A changing climate in the Klamath basin

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Klamath Basin warming

http://www.ncdc.noaa.gov/cag
Klamath summer (June-Aug) precipitation

http://www.ncdc.noaa.gov/cag
Klamath annual mean precipitation

http://www.ncdc.noaa.gov/cag
2015 Snow drought:
Normal precipitation, ~3°C warmer than normal

Record low April 1 snow at ~80% of sites

Mote et al. GRL 2016
Simultaneous Corr with Precipitation (DJF 1950/51–2017/18, 95%)
Figure 8: The probability of each county recovering from being at or below the 25th percentile in February and recovering to the median percentile in July for Oregon.
June 2021

https://www.opb.org/article/2021/06/03/5-things-to-know-about-the-klamath-water-crisis/
What about the future?
Global CO2 emissions have been flat for a decade, new data reveals.
Scenario group
Forcing target and temperature
Baseline (3.0–5.1°C)
6.0 W/m² (3.2–3.3°C)
4.5 W/m² (2.5–2.7°C)
3.4 W/m² (2.1–2.3°C)
2.6 W/m² (1.7–1.8°C)
1.9 W/m² (1.3–1.4°C)

Net CO₂ emissions (GtCO₂)

Global Carbon Project
Jun-Jul-Aug Max Temperature
Klamath Falls, OR

climatetoolbox.org
John Abatzoglou, Katherine Hegewisch, Bart Nijssen
As the West warms, winter flows rise and summer flows drop.

Stewart et al. J Climate 2005
Projected Change in Total Runoff, Winter (Dec-Jan-Feb)

Lower Emissions (RCP 4.5) 2040-2069 vs. historical simulation 1971-2000, mean change

Multi-model mean from 10 VIC runs forced by downscaled CMIP5 models
Projected Change in Total Runoff, Summer (Jun-July-Aug)

Lower Emissions (RCP 4.5) 2040-2069 vs. historical simulation 1971-2000, mean change

Multi-model mean from 10 VIC runs forced by downscaled CMIP5 models

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Projected Change in Total Soil Moisture, Summer (Jun-July-Aug)
Lower Emissions (RCP 4.5) 2040-2069 vs. historical simulation 1971-2000, mean change

Multi-model mean from 10 VIC runs forced by downscaled CMIP5 models

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More changes…

Conclusions

• Climate-driven shifts in summer flow will make drought even more common

• Intersections with other factors exacerbate the effects