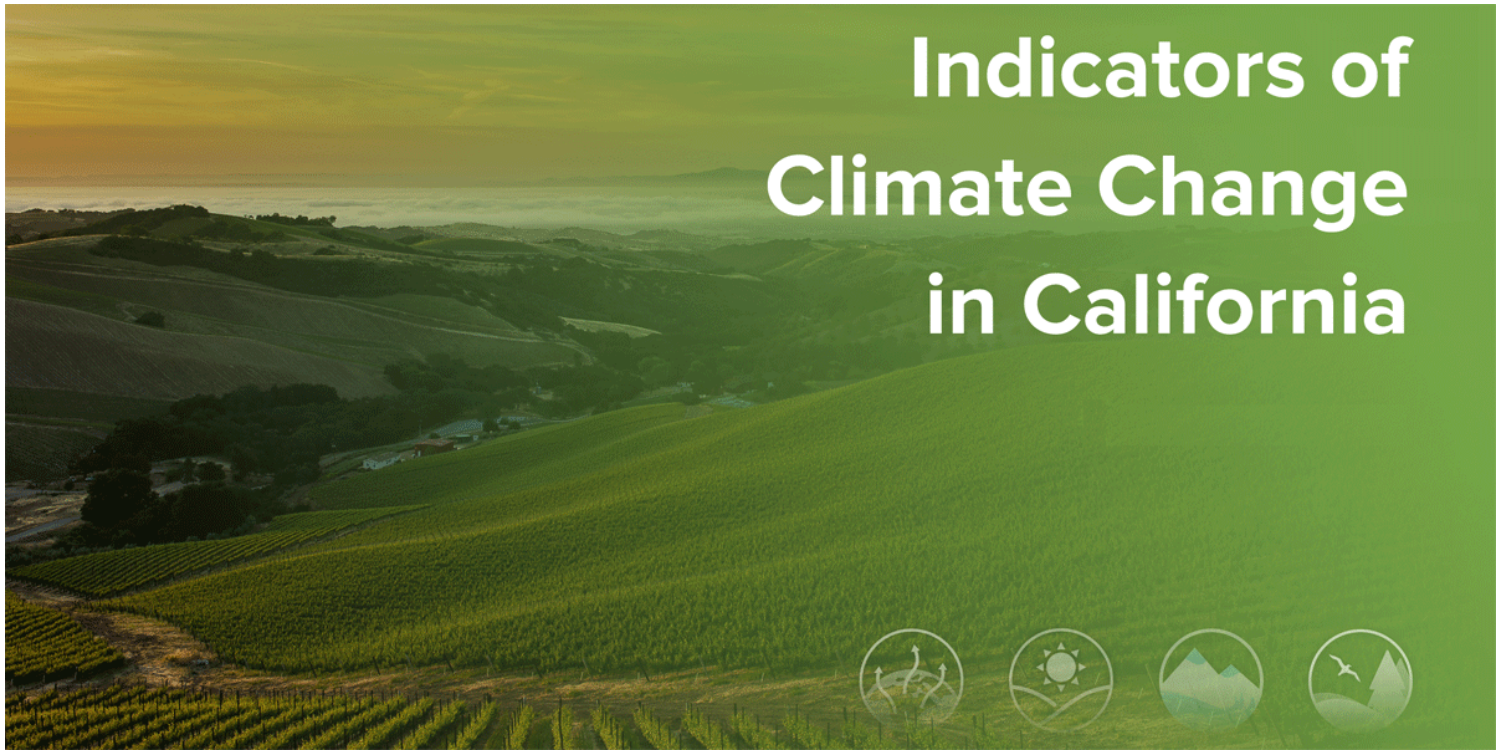
Climate Refugia – Locations that will retain tolerable climate conditions for a species or set of species.

Species Range Shifts – the distance that a species range may shift to remain in a set of climatic conditions. If the species can keep up, it may be able to track the velocity of climate change.

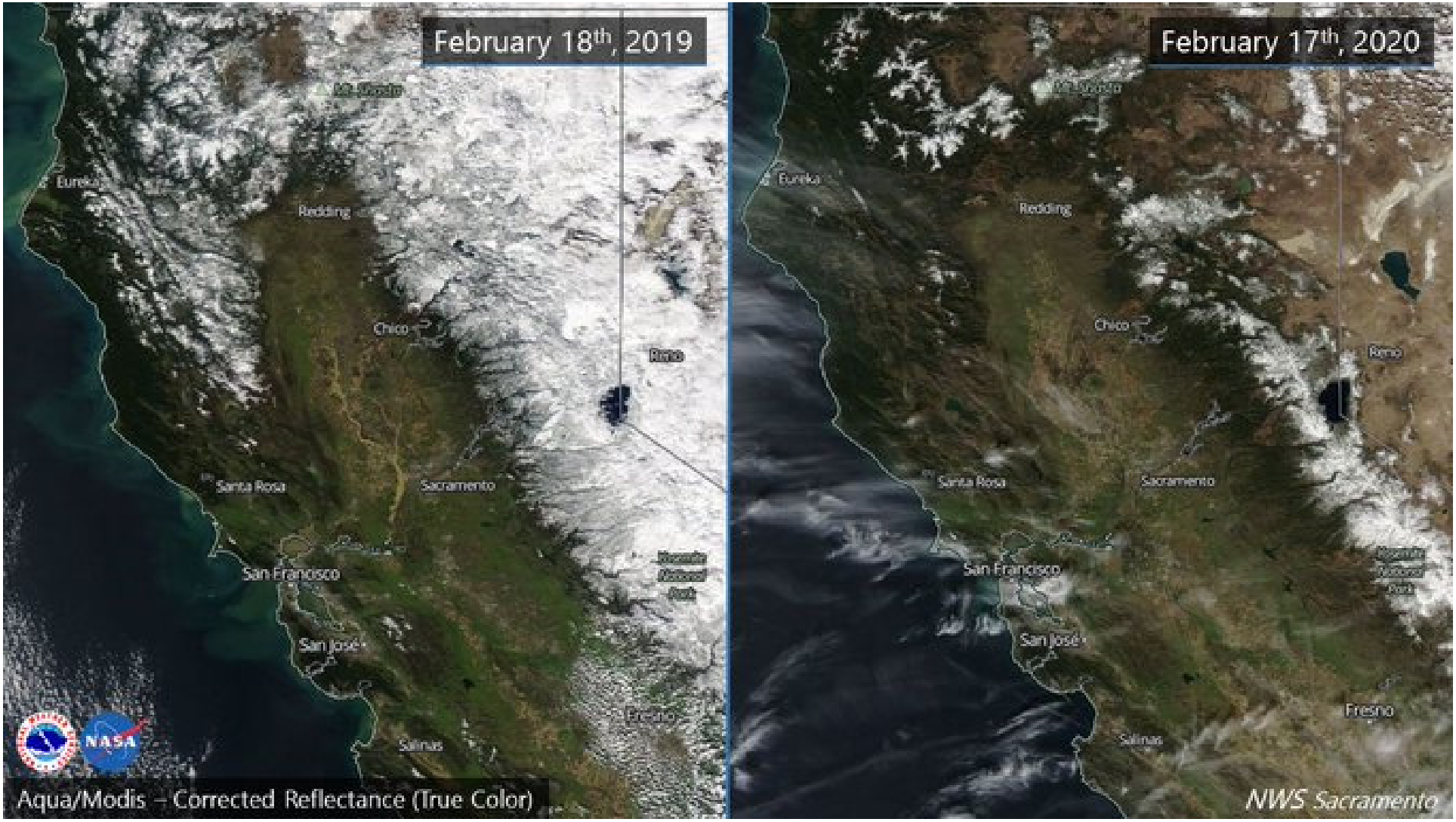
Other shifts – seasonality, soil moisture, suitable species

