Bear Essential?

The Past and Potential Future of Grizzlies in California

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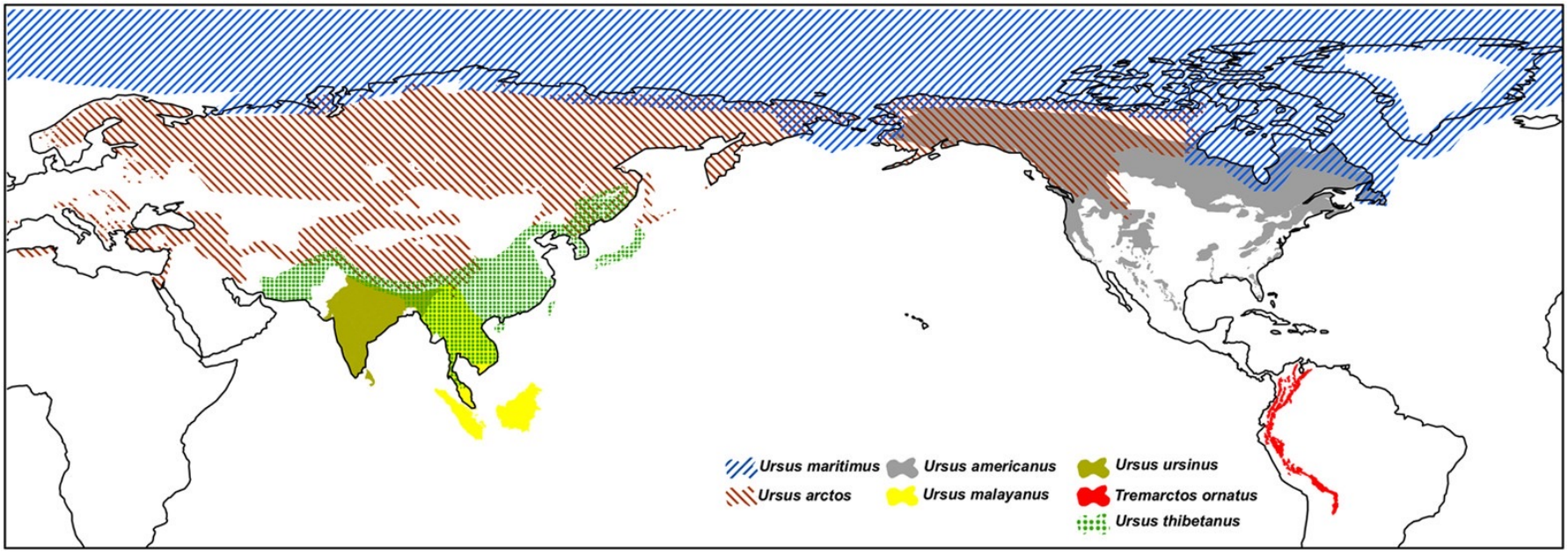
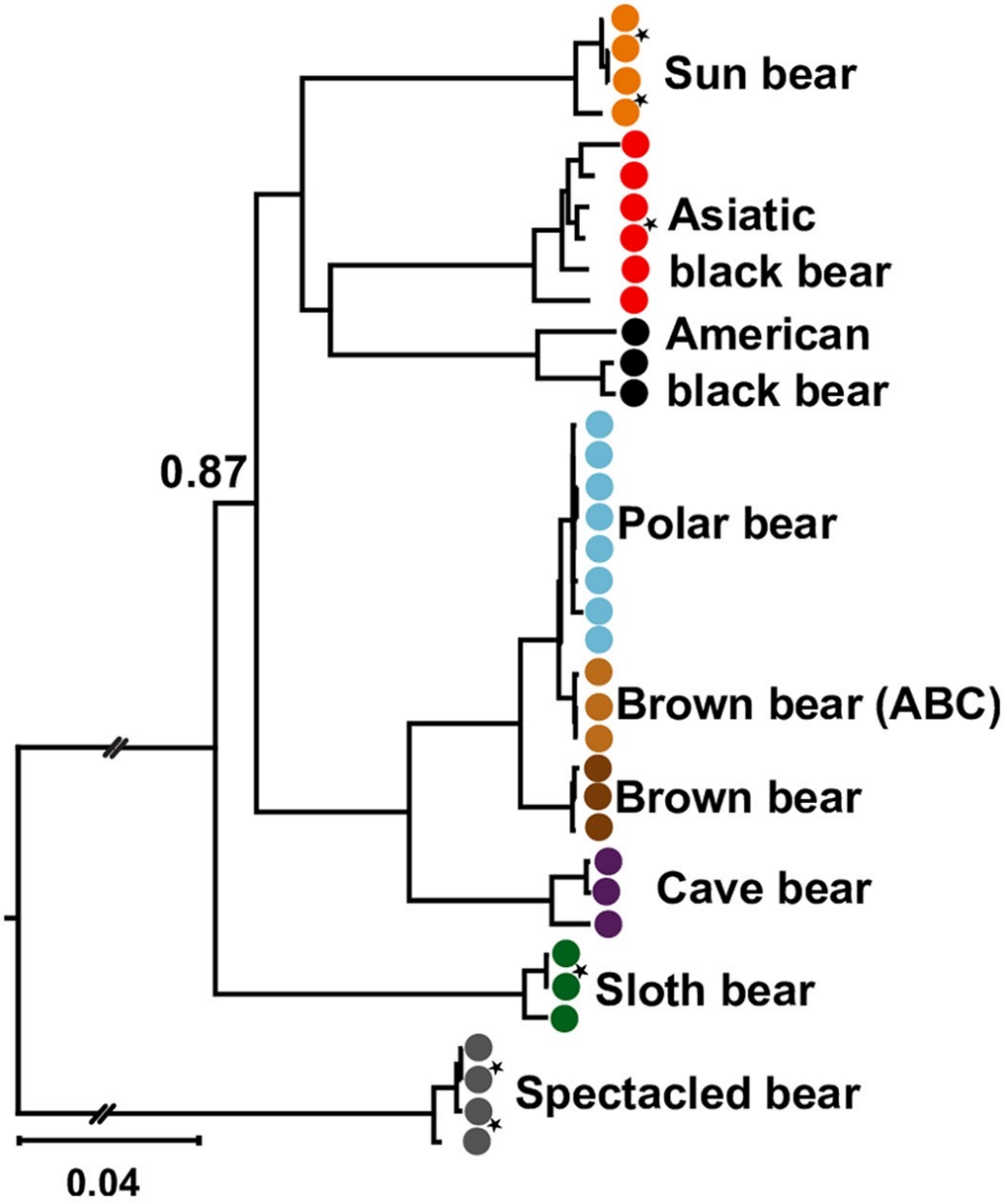
To follow along, go to www.calgrizzly.com, scroll down, and click on "Presentation"


Ursus maritimus
Ursus arctos
Ursus americanus
Ursus malayanus
Ursus ursinus
Tremarctos ornatus
Ursus thibetanus



