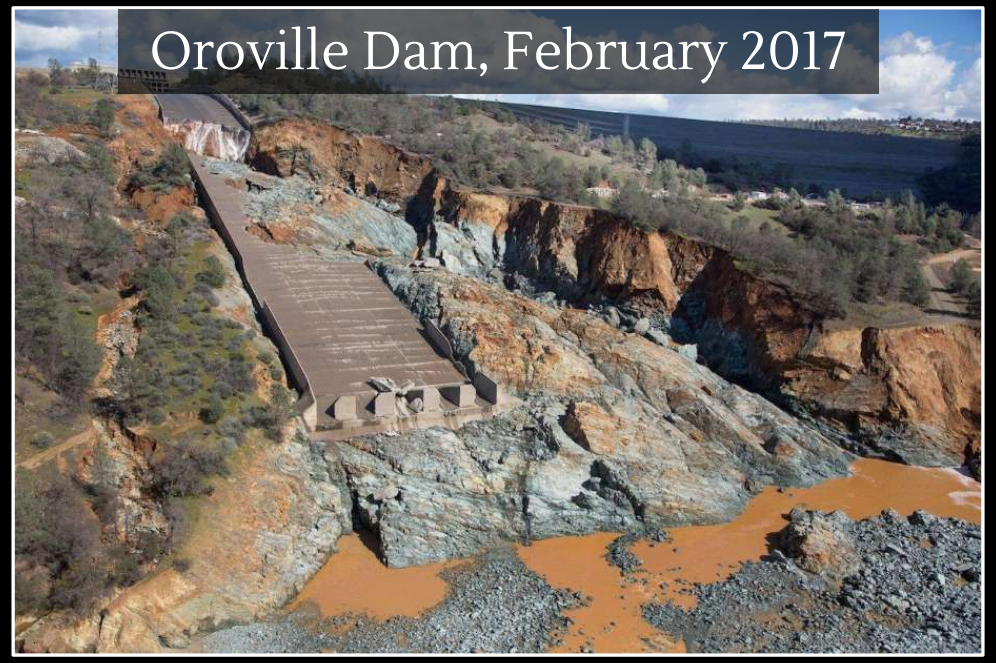
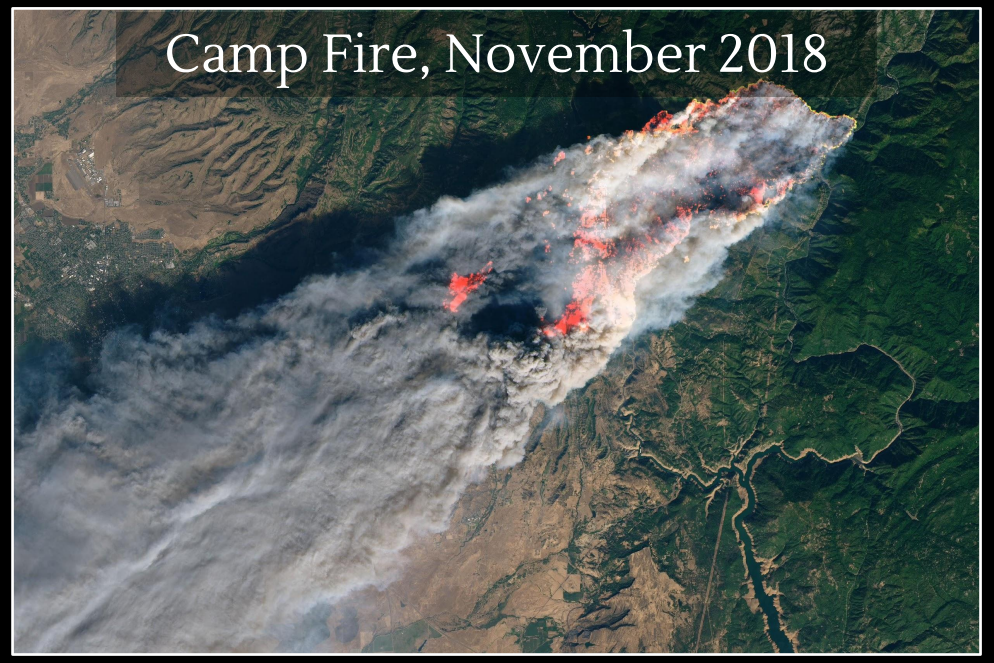
Climate extremes in a warming California





