NATURAL RESOURCES OF THE SOUTHERN SIERRA NEVADA

John Battles

Southern Sierra Nevada Change Adaptation Workshop

February 20, 2013

outline

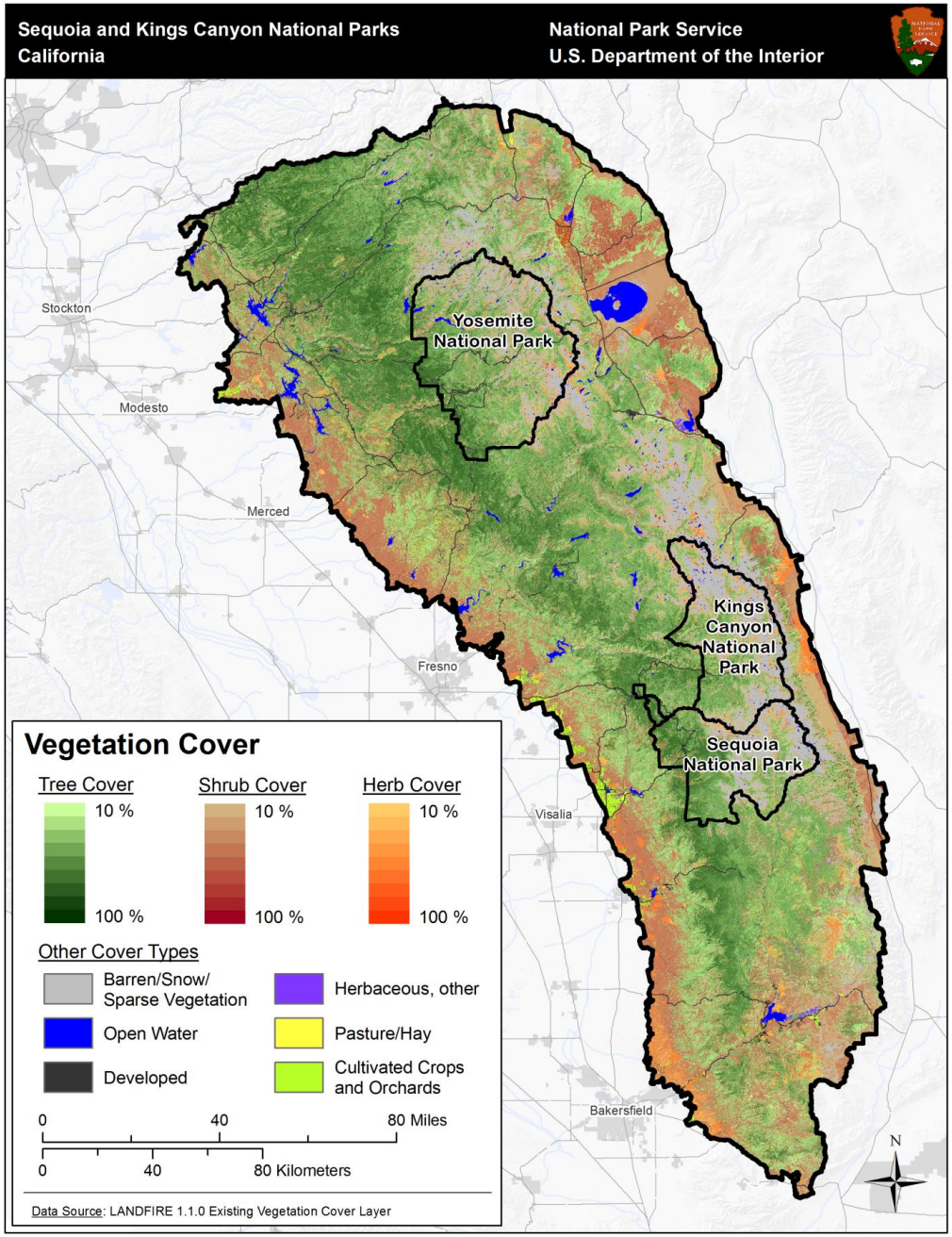
1) perspective
2) air & water quality
3) water yield & carbon storage
4) biodiversity
5) sensitive species
6) future

PERSPECTIVE

- PACE
- state factors
- defining the baseline
- success of past efforts

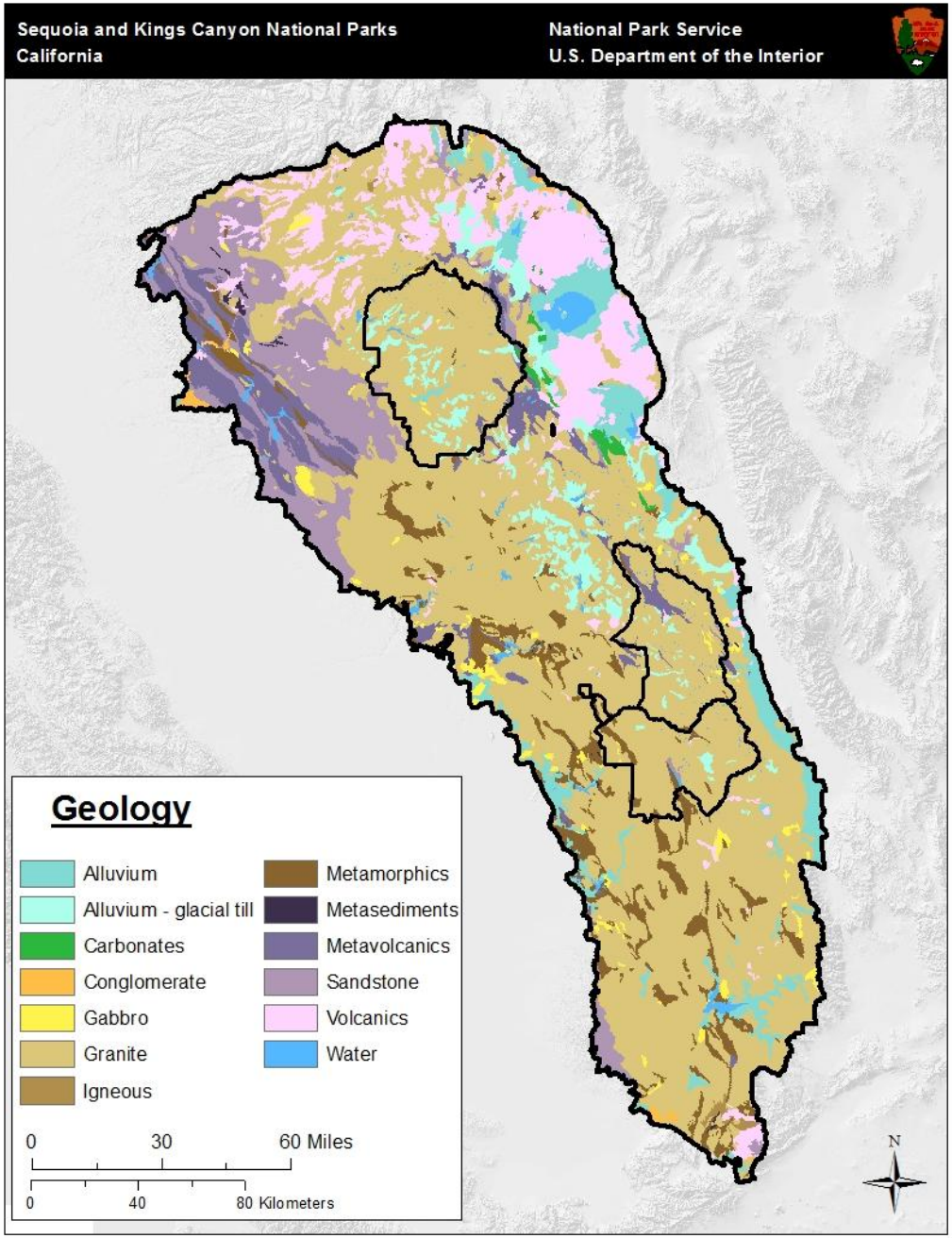
Protected Area Centered Ecosystem (PACE)

area = 45,294 km^2



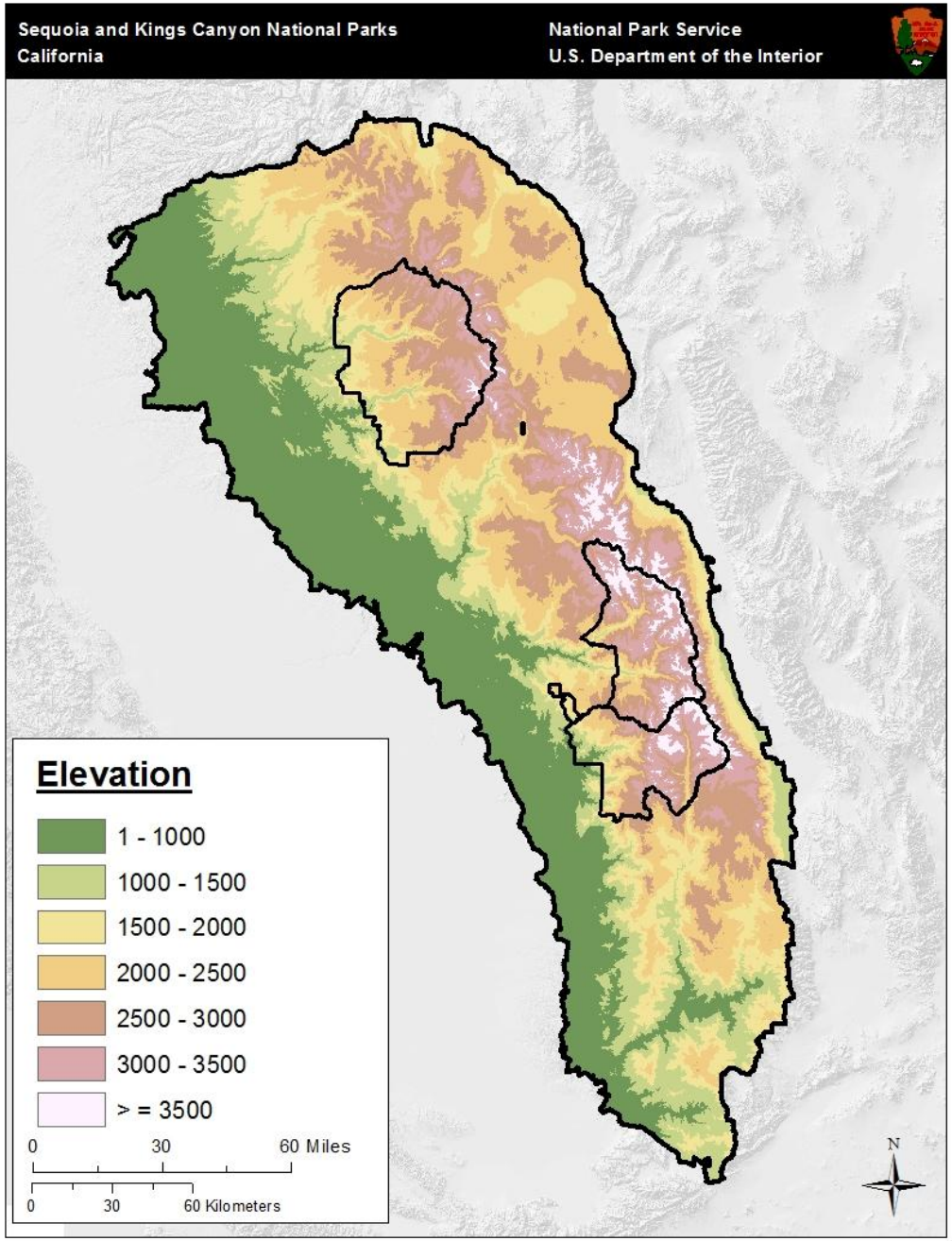
Thorne et al. NRCA (2013)

parent material



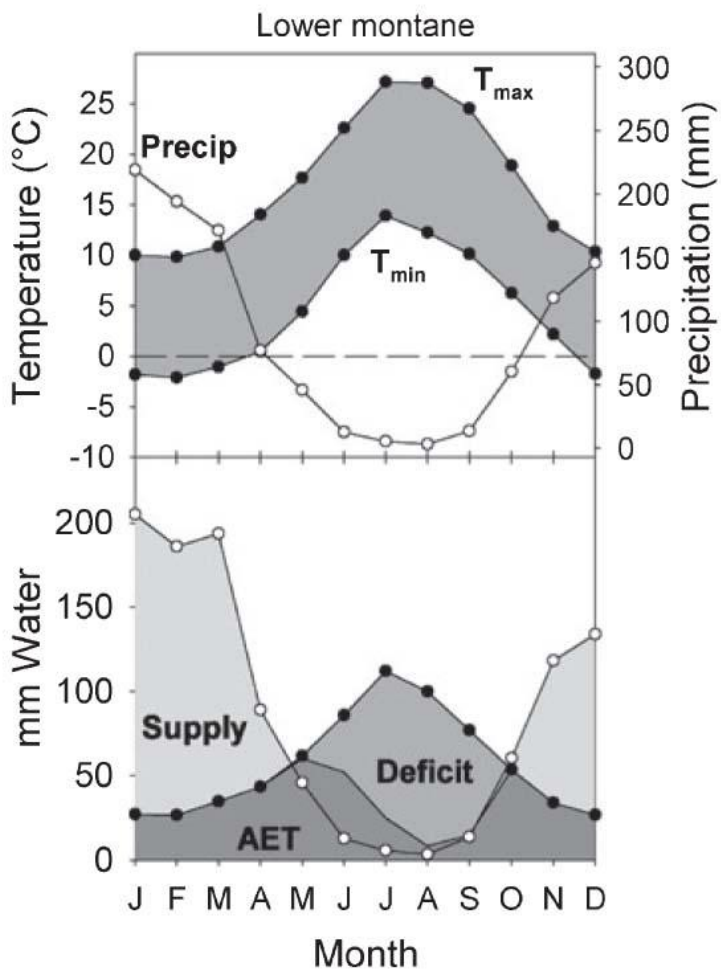
Thorne et al. NRCA (2013)