State and Regional climate trends and projections

Role of climate science in decision making



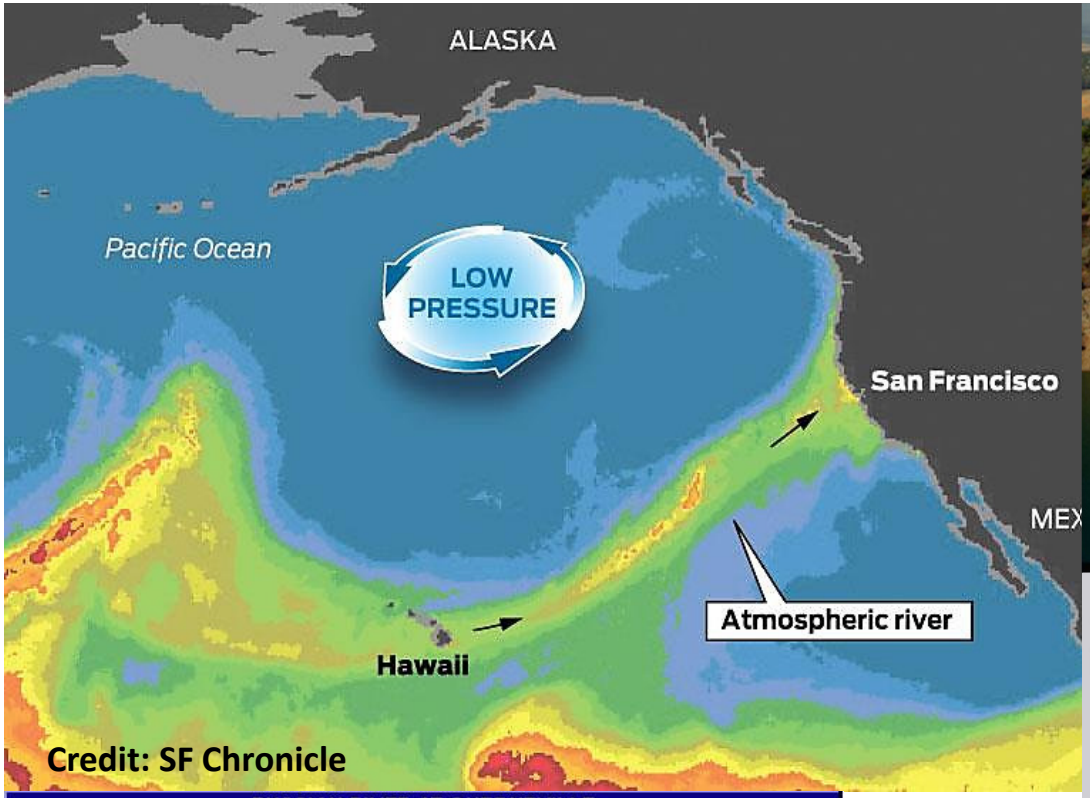
https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california



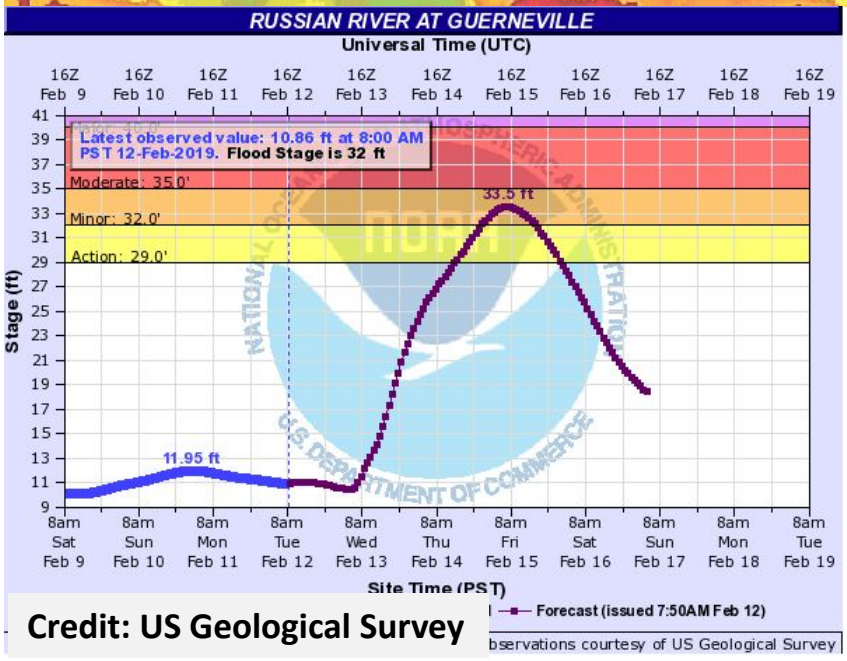
Climate Change is already impacting California's Ecosystems:

Snowpack; Water – ground water extraction, algal blooms;

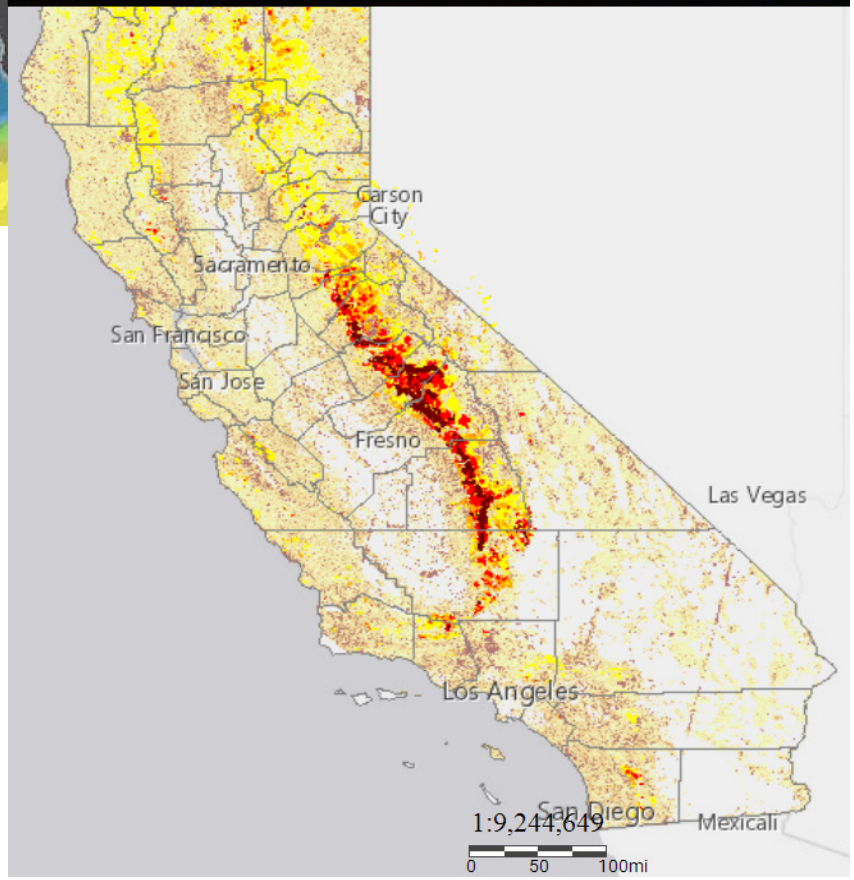
Tree Mortality – Drought, beetle outbreaks; Coastal Ecosystems; Fire Frequency; Winds; Seasonality – 'shoulder seasons'