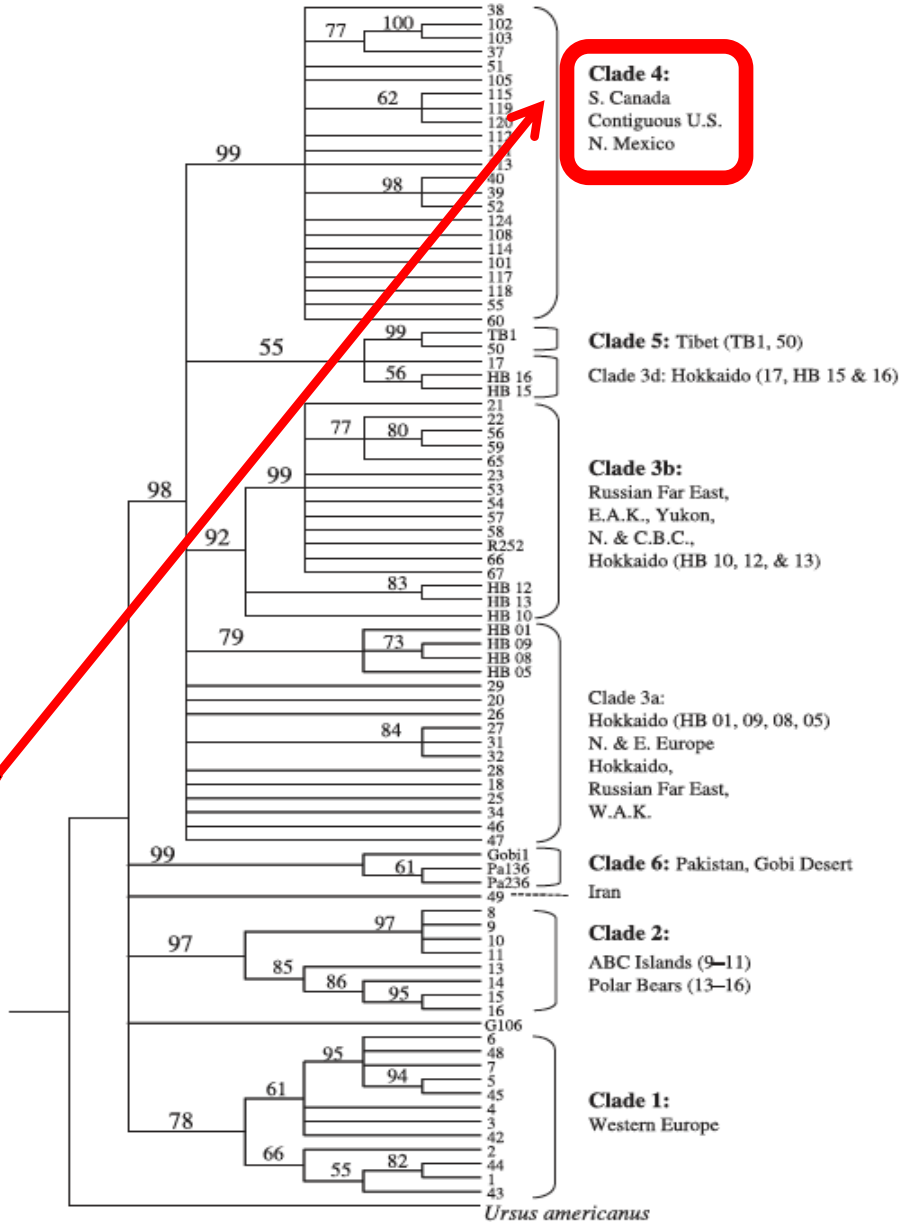
Phylogenetic relationship among the bears using mtDNA genomes.

Current Brown Bear Subspecies (n=15)

1. *Ursus arctos arctos* - Eurasian brown bear
2. *Ursus arctos beringianus* - Kamchatka brown bear
3. *Ursus arctos collaris* - East Siberian brown bear
4. *Ursus arctos isabellinus* - Himalayan brown bear
5. *Ursus arctos pruinosus* - Tibetan blue bear
6. *Ursus arctos lasiotus* - Ussuri brown bear
7. *Ursus arctos syriacus* - Syrian brown bear
8. *Ursus arctos alascensi* - Alaska brown bear
9. *Ursus arctos dalli* - Dall Island brown bear
10. *Ursus arctos sitkensis* – Sitka/ABC bear
11. *Ursus arctos middendorffi* - Kodiak bear
12. *Ursus arctos horribilis* – Regular old grizzly
13. *Ursus arctos californicus* - California grizzly
14. *Ursus arctos nelsoni* - Mexican grizzly bear
15. *Ursus arctos crowther* - Atlas bear (North Africa)

**Considered extinct*

Phylogenetic Clades (n=6)



Really,

in North America there are probably only two systematically justifiable brown bear subspecies, the grizzly and the Kodiak/ABC,

and one very, very close relative

Ursus maritimus **– Polar bear**

Ursus arctos alascensi **- Alaska brown bear**

Ursus arctos dalli **- Dall Island brown bear**

Ursus arctos sitkensis **– Sitka/ABC bear**

Ursus arctos middendorffi **- Kodiak bear**

Ursus arctos horribilis **– Regular old grizzly**

Ursus arctos californicus **- California grizzly**

Ursus arctos nelsoni **- Mexican grizzly bear**

Global population and range of brown bears

Around half of the brown bear's historical range has been lost since 1800

Population estimates:

Alaska = 40,000
Canada = 25,000
Lower 48 states = 2,000
Europe = 25,000
Asia and the Middle East = 115,000

Total = ~207,000
An IUCN "species of least concern"

A diverse and flexible species

In 1800, grizzlies were widespread in diverse mountain, foothill, plains, and coastal habitats across the American West.

Today, they are limited to the Northern Rockies and North Cascades of Idaho, Montana, Wyoming, and Washington state.

Light Green: Grizzly range in 1800 (lower 48 states & Mexico)

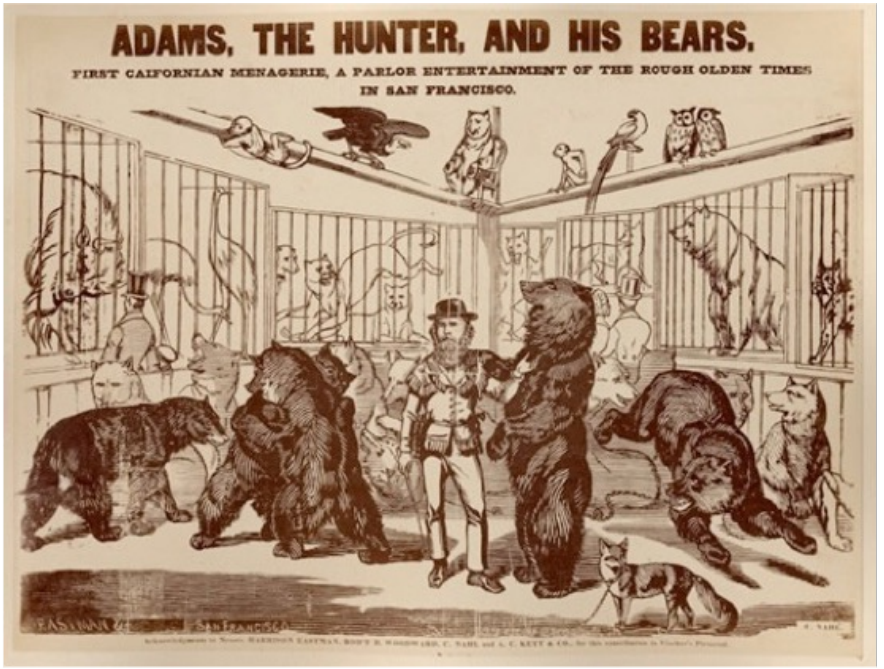
Dark Green: Grizzly range by 1900

Numbers: Year of last sightings or presumed extinctions

POMO BEAR DOCTOR'S SUIT
MODEL IN PEABODY MUSEUM

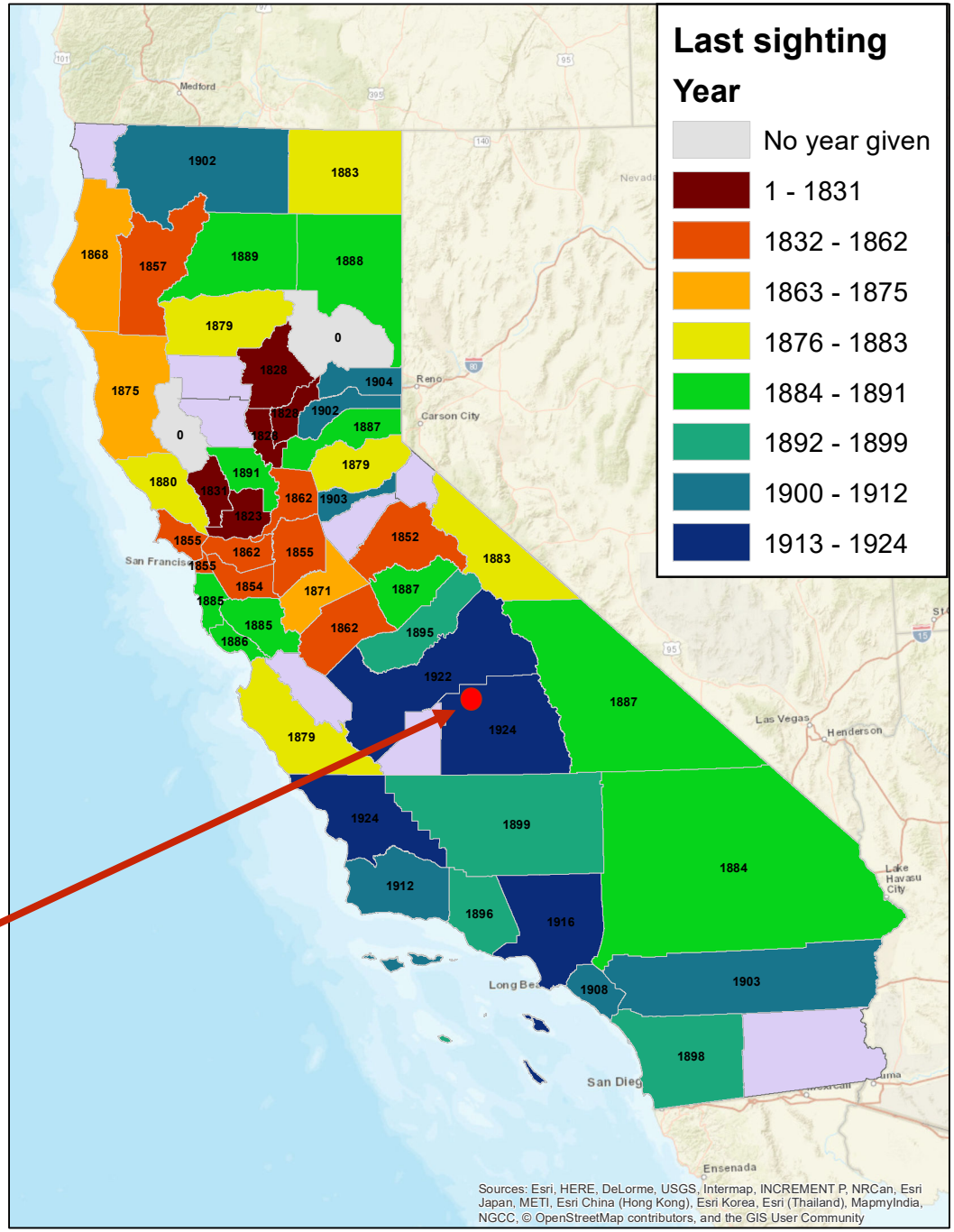
A DANGEROUS SITUATION.

