

Resurveying historic pika populations in California: Results and Lessons from the Grinnell Resurvey Project

John D. Perrine and James L. Patton

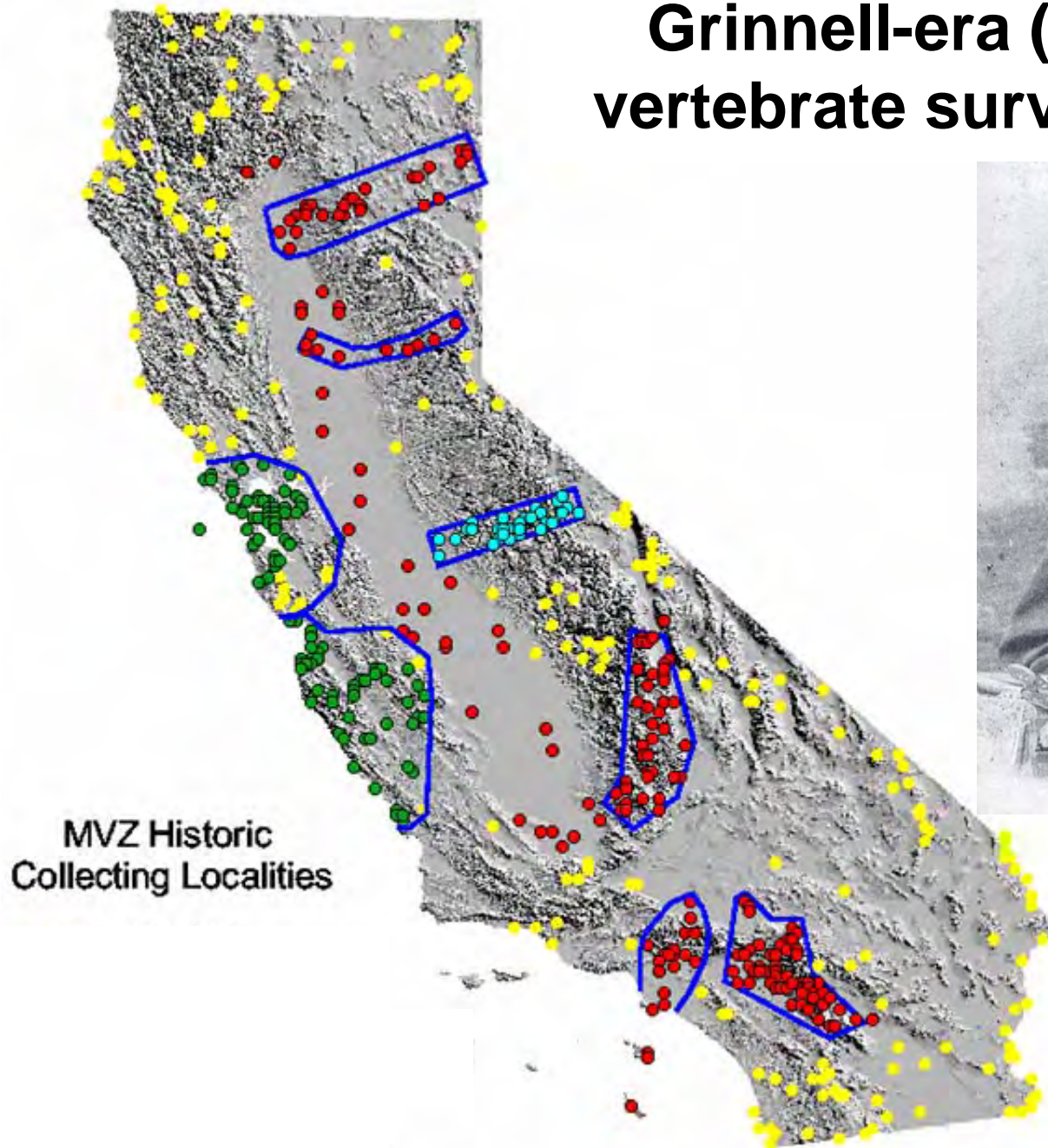
12 Sept 1923



4 Aug 2009



Grinnell-era (1907-1937) vertebrate survey locations

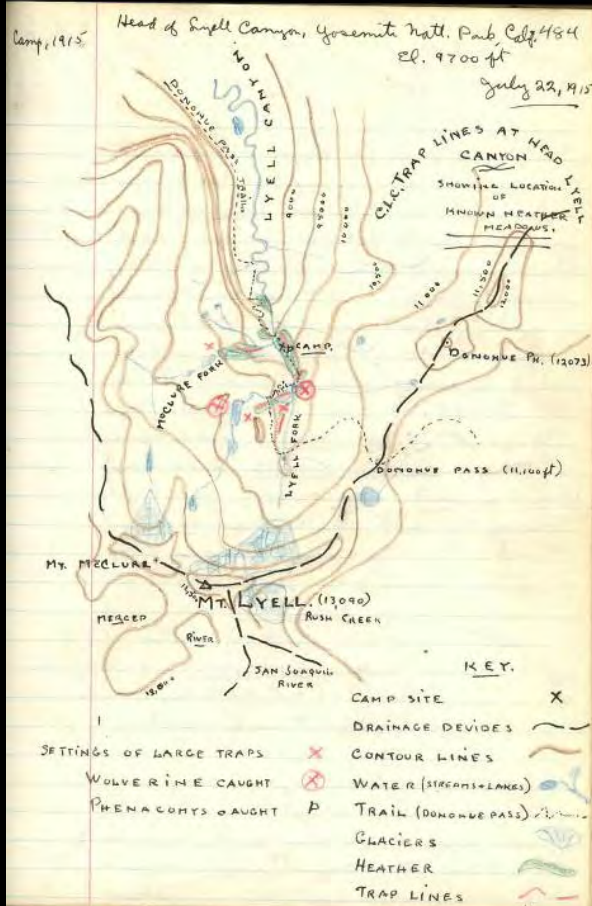


Joseph Grinnell
MVZ Director 1908 - 1939

Beyond the specimens: Field Notes



Mar. 11 Nogales to Peña Blanca Springs, Santa Cruz Co., Ariz.
Wrote color notes on Encantada, Batiaschanga, etc. collected in Calif. Wind came up. Girl in shoe store in Nogales says it will rain. Drove to Peña Blanca leaving Sylkes' place at about 1:00 p.m. Mr. Sylkes believes we are too early for reptiles but it is an early spring. 75-100 miles below Mexican line mesquite is leafed out. Still dormant at Nogales. Several butterflies seen and some trees beginning to leaf. Grass dry. Mesquite dead-looking. Arrived at Peña Blanca about 2:00 p.m. Unhooked trailer and drove 1 mi. back toward Nogales to site where Hyla arenicolor marked last July. Much more water in canyon than in July but no frogs. Water crystal clear - Water beetles and boatmen. Many pools - several connected by trickles. Pool where Hyla marked has water twice as deep as in July. Batallas on hill to N leafed out but no sign of bloom. Grass dry. Turned rocks in canyon bottom - no luck. Went back to Peña Blanca. Hunted for about 1 hr. with John and Melinda. Saw nothing. Turned a few rocks. Soil damp under objects but surface dry where exposed. Went out again.