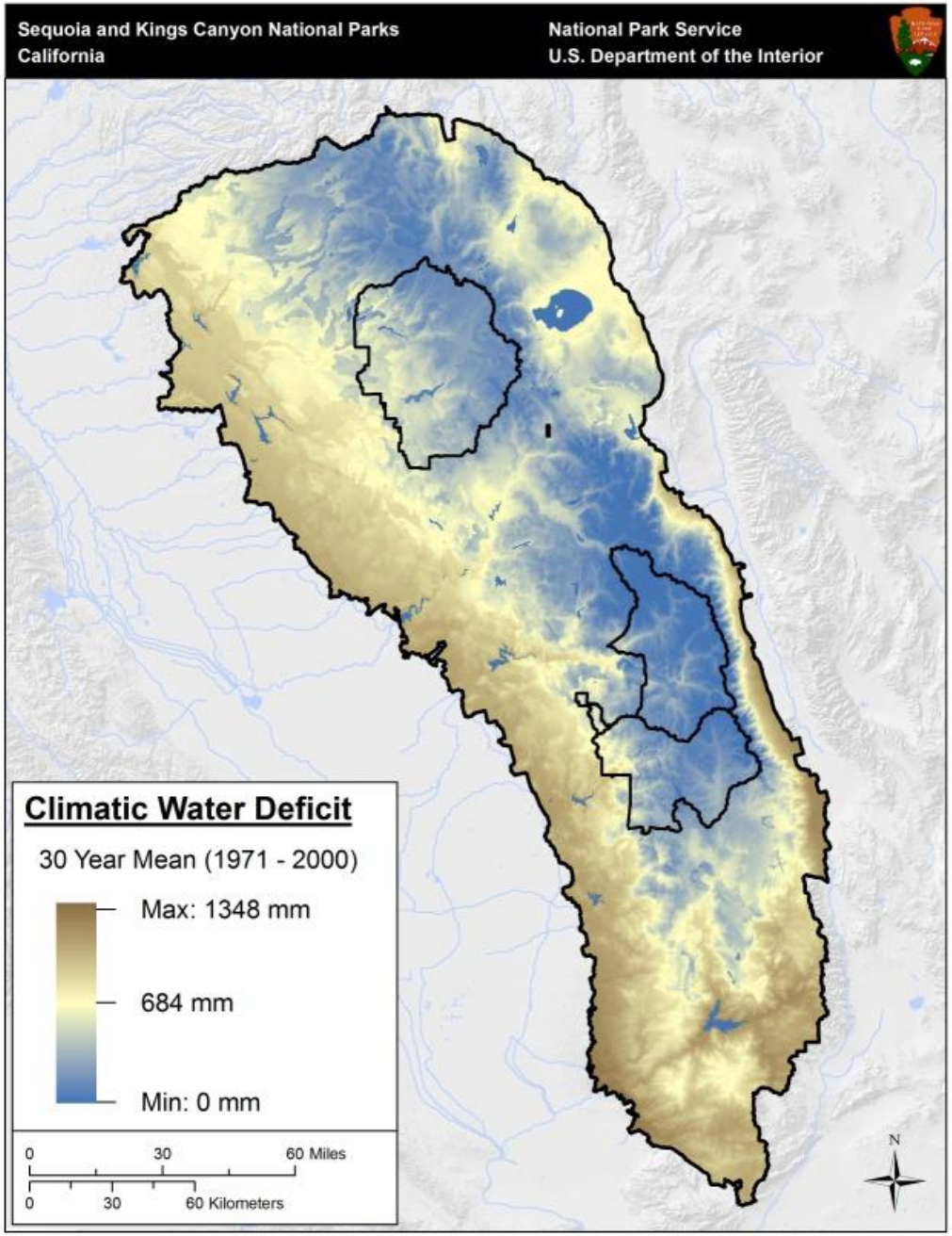
elevation gradient



Thorne et al. NRCA (2013)

climate

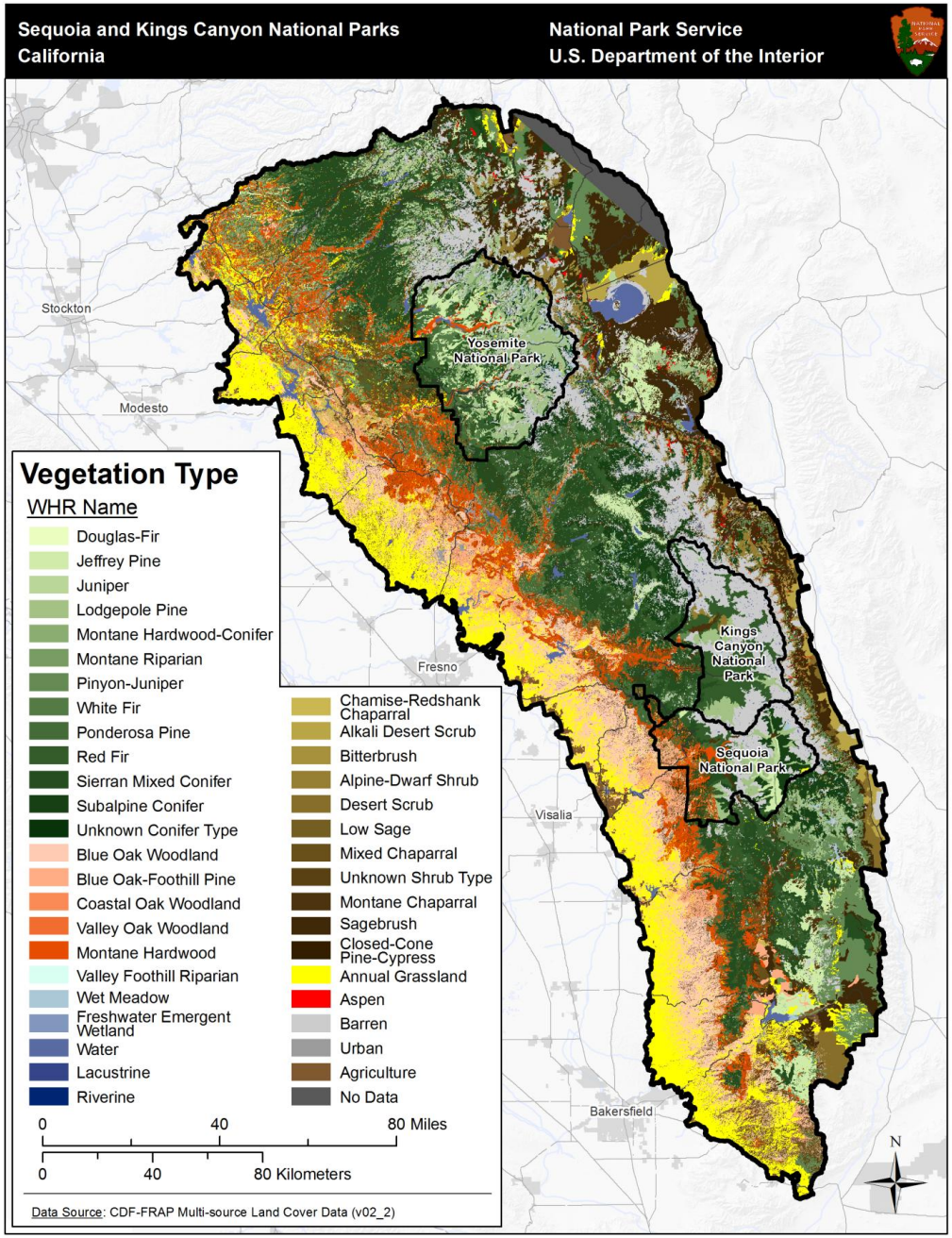




Lutz et al. J. Biogeogr. 936-950 (2010)

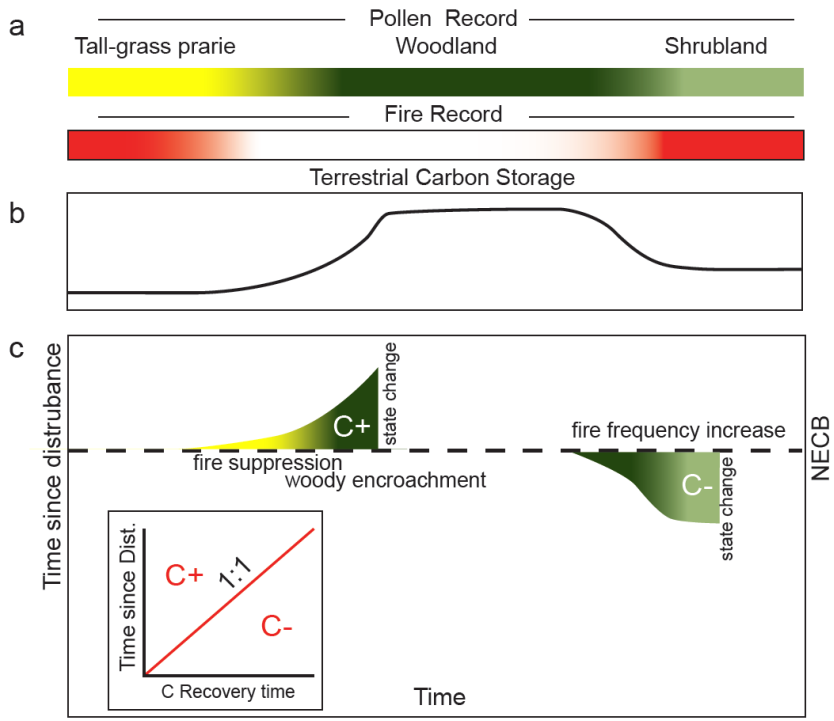
Thorne et al. NRCA (2013)

vegetation

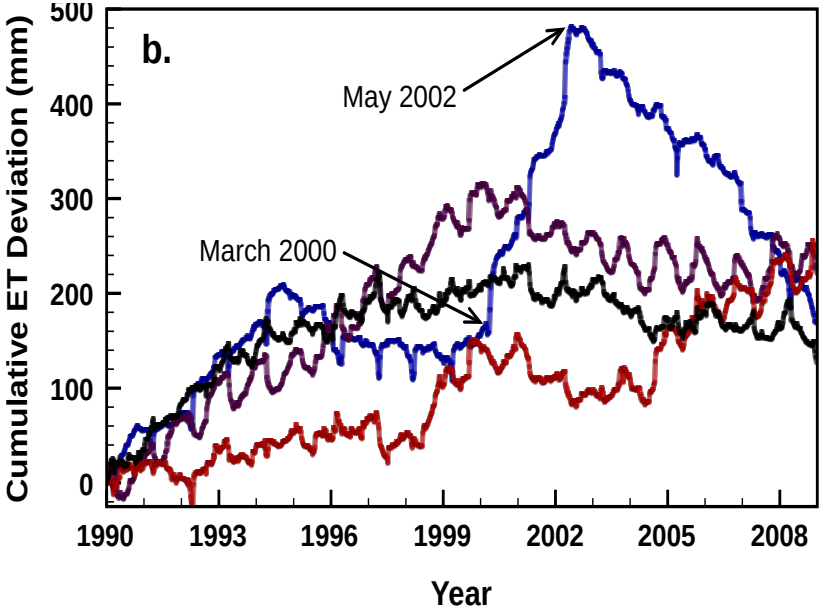


Thorne et al. NRCA (2013)

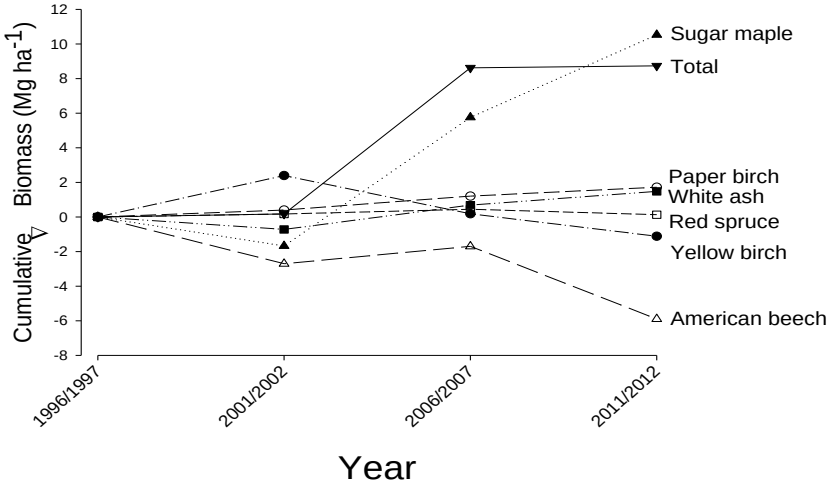
baseline



McLauchlan et al. PROBE (In review)
Paleo Reconstructions of Biogeochemical Environments

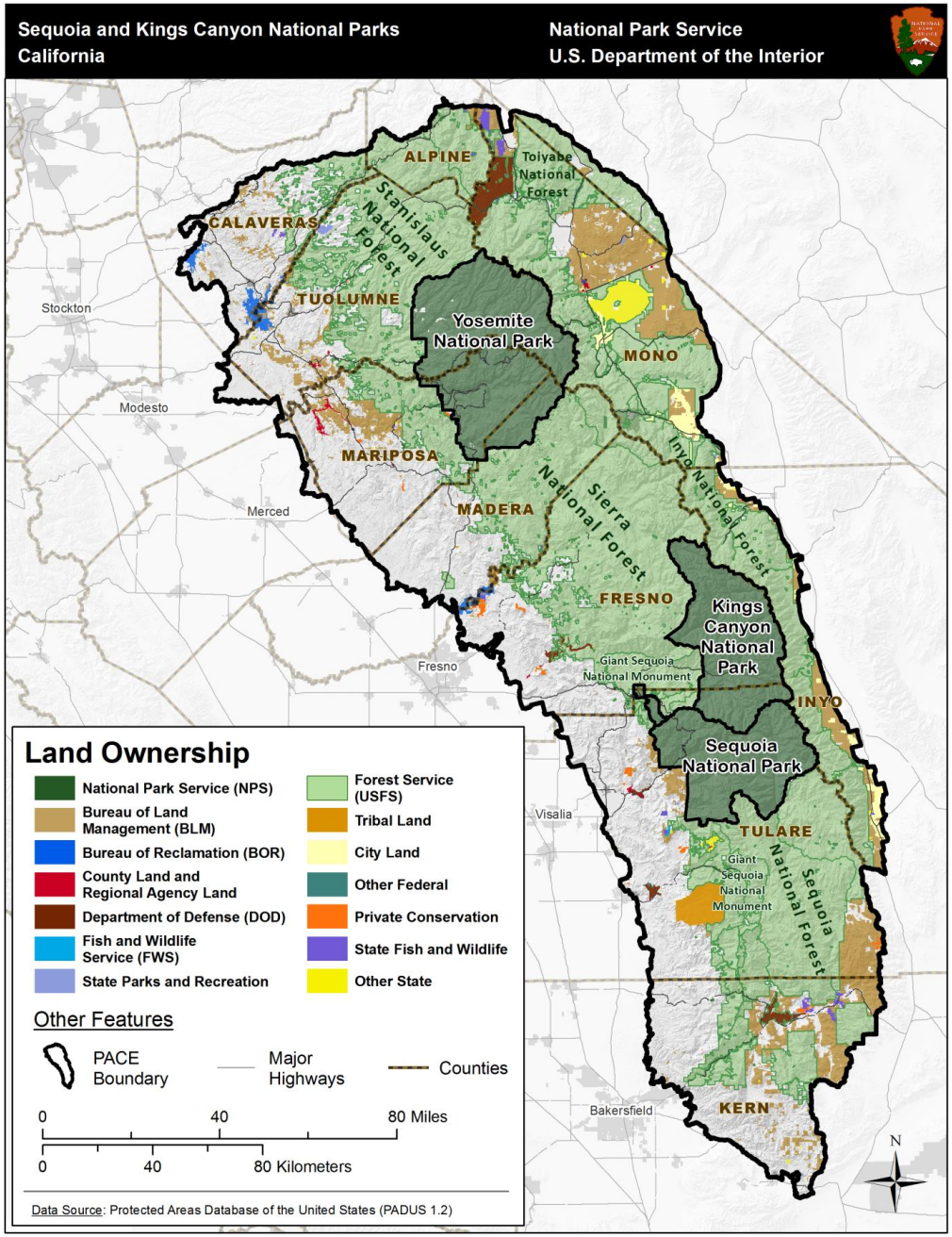


Green et al. PNAS (In press)