Won day when I war gone off from home, and my wife sot a nitting by the fire, she heerd a sort of a growl behind her; and when she looked around she seed a big bear that had walked in at the dore, and sot down close by her cheer. She looked rite into his face, and he lookt very surprised. She war

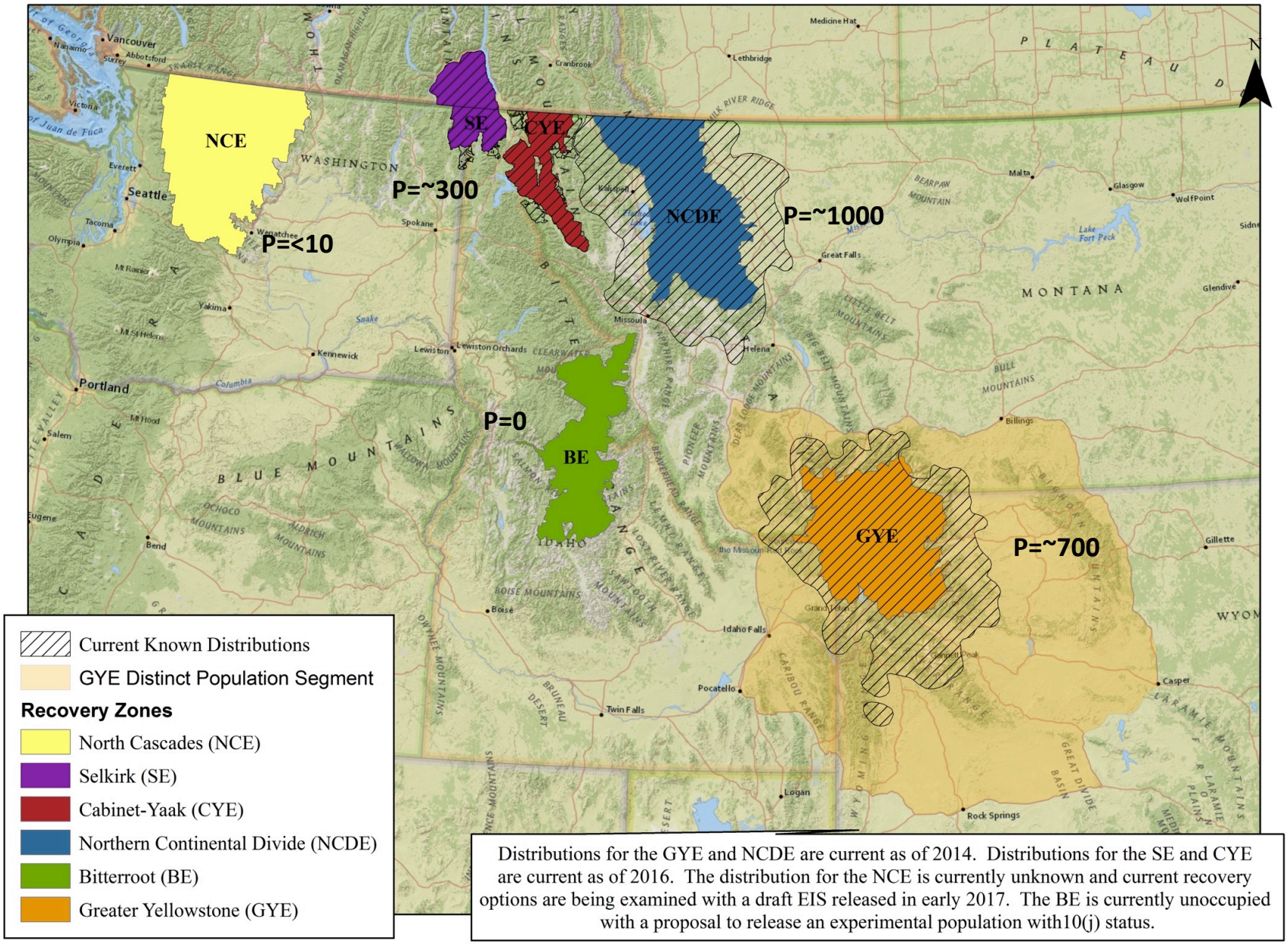


By the 1840s, CA contained an estimated 10,000 grizzlies, around one-fifth of the grizzlies in the area that is now the lower 48 US states, and a ratio of about 1 grizzly for every 11 people in CA at that time.

Grizzlies disappeared from the most populated and developed areas first. The last credible sighting of a CA grizzly occurred in 1924 on the west slope of Sequoia National Park.



Grizzly Bear Recovery Zones, Distributions, and Distinct Population Segments



Distributions for the GYE and NCDE are current as of 2014. Distributions for the SE and CYE are current as of 2016. The distribution for the NCE is currently unknown and current recovery options are being examined with a draft EIS released in early 2017. The BE is currently unoccupied with a proposal to release an experimental population with10(j) status.

The purpose of the California Grizzly Research Network is to promote—through rigorous, interdisciplinary research—a more informed scholarly and public discussion about the past and potential future of grizzly bears in California.

Why now?