Daniel Swain
UCLA, NCAR, The Nature Conservancy
California Climate Safe Policy Summit
August 2021

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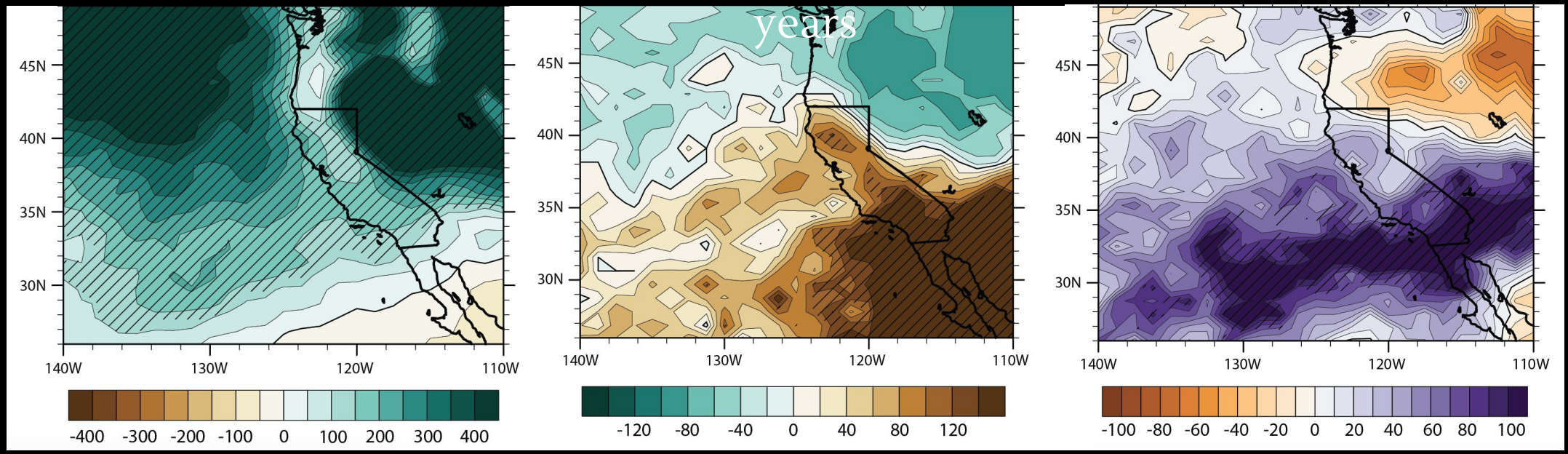
A wetter *and* drier future?

Increase in very wet years

Increase in very dry years

Increase in “whiplash”



Swain et al. 2018

Large increase in both wet & dry extremes
despite little mean precip change!

