

Threatened Amphibians of Yosemite



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Climate Change Refugia Workshop
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Yosemite's six Native Frogs



California Red-legged frog



Yosemite toad



Western toad



Sierra Nevada yellow-legged frog



Foothill yellow-legged frog



Pacific chorus frog



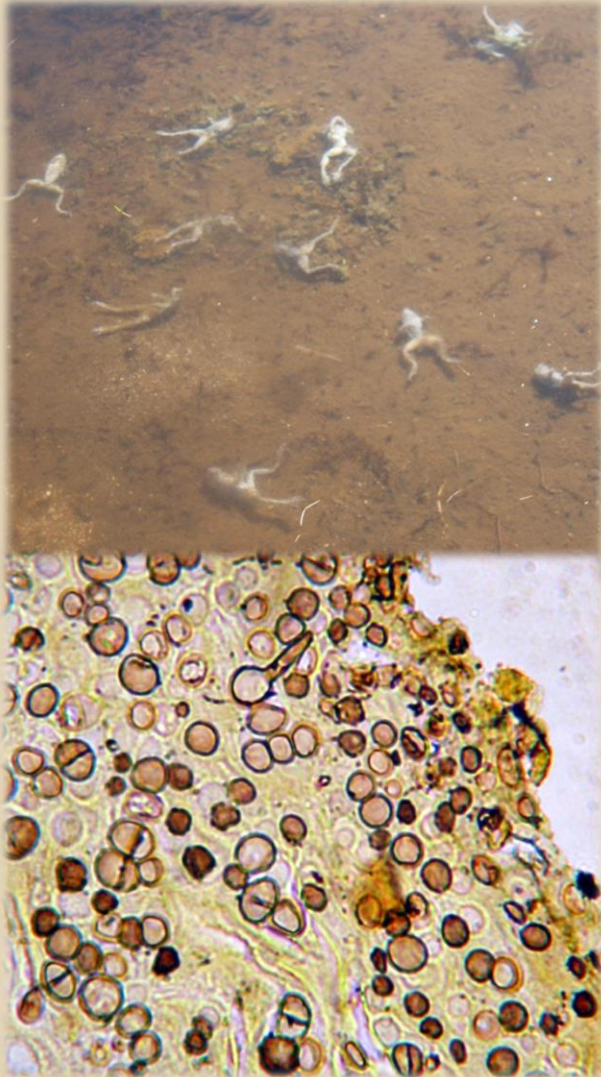
Sierra Nevada Yellow-legged Frog: Status



- U.S. Endangered Species Act:
Endangered
- California Endangered Species Act:
Threatened
- >90% decline, largely due to:
 - Non-native fish
 - Chytridiomycosis

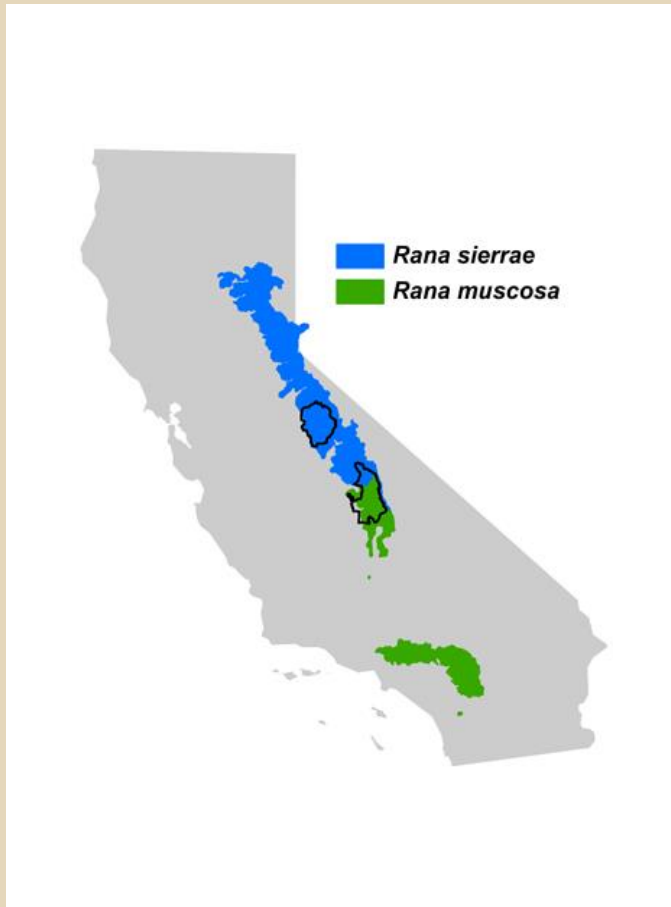
Chytridiomycosis

Batrachochytrium dendrobatidis (Bd)



- Non-native pathogen responsible for global extinctions of >200 amphibians
- 1970s spread into Yosemite
- Large die-offs of SNYL frogs
- 100% of Yosemite's SNYL frog populations assumed to be infected

Sierra Nevada Yellow-legged Frog Habitat and Range



- Elevation: 5,500-12,500 ft.
- Highly aquatic—primarily lakes & ponds; also streams and marshes
- Rarely found > few feet from water
- Deep lakes (>10 ft.)
 - don't freeze solid in winter
 - don't dry out in summer

Sierra Nevada Yellow-legged Frog Life History



Breeding age: 3-4 yrs.