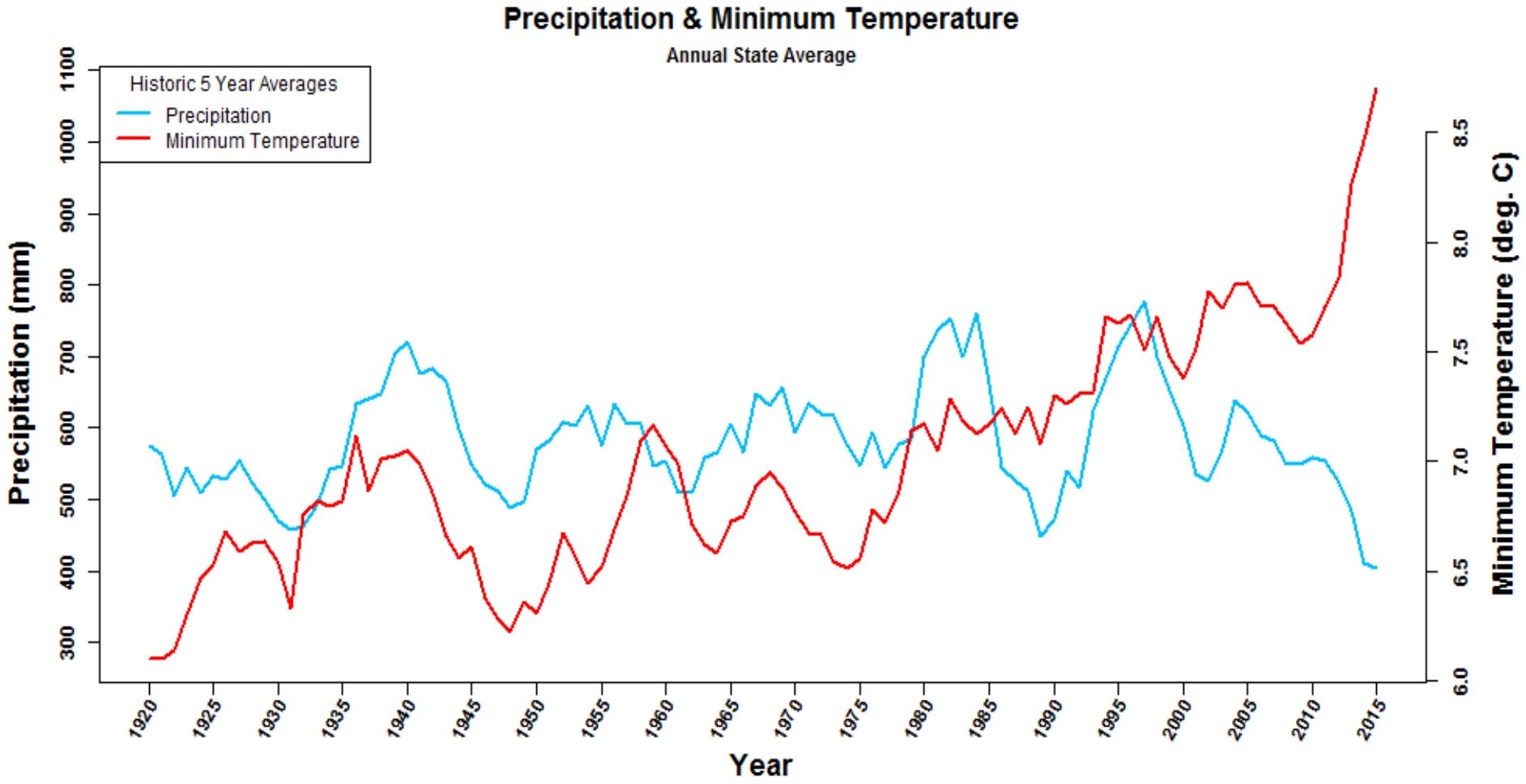
Credit: SF Chronicle



Credit: US Geological Survey

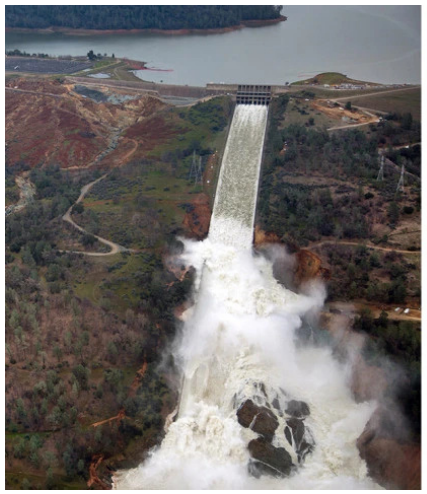


State and Regional climate trends and projections



Annual Average Precipitation and Temperature for California

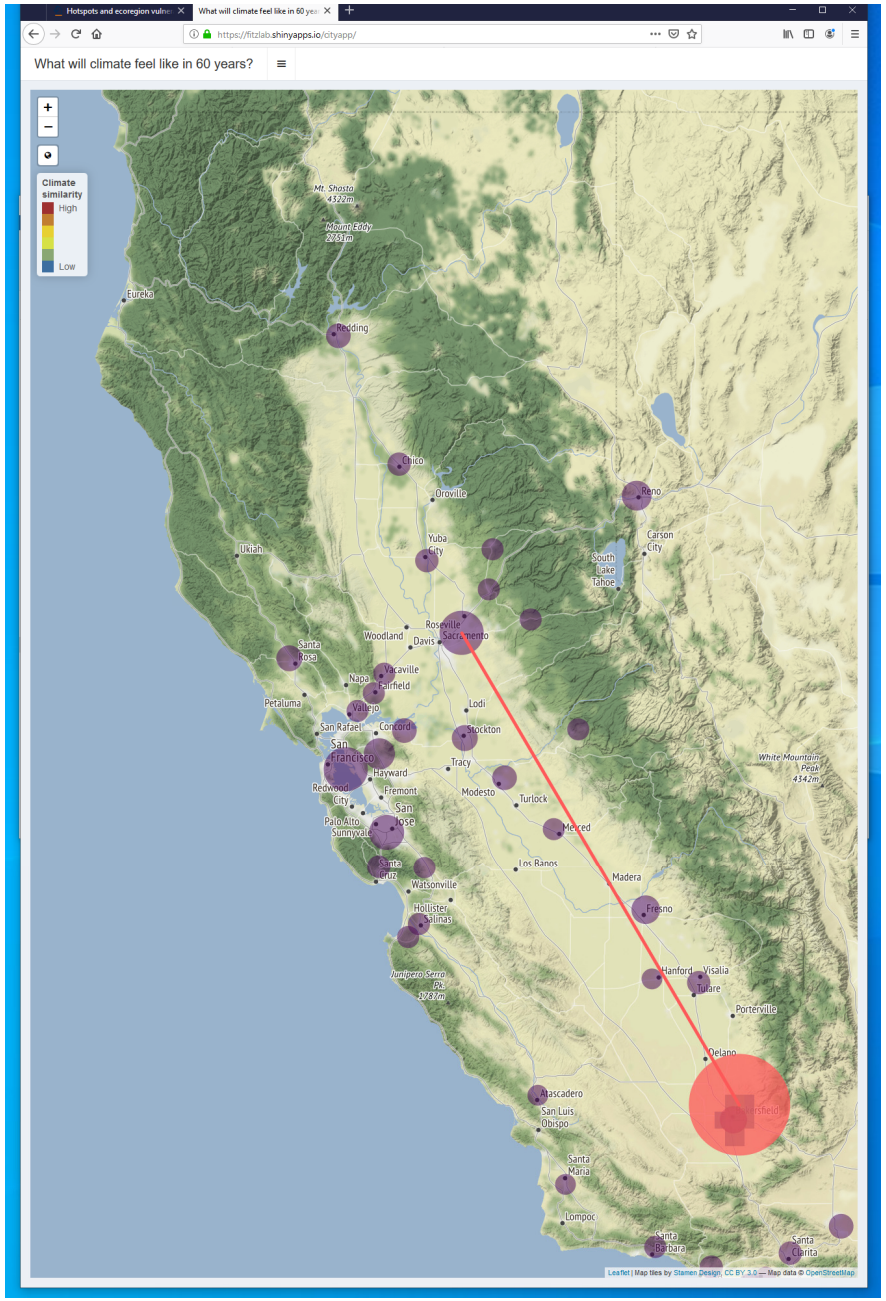
Climate Change is also already impacting California's Infrastructure



Oroville Dam $ 1.1 Billion

Road repair post-wildfire $ 500 M

Shutting of Electrical Power during windstorms - $?