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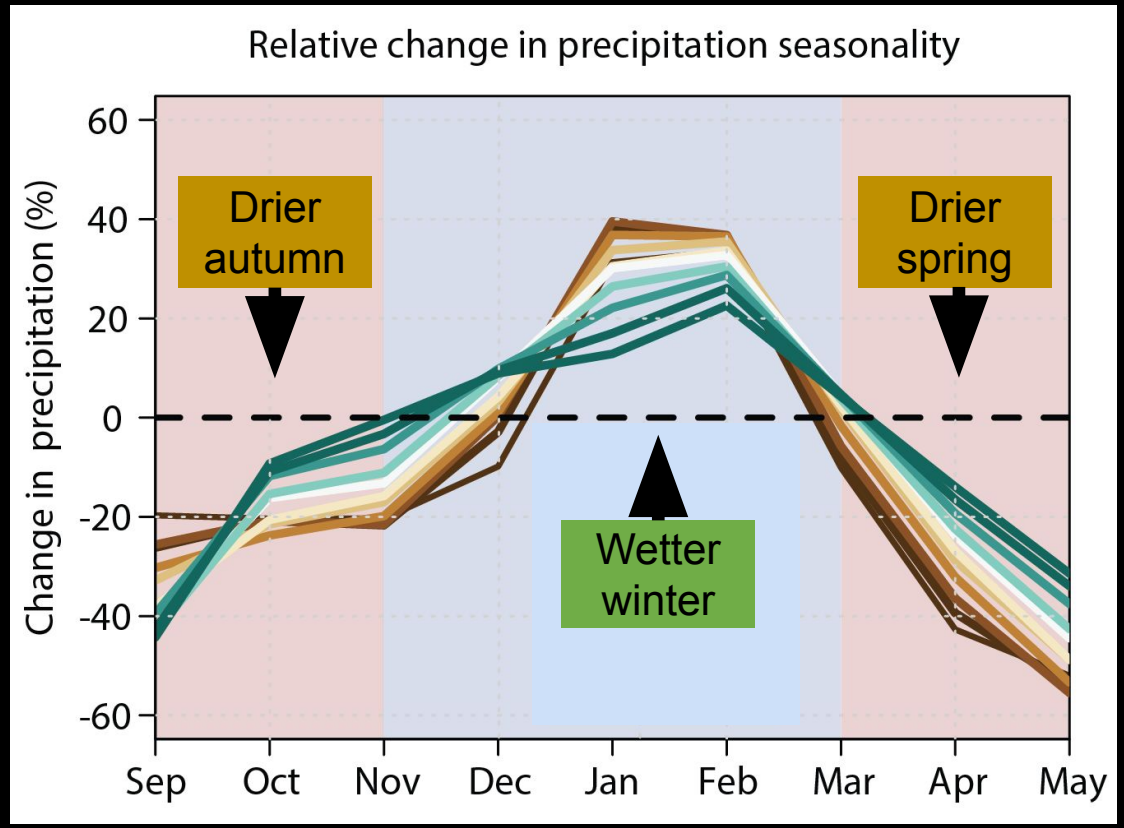
An (even) shorter, (even) sharper rainy season



Swain et al. 2018

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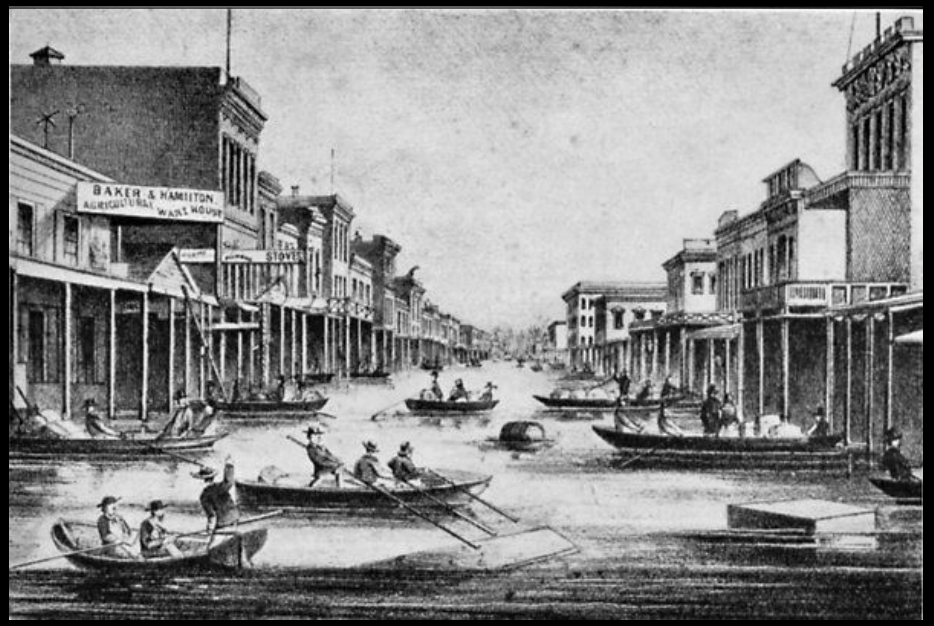
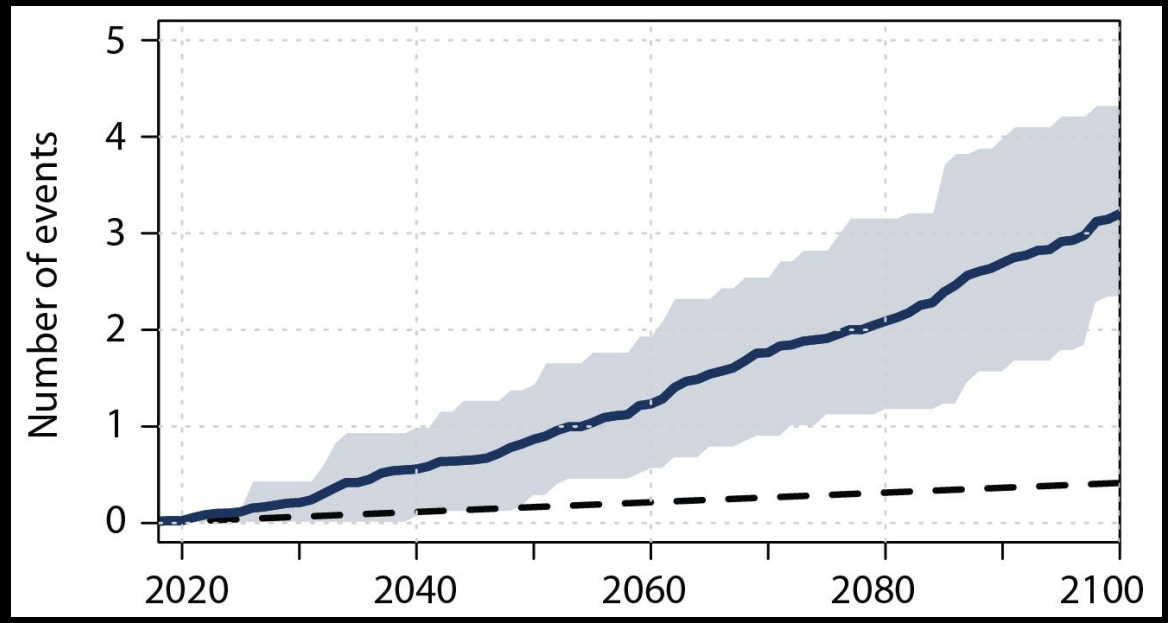
California's "Other Big One": Month-long atmospheric river deluge