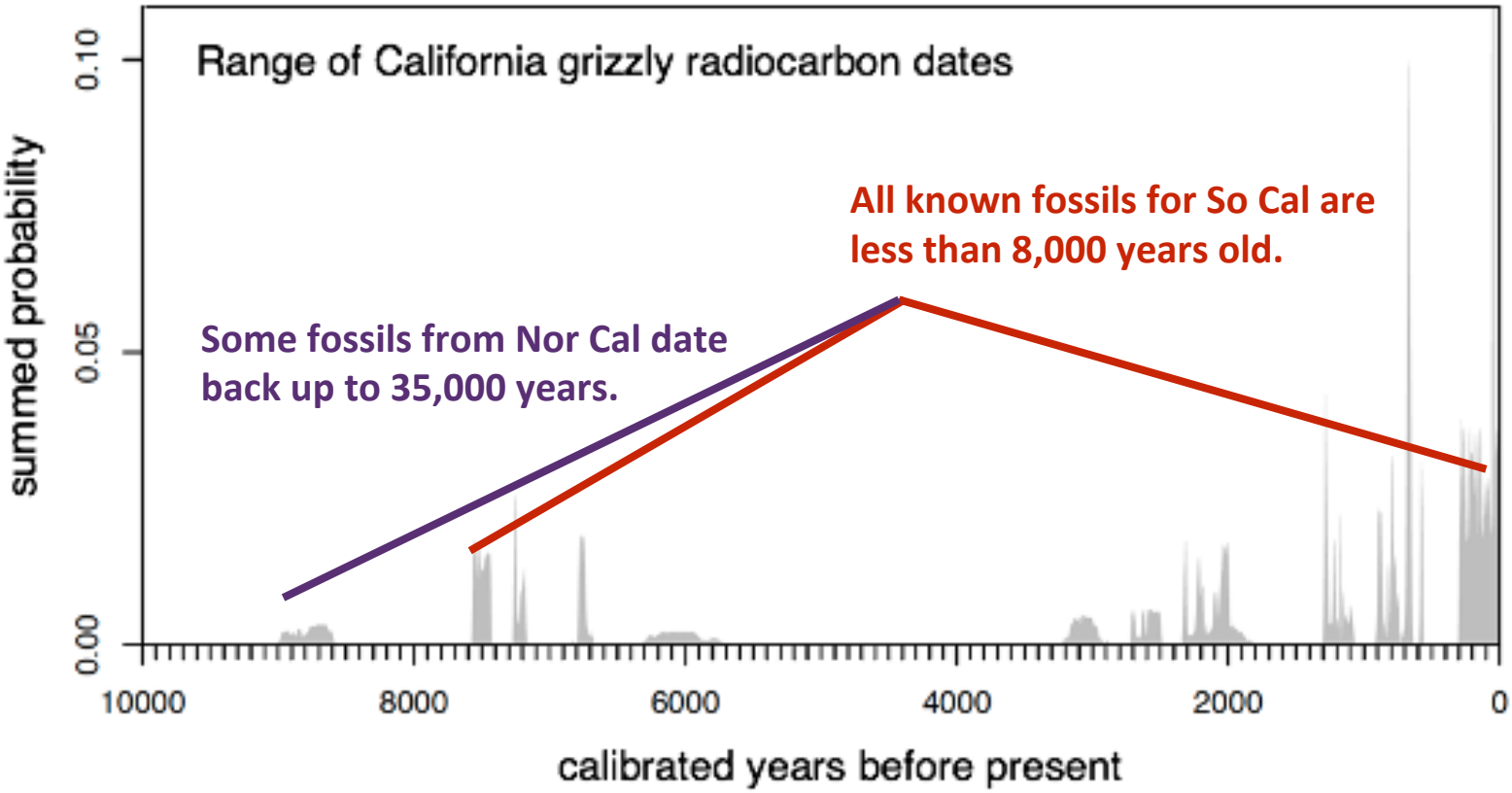
- Increasing recovery of grizzlies in the Northern Rockies (2010s)
- Black bear population has tripled in CA since 1980s, to as many as 40,000
- Wolves return to CA for the first time in 80 years (2011)
- Center for Biological Diversity petition to list grizzlies CA and the Southwest as federally endangered (2014)
- Large carnivore recovery in Europe provides new models (2014)
- North Cascades grizzly recovery plan completed (2017)
- Growing tolerance of large carnivores in CA, such as P-22 in Los Angeles

What has the CGRN learned?

Most Californians know little about their state mascot; only about 25 percent of CA residents know that grizzlies do not currently exist there (Hiroyasu et al. 2019)

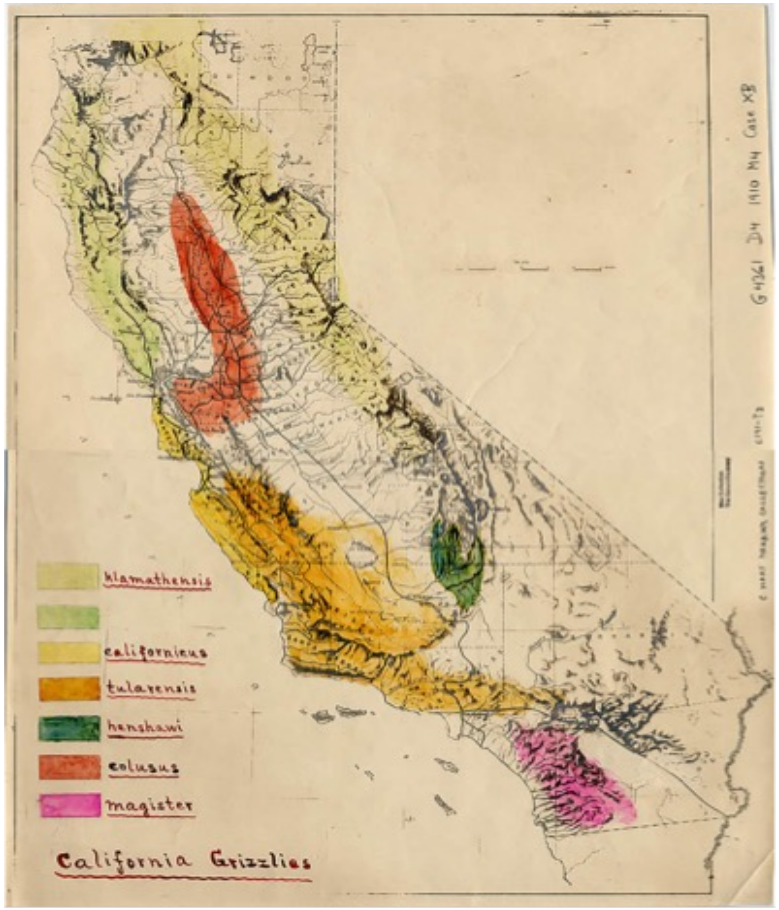
What has the CGRN learned?

Grizzlies are new to CA, likely having arrived in this region during the late Pleistocene or early Holocene (Mychajliw et al., forthcoming)

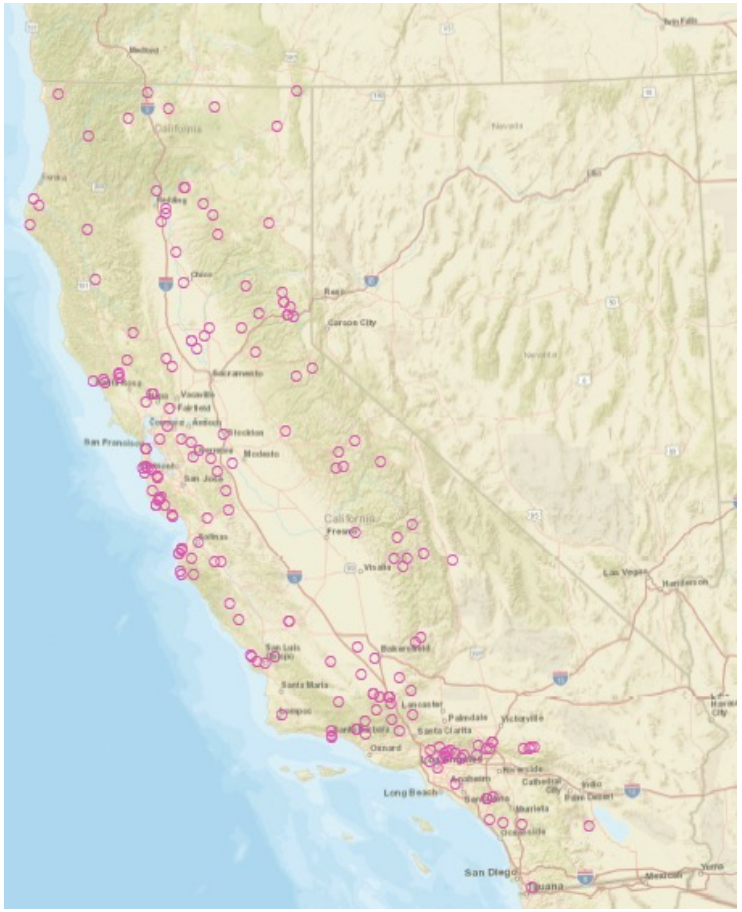


What has the CGRN learned?