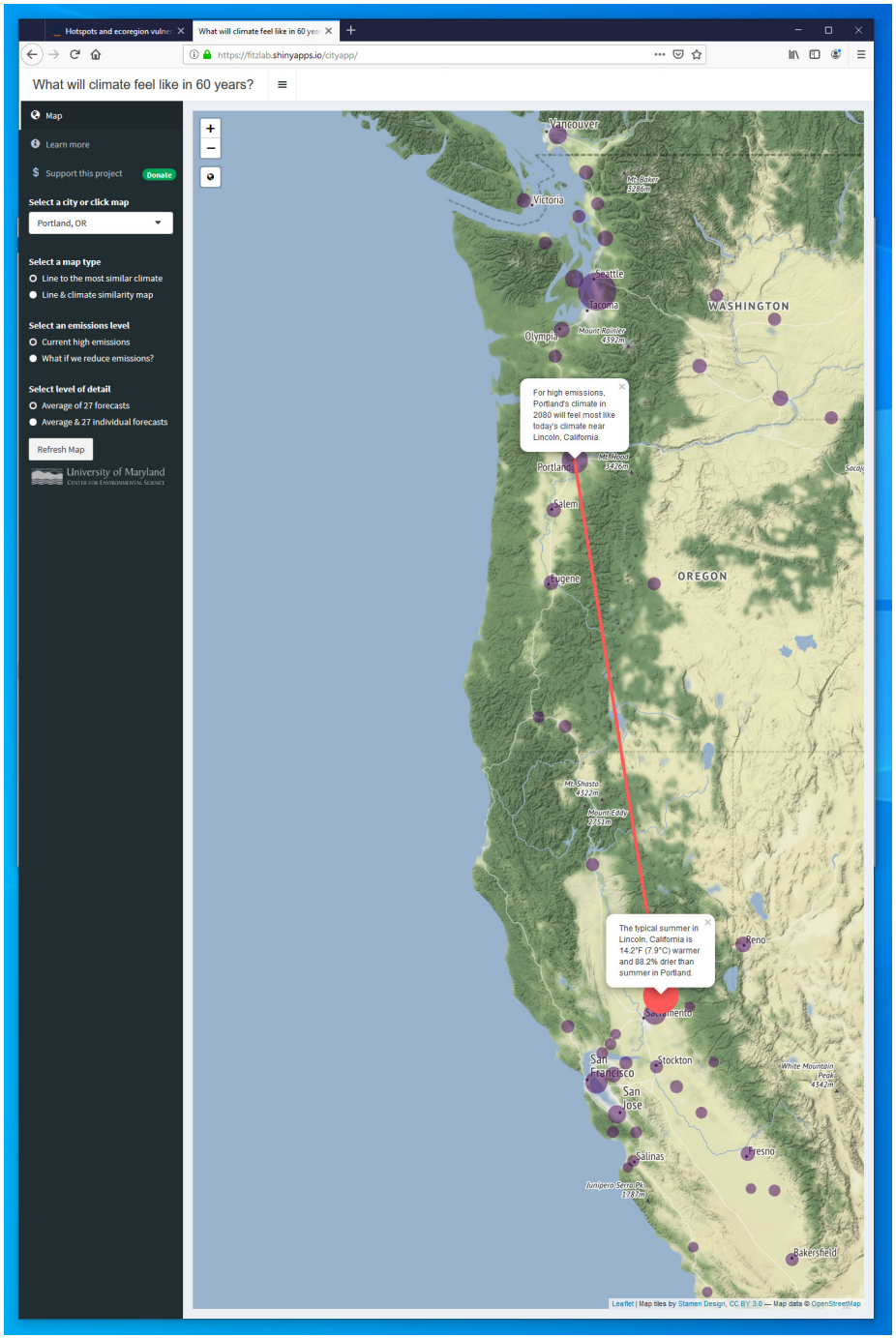


Arriving Climates - Davis will by like Bakersfield by 2080

Departing Climates -

Salem, OR will by like Sacramento in 2080

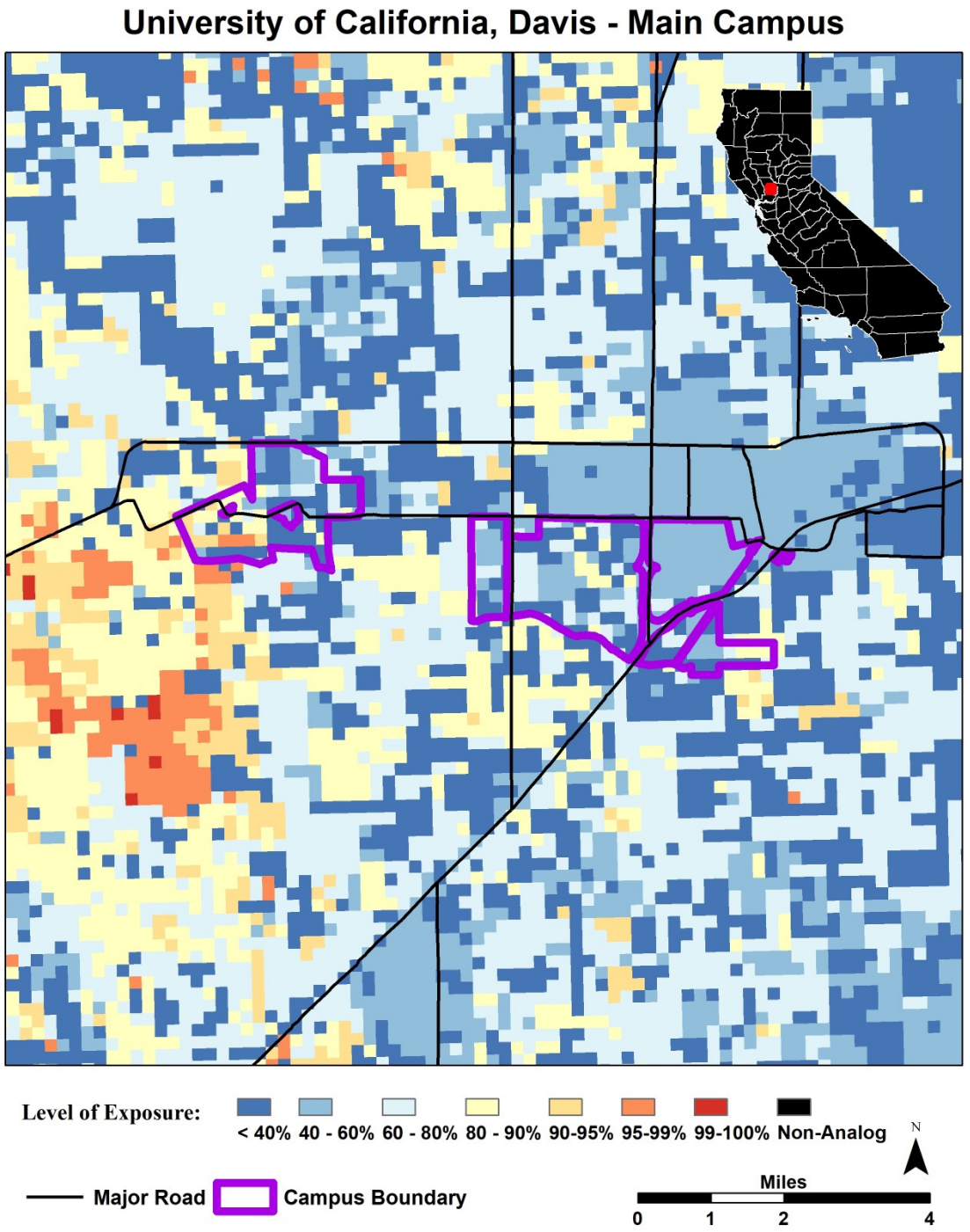
https://fitzlab.shinyapps.io/cityapp/



Climate Exposure – In-Place Measures

Campus climate exposure

1980-2010



Campus climate exposure

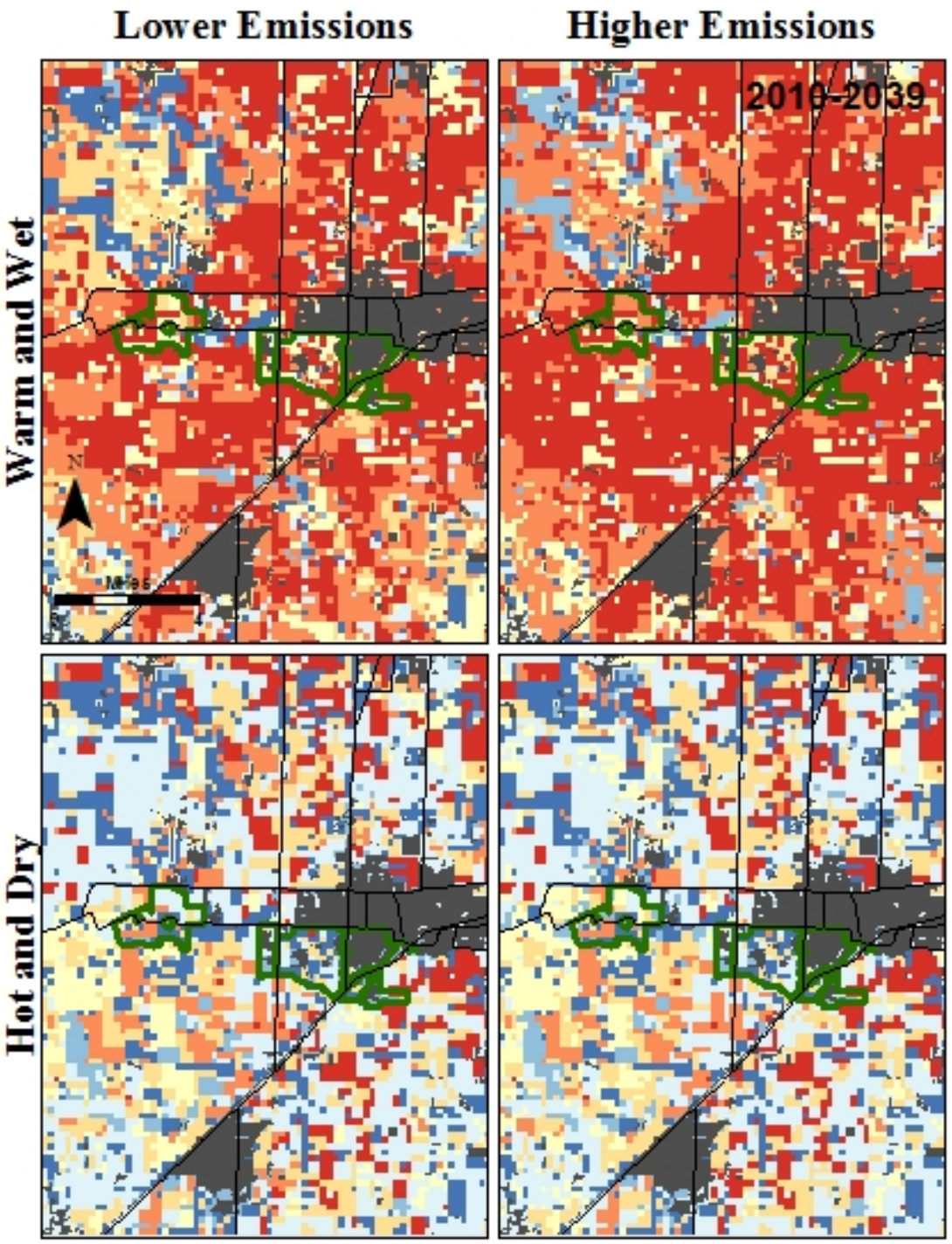
2010-2039

Level of Exposure:

< 40% **40 - 60%** **60 - 80%**

90-95% **95-99%** **99-100%**

Non-Analog



Campus climate exposure

2040-2069

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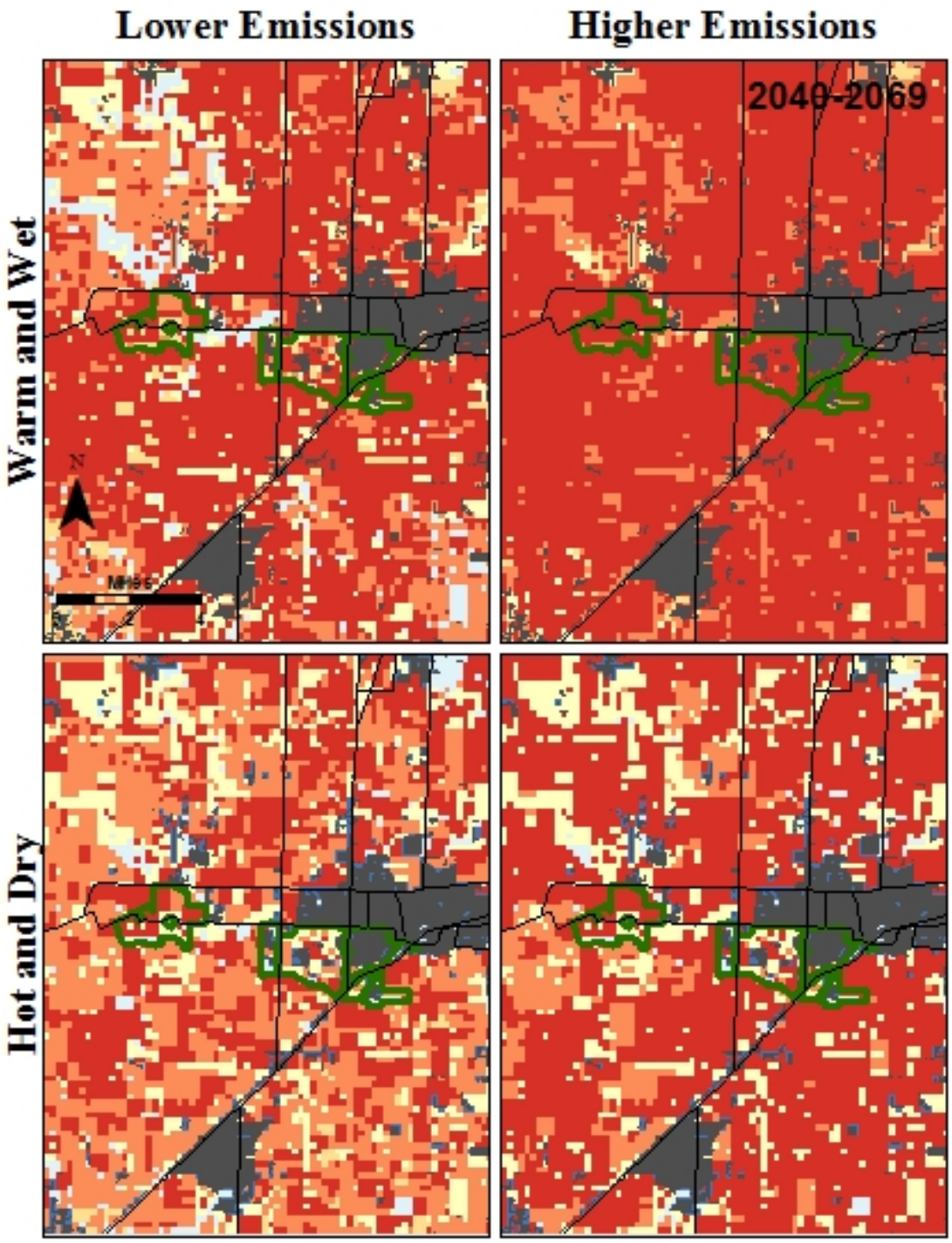

Campus climate exposure

2070-2099

Level of Exposure:

< 40% **40 - 60%** **60 - 80%**

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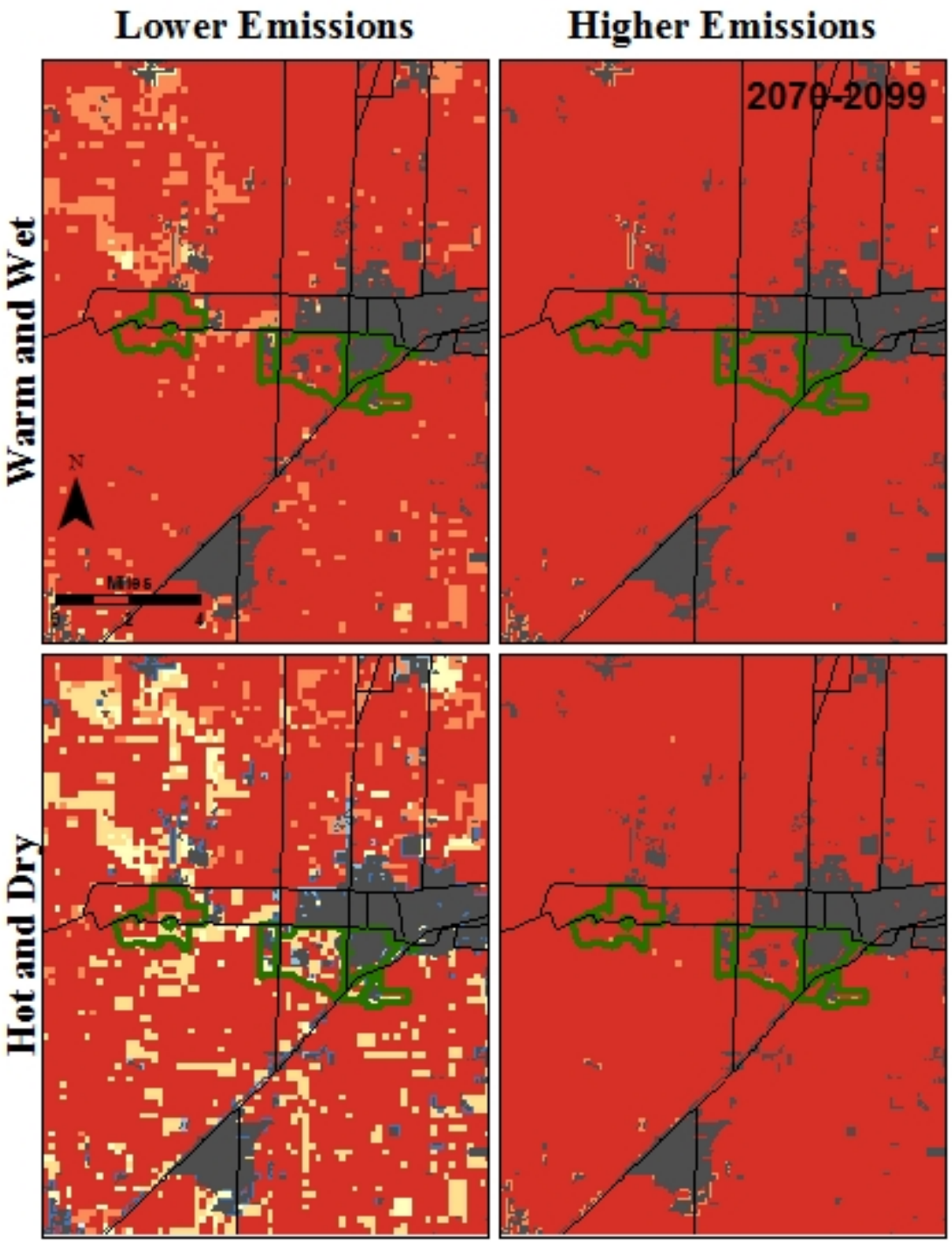
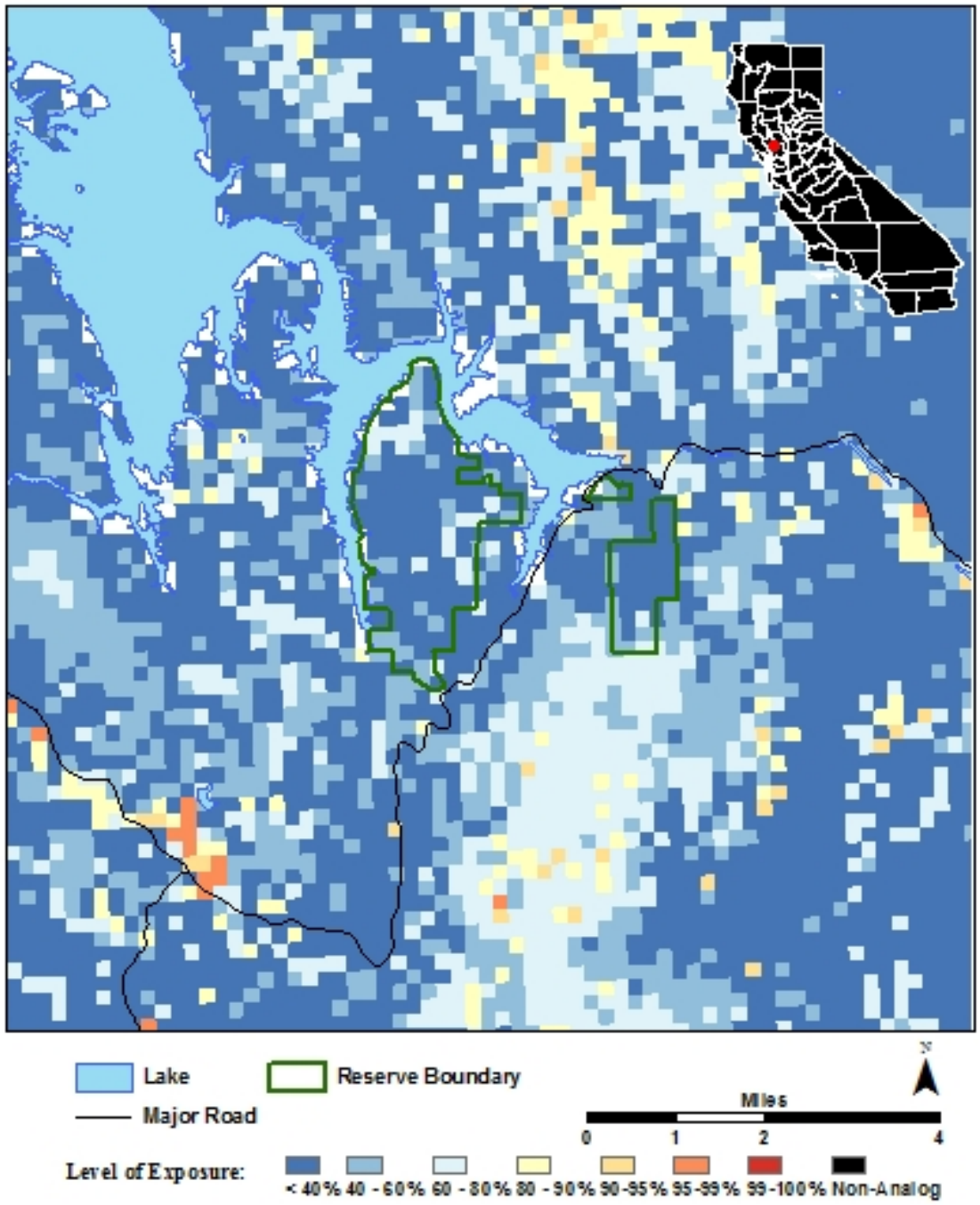
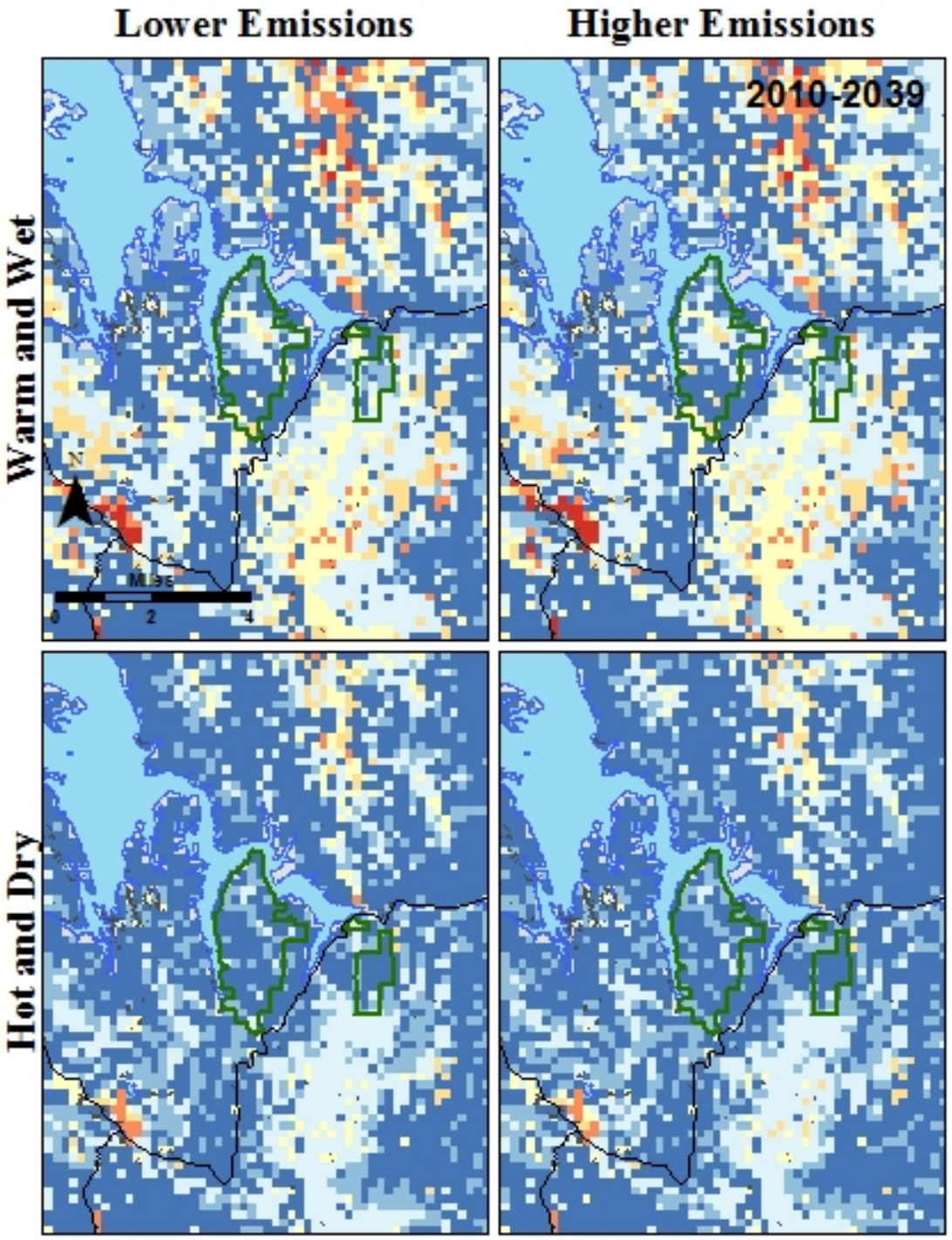
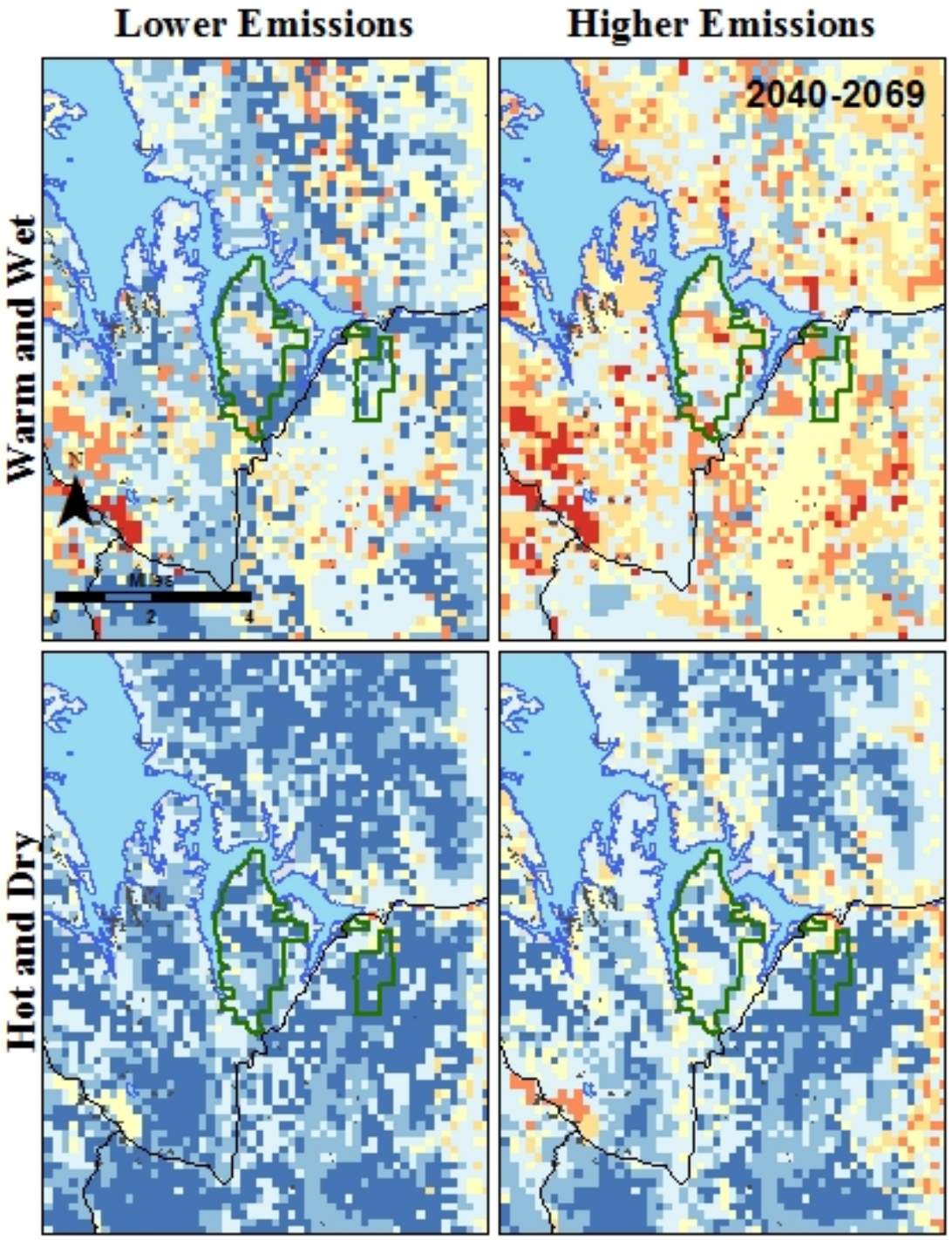
Non-Analog