Stock - 1115

Peregrine Flight - June 23

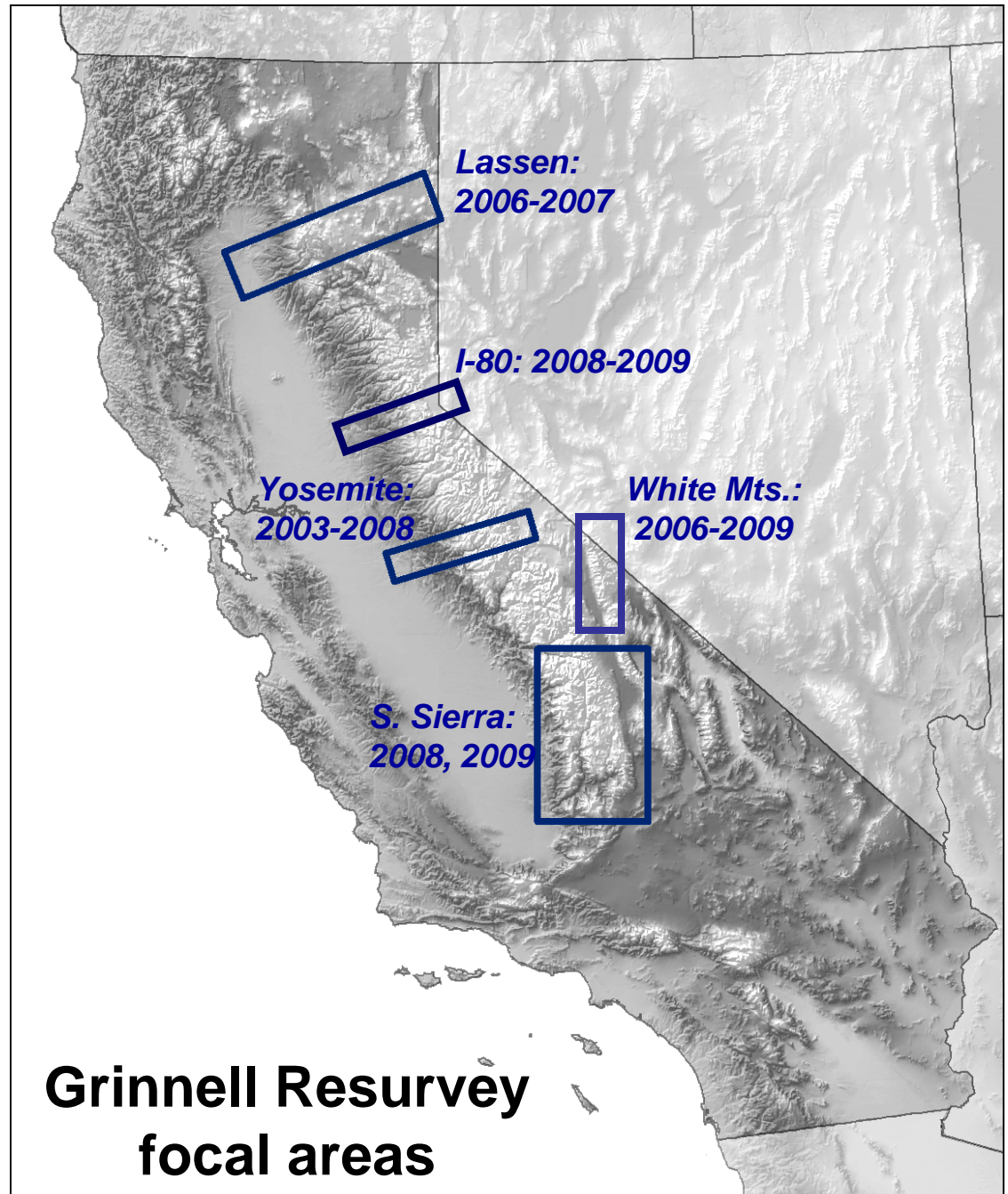
Our joint bird census is as follows:

Species	6:55 to 7:00 am	7:00 to 7:15 am	7:15 to 7:30 am	7:30 to 7:45 am	7:45 to 8:00 am	8:00 to 8:15 am	8:15 to 8:30 am	8:30 to 8:45 am	8:45 to 9:00 am	9:00 to 9:15 am	9:15 to 9:30 am	9:30 to 9:45 am	9:45 to 10:00 am	10:00 to 10:15 am	10:15 to 10:30 am	10:30 to 10:45 am	10:45 to 11:00 am	11:00 to 11:15 am	11:15 to 11:30 am	11:30 to 11:45 am	11:45 to 12:00 pm	12:00 to 12:15 pm	12:15 to 12:30 pm	12:30 to 12:45 pm	12:45 to 1:00 pm	1:00 to 1:15 pm	1:15 to 1:30 pm	1:30 to 1:45 pm	1:45 to 2:00 pm	2:00 to 2:15 pm	2:15 to 2:30 pm	2:30 to 2:45 pm	2:45 to 3:00 pm	3:00 to 3:15 pm	3:15 to 3:30 pm	3:30 to 3:45 pm	3:45 to 4:00 pm	4:00 to 4:15 pm	4:15 to 4:30 pm	4:30 to 4:45 pm	4:45 to 5:00 pm	5:00 to 5:15 pm	5:15 to 5:30 pm	5:30 to 5:45 pm	5:45 to 6:00 pm	6:00 to 6:15 pm	6:15 to 6:30 pm	6:30 to 6:45 pm	6:45 to 7:00 pm	7:00 to 7:15 pm	7:15 to 7:30 pm	7:30 to 7:45 pm	7:45 to 8:00 pm	8:00 to 8:15 pm	8:15 to 8:30 pm	8:30 to 8:45 pm	8:45 to 9:00 pm	9:00 to 9:15 pm	9:15 to 9:30 pm	9:30 to 9:45 pm	9:45 to 10:00 pm	10:00 to 10:15 pm	10:15 to 10:30 pm	10:30 to 10:45 pm	10:45 to 11:00 pm	11:00 to 11:15 pm	11:15 to 11:30 pm	11:30 to 11:45 pm	11:45 to 12:00 am	12:00 to 12:15 am	12:15 to 12:30 am	12:30 to 12:45 am	12:45 to 1:00 am	1:00 to 1:15 am	1:15 to 1:30 am	1:30 to 1:45 am	1:45 to 2:00 am	2:00 to 2:15 am	2:15 to 2:30 am	2:30 to 2:45 am	2:45 to 3:00 am	3:00 to 3:15 am	3:15 to 3:30 am	3:30 to 3:45 am	3:45 to 4:00 am	4:00 to 4:15 am	4:15 to 4:30 am	4:30 to 4:45 am	4:45 to 5:00 am	5:00 to 5:15 am	5:15 to 5:30 am	5:30 to 5:45 am	5:45 to 6:00 am	6:00 to 6:15 am	6:15 to 6:30 am	6:30 to 6:45 am	6:45 to 7:00 am	7:00 to 7:15 am	7:15 to 7:30 am	7:30 to 7:45 am	7:45 to 8:00 am	8:00 to 8:15 am	8:15 to 8:30 am	8:30 to 8:45 am	8:45 to 9:00 am	9:00 to 9:15 am	9:15 to 9:30 am	9:30 to 9:45 am	9:45 to 10:00 am	10:00 to 10:15 am	10:15 to 10:30 am	10:30 to 10:45 am	10:45 to 11:00 am	11:00 to 11:15 am	11:15 to 11:30 am	11:30 to 11:45 am	11:45 to 12:00 pm	12:00 to 12:15 pm	12:15 to 12:30 pm	12:30 to 12:45 pm	12:45 to 1:00 pm	1:00 to 1:15 pm	1:15 to 1:30 pm	1:30 to 1:45 pm	1:45 to 2:00 pm	2:00 to 2:15 pm	2:15 to 2:30 pm	2:30 to 2:45 pm	2:45 to 3:00 pm	3:00 to 3:15 pm	3:15 to 3:30 pm	3:30 to 3:45 pm	3:45 to 4:00 pm	4:00 to 4:15 pm	4:15 to 4:30 pm	4:30 to 4:45 pm	4:45 to 5:00 pm	5:00 to 5:15 pm	5:15 to 5:30 pm	5:30 to 5:45 pm	5:45 to 6:00 pm	6:00 to 6:15 pm	6:15 to 6:30 pm	6:30 to 6:45 pm	6:45 to 7:00 pm	7:00 to 7:15 pm	7:15 to 7:30 pm	7:30 to 7:45 pm	7:45 to 8:00 pm	8:00 to 8:15 pm	8:15 to 8:30 pm	8:30 to 8:45 pm	8:45 to 9:00 pm	9:00 to 9:15 pm	9:15 to 9:30 pm	9:30 to 9:45 pm	9:45 to 10:00 pm	10:00 to 10:15 pm	10:15 to 10:30 pm	10:30 to 10:45 pm	10:45 to 11:00 pm	11:00 to 11:15 pm	11:15 to 11:30 pm	11:30 to 11:45 pm	11:45 to 12:00 am	12:00 to 12:15 am	12:15 to 12:30 am	12:30 to 12:45 am	12:45 to 1:00 am	1:00 to 1:15 am	1:15 to 1:30 am	1:30 to 1:45 am	1:45 to 2:00 am	2:00 to 2:15 am	2:15 to 2:30 am	2:30 to 2:45 am	2:45 to 3:00 am	3:00 to 3:15 am	3:15 to 3:30 am
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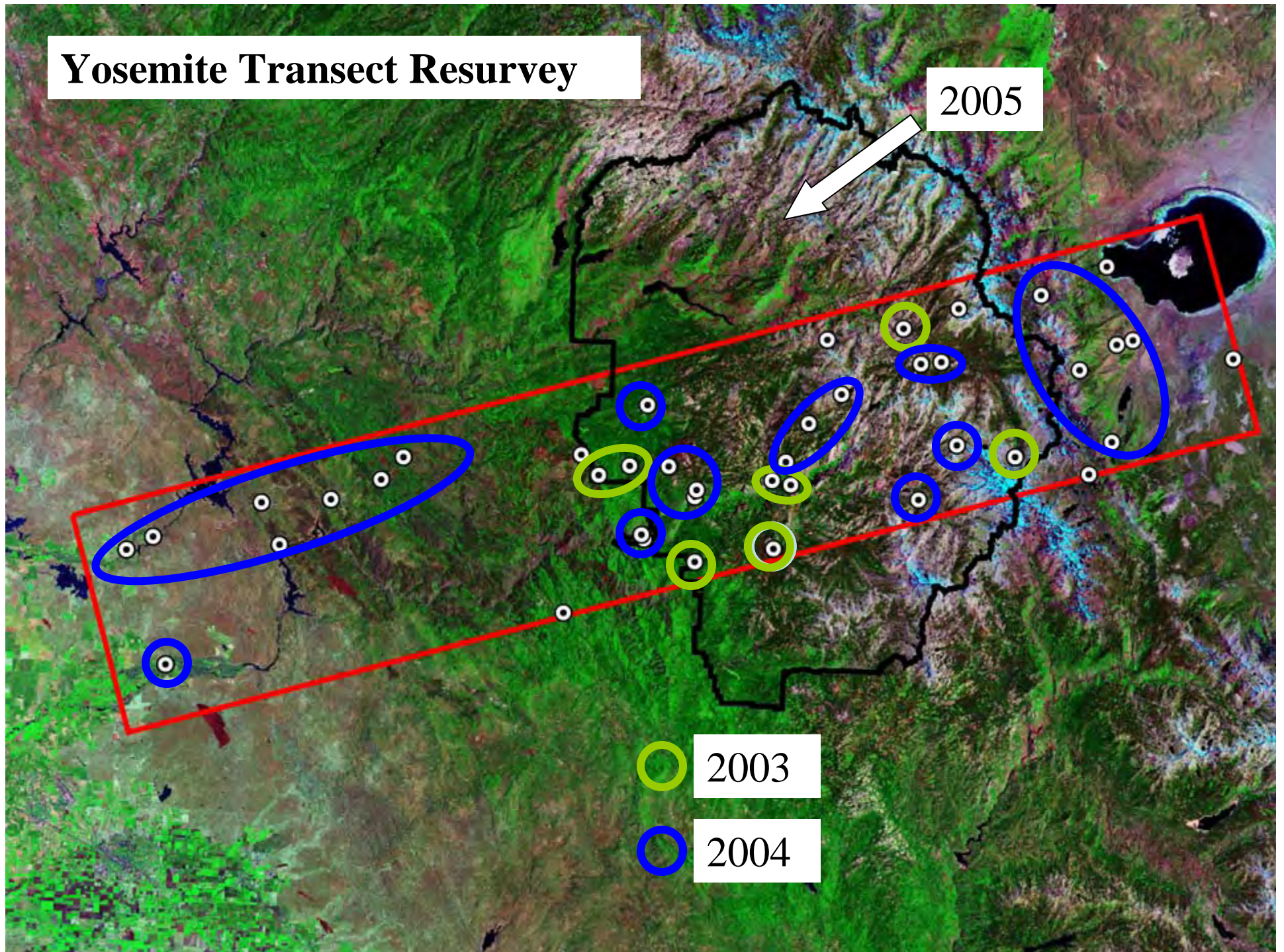
Grinnell's vision



“... the greatest purpose of our museum... will not be realized until the lapse of many years, ***possibly a century***...and this is that the student of the future will have access to the original record of faunal conditions in California and the west, wherever we now work” (Grinnell, 1910).



Yosemite Transect Resurvey



Yosemite Pika Resurvey

Grinnell era [1915-1916]

- **Main sites:**

Pika recorded (collected or observed) at 9 of 41 original “sites” (7800 to ~10,500 ft elevation)