Before the start of the Mission era (European colonization) in 1769, grizzlies lived almost everywhere in non-desert CA



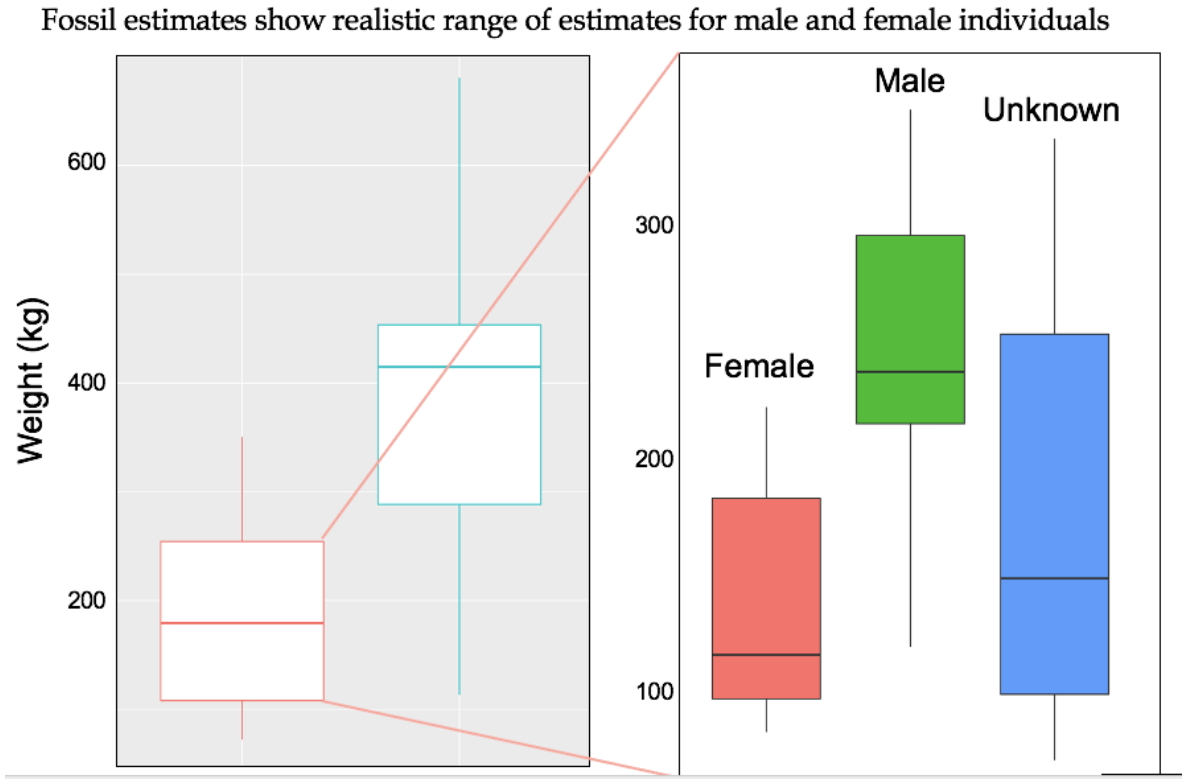
Merriam, ca. 1890



CGRN historical records (n=330)

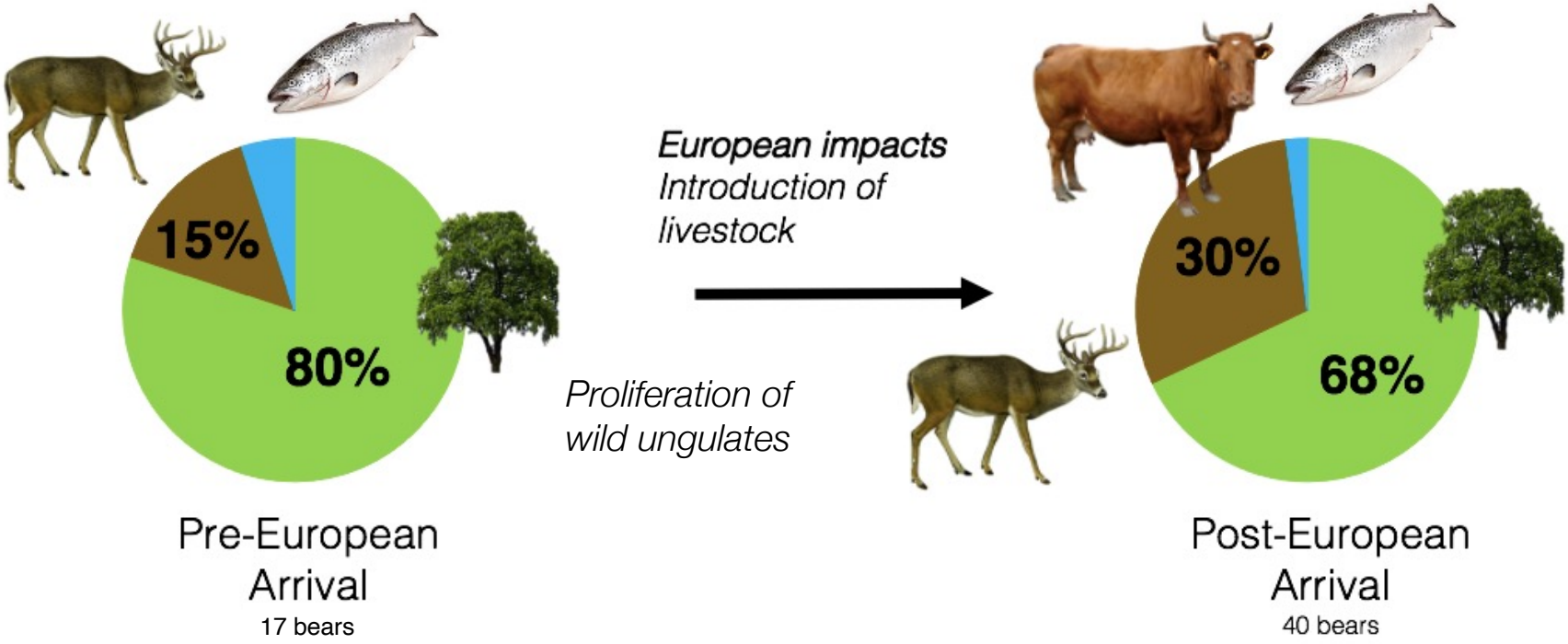
What has the CGRN learned?

CA grizzlies were not the gargantuan beasts of lore; most probably weighed 400 to 700 pounds, about the size of a Yellowstone grizzly and less than half the size of an adult male Kodiak/ABC bear



What has the CGRN learned?

Prior to colonization, CA grizzlies were mostly herbivorous; afterward, they became only modestly more carnivorous



Findings based on stable isotope analysis of 57 museum specimens

To figure this out, we scoured the primary sources to better understand ideas about CA grizzlies over time.

We found 330 records of grizzly sightings or other interactions in CA, 136 of which included references to grizzlies eating. From this list, we generated a "menu" of grizzly foods for later analysis.

59 (43%) = livestock
7 (5%) = terrestrial mammals
6 (4%) = marine mammals
2 (1%) = fish

} **54% *carnivory***

37 (27%) = wild plants
25 (18%) = honey, crops, or other unspecified foods

Then we collected as many specimens of CA grizzlies we could find.

Searching museums across the world, we found 57 usable specimens of CA grizzlies. Useable specimens had traceable provenance, sufficient metadata, and were available for sampling.

These included 17 pre- and 40 post-European contact bears.

To study their diets, we subjected grizzly samples to *stable isotope analysis*.

Isotopes** are alternate forms of the same elements with different molecular weights (the same number of protons, but different numbers of neutrons). Isotopes of elements such as carbon and nitrogen are stable, meaning that they do not decay radioactively, and can thus be used **to trace nutrients through food webs.

In other words,

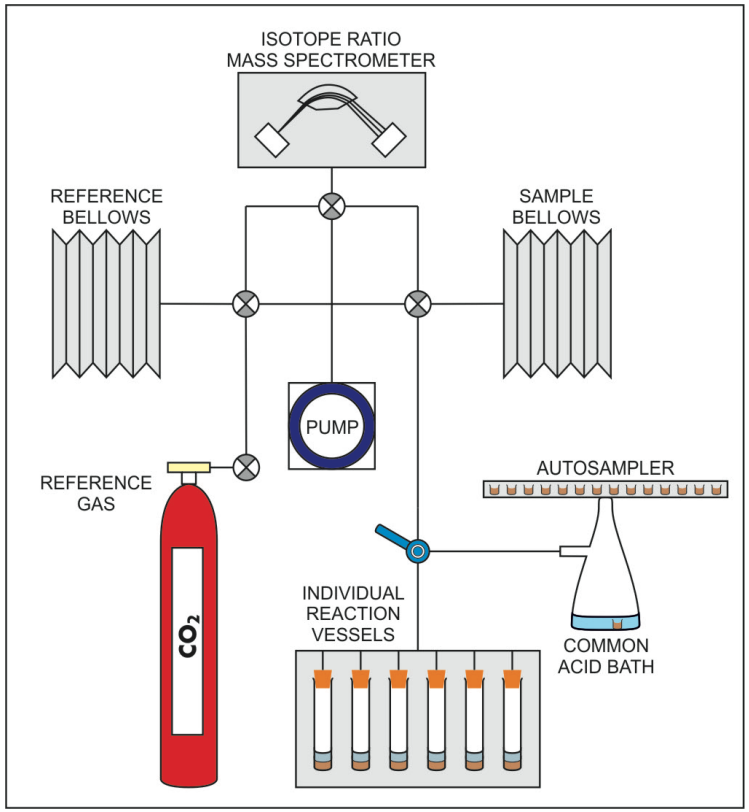
YOU ARE WHAT YOU EAT!