Downtown Sacramento, Jan 1862



San Francisco Chronicle

Cumulative likelihood of "1862-like" event



Swain et al. 2018

- California "great floods" have occurred every ~200 years
- Modern day repeat would be disastrous for California
- Greater than 50% risk of an 1862-level in next ~40 years (!)

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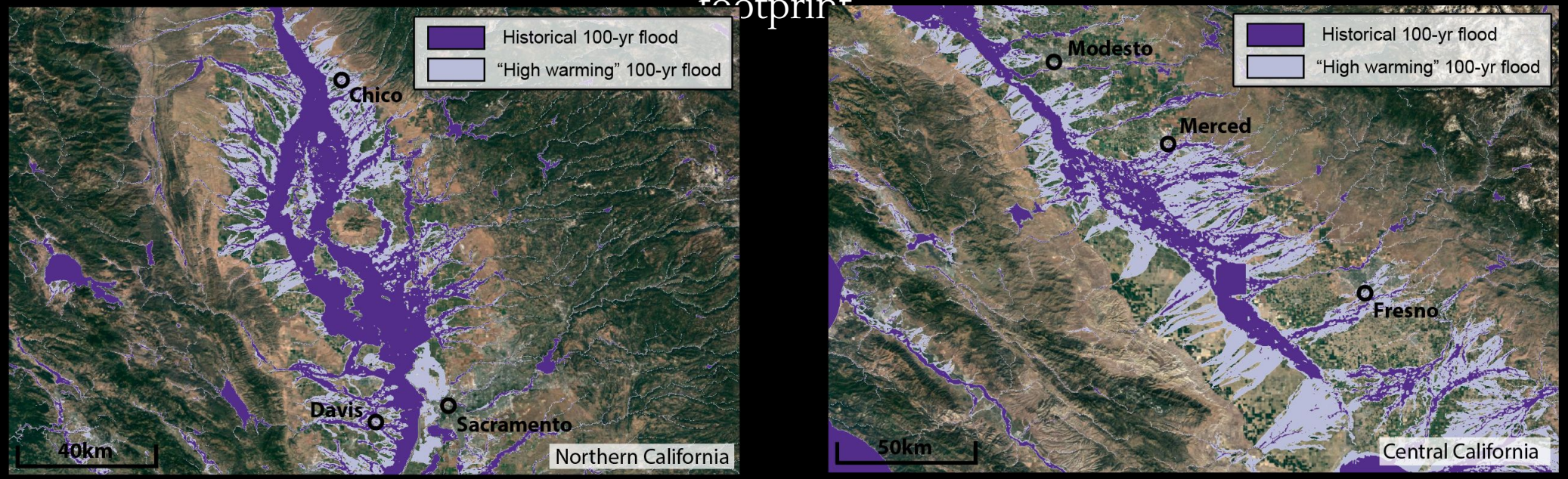
California flood risk looms large in warming climate