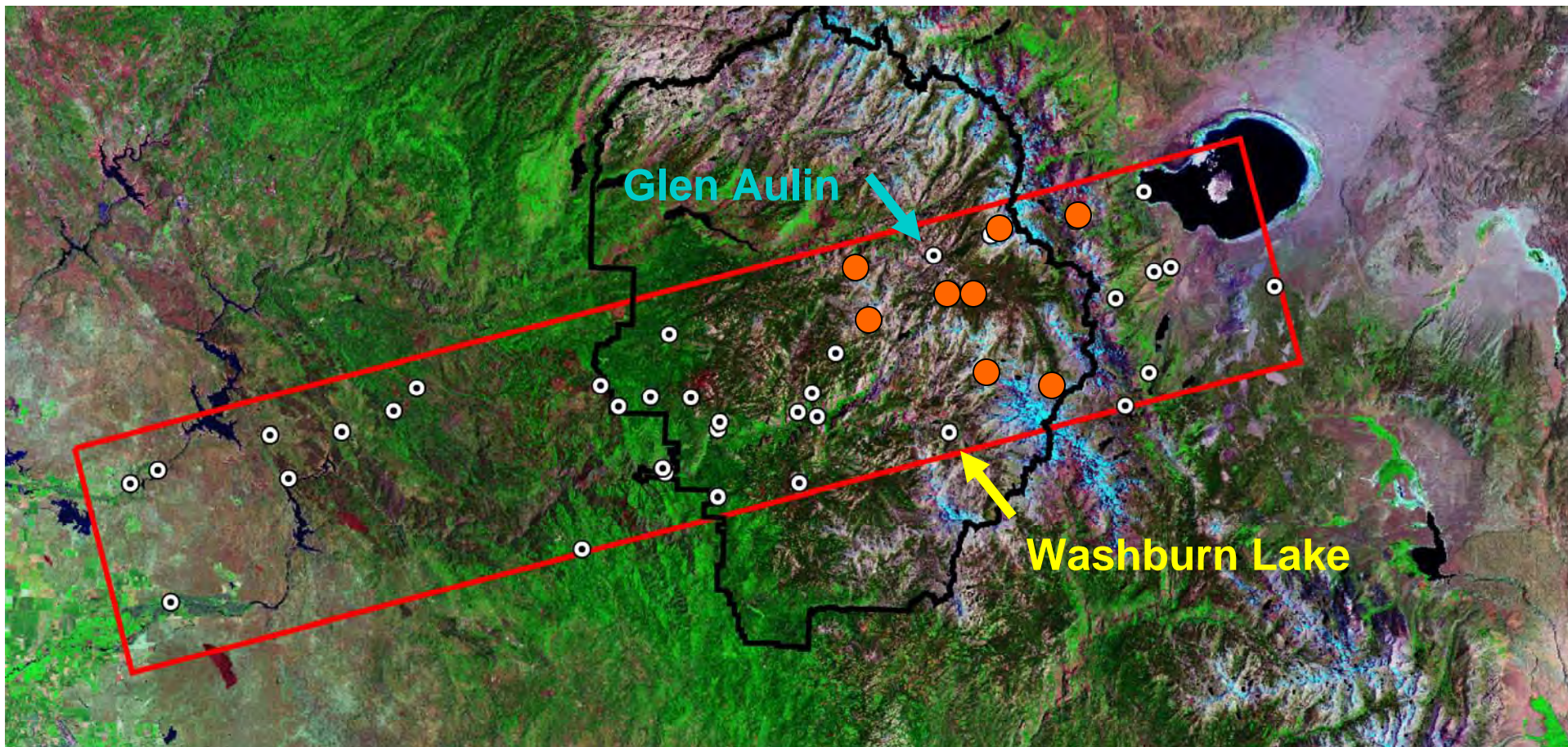
- **Secondary sites:**

Pika *collected* at 10 additional localities (within same elevational range).

Resurvey [2003-2008]

Pika found at 8 of the 9 “sites” where observed / collected in Grinnell era. Apparently absent at 1 site (Glen Aulin, 7800 ft).

Have not resurveyed a second 7800 ft locality where collected in Grinnell era (Washburn Lake).



NR = not resurveyed

R = resurveyed

WEST SLOPE	Elevation	EAST SLOPE	Elevation
E. Fork Indian Canyon	6840	Warren Fork [R-present]	9900
Mono Meadow	7110	Gem lake	9170
1 mi E Merced Lake	7500	Walker Lake	8500
Glen Aulin [R-absent]	7800	Silver lake	7615
Porcupine Flat	8250	Mono Mills	7300
Soda Springs [R-present]	8800	Williams Butte	7050
Fairview Dome [R-present]	9200	Farrington Ranch	6830
Ten Lakes [R-present]	9200	Mono Lake P.O.	6390
Young Lakes [R-present]	9930		
Upper Lyell Canyon [R-present]	10200		
Vogelsang Lake [R-present]	10350		
Mt. Hoffman [NR* - 9300]	10500		

[elevation in meters]

Yosemite Pika Resurvey

Grinnell era [1915-1916]

- **Main sites:**

Pika recorded (collected or observed) at 9 of 41 original “sites” (7800 to ~10,500 ft elevation)

- **Secondary sites:**

Pika *collected* at 10 additional localities (within same elevational range).

Unknown number of localities where pika were only *observed* -- these can be, but to date have not been, systematically gleaned from the fieldnotes

Resurvey [2003-2008]

Pika found at 8 of the 9 “sites” where observed / collected in Grinnell era. Apparently absent at 1 site (Glen Aulin, 7800 ft).

Have not resurveyed a second 7800 ft locality where collected in Grinnell era (Washburn Lake).

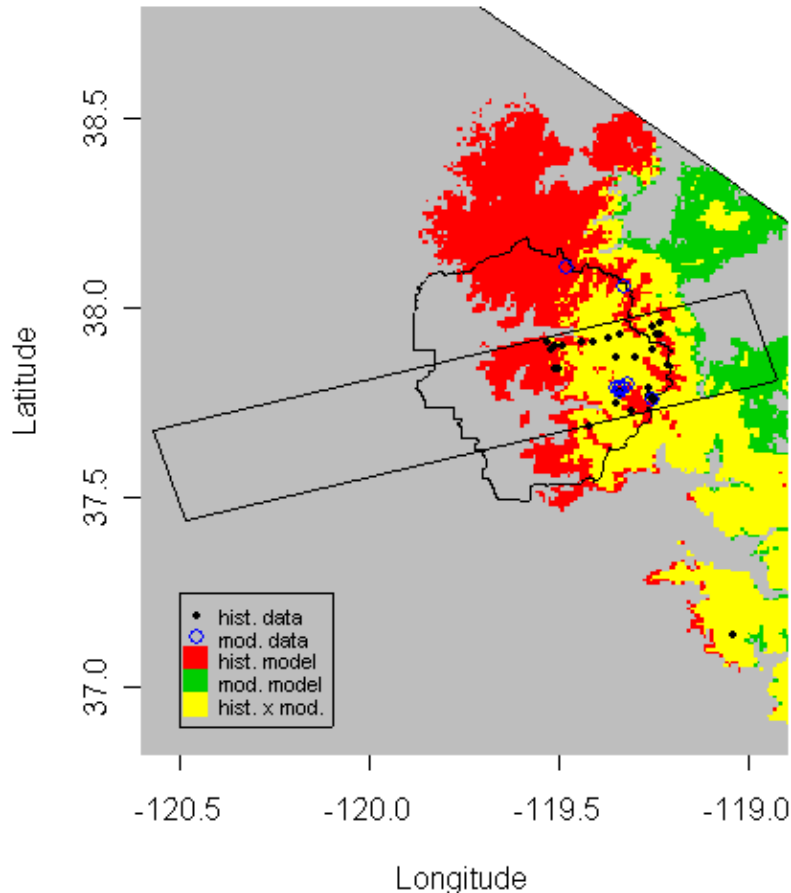
We collected or observed pika at ~20 additional localities (8300 to 11,000 ft). We made no attempt to survey all likely habitat when visiting an area or walking trails.