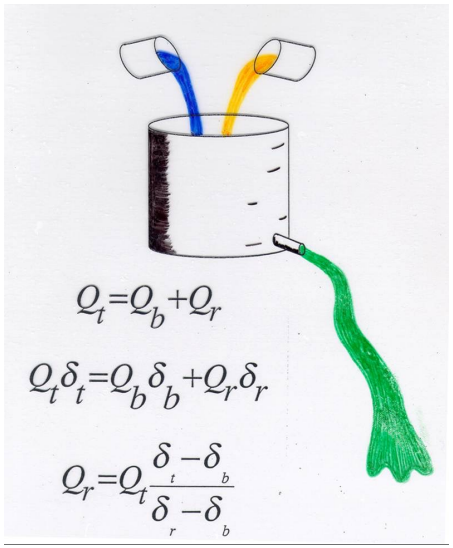
Three-step process of stable isotope analysis:

1. Gathering biological samples (field)
2. Separating out the constituent isotopes (lab)
3. Calculating the relations between foods and consumers (computer model)

1 **2** **3**

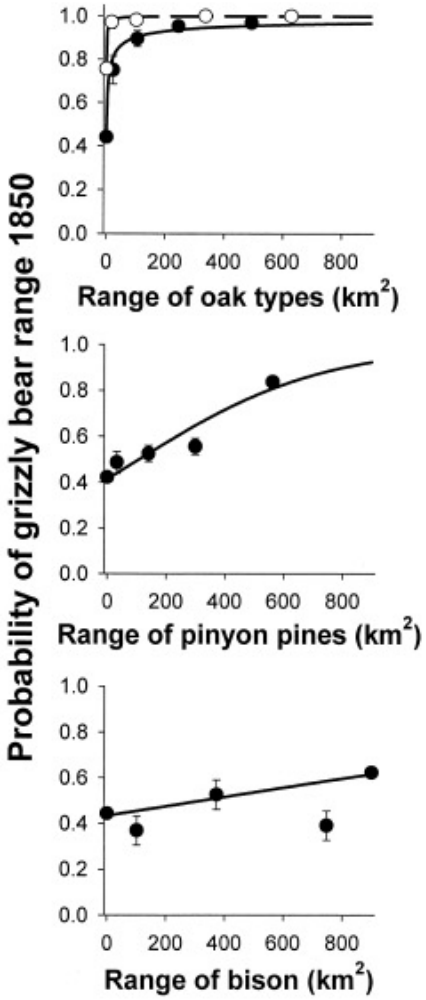
+





What has the CGRN learned?

Oaks were important for grizzlies throughout the American West, but grizzlies were not limited to oak woodlands



Prior to around 1850 when their populations started to collapse, in the area that is now the lower 48 US states, grizzly bear ranges were most closely associated with key foods that varied by region and season. The most important of these foods was acorns from oak trees.

What has the CGRN learned?

Grizzlies probably played important roles in CA ecosystems, though probably not as much as some famous ecosystem engineers like wolves and beavers

What has the CGRN learned?

Habitat loss did not kill off CA's grizzlies; a small group of white men armed with guns, traps, and poisons did it (before modern laws that would have stopped them)


Los Angeles Times
LATEST
Jan. 8, 1908.
WIPED OUT.
LAST GRIZZLY BEAR IS SHOT.
Steals Honey Near Santa Ana; Pays the Penalty.
Hunters and Dogs Fight Her in Final Struggle.
Battled Single-handed for Twenty-five Years.

What has the CGRN learned?

We modeled potential grizzly habitat in CA using three sources of indirect information (analogies).

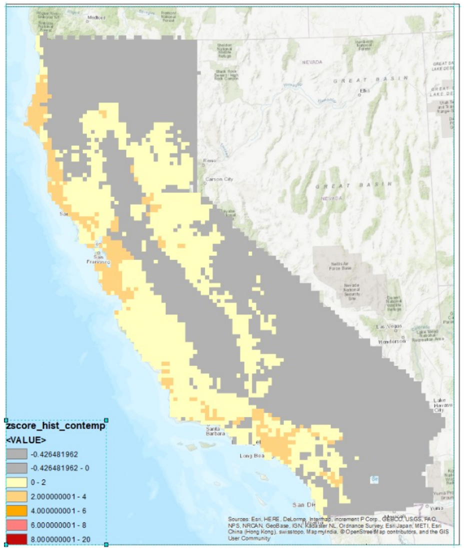
1. **Historical data on habitat use by CA grizzlies before their extinction**

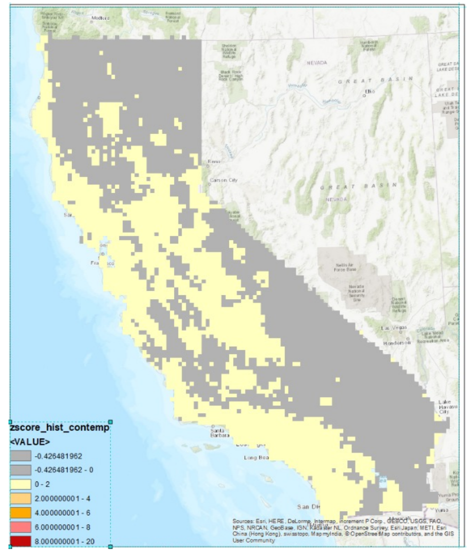
2. **Current data on habitat use by grizzlies in other regions**

3. **Current data on habitat use by other CA large carnivores**

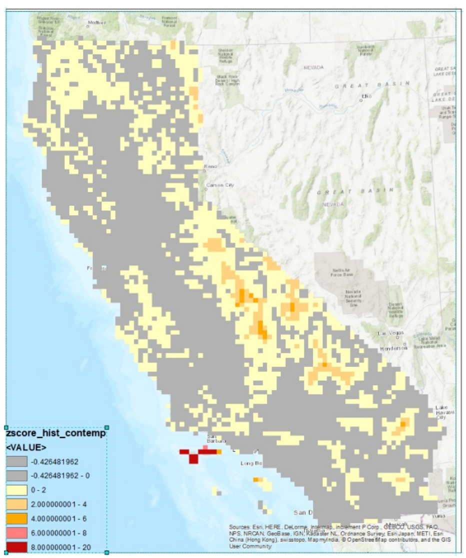
We then combined these to map potential habitat for a long-lost species in a transformed landscape

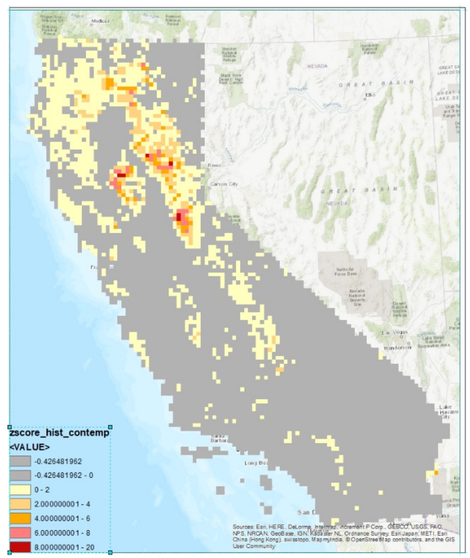
What has the CGRN learned?