20th century vs. warmer future "100 year flood" footprint



Swain et al. 2020

- Climate change likely to increase risk broadly, but CA is a hotspot
- Why? Stronger, moister atmospheric river storms
- How, exactly, will flood protection infrastructure fare in a "megastorm?"
  - Stay tuned for ARkStorm 2.0 (ask me more!)

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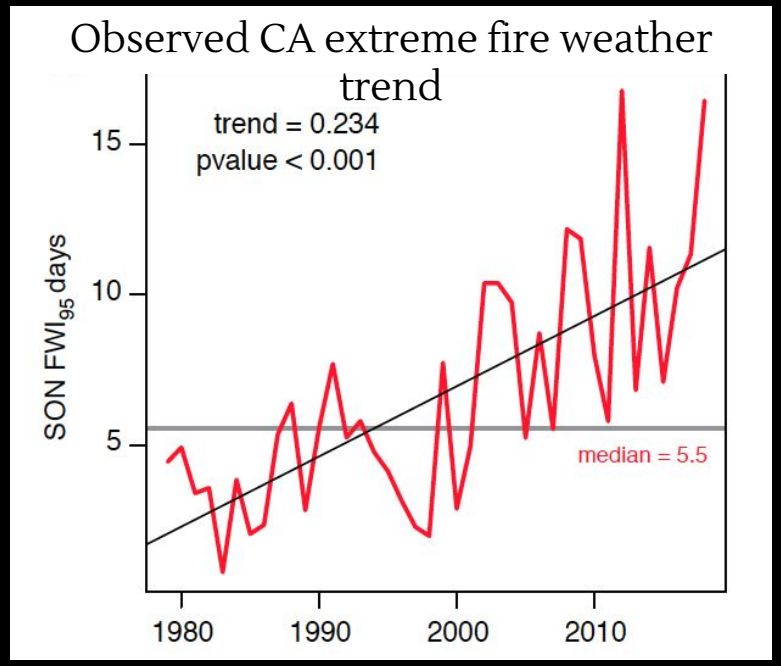
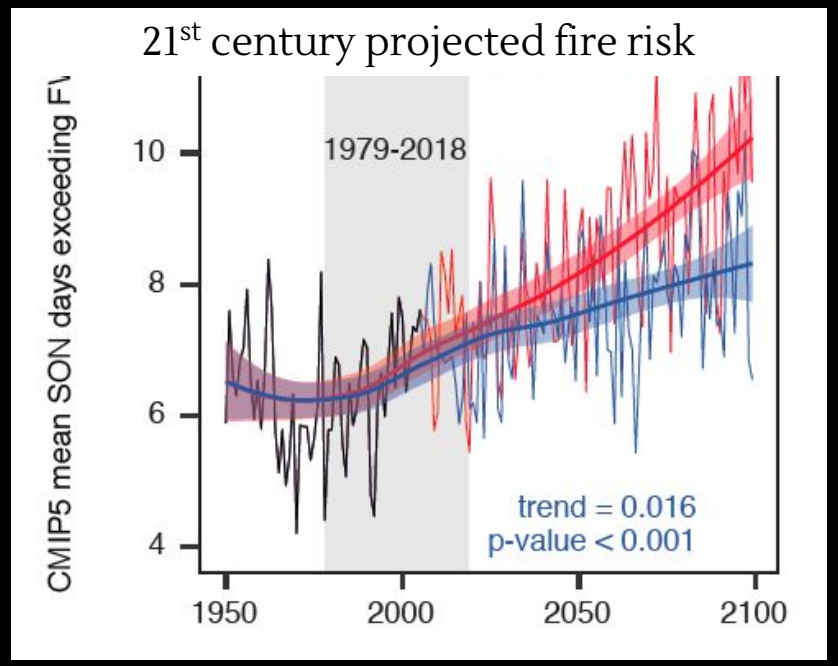
Climate change is making wildfires larger, more intense, and more dangerous