Species distribution modeling [Maxent; historical climate variables]

Predicted ranges: red + yellow = historic range;
yellow + green = extant range

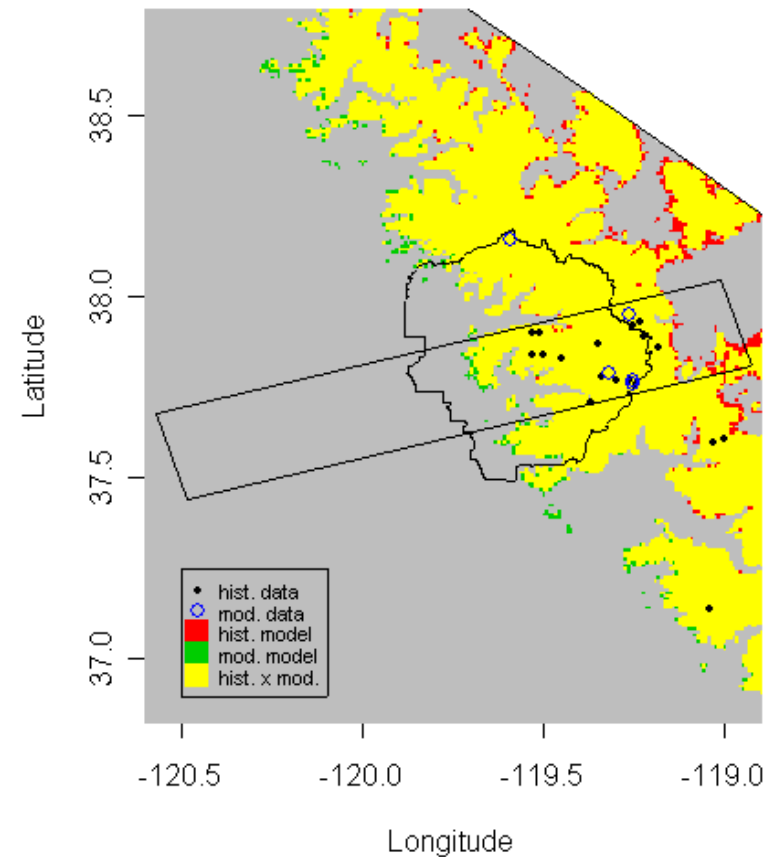
Tamias alpinus

Range shift predicted and observed from
Grinnell era to present



Ochotona princeps

No predicted range shift from
Grinnell era to present



Yosemite Pika Resurvey

It is premature to conclude that pika have had any range shifts in the Yosemite region.

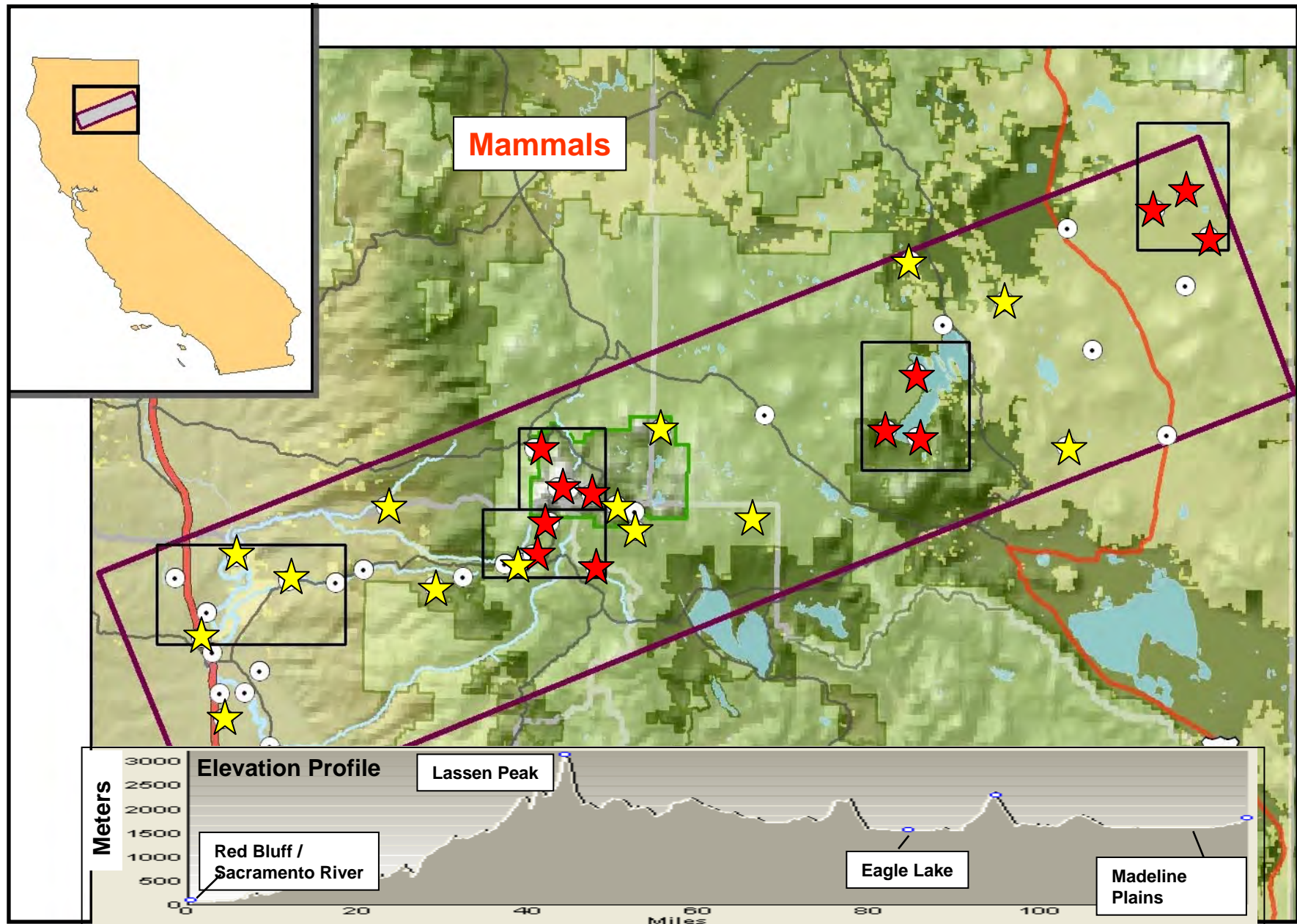
Pika persist at all the known historic sites that we have resurveyed, with 1 exception. That exception is the lowest-elevation historic record.

An additional historic pika location at that same elevation has not yet been resurveyed.

There has been no systematic assessment of pika distribution within the park. YNP has mapped potential pika habitat using aerial photos, but these have not yet been ground-truthed nor surveyed for pika occupancy.