Quail Ridge and Stebbins Cold Canyon




Lower Emissions
Higher Emissions
Warm and Wet
Hot and Dry
2010-2039
N
Miles
0
2
4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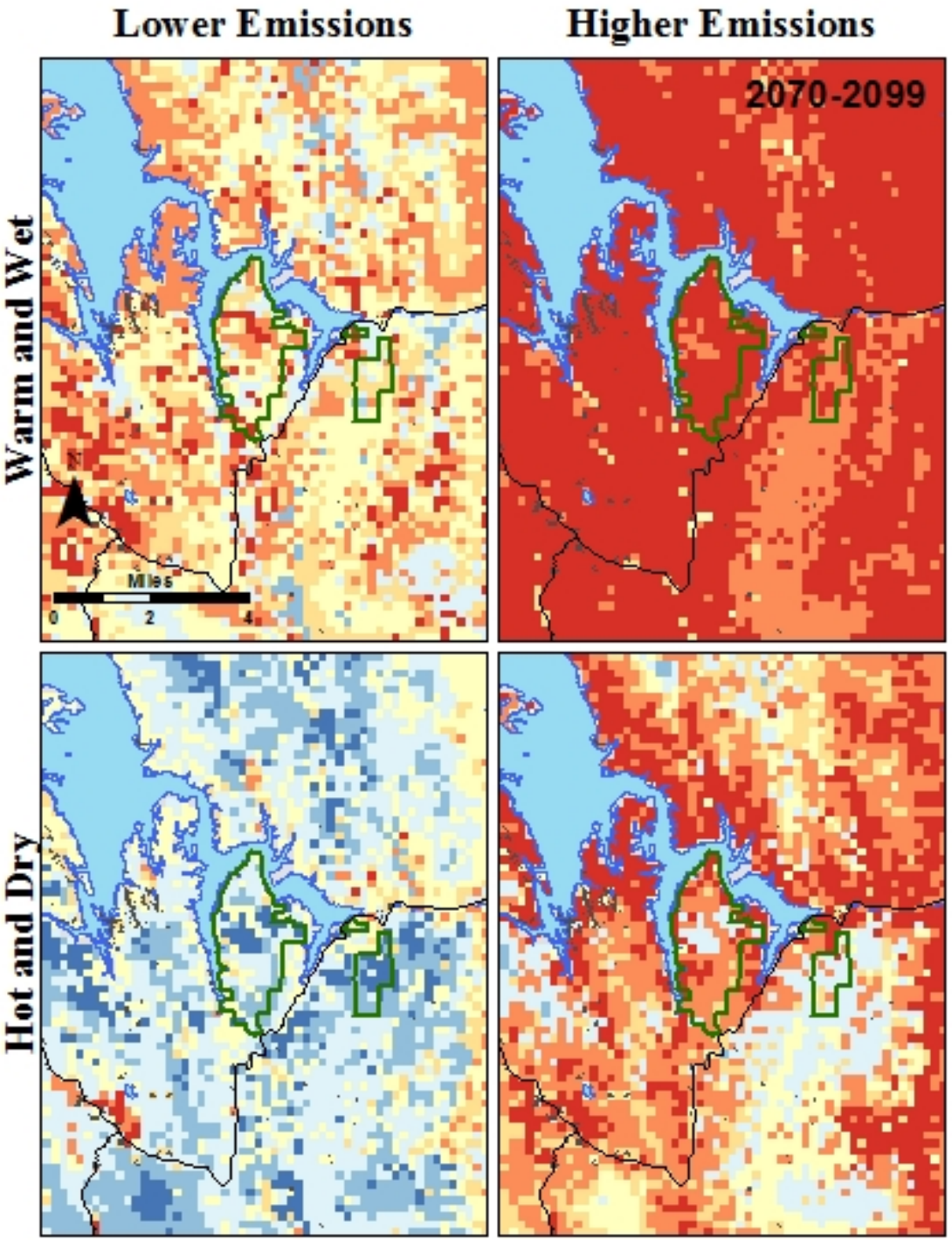
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Climate Models, Emissions Levels and Exposure

State and Regional climate trends and projections

Role of climate science in decision making

Science can provide context

Climate Science can provide context across many sectors

So, how can it help inform campus land management?

A few questions CS could inform

What tree and shrub species to plant in anticipation?

Where can greenery provide shade to reduce solar exposure?

How do we maximize water retention and re-use?

How can we provide the best habitat for pollinators?

How can the campus become part of the landscape connections needed by species?

How can we provide a sustainable and comfortable environment for students?

How can we speed transition to a fossil fuels free future?

Climate-change impact as risk management

- Average Change vs Sudden Impacts

  Adaptation & Mitigation vs Emergency Response

- Components of Risk:
  - Exposure: who and where?
  - Hazard: how bad is the impact?
  - Vulnerability: who/what will be most affected?

Areas of Concern

Climate Science can help in developing actions for

Mitigation – lowering our consumption and emissions

How can the campus become carbon neutral?

Adaptation – How can we prepare for changes that are coming

What landscape actions will improve climate resilience?

Extreme events – are often the tipping points that change the statu quo

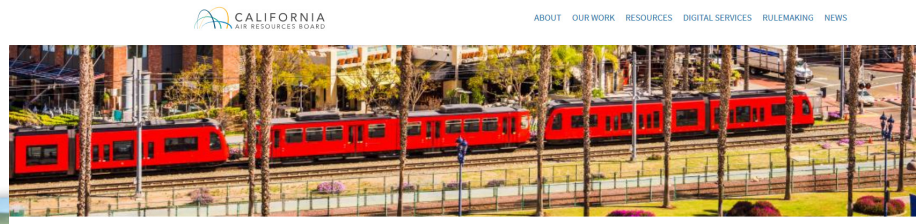
Is the campus ready for drought? What about fire & wind?