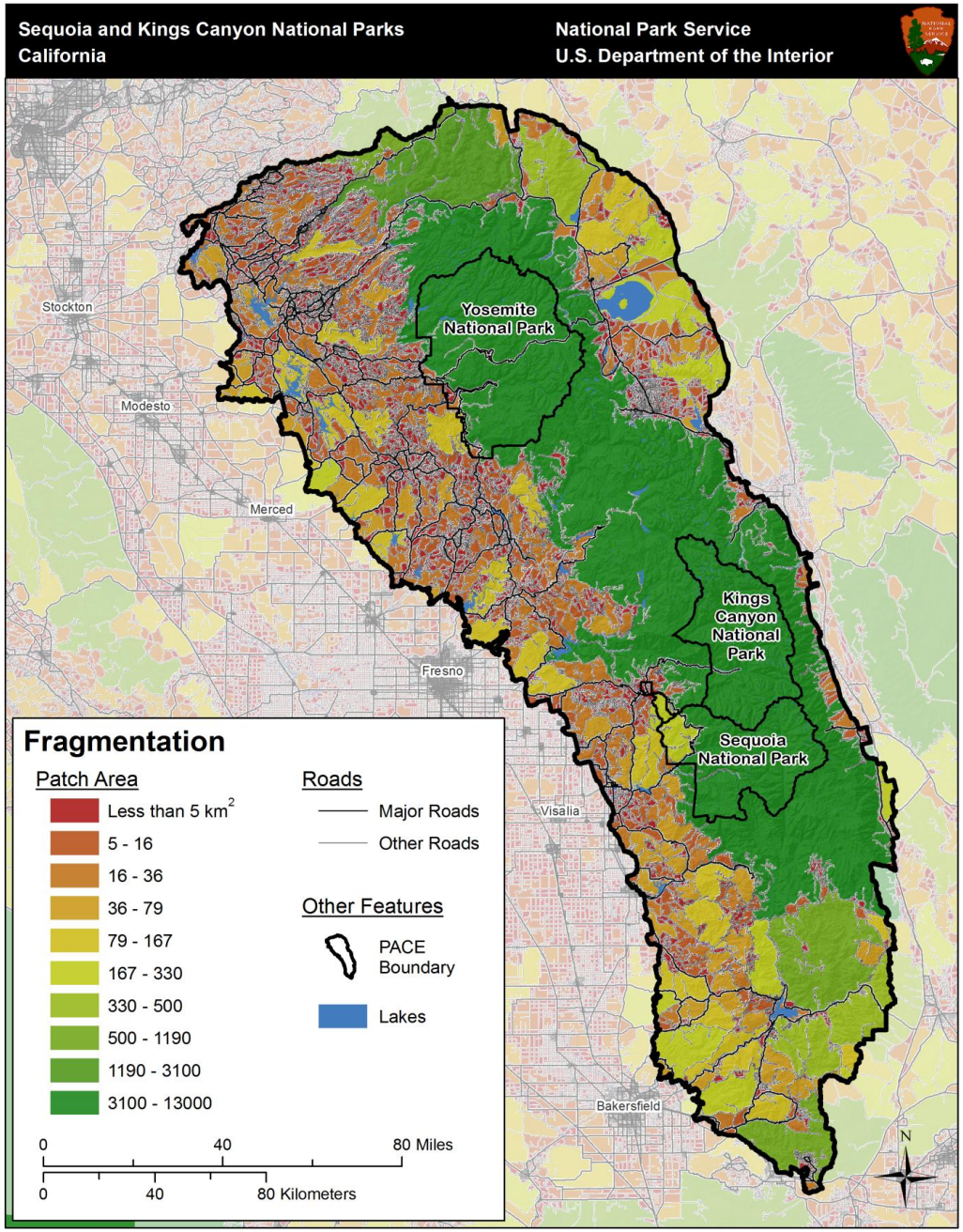
Battles et al. Reversing Forest Decline (In review)

ownership



Thorne et al. NRCA (2013)

landscape continuity



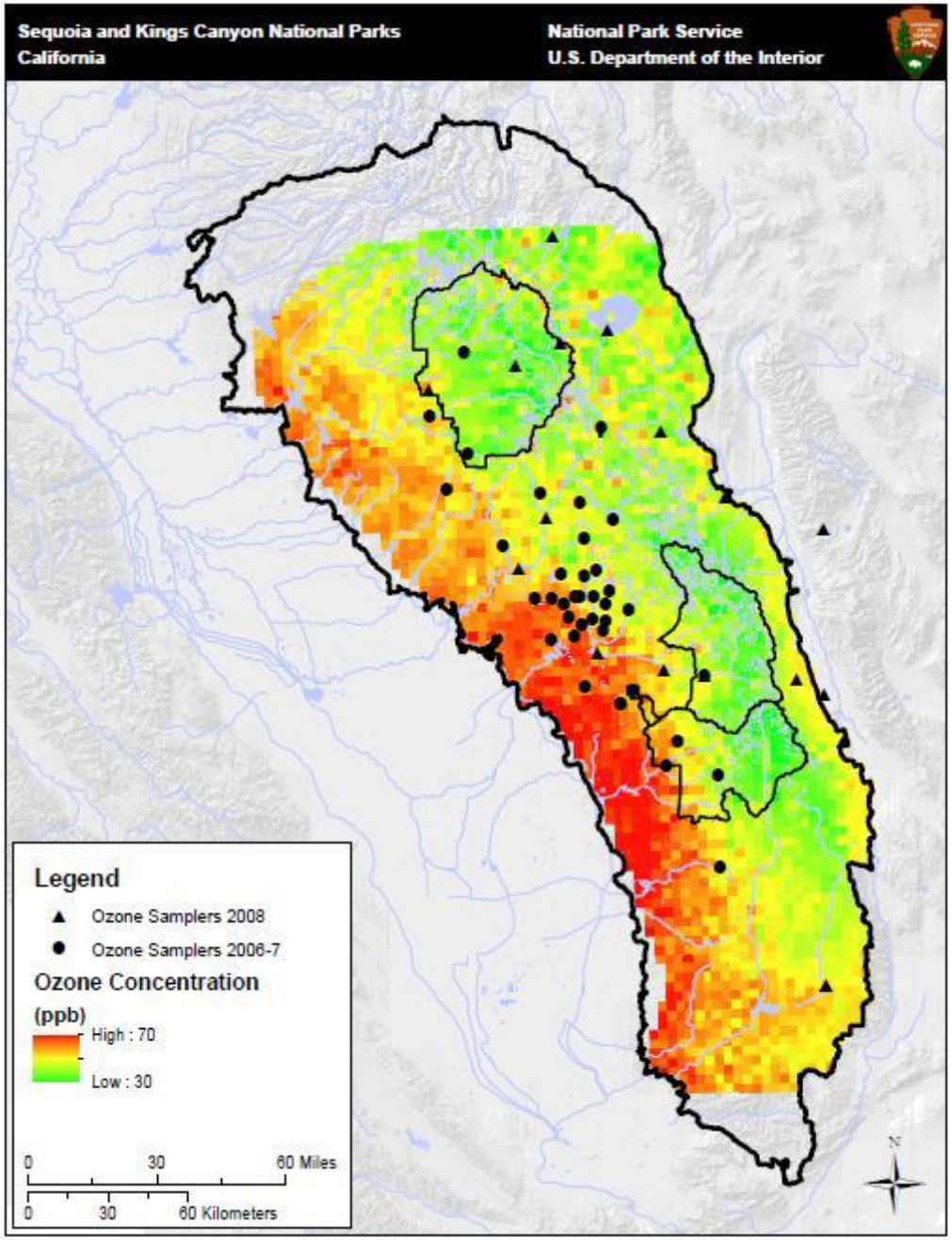
Thorne et al. NRCA (2013)

AIR & WATER QUALITY

- ozone
- nitrogen
- acid neutralizing capacity
- priority contaminants

ozone

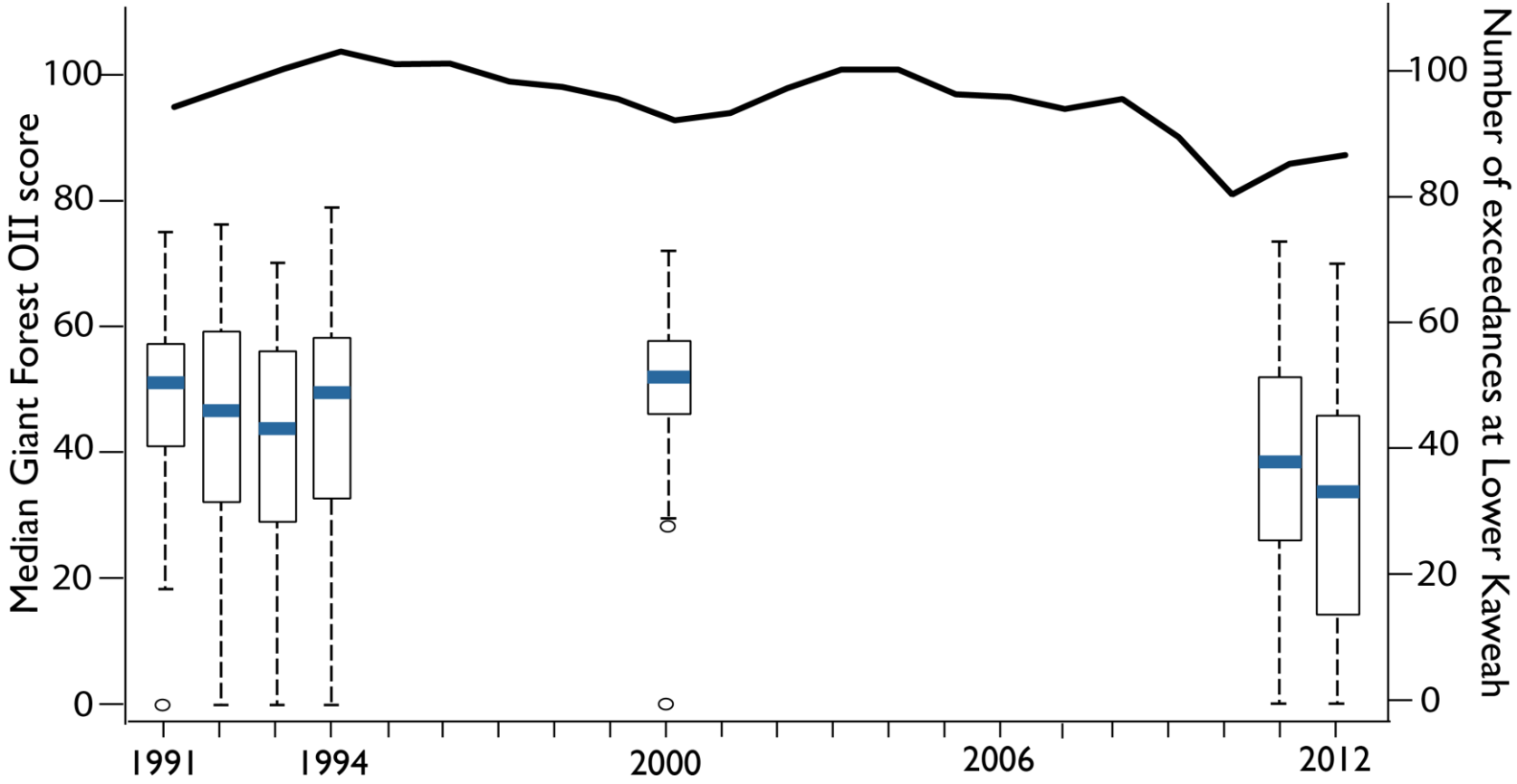
spatial gradient



Panek et al. NRCA (2013)