Lassen Transect: Mammal Resurvey Locations

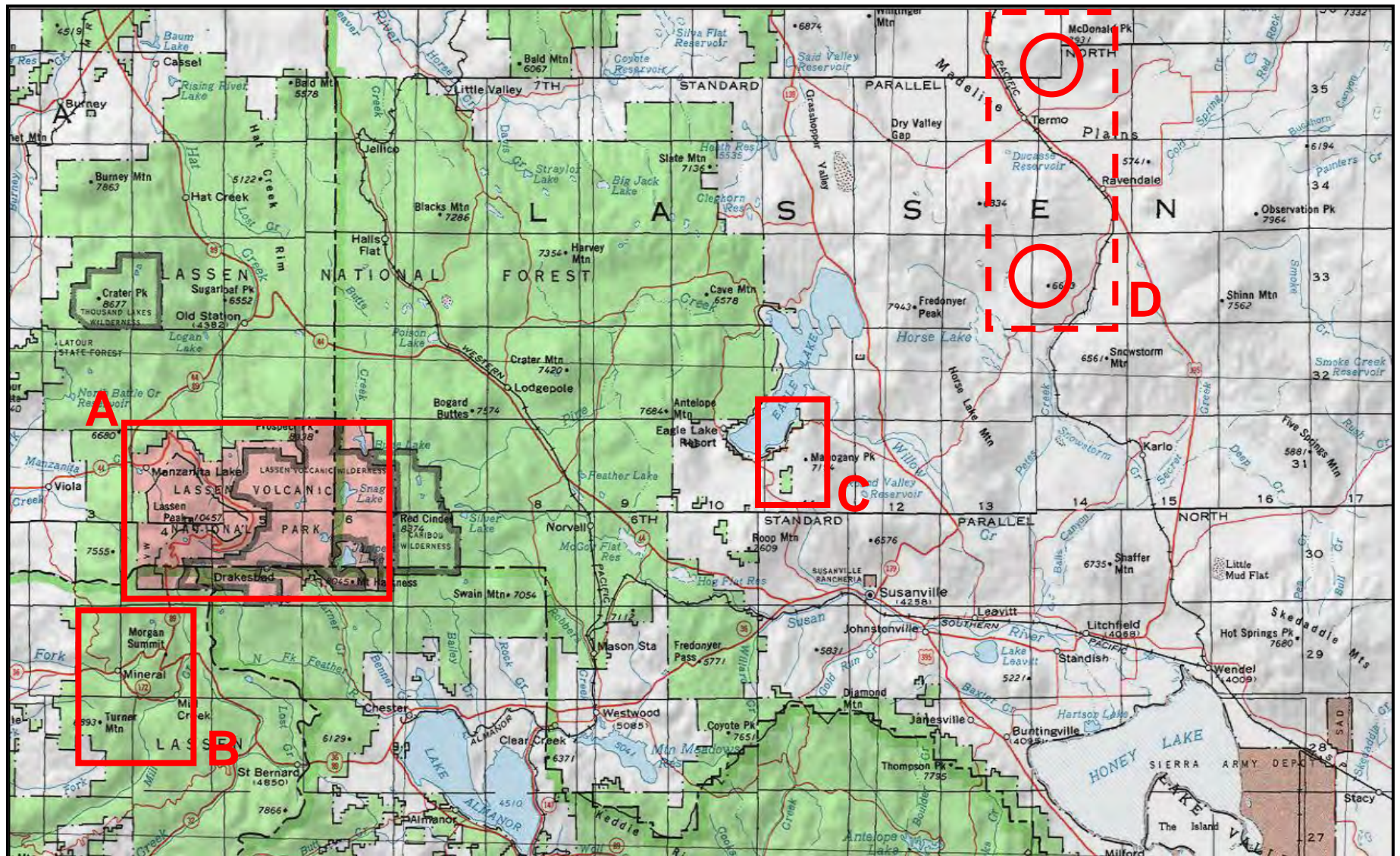
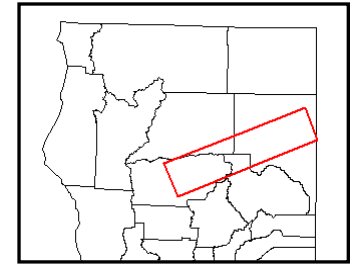
★ 2006
★ 2007



4 Pika survey areas (summer 2009):

- A) Lassen Volcanic National Park
- B) Mineral area
- C) Eagle Lake, S shore
- D) Madeline Plains (2 sites)

(the next slide cuts out the empty space in between)



How many Grinnell-era pika sites in Lassen Transect?

Specimen (n=43):	10 localities
Lassen Monograph:	
Map:	12 localities
Species account:	13+1 localities
Field notes:	17 localities (some with sub-localities)

“Warner Creek, 8300 ft.”

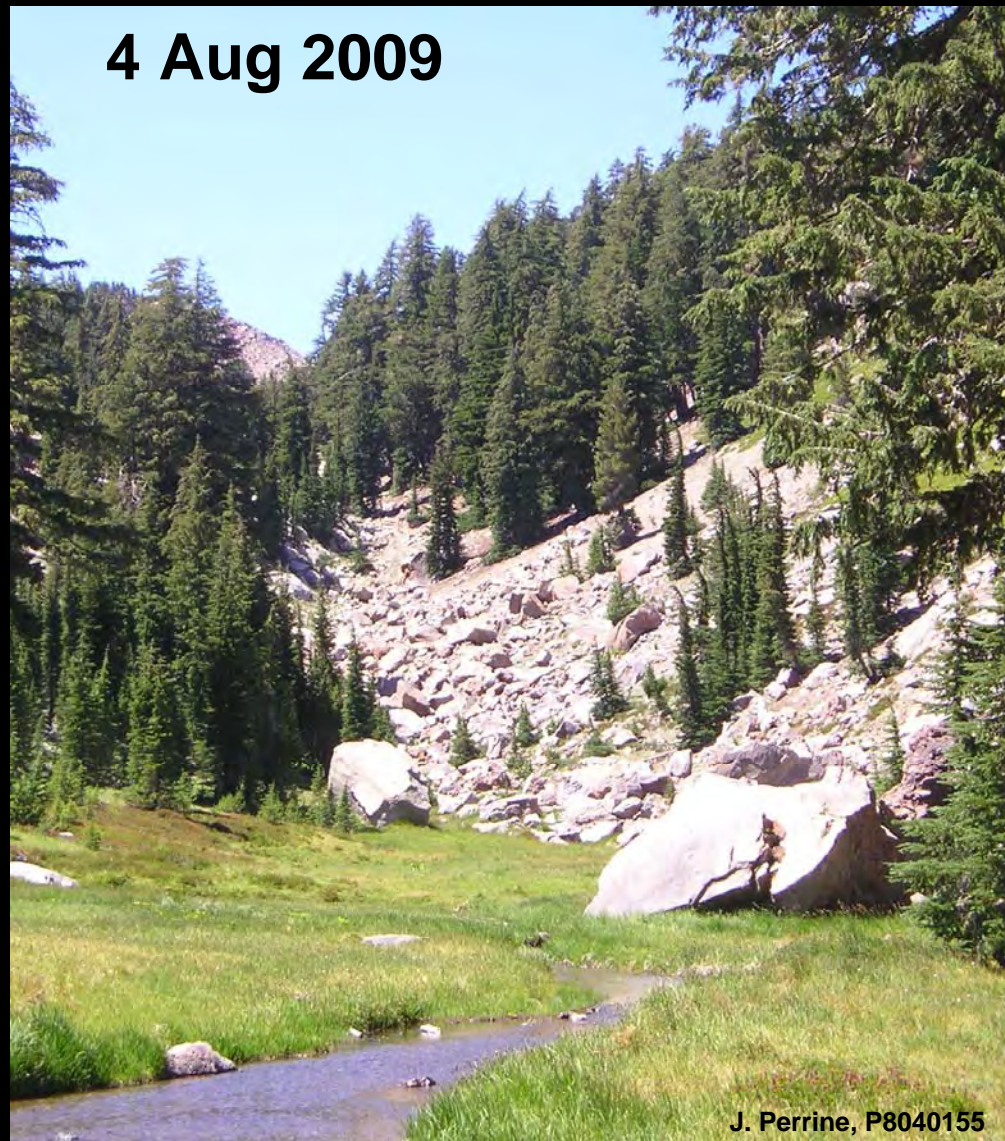
12 Sept 1923



4226

J. Dixon, #4226

4 Aug 2009



J. Perrine, P8040155

Determining occupancy:

Occupied	current sign
Abandoned	old sign only
No sign	no evidence of presence

Criteria for “Occupied”

Pika sighting or vocalization

“Perched pellets”

(present at 100% of sites with sighting, vocalization,
or active haypiles.)