Egg masses: ~18 to
21 days to hatch

- Tadpoles & adults hibernate in lakes
- May live 15-20 yrs.
- Avg. 3 yrs.



Spend 1-4 yrs. as
tadpoles

Sierra Nevada Yellow-legged Frog & Climate Change



- High-elevation lakes, ponds, & streams
 - Inter-annual variability in snowpack (20-200% of normal)
 - Summer rainfall variability
- Drying risk can affect recruitment (Lacan et al. 2008)
- Interactive effects with disease (?)

Yosemite Toad Status



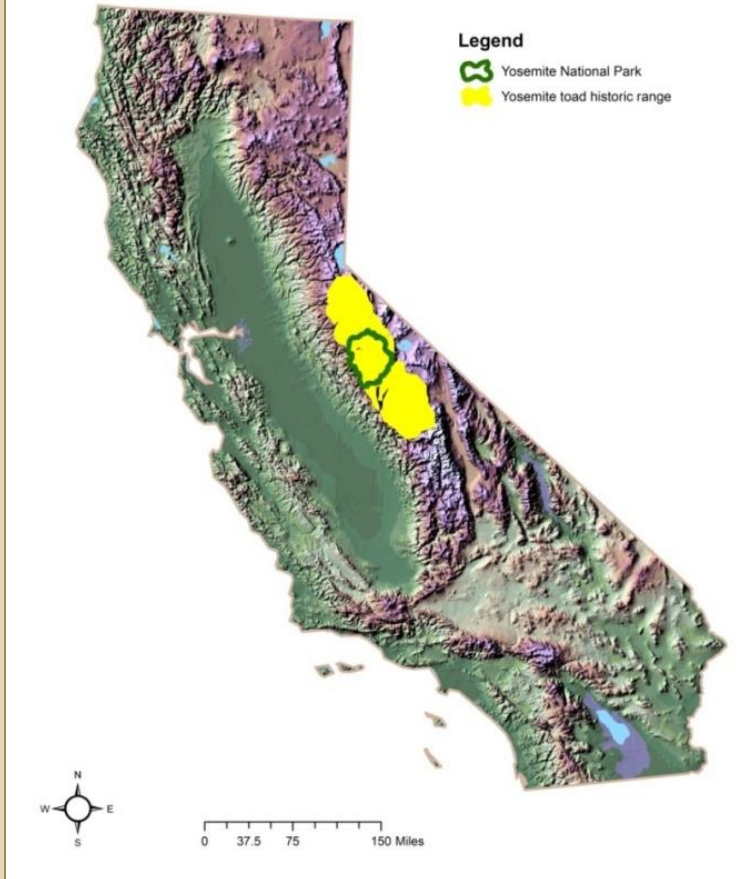
- California: Species of Special Concern
- U.S. Endangered Species Act: Threatened



Yosemite Toad (*Anaxyrus canorus*)



Historic Range of Yosemite Toad



- Yosemite: ~1/3 of range
- 6,435 -11,385 ft.
- Primary breeding habitat:
 - **Shallow** snowmelt pools in meadows; **shallows** of lakes & ponds
 - Sensitive to small fluctuations
- Upland habitat
 - Willow thickets, springs, seeps, rodent burrows

Yosemite Toad Life History



Adults begin breeding at 3-6 yrs.



May live 12-15 yrs.