ozone

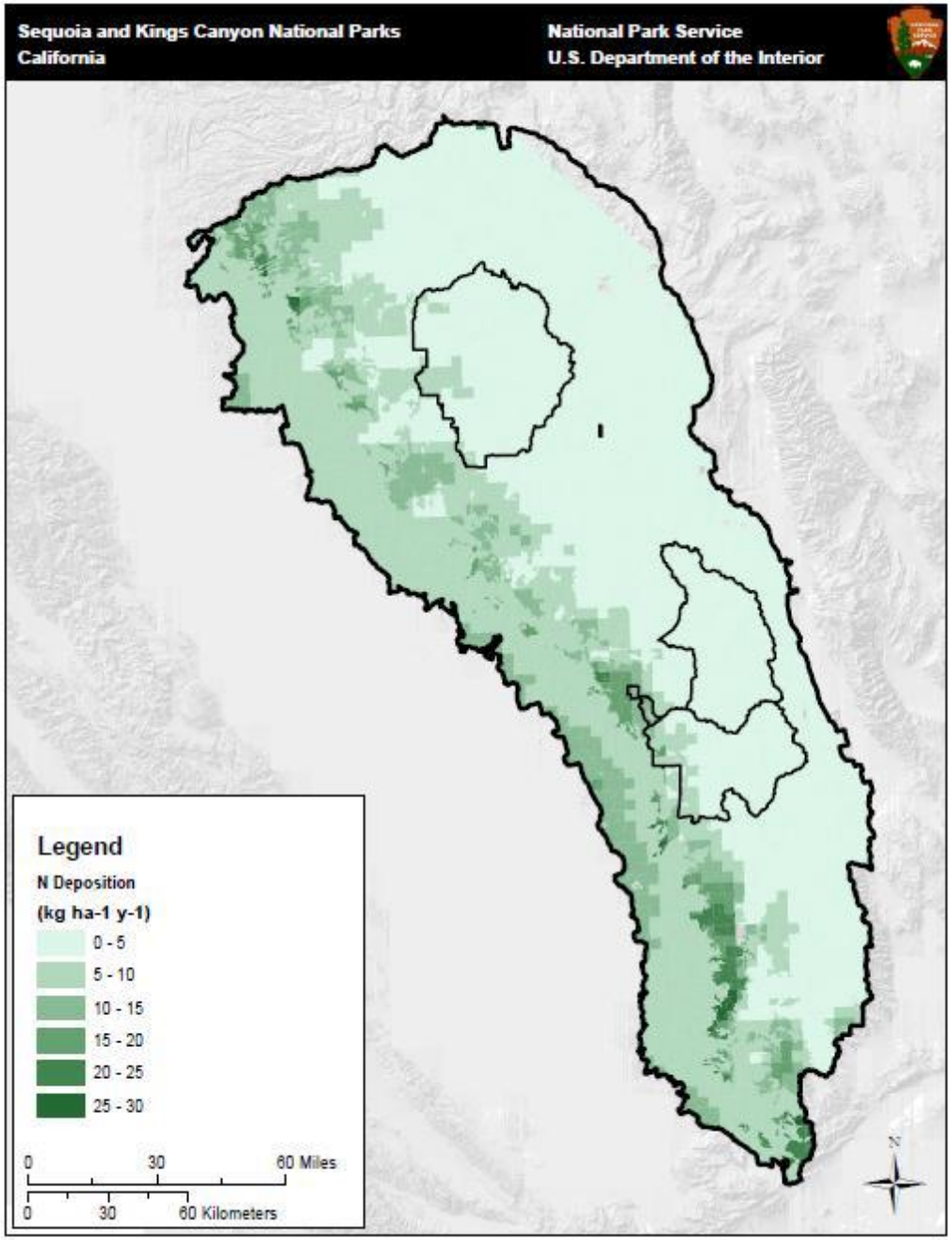
trend and impact



Cousins, poster session

N-dep

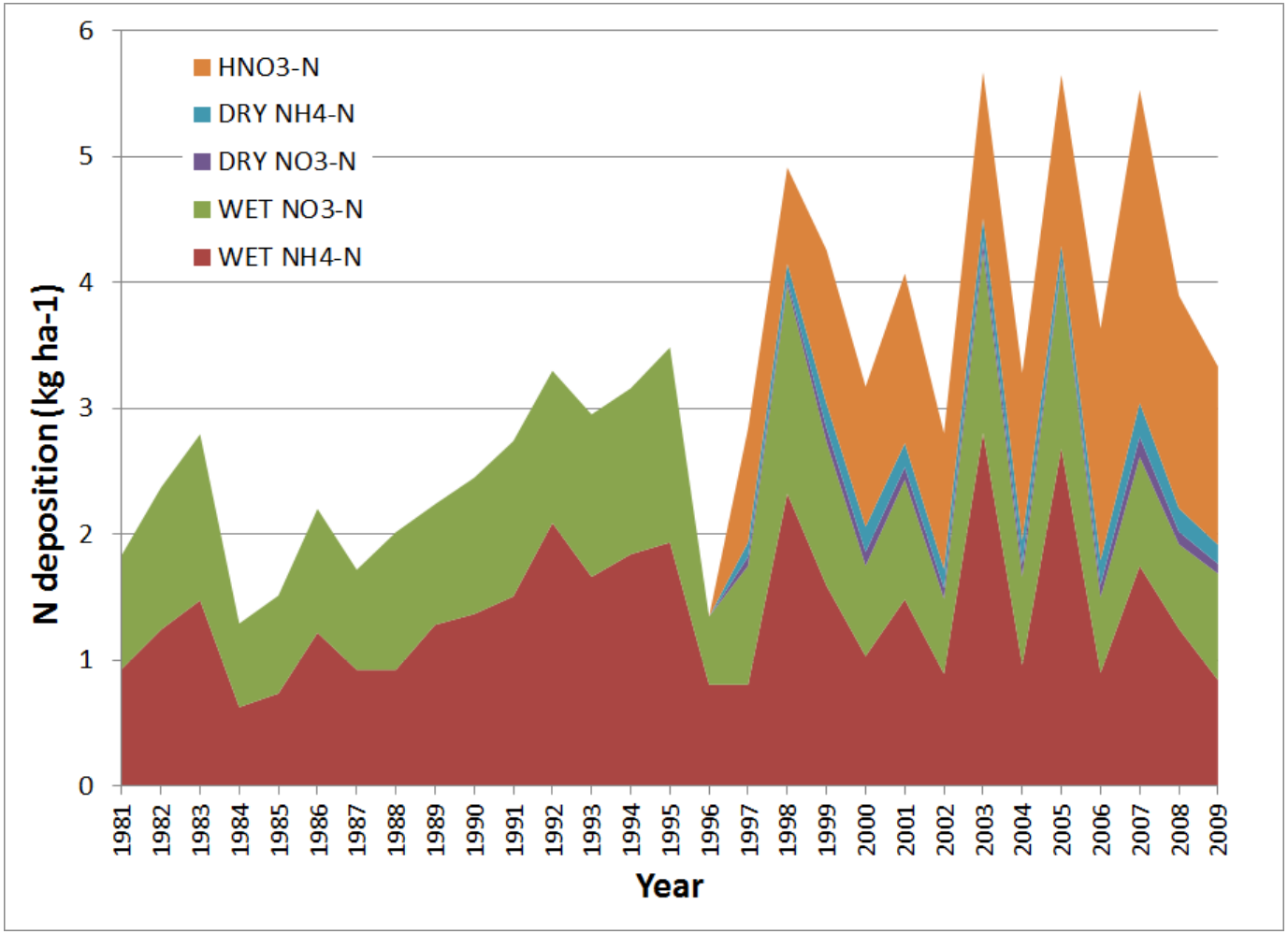
spatial gradient



Panek et al. NRCA (2013)

N-dep

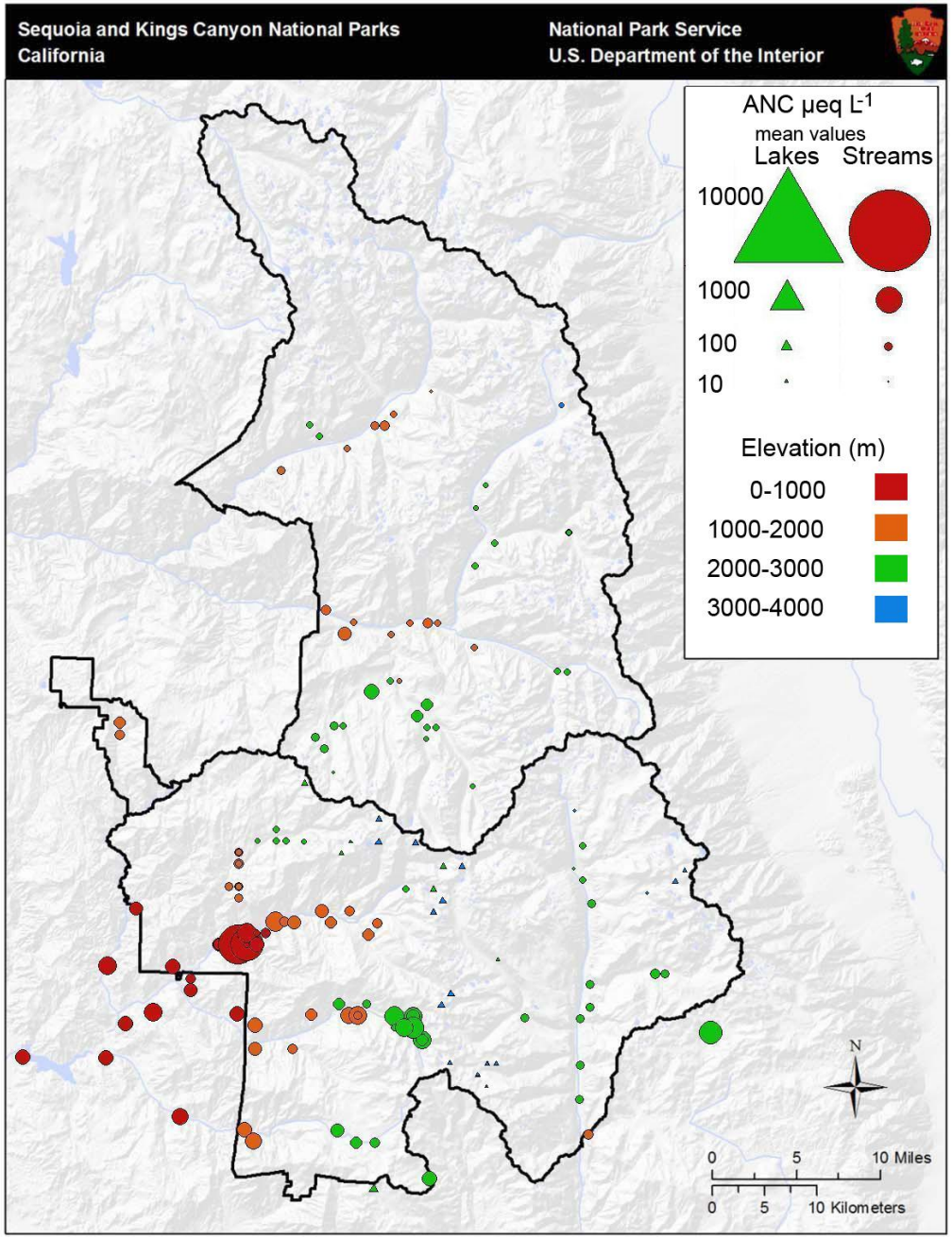
temporal trend



Panek et al. NRCA (2013)

ANC

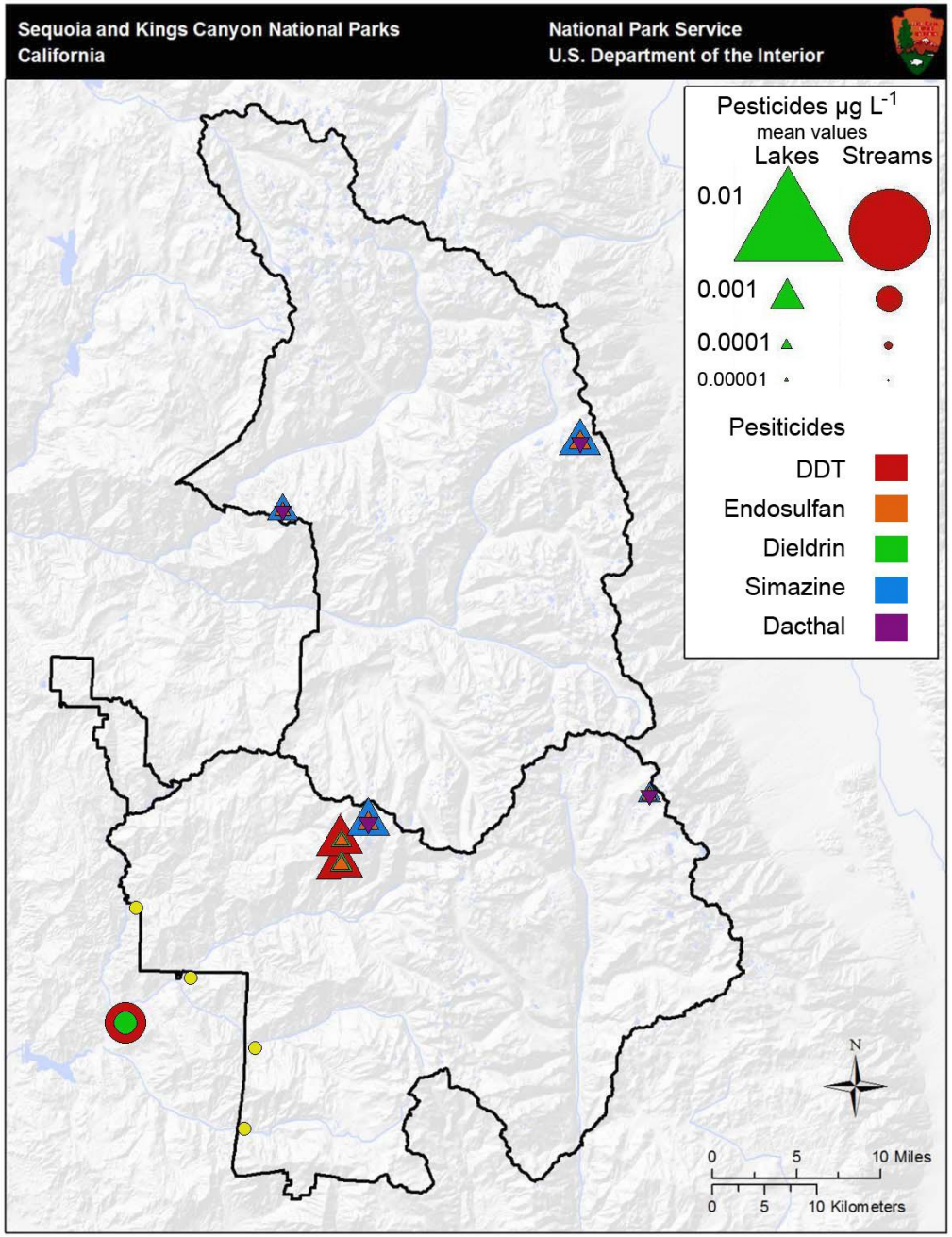
SEKI example



Day and Conklin, NRCA (2013)

pesticides

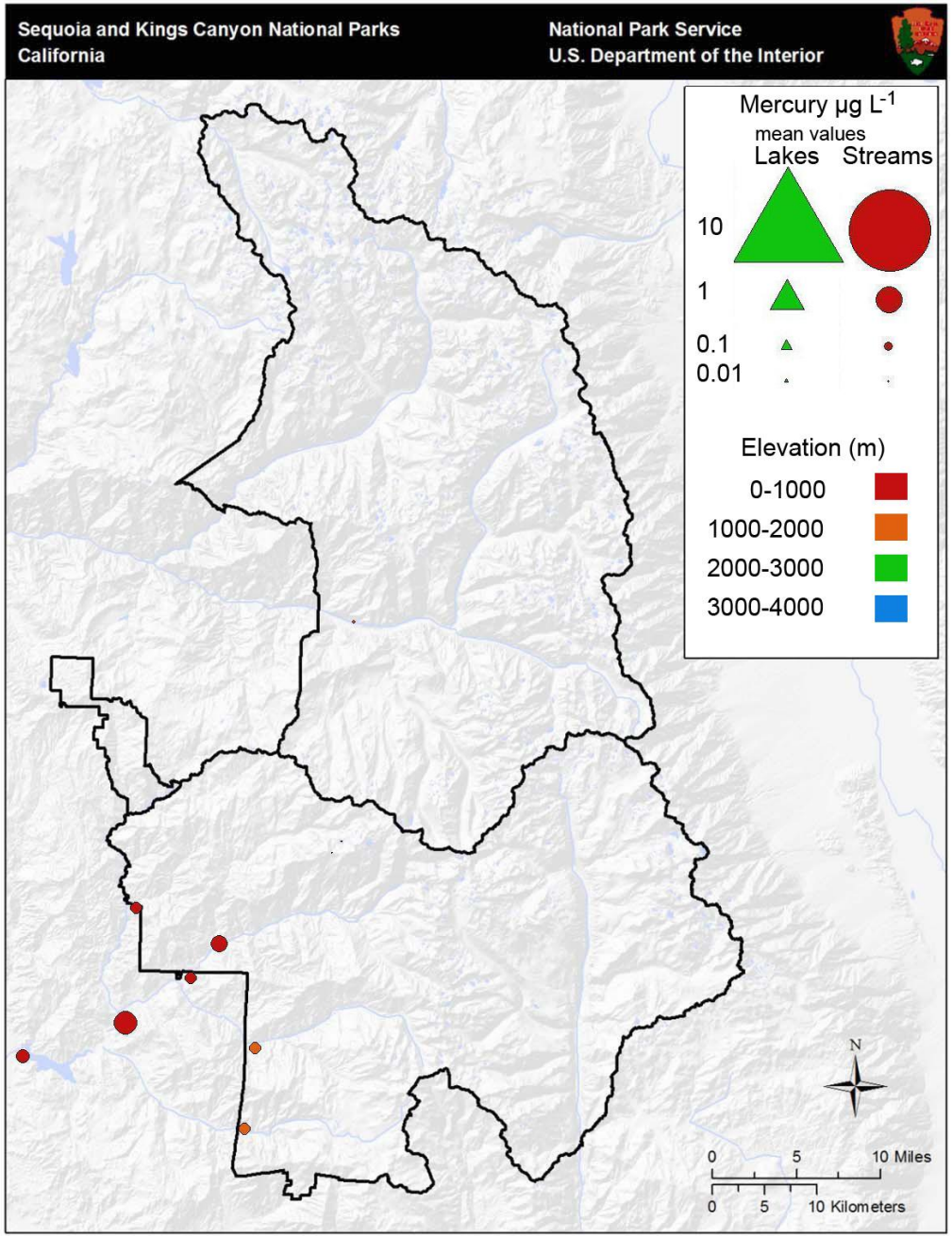
SEKI example



Day and Conklin, NRCA (2013)