Perched pellets



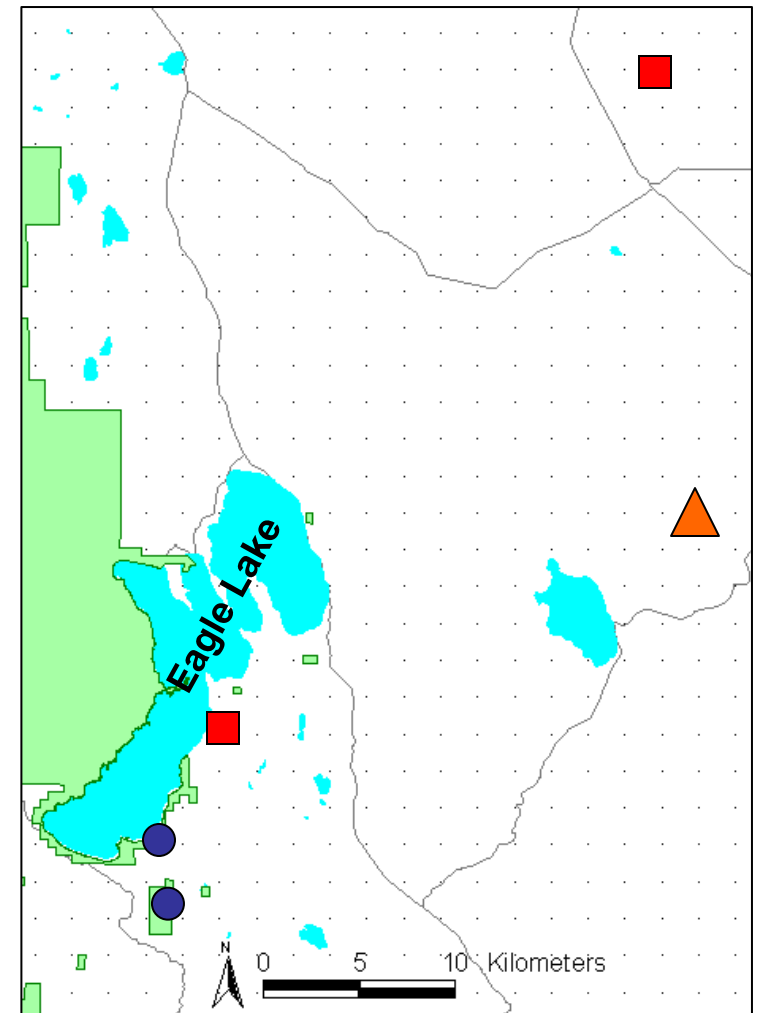
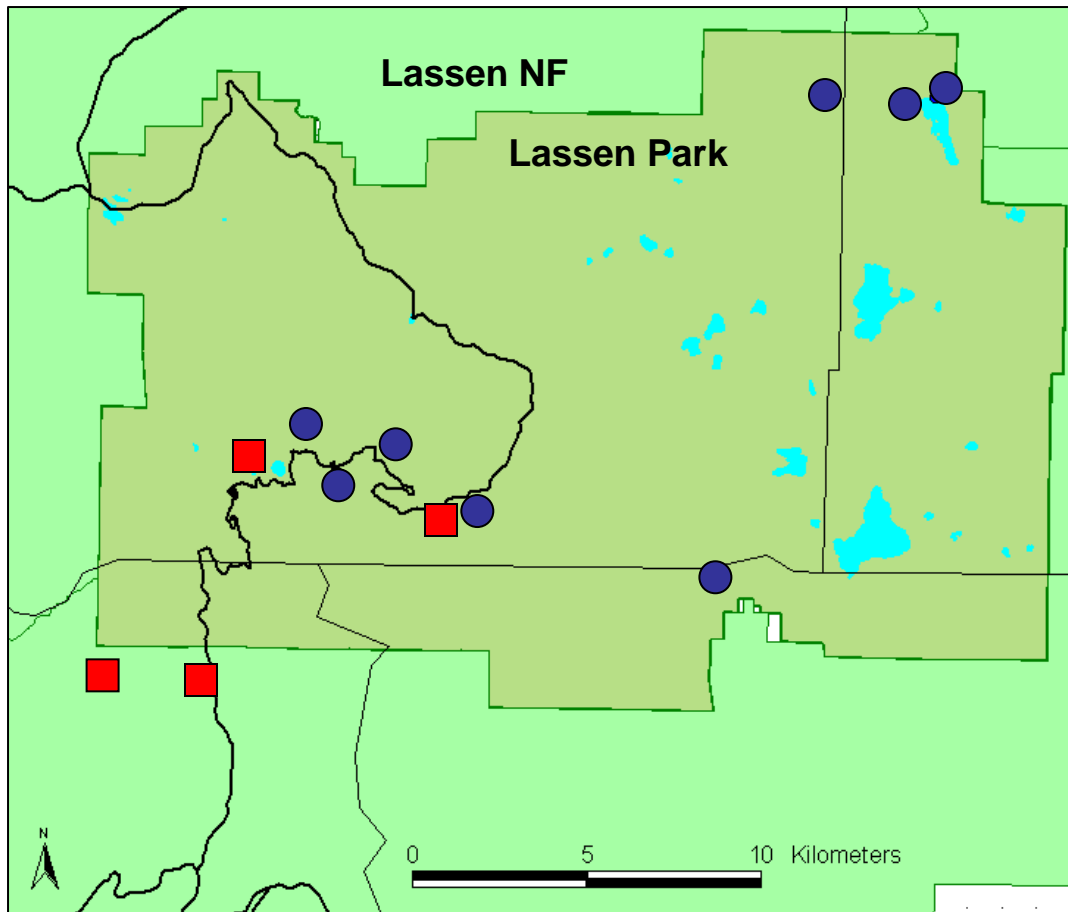


