

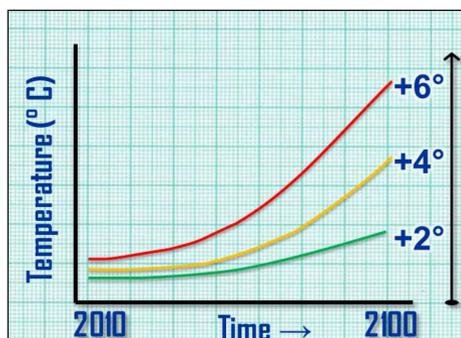
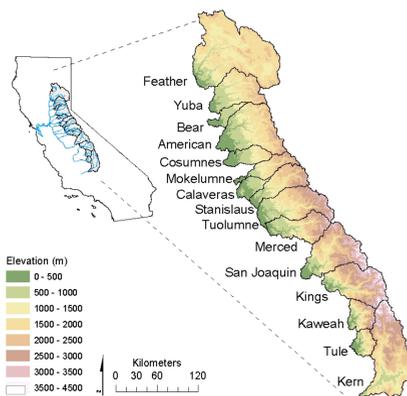
Water, Energy and Ecosystems

Assessing the vulnerability of the west-slope of California's Sierra Nevada to climate change and opportunities for adaptation

WHAT EFFECTS WILL CLIMATE CHANGE have on California's waterways? What does more rain and less snow mean for people and ecosystems?

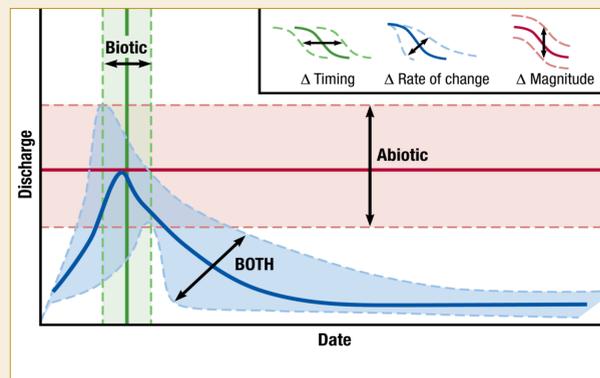
This report defines and quantifies the vulnerability of the west-slope of California's Sierra Nevada mountain range to climate change by analyzing the temperature, flow and ecology of its stream waters and the impact temperature and flow changes have on ecosystems, hydropower, recreational activities and aquatic life.

STUDY AREA:



MODEL CLIMATE WARMING:
Weekly time step, 250m elevation bands

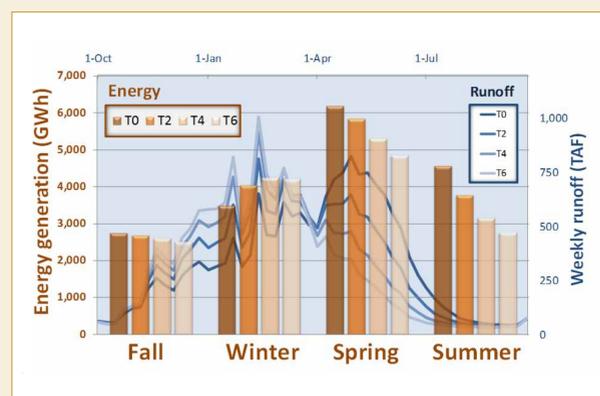
STUDIES:



STREAM ECOLOGY—Primary components of the spring snowmelt recession. Arrows indicate the direction in which increases or decreases in a component will shift the hydrograph.

FINDINGS:

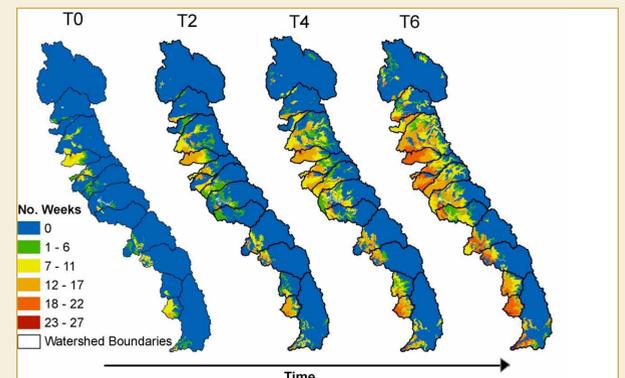
- Changes to the snowmelt recession affect aquatic and riparian species
- With climate warming, the spring recession will occur earlier and decrease in magnitude, impacting physical and biological processes
- Restoring the spring recession in managed systems could maintain diversity of stream habitats and species



HYDROPOWER—Potential changes in seasonal hydropower generation with warming

FINDINGS:

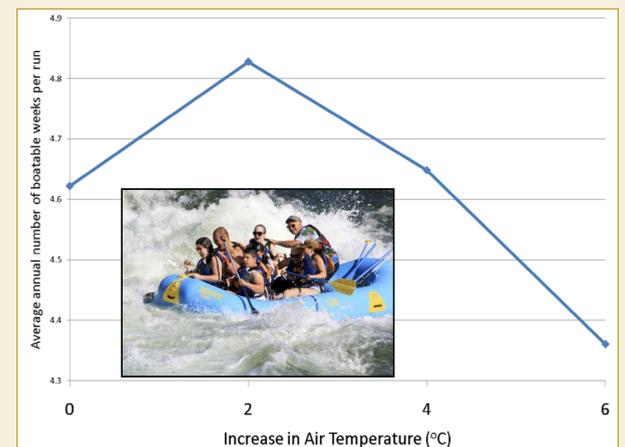
- Changing runoff patterns will impact hydropower generation
- Winter generation will increase, while more valuable summer generation will decrease



STREAM TEMPERATURE—Potential changes in seasonal hydropower generation with warming

FINDINGS:

- For each 2°C air temperature increase, average annual stream temperatures warms about 1.6°C, potentially stressing aquatic species
- Thermal heterogeneity exists within and between watersheds
- Cold water habitat will shift to higher elevations
- Without management, cold water habitat will likely be reduced



WHITewater RECREATION

FINDINGS:

- 128 recreational whitewater runs on the west-slope Sierra Nevada
- Climate warming will non-uniformly reduce the number of weeks that boaters can run Sierra Nevada rivers
- Recreating on runs with regulated flows will become more important

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