mercury

SEKI example

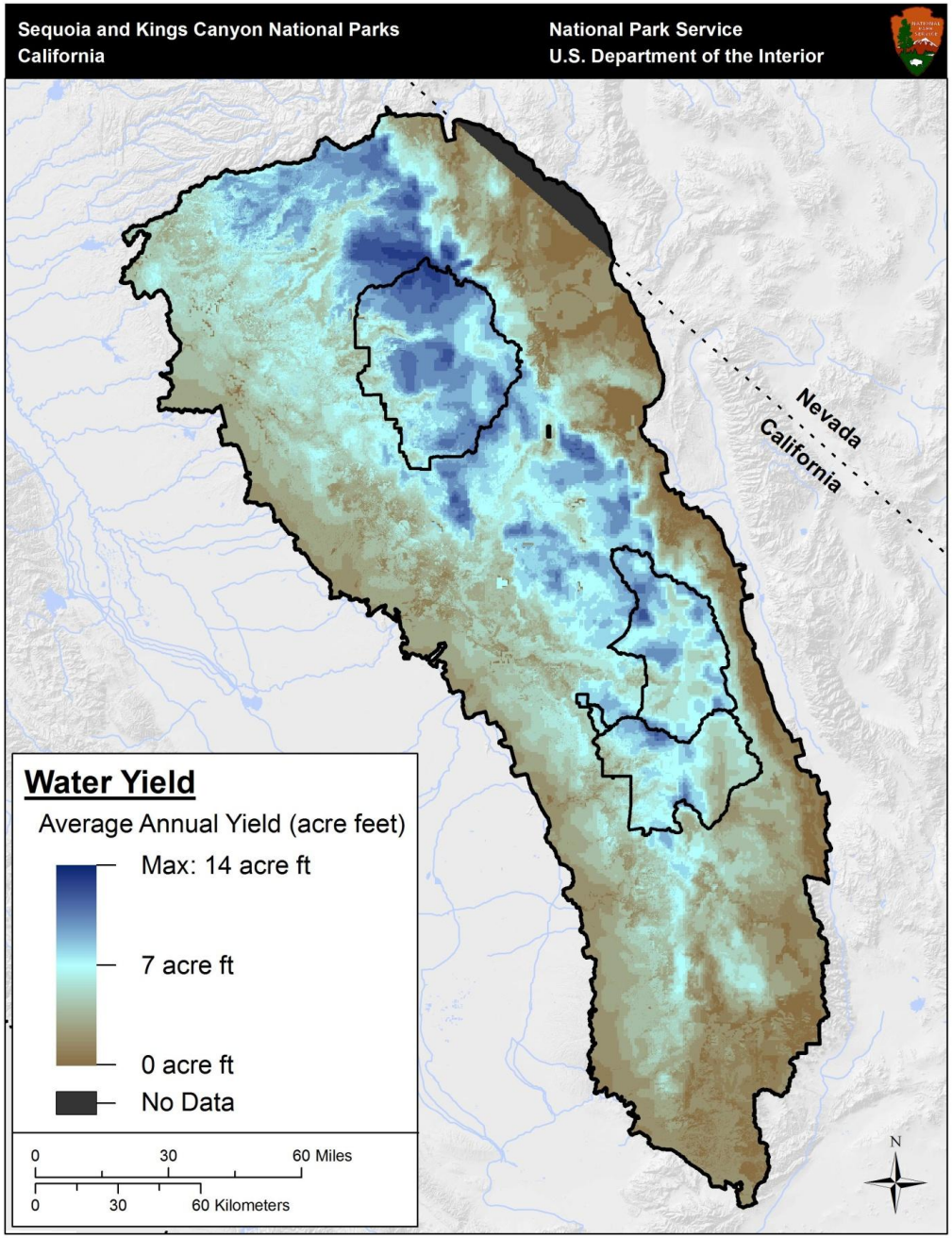


Day and Conklin, NRCA (2013)