Goss et al. 2020

- In California, climate change has *already* more than doubled occurrence of extreme fire weather conditions
- Climate change is changing *character* of wildfire (rather than #)

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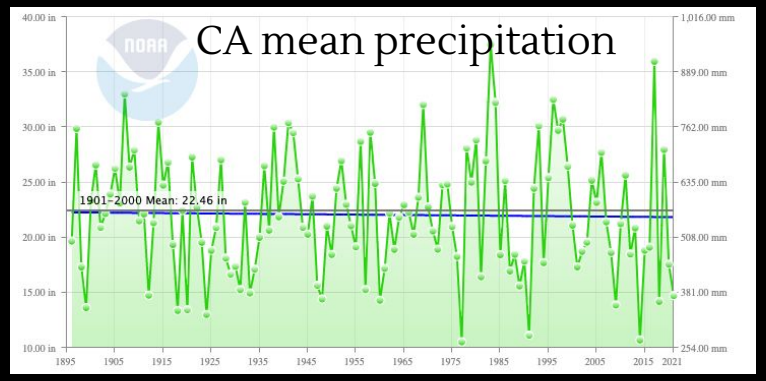
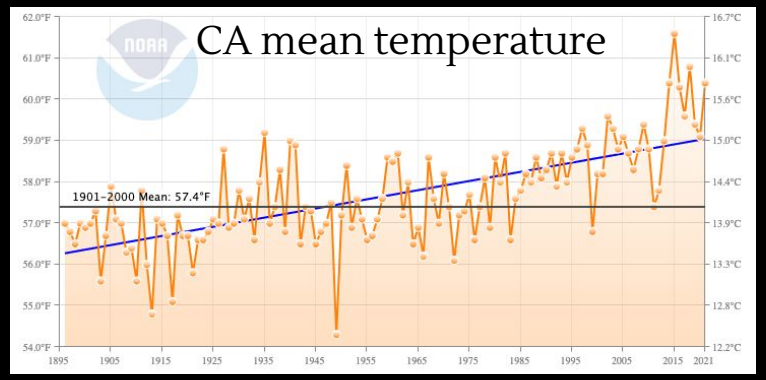
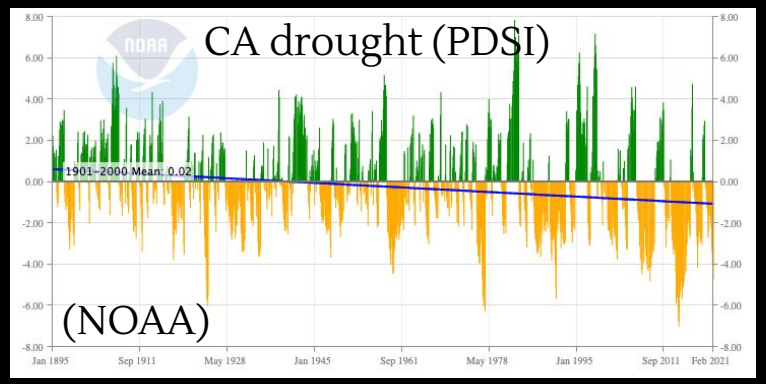
A paradox: simultaneously increasing water scarcity and overabundance







- Precipitation-only drought metrics are becoming increasingly misleading in a warming climate
- The same amount of rain/snow just doesn't go as far as it used to
- Less autumn/spring precipitation, but more winter precipitation
- More precipitation on fewer days, with more intense (but fewer?) storms
- Much less snowpack, but more evaporation

- All of this put together = increased risk of drought *and* flood

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To cope with increasing extremes, flexible adaptations will be key

Yolo Bypass (in flood) near Sacramento

Prescribed burn on Yurok tribal land

- Can we mitigate flood & drought risk simultaneously, and fight fire with fire—all while offering environmental co-benefits? FloodMAR & prescribed fire are promising tools.

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made possible by a unique partnership between
UCLA, NCAR, and The Nature Conservancy.

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