

National Park Service U.S. Department of the Interior Yosemite National Park Resources Management and Science

Protecting Threatened & Endangered Wildlife in Wilderness



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Presentation Overview



 Federal Endangered Species Act (ESA) Listing Status
 Conservation Assessments/Strategies & Critical Habitat Designations
 Current threats & management actions
 Future research & management needs

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Other Listed, Candidate, and Proposed/petitioned Species

Federally Recognized
California Red-legged frog (Threatened)
SN Red Fox (Cand.) & Wolverine (Cand.)

 Proposed/petitioned for Federal listing
 Western Pond Turtle, Foothills Yellow-legged frog, Black-backed Woodpecker, CA Spotted Owl, & Pacific Fisher

(Current listings can be found at https://www.fws.gov/sacramento/es_species/Accounts/ Home/es_species.htm)

Yosemite toad (Anaxyrus canorus)



ESA Threatened
 Species (USFWS 2014)

 California Species of Special Concern (1998)

Conservation Assessment (USFS, 2015) Habitat Designation (USFWS, 2016)



Yosemite Toad; Conservation

Historic Range of Yosemite Toad



 Yosemite contains ~1/3 of species range

 Endemic to the Sierra Nevada

 Estimates decline 47-79%

(Wake 1990, Martin 1990 & 1991, Bradford et al 1991, USFWS Cons. Assessment 2015)

Yosemite Toad; Biology



(Mullally 1953, Karlstrom & Livezey 1955, Karlstrom 1962, Kagarise Sherman 1980, Sadinski 2002, Sadinski 2004, Martin 2008, Brown 2006, Brown & Olsen 2013)

Climate change

Impacts to meadow hydrology, water quality, & vegetation



Possible effects of livestock

bank erosion, water sedimentation, & increased bare ground..

(Menke et al. 1996, Kauffman and Krueger 1984, Marlow and Pogacnik 1985, Olson-Rutz et al. 1996, etc)

<u>Studies of Yose Toads & stock have not</u> found significant correlations

(Tate et al. 2010, Lind et al. 2011, McIlroy et al. 2013, Roche et al. 2012)

Climate change

Impacts to meadow hydrology, water quality, & vegetation Recreational activities (trampling = poorly studied)



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Breeding Probability HIGH LOW



(Berlow et al. 2011)

Hiker Access EASY DIFFICULT

Conservation Assessment (USFS, 2015)

- Acid deposition
- Airborne contaminants, including pesticides
- Climate change
 - Disease
- Fire management, including fire supression
 Habitat degredation
 Introduced fish and other predators

- Livestock grazing
- Recreational activities, including packstock
- Research Activity
- Restoration
- Roads
- UV-B radiation

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SN Mountain Yellow-Legged Frog (*Rana sierrae*)



ESA Endangered
 Species (2014)

California Species of Special Concern

Conservation Assessment (USFS, 2014) Critical Habitat Designation (USFWS, 2016)

SN Mt. Yellow-legged Frog; Conservation

Once among the most abundant vertebrates in the Sierra Nevada

 At least 93% of populations have disappeared

 Remaining populations small (median = 2 frogs)

(Grinnell & Storer 1924, Zweifel 1955, Bradford et al 1994, Jennings & Hayes 1994, Drost & Fellers 1996, Jennings 1996, Matthews & Knapp 1999, Knapp and Matthews 2000, Vredenburg et al. 2007, Brown et al. 2014)



SN Mt. Yellow-legged Frog; Biology



(Zweifel 1955, Mullally & Cunningham 1956, Cory 1962, Bradford 1982, Bradford 1983, Pope 1999, Matthews & Pope 1999, Lacan et al. 2008, etc.)

SN Mt. Yellow-legged Frog; Threats



(Bradford et al. 1993, Knapp & Matthews 2000a, 2000b, Vredenburg 2004, NPS 2006, Knapp et al. 2007, etc.) (Fellers et al. 2001, Vredenburg & Summers 2001, Rachowicz & Vredenburg 2004, Rachowicz et al. 2006, etc.)

SN Mt. Yellow-legged Frog; Management

Fish removal
9 sites completed
4 sites on-going
One on-going site is a basin of 7 lakes



(Bradford et al. 1993, Knapp & Matthews 2000a, 2000b, Vredenburg 2004, NPS 2006, Knapp et al. 2007, <u>Finlay & Vredenburg 2007</u>)

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SN Mt. Yellow-legged Frog; Management

Frog restoration 6 sites now have frogs! 2 were facilitated • 4 were independent 20 yr-study shows 7 fold increase in frog populations in YOSE (Knapp et.al 2016)



(Bradford et al. 1993, Knapp & Matthews 2000a, 2000b, Vredenburg 2004, NPS 2006, Knapp et al. 2007, <u>Finlay & Vredenburg 2007</u>)

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Sierra Nevada Bighorn Sheep sierrae)

ESA Endangered Species (2000)California Endangered

Rana



Conservation Assessment (USFS, 2014) Recovery Plan (USFWS, 2007) Critical Habitat Designation (USFWS, 2008)

S.N. Bighorn Sheep Conservation



Prior to mid-1800s: 1000s of bighorns Mid-1800s to current: **Domesticated sheep** cause fatal diseases 1975 – bighorn population shrank to 3 herds totaling 250 1995 – low of 100 bighorns 2000 – Federal **Endangered Status** 2007 – Recovery Plan 2016 – Population > 600