WATER YIELD & CARBON STORAGE

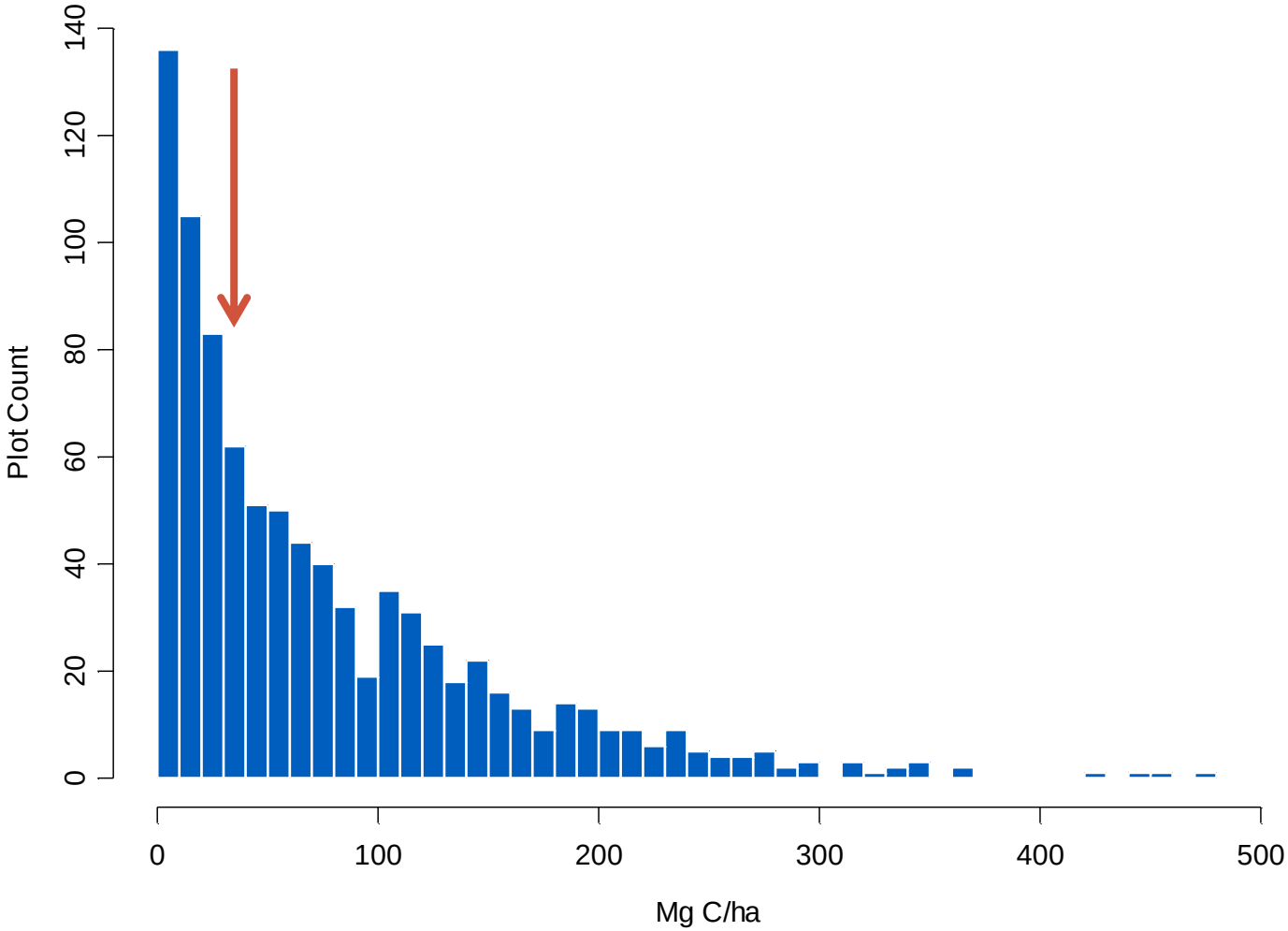
- supply
- links
- budgets

water yield

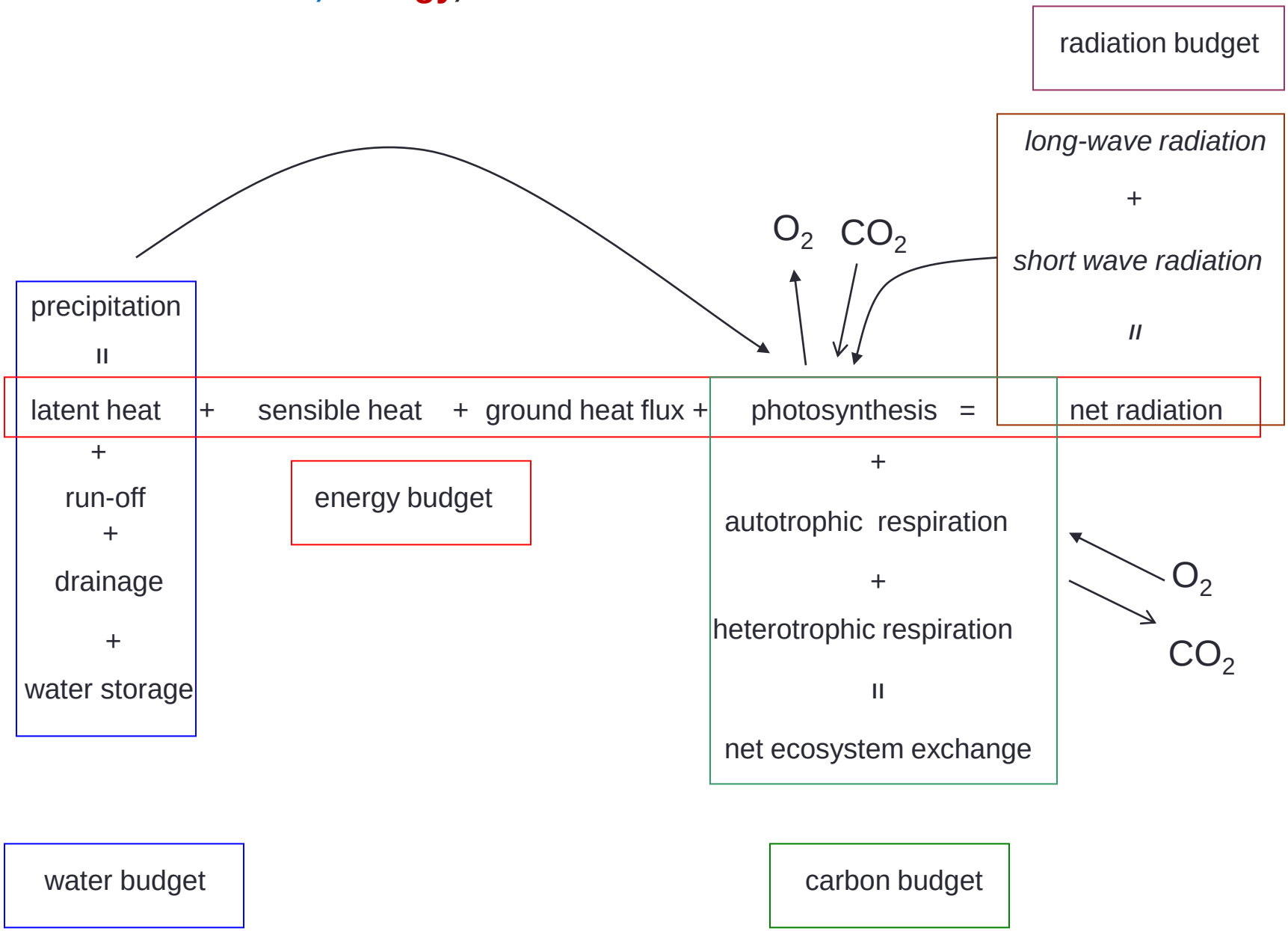


Thorne et al. NRCA (2013)
Southern Sierra Partnership Report

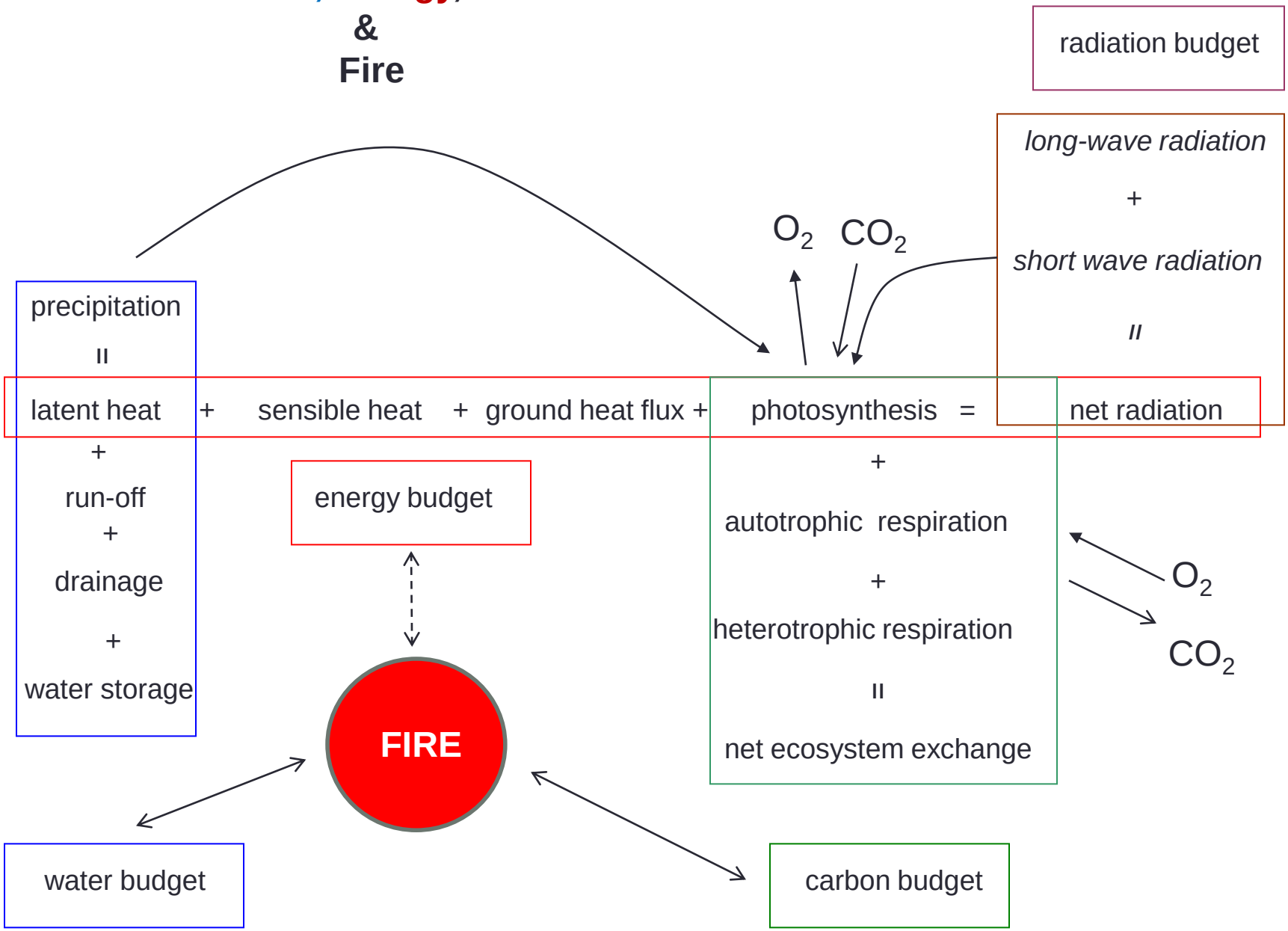
forest carbon storage



A Cheat Sheet of Water, Energy, and Carbon Balance



A Cheat Sheet of Water, Energy, and Carbon Balance & Fire



small watershed approach

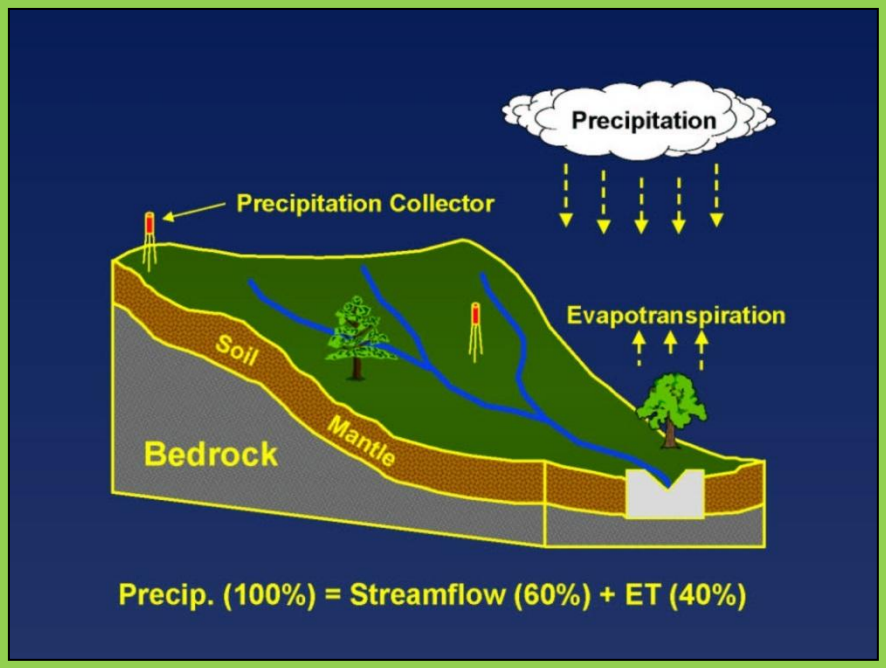


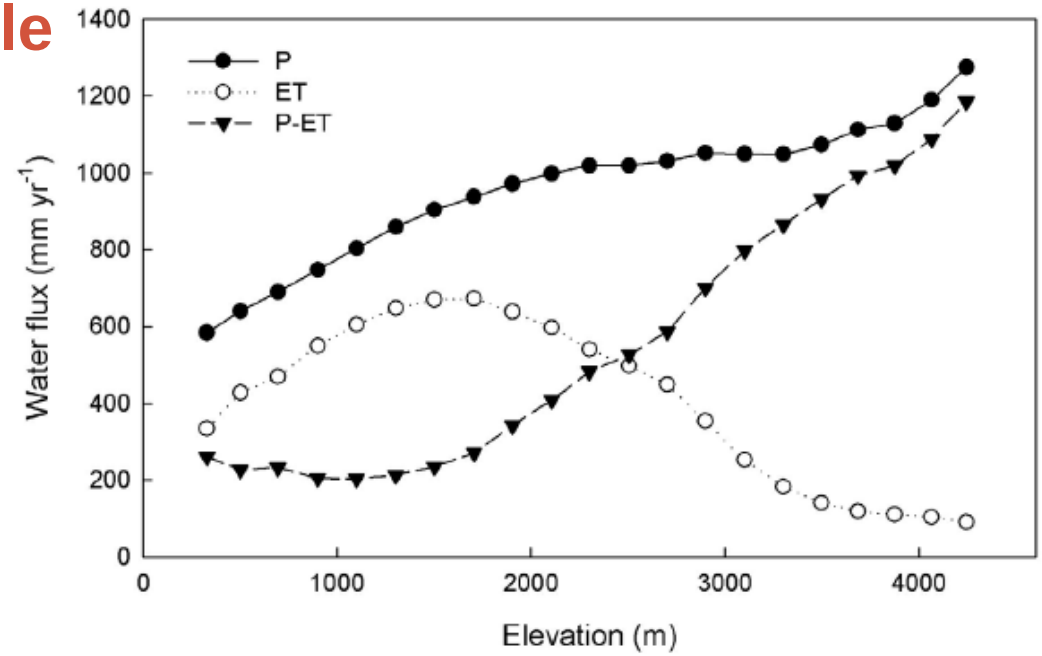
Diagram courtesy of:
Hubbard Brook Experimental Forest

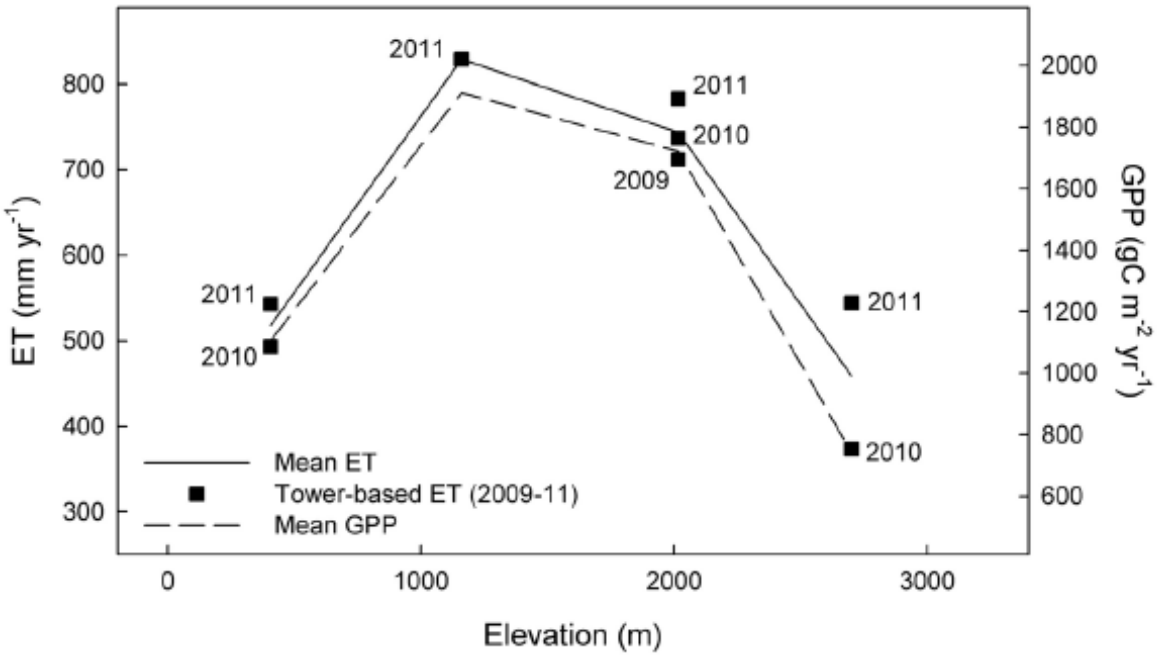
integrative instrumentation

Diagram courtesy of:
Roger Bales, Southern Sierra CZO

Southern Sierra Example

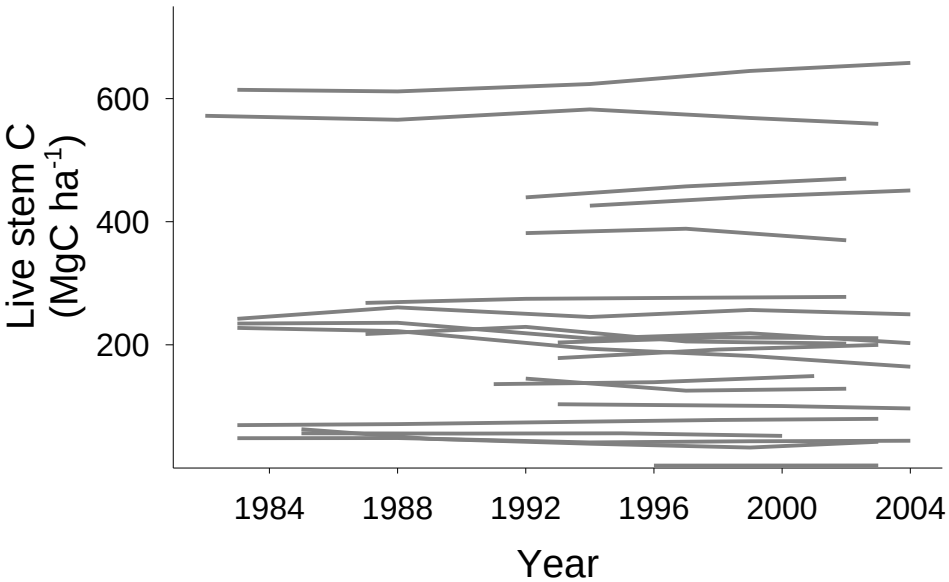
- evapotranspiration
- water yield
- productivity

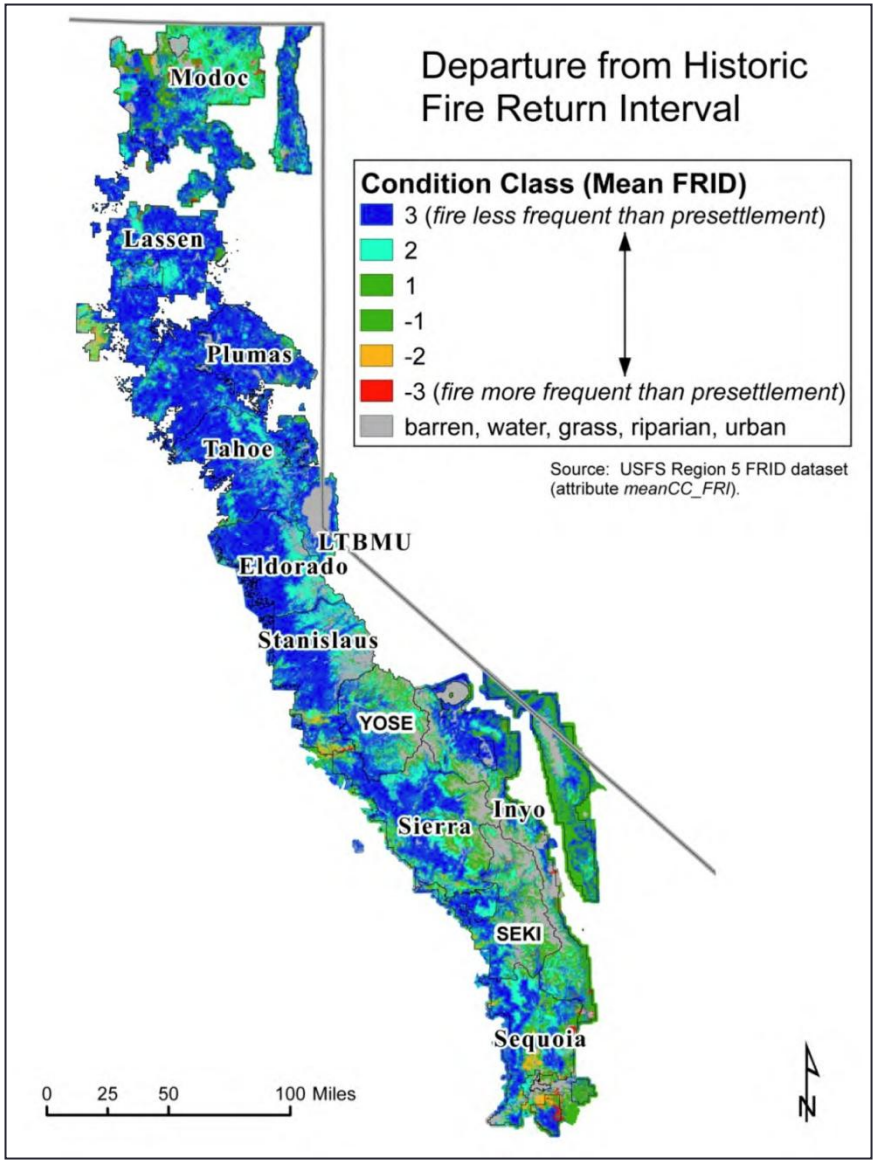




Goulden et al. J. Geophys. Res., 117 (2012)

carbon carrying capacity & fire





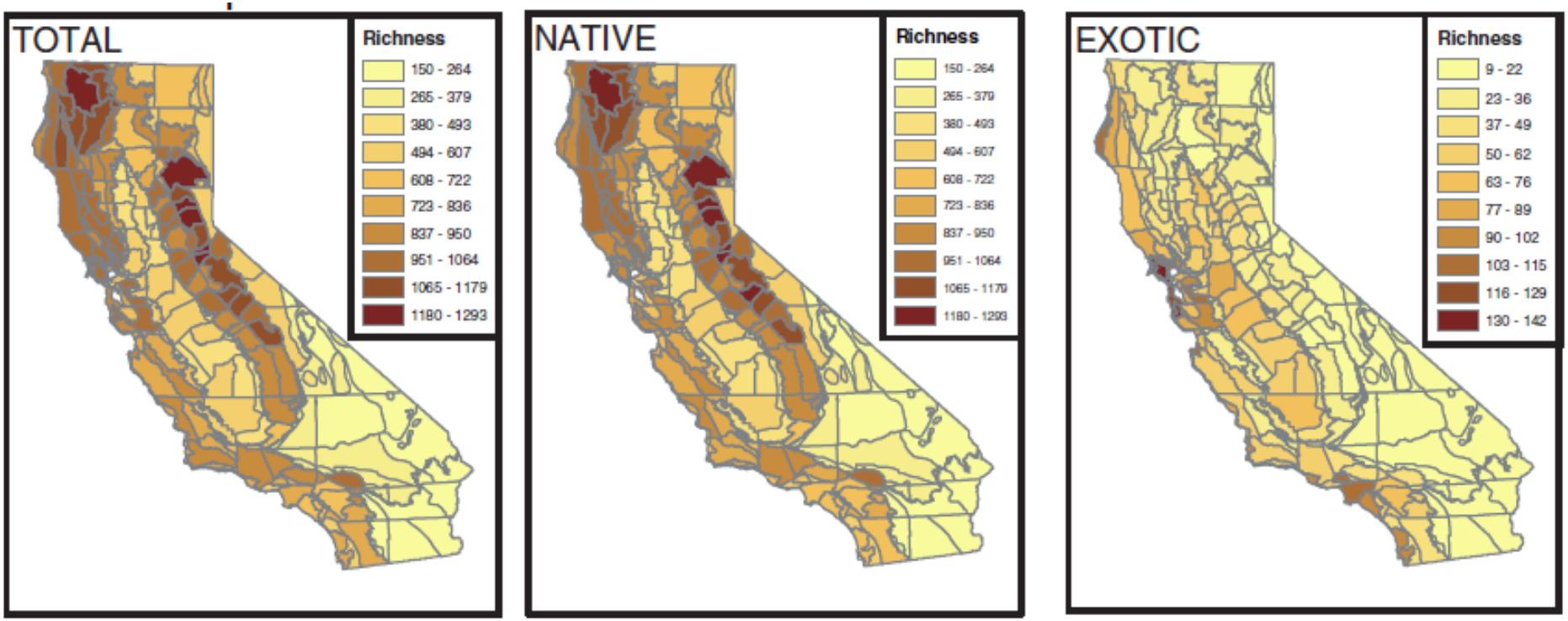
van Mantgem & Stephenson, Ecology Letters: 909-916 (2007)

Long et el. PSW Science Synthesis (2013)