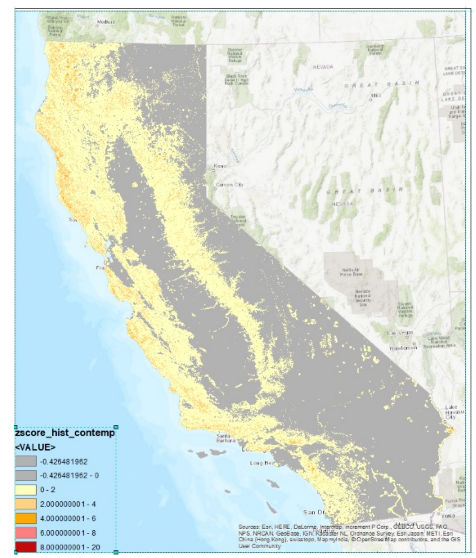




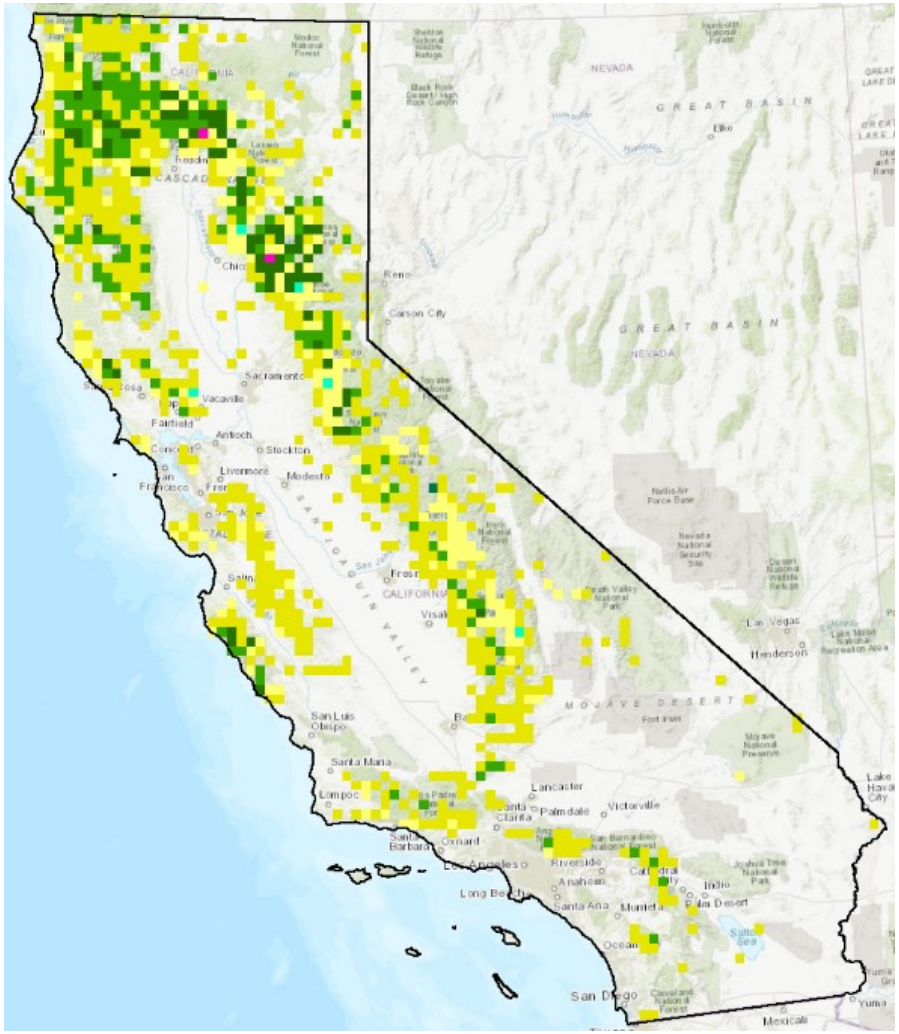
Our approach to potential habitat mapping uses multiple modeling approaches, and then compares them to find areas of convergence and divergence.







What has the CGRN learned?



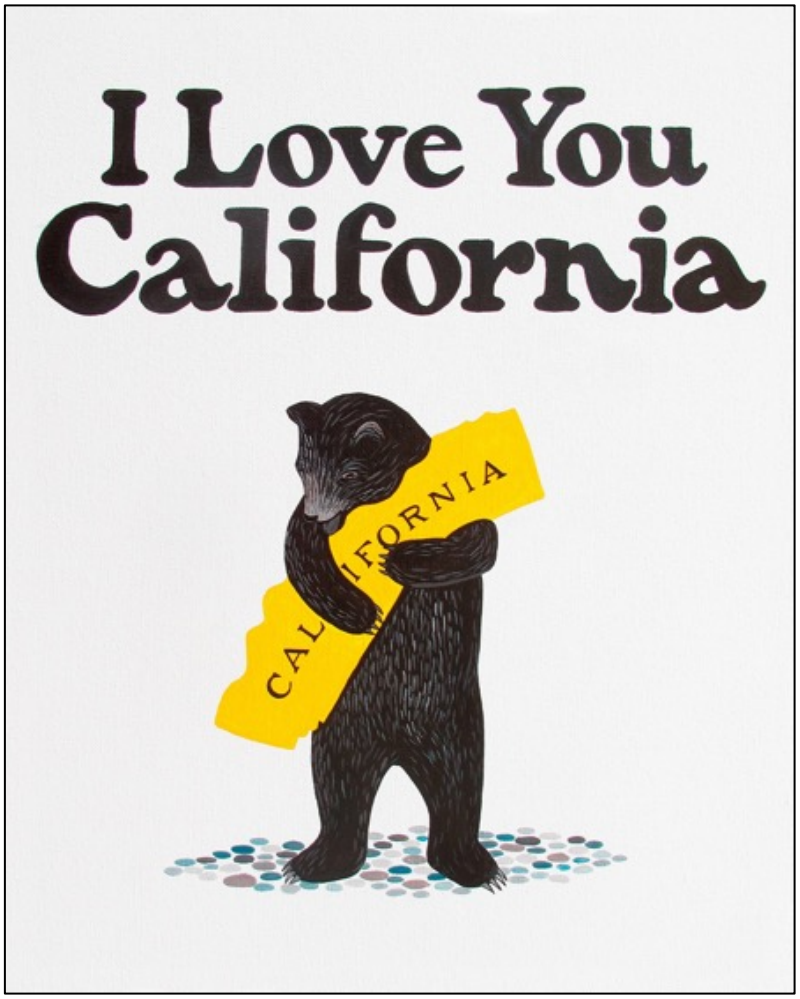
The result is a composite map, with yellow lighting up as ”suitable” habitat and green as “very suitable” habitat. These models produce results that show way more suitable habitat than one would expect, and do so in some surprising places.

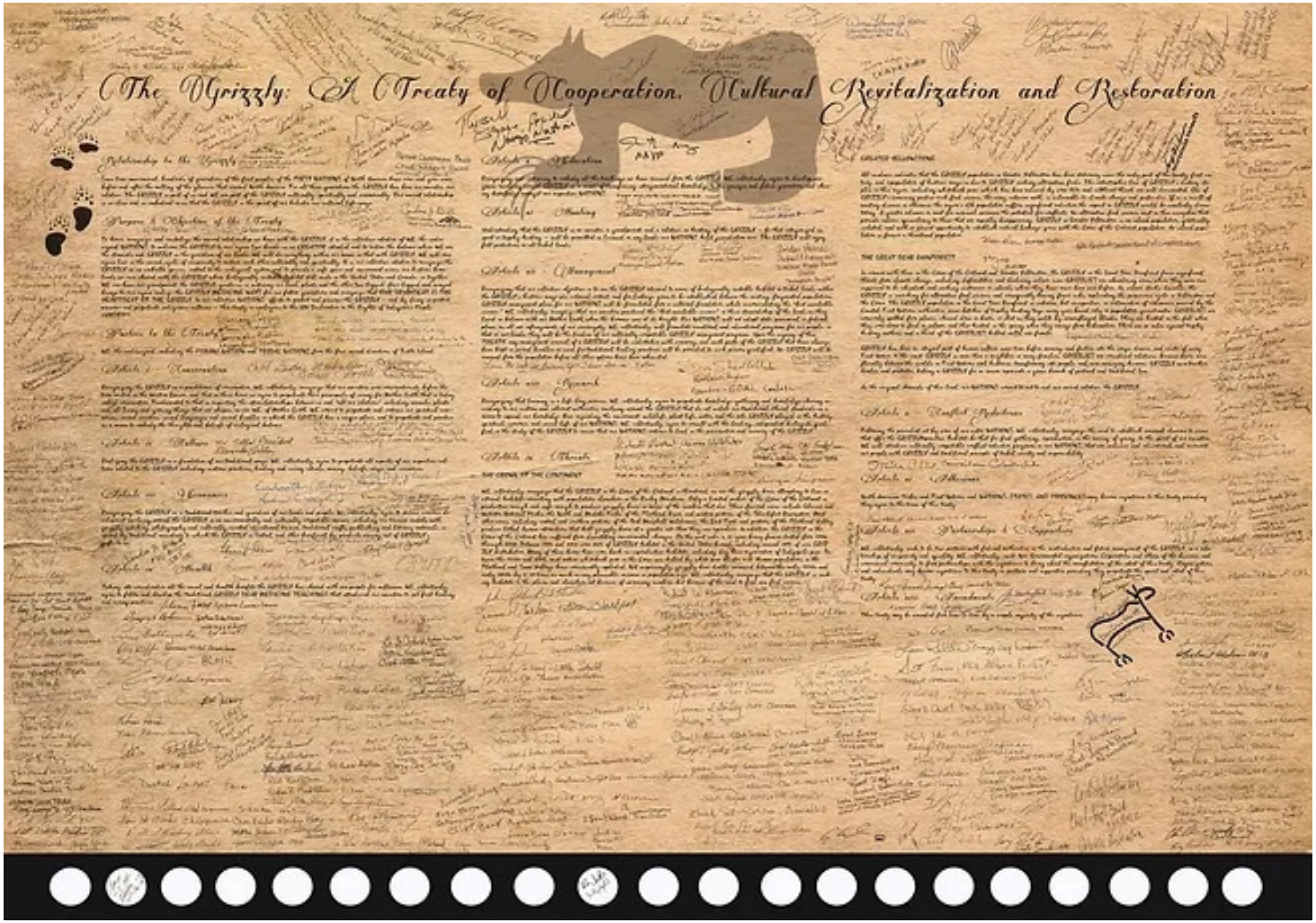
What has the CGRN learned?