Exposure – the change in day-to-day conditions that people experience

How can we improve the outside conditions for students?

Potential for Campus to practice adaptive management

California has been very active in leading science and climate change adaptation One CA-specific climate report was in 1989!



Sustainable Communities & Climate Protection Program

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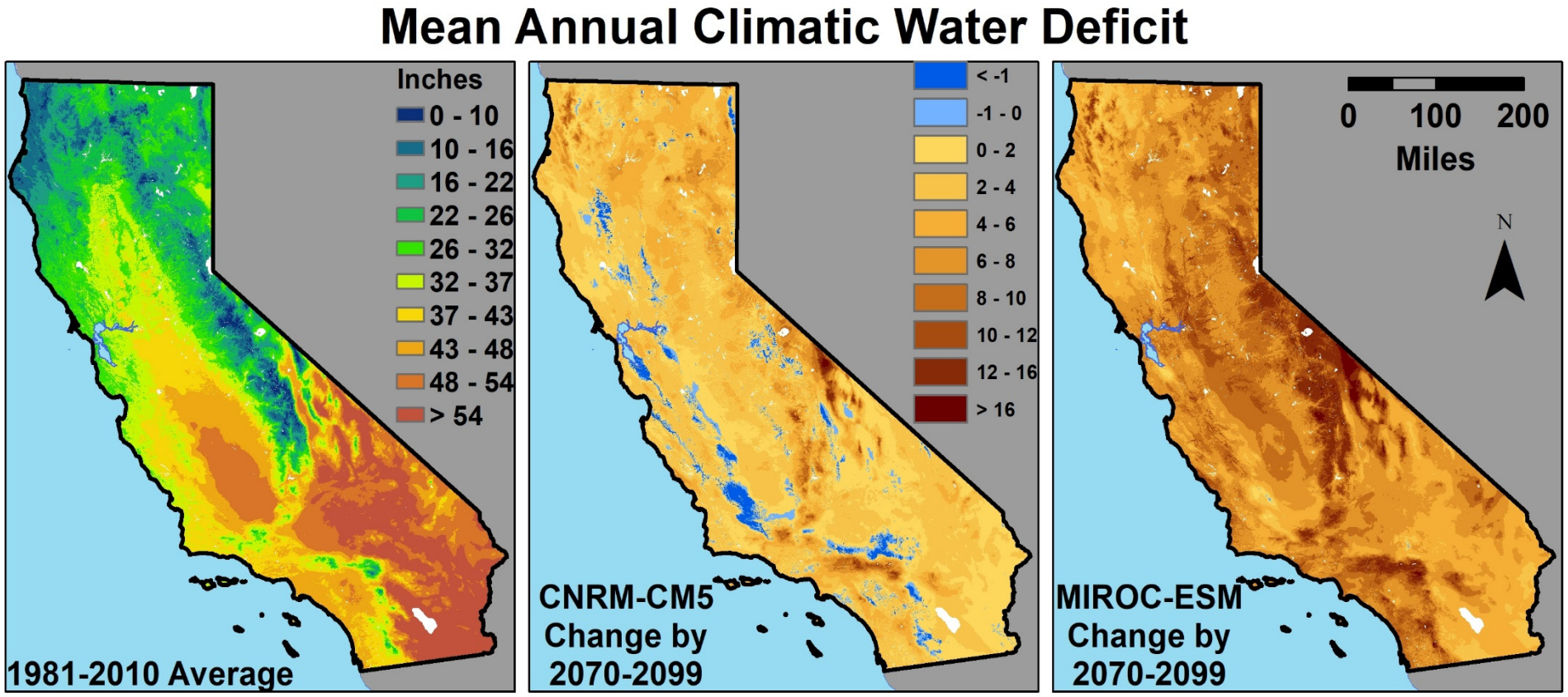
ABOUT

The Sustainable Communities and Climate Protection Act (SB 375) supports the State's climate goals by helping reduce greenhouse gas emissions through coordinated transportation, housing, and land use planning.

Under the Sustainable Communities Act, the California Air Resources Board (CARB) sets regional targets for greenhouse gas emissions reductions from passenger vehicle use. CARB set targets for 2020 and 2035 for each of the 18 metropolitan planning organization regions in 2010, and updated them in 2018.

Each of the regions must prepare a Sustainable Communities Strategy (SCS), as an integral part of its regional transportation plan, that contains land use, housing, and transportation strategies that, if implemented, would allow the region to meet CARB's targets. Once the SCS is adopted by the MPO, CARB must review the adopted SCS to

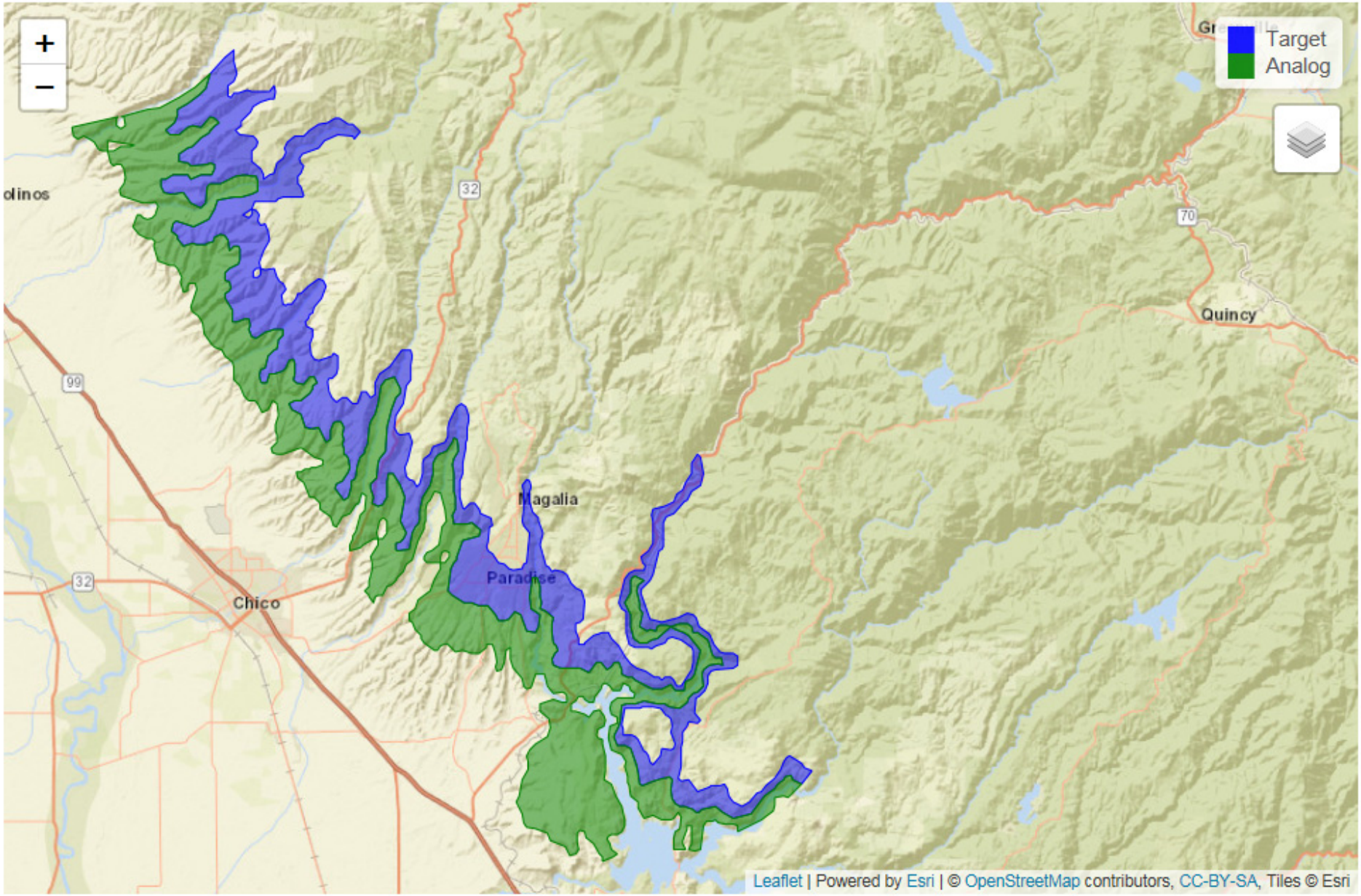
Map-based products include climate + hydrology models such as plant water stress



We can learn from reforestation efforts –
Mangers face the question of 'What to plant?"

- **Species Mix**
- **Density of planting**
- **Genetic Source of individuals**

Seed sourcing



Thank you!

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