BIODIVERSITY

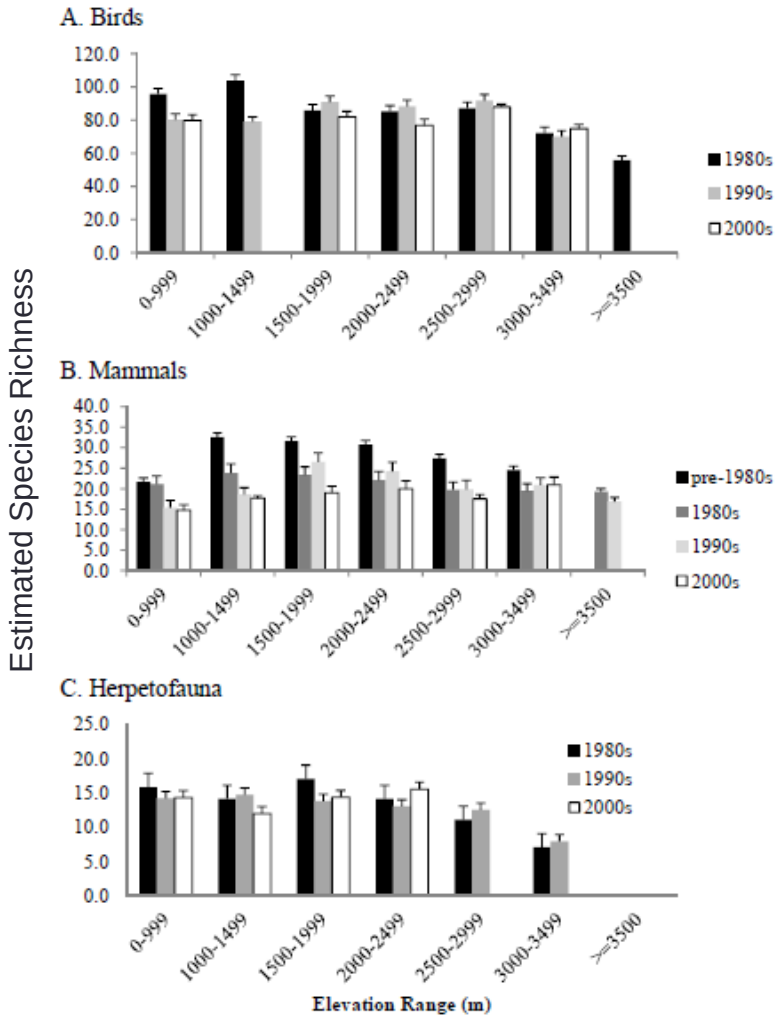
- richness
- refugia
- invasibilty

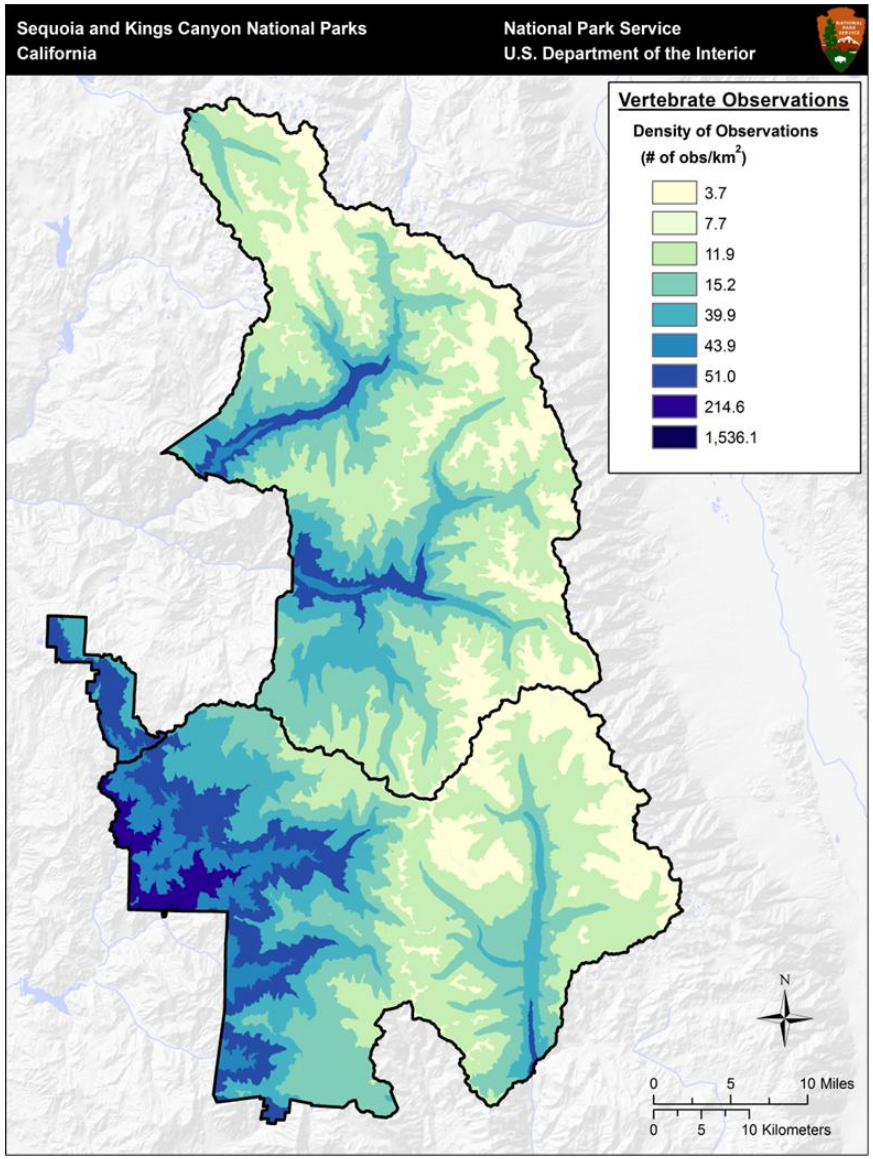
vascular plant richness



Williams et al. Ecology Letters: 127-137 (2005)

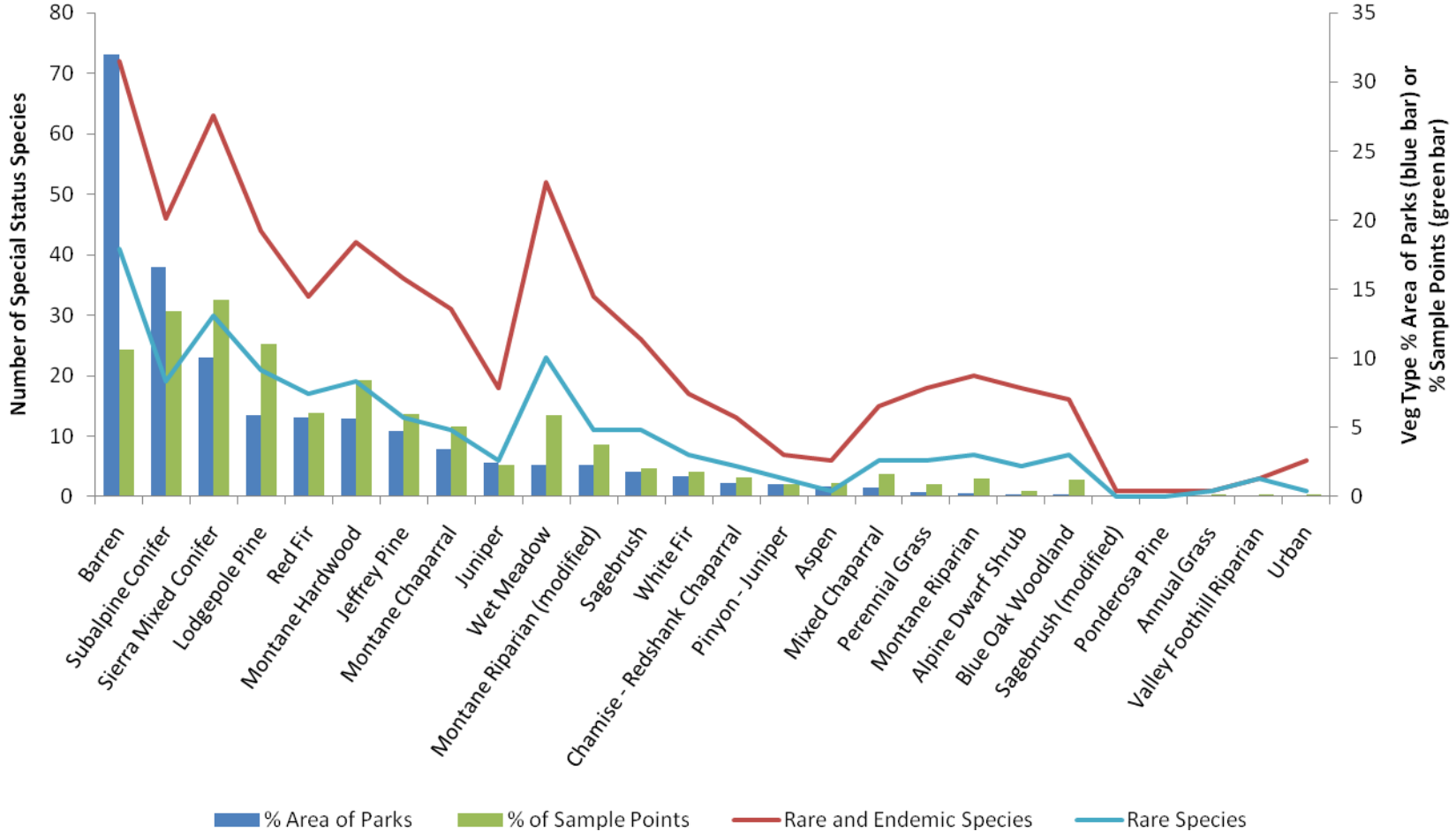
vertebrate richness





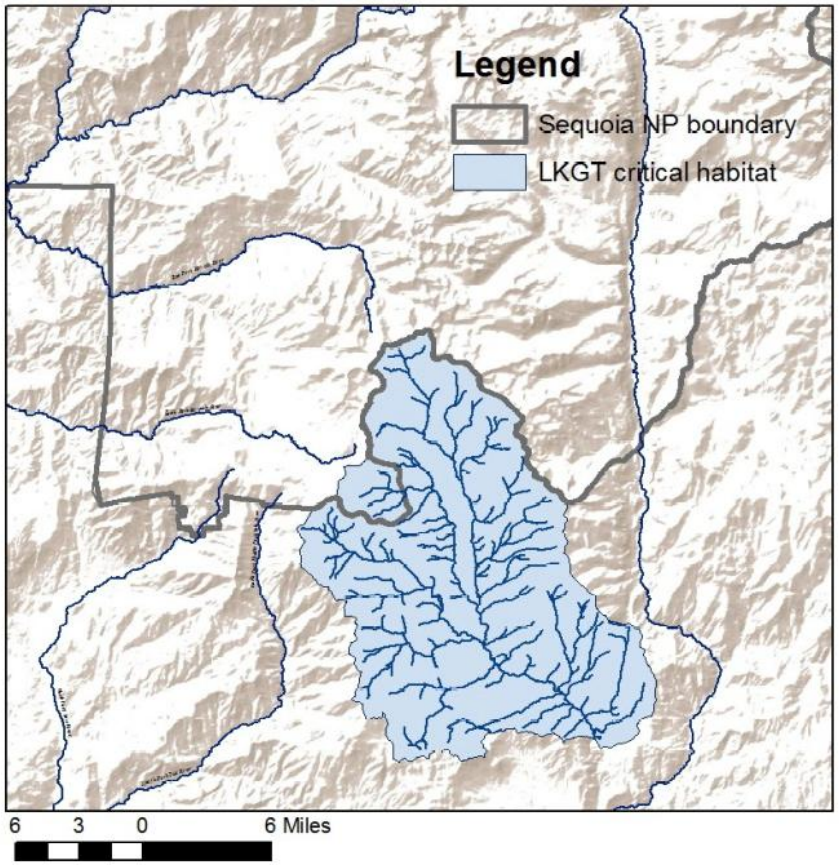
Schwartz et al. NRCA (2013)

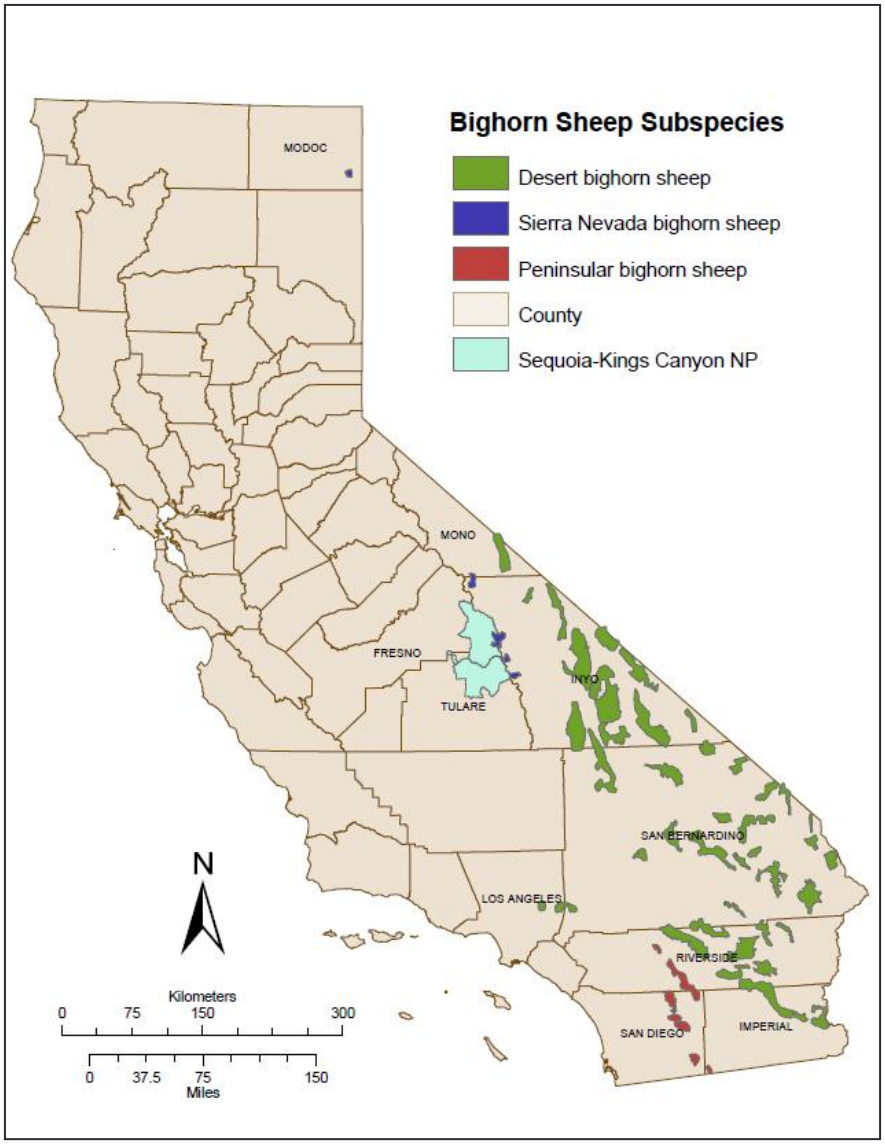
vascular plant refugia



Huber et al. NRCA (2013)