Egg masses typically hatch in 11-12 days



Hibernate in upland habitat



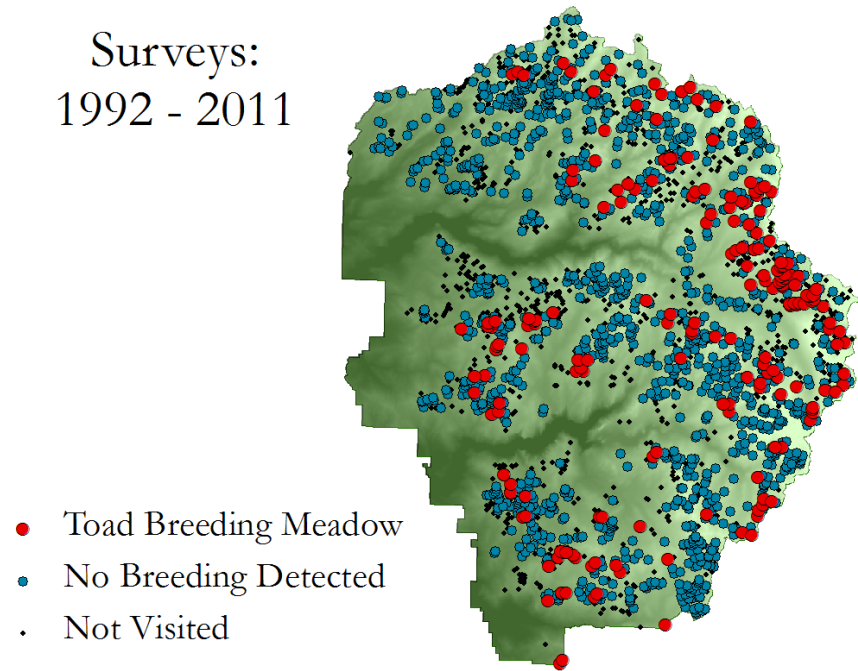
Tadpoles develop in 4-6 wks.

Climate Change & Yosemite Toad



- Sensitive to hydroperiod
 - Inter-annual variability in snowpack
- Long-lived: may be able to experience & respond to extreme habitat variability (?)
- Info needs:
 - How CC-linked habitat alteration affects pop. dynamics
 - Time-lagged?
 - Toad energetics
 - Interactions with other risk factors (i.e., disease)

Surveys:
1992 - 2011



Native Frogs of Yosemite: Threats



Foothill yellow-legged frog (*Rana boylii*)

- 1 Park record, outside Park boundary
- < 6,000 ft.
- Water development & diversion
- Non-native fish, disease (?)



California red-legged frog (*Rana draytonii*)

- Mainly < 3,500 ft.
- Some Park locations ~5,000 ft.
- Overharvest, habitat loss
- Invasive species: bullfrogs, fish

California red-legged frog conservation introduction to Yosemite Valley



- Made possible by bullfrog eradication (2005-2019)
 - 1st successful eradication on a landscape level! (Kamoroff et al. 2019 *Biol. Inv.*)
- Eggs collected outside park (2016)
- Captive-reared at San Francisco Zoo
- > 1,000 adults released 2017-2019

California red-legged frog conservation introduction to Yosemite Valley



Conservation introduction:

- *Movement outside of a species' natural range (past or present) to achieve a conservation goal.*

Assisted colonization:

- *Intentional movement and release outside of indigenous range to avoid extirpation of populations or extinction of focal species.*

(IUCN 2013)

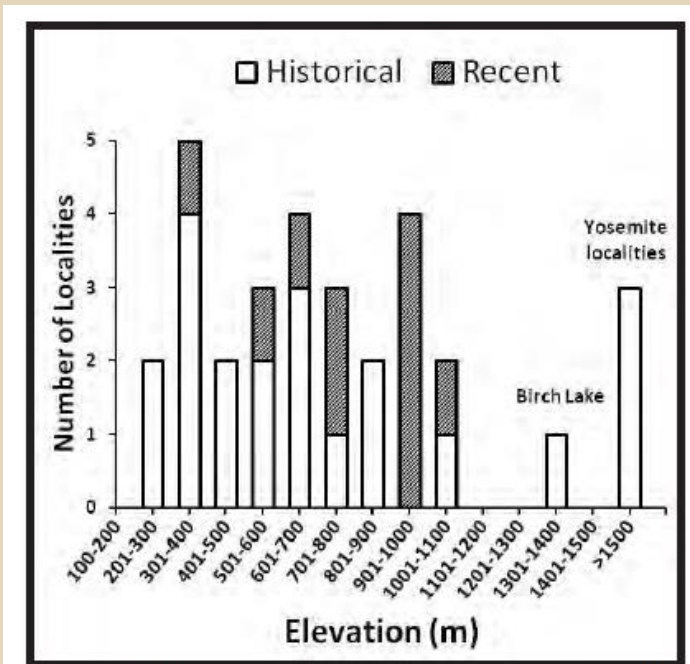


FIGURE 2. Elevation distribution of 21 historical and 10 recent *Rana draytonii* localities in the Sierra Nevada of California. The graph includes the Cascades Mountains (Paynes Creek) locality and excludes the “Upper Lake” locality (Table 1; see text). Locality details are provided in Tables 1 & 6.

Barry & Fellers 2013