SN Bighorn Sheep Recovery Actions

Translocations

AugmentationsReintroductions

Population Monitoring



Disease Management
 Domestic sheep and goats carry can cause fatal pneumonia

Contact remains a risk on Yosemite's eastern boundary

S.N. Bighorn Sheep Recovery Plan

 Recovery Goal: 305 females distributed among 4 recovery units

Distribution Goal – Achieved

14 herd units (12 is minimum target) within 4 recovery units

Population size – In Progress

 Distribution and Population Goals in Northern Recovery Unit (Yosemite) – Achieved

50 ewes (minimum target) distributed among Cathedral Herd, Mt Warren Herd, and Mt Gibbs Herd

Conclusions & take home points

Ongoing Risk of displacement
 Cumulative impacts from management stem from the parks inception

(fur trapping, intentional removals & introductions, food conditioning, disease introductions, etc.)
 Major current changes (fire regimes, climate change)

 We need to be sensitive to cumulative impacts & aware that the actual changes in the plan are rather small;

 Re-routing some trails, removing fish in some areas, small scale seasonal closures of meadows, minimally invasive research & monitoring methods

 Our goal is to be "hands off" BUT populations are VERY small causes are clearly anthropogenic

Questions?

RMS, Wildlife Branch Yosemite National Park



National Park Service U.S. Department of the Interior

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SUPPLEMENTAL SLIDES



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Wilderness Stewardship Plan

 Potential impacts from Wilderness Recreational Activities (backpacking, hiking, and mountaineering) and Packstock

 Potential to disturb bighorn through behavioral displacement, excessive consumption of forage (packstock), or habitat destruction, e.g., meadows

 Management and monitoring ensures bighorn and their habitat are protected, while avoiding unnecessary restrictions on wilderness recreation



R.C. Klinger et al. 2015. Evaluating Potential Overlap Between Pack Stock and Sierra Nevada Bighorn Sheep (Ovis canadensis sierrae) in Sequoia and Kings Canyon National Parks, California. United States Geology Survey Report 2015-1101, 2015

HISTORICAL PRESENCE OF BD IN MUSEUM SPECIMENS



DISEASE-CAUSED IMPACTS IN THE A. BOREAS GROUP

Slide by R. Knapp

Muths, E., et al. 2003. Evidence for disease-related amphibian decline in Colorado. Biological Conservation 110:357-365.

- Blaustein, A. R., et al. 2005. Interspecific variation in susceptibility of frog tadpoles to the pathogenic fungus *Batrachochytrium dendrobatidis*. *Conservation Biology* 19:1460-1468.
- Scherer, R. D., et al. 2005. An evaluation of weather and disease as causes of decline in two populations of boreal toads. Ecological Applications 15:2150–2160.
 Murphy, P. J., et al. 2009. Distribution and pathogenicity of *Batrachochytrium dendrobatidis* in boreal toads from the Grand Teton area of western Wyoming. EcoHealth 6:109-120.
- Pilliod, D. S., et al. 2010. Effects of amphibian chytrid fungus on individual survival probability in wild boreal toads. Conservation Biology 24:1259-1267.
- Murphy, P. J., et al. 2011. Temperature, hydric environment, and prior pathogen exposure alter the experimental severity of chytridiomycosis in boreal toads. Diseases of Aquatic Organisms 95:31-42.
- Muths, E., et al. 2011. Compensatory effects of recruitment and survival when amphibian populations are perturbed by disease. Journal of Applied Ecology 48:873–879.

SPECIES CONSIDERED FOR LISTING (NOT CANDIDATE SPECIES)



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Great Gray Owl



- State Endangered Species Strix nebulosa yosemitensis
- At time of last ice age (~20,000 years ago) population declined to perilously low numbers, genetic bottleneck — small population size, isolation, low genetic diversity, and high vulnerability to inbreeding depression
- Stochastic event (e.g., extreme weather event) extinction
- "The species I'm most concerned about in the state of California is the Great Gray Owl" –Dan Applebee, CDFG Staff Environmental Scientist, Threatened and Endangered Species



CLIMATE CHANGE



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Effect of Rising Snowline on Yosemite Watersheds



Changes in Snowpack & Surface Water Flows

- Period of record: 1927-66 to 2008
- Snowpack declining below 8,500 feet (2,600 m), increasing above
- 56% of park below 8,500 ft
- Precipitation and runoff unchanged
- Increase in temperature
- Surface flows occurring earlier



Documented Vegetation Changes

- Sugar pine, red fir, white fir, oth
- Mortality rate doubled (1983 2004)
- Increase in temperatures, stagr precipitation
- Predicted by water deficits
- Mortality attributed to:
 - Increased stress
 - Pathogens and pests



van Mantgem & Stephenson, 2007

Non-native species trends

1988-89: 22/362 (6%) contain at least one non-native species

2006: 87/150 (58%) contain at least one non-native species

1988 – 2006:

- 15/18 years above avg temps
- We find ~3 new non-natives/yr
- 2012: 12 new species
- YST at Big Oak Flat and Tuolumne
- Cheat grass on mtn tops



Documented Changes: Mammals

- 28 species of small mammals
- Emerging patterns
 - Many low elevation species expanded upward



Grinnell Surveys 1914-1920

- Half high elevation species contracted



Moritz et al., 2008