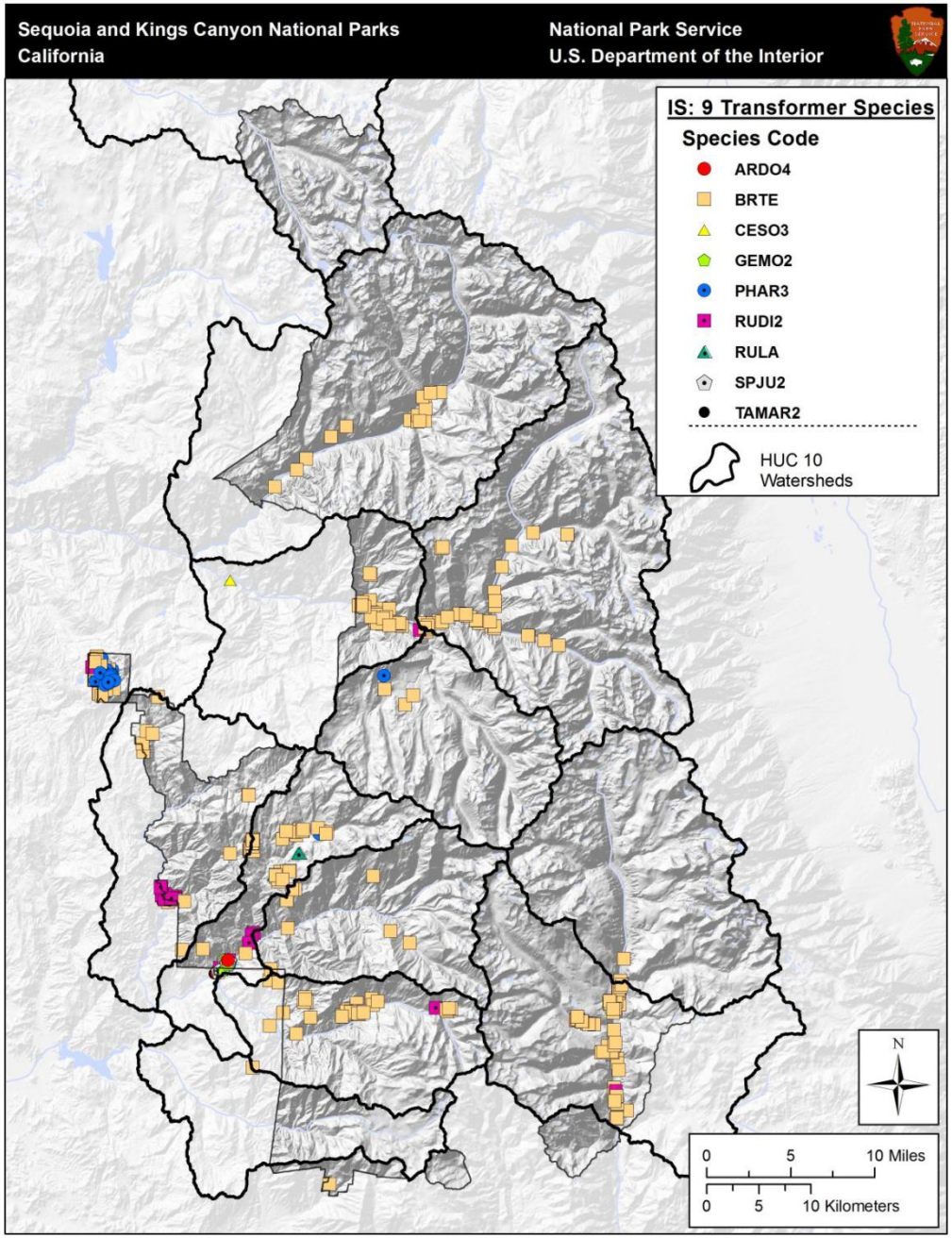
vertebrate refugia





The Ecology Graduate Group Collective NRCA (2013)

invasibility



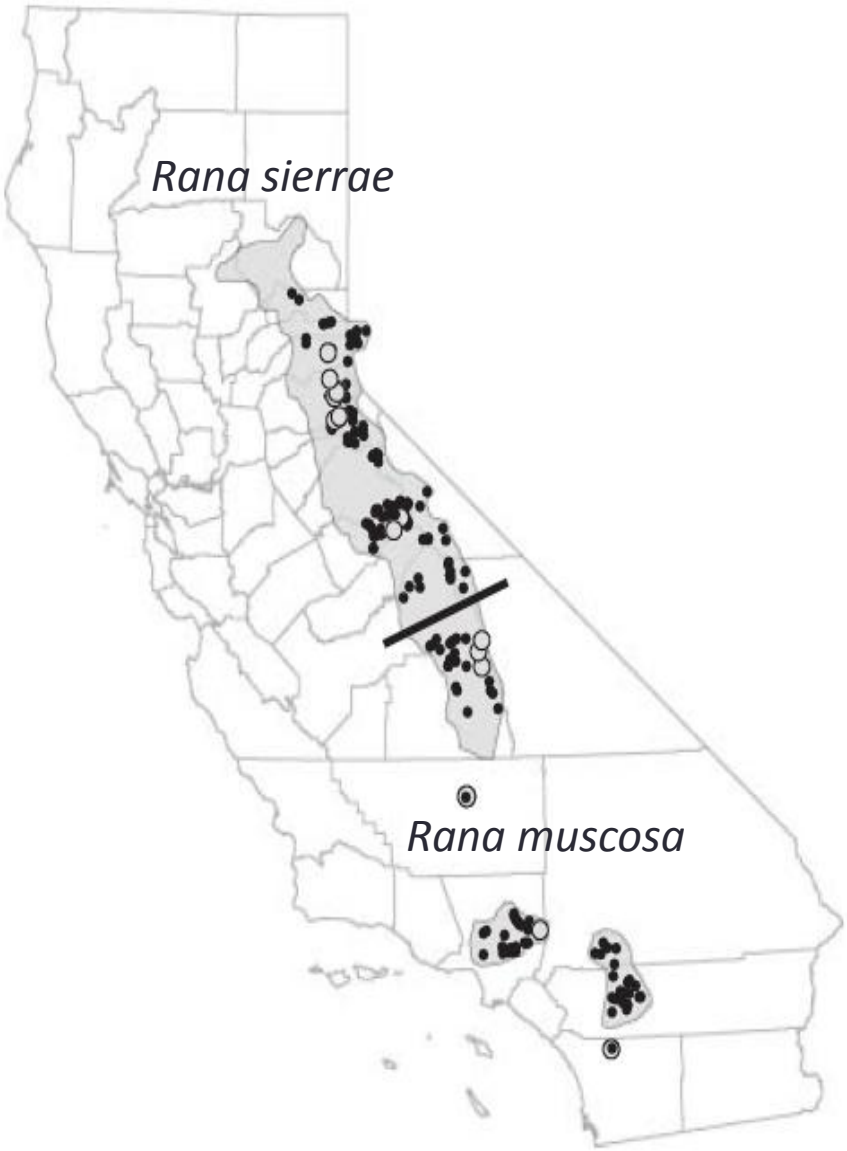
Tu et al. NRCA (2013)

SENSITIVE SPECIES

- frogs
- weasels
- giants

mountain yellow-legged frog

Photo credit: T. Poorten



SIERRA NEVADA AMPHIBIAN RESEARCH GROUP

Vredenburg et al. J. Zoology:361-374 (2007)

Pacific fisher

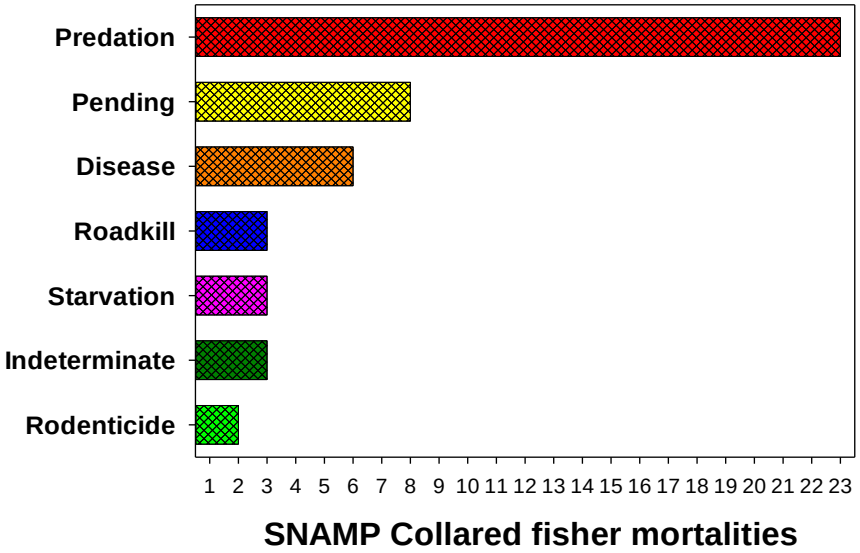
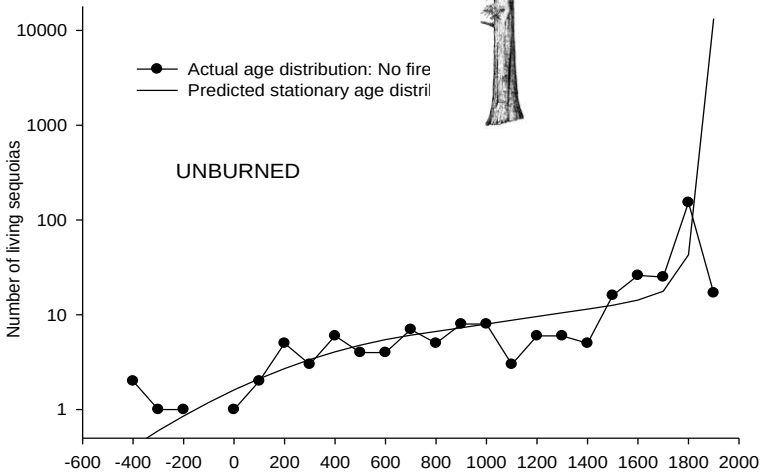
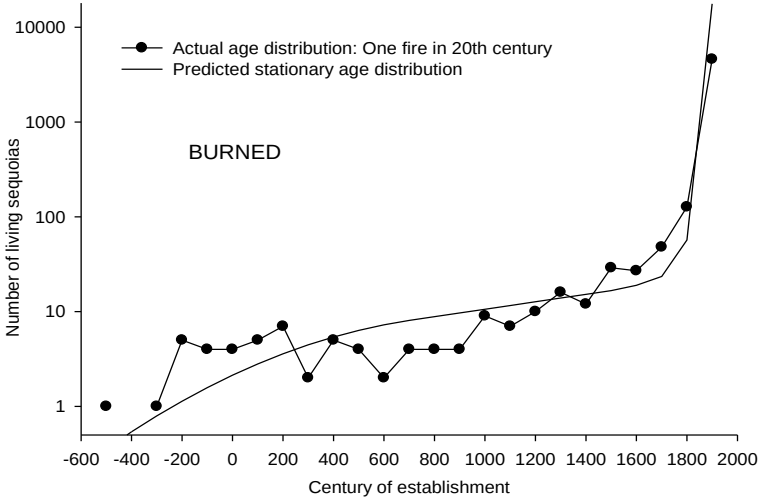


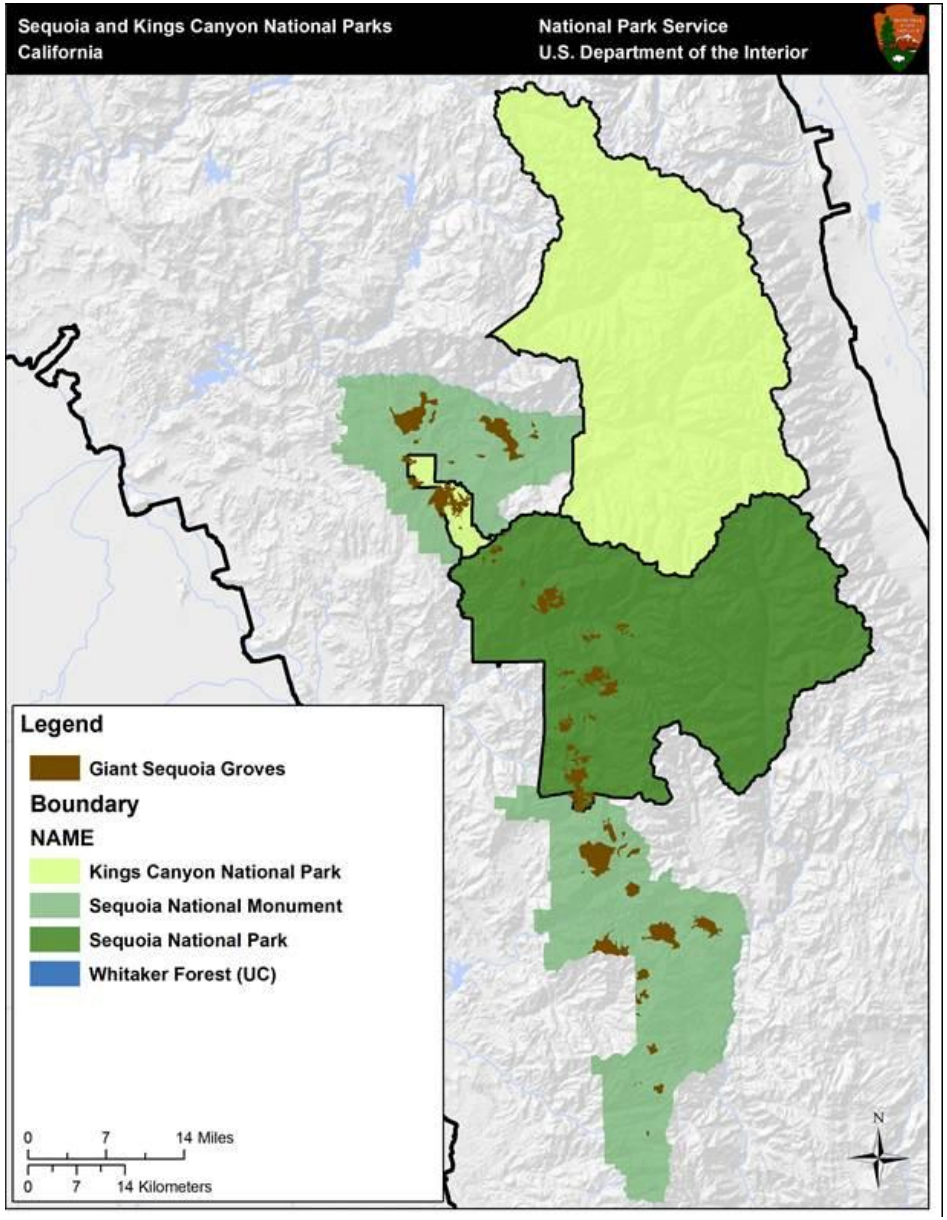
Figure 5. AREAS IN CALIFORNIA WHERE FISHER ARE NOW RARE OR ABSENT, TOTALLING APPROXIMATELY 43% OF HISTORIC RANGE

CA Dept. of Fish and Wildlife
Sweitzer et al. SNAMP

giant sequoia







York et al. NRCA (2013)

FUTURE

- key natural resource
- wisdom

What is the key natural resource? We are!

PRAYER FOR STEWARDS

Grant us the serenity to accept the things we cannot change,

The courage to change the things we can,

And wisdom to know the difference.