(Almost!) everyone loves bears, but not everyone wants to live with them

What has the CGRN learned?

It's easier to explain *when*, *where*, and *how* grizzlies could be reintroduced than to explain *why* they should be

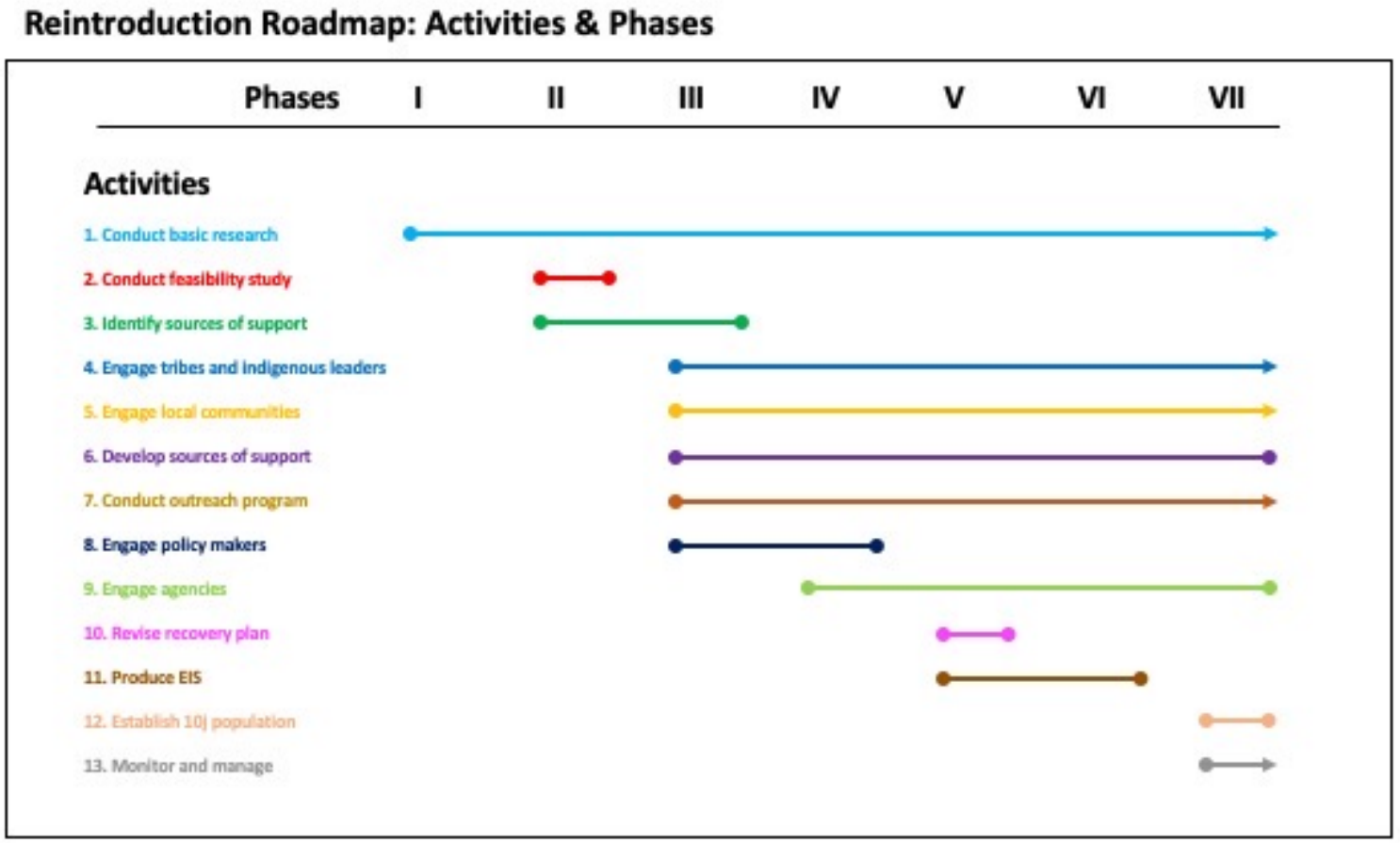




Since 2016, more than 200 tribes have signed the Grizzly Treaty, declaring their support for grizzly conservation and opposition to grizzly hunting. Several CA tribes have signed, and many more could join in the coming years. This now appears to be the most widely adopted Indigenous treaty in American history.

What has the CGRN learned?

Bringing grizzlies back to CA, is possible under current state and federal laws, but the process would be long and difficult



What has the CGRN learned?

But it's not impossible! California ecosystems are under tremendous strain, but still, several California wildlife species once considered on the verge of extinction have returned or rebounded in recent decades






Many others are being reintroduced









And other exciting projects are now being discussed

What has the CGRN learned?

Studying CA grizzlies is only partly about bears. It is about the past and future of conservation, about coexistence, and about imagination. It is not impossible; it's a choice.

"Missing Mascot" by Ethan Turpin

https://www.dropbox.com/recents?_tk=web_left_nav_bar&preview=IMG_2977+(2).MOV&role=personal

https://www.youtube.com/watch?v=AihvuZiDhsg

Appendix 1. Public safety

Courtesy of Jack Oelfke, North Cascades National Park

Yellowstone National Park, 1872-2014	
Cause of death, visitors	Number of deaths
Motor vehicle accident	Many
Heart attack	Many
Drowning	119
Falling	36
Suicide	24
Airplane crashes	22
Thermal burns (falling into thermal pools)	20
Horse-related accidents	19
Freezing	10
Murder	9
Falling trees	6
Avalanche	6
Grizzly bears*	6
Lightning	5

* One killed by grizzly in 2015; no data for other causes for 2015

Appendix 1. Public safety

Courtesy of Jack Oelfke, North Cascades National Park

Number of injuries from grizzly bears, Yellowstone NPS – 1930-2014

Table 1. Number of park visits, number of people injured by grizzly bears, and number of injuries per one million visits by decade in Yellowstone National Park, 1930–2014.

Decade	Park Visits	Number of grizzly bear inflicted human injuries	Injuries per one million visits
1930-1939	3,232,417	6	1.9
1940-1949	5,524,563	11	2
1950-1959	13,553,771	6	0.4
1960-1969	19,520,600	36	1.8
1970-1979	22,397,176	15	0.7
1980-1989	23,449,930	12	0.4
1990-1999	30,126,032	9	0.3
2000-2009	29,677,184	12	0.4
2010-2014	17,183,756	4	0.2

Table 2. Risk of grizzly bear attack during different recreational activities in Yellowstone National Park, 1980–2014.

Type of recreational activity	Risk of grizzly bear attack
Remain in developments, roadsides, and boardwalks	1 in 25.1 million visits
Camp in roadside campground	1 in 22.8 million overnight stays
Multi-day backcountry trips	1 in 200 thousand overnight stays
All park activities combined	1 in 2.7 million visits