Cody and Mark installing iButton thermal datalogger



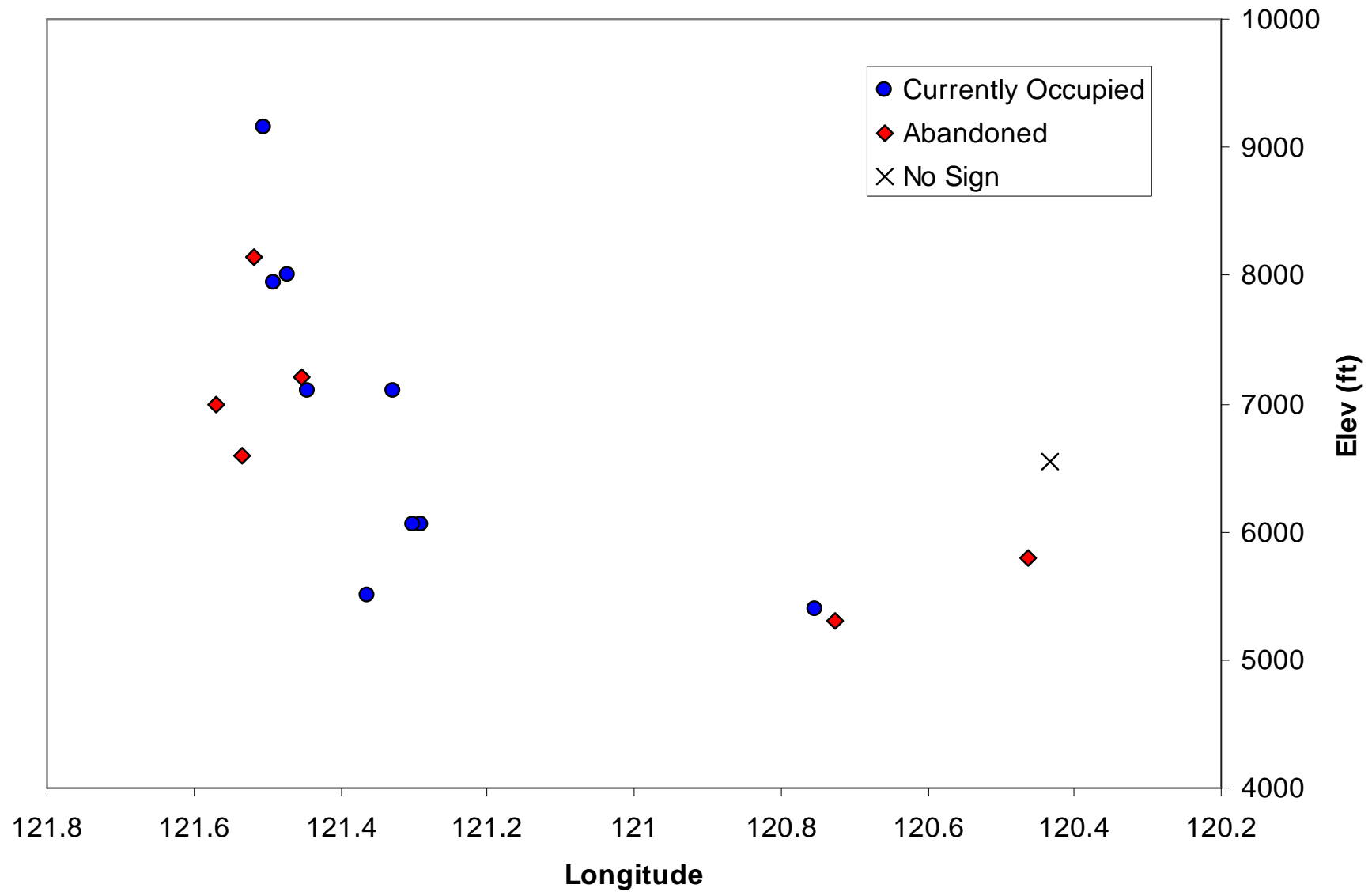
Of 17 Grinnell-era sites surveyed:

Currently Occupied: 10 (blue circles)
Abandoned: 6 (red squares)
No pika sign: 1 (orange triangles)

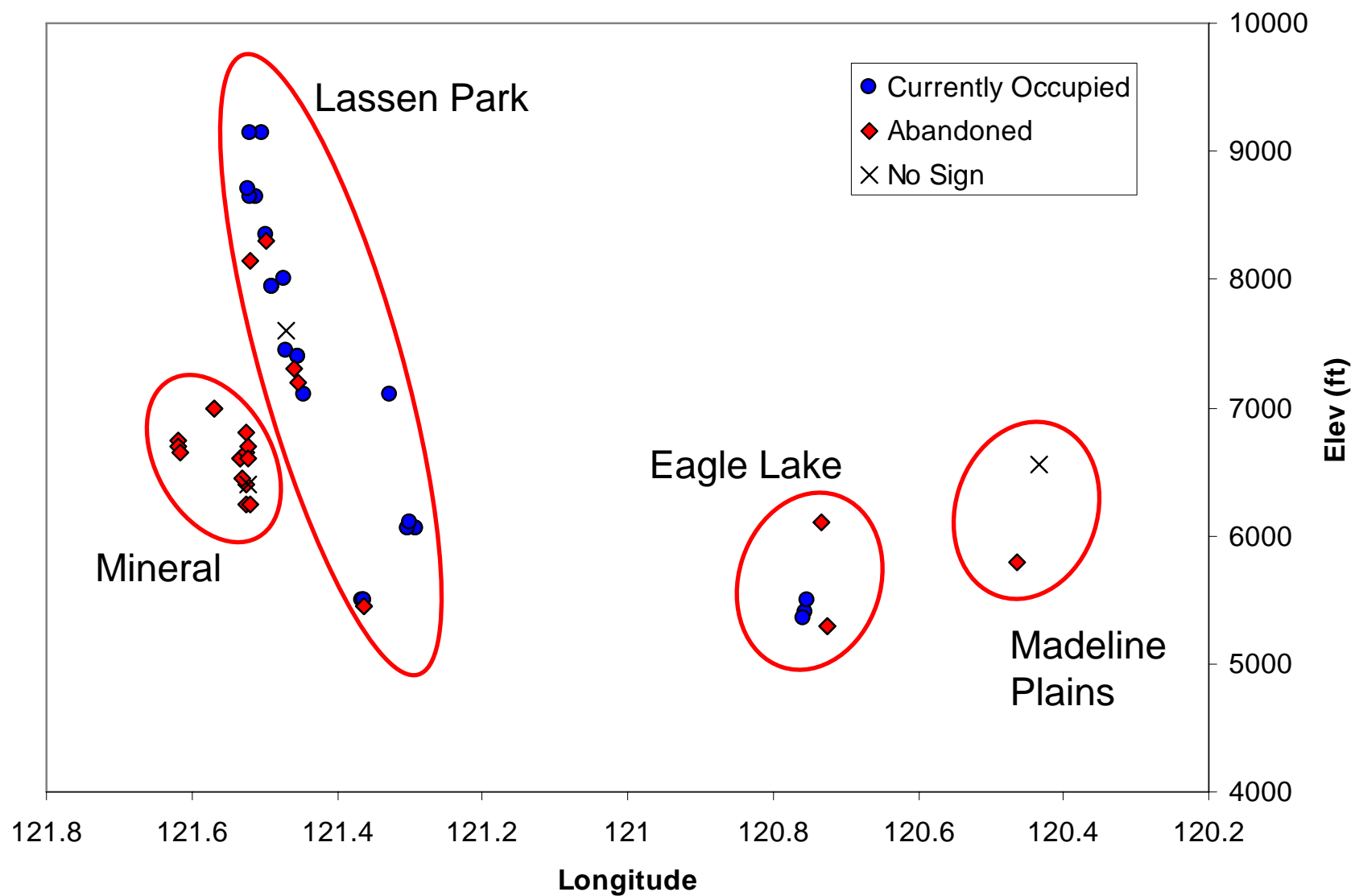


Current status of Grinnell-era pika detection sites in Lassen Transect

(plotted by Longitude and Elev_ft)



Current status, all sites surveyed:
(n = 45: 17 Grinnell-era sites + 28 nearby sites)



Caveats and considerations:

1. Metapopulation dynamics

Pika are a classic metapopulation species.

Sites “patches” may go extinct and be re-colonized.

Highest risk: Small, isolated, low-quality patches.

Lowest risk: Large, connected, high-quality patches.

Caveats and considerations:

2. Historical records are mostly “Presence Only”

P/A surveys lack info on population size, vital rates, etc.

“Presence only”: No info on where pika were *absent*.

Resurveys can only show persistence or loss, not expansion to previously-unoccupied areas.

Given their metapopulation dynamics, some pattern of patch-level loss is likely.

Key: Differentiating *stochastic* metapopulation dynamics from deterministic external forcings.

Caveats and considerations:

3. Resurveys are not random samples

Patterns in the resurveys cannot be generalized beyond the specific sites. May not be indicative of other sites within region, or patterns beyond the region.

Original site selection haphazard, not random.

Frequently lack replicates.

May not be sufficiently robust to support management actions.

Historical resurveys are neither *inventory* nor *monitoring*

Patterns in the Grinnell resurveys should be used to justify and develop a statistically-solid inventory and monitoring program which can yield generalizable conclusions.

Historical resurveys are not an “end point” but rather a first step in a long-term process.

