

# National Park Service pika habitat occupancy study

Preliminary results from eight parks

*Presenters:*

Chris Ray & Mackenzie Jeffress

Date: 2/11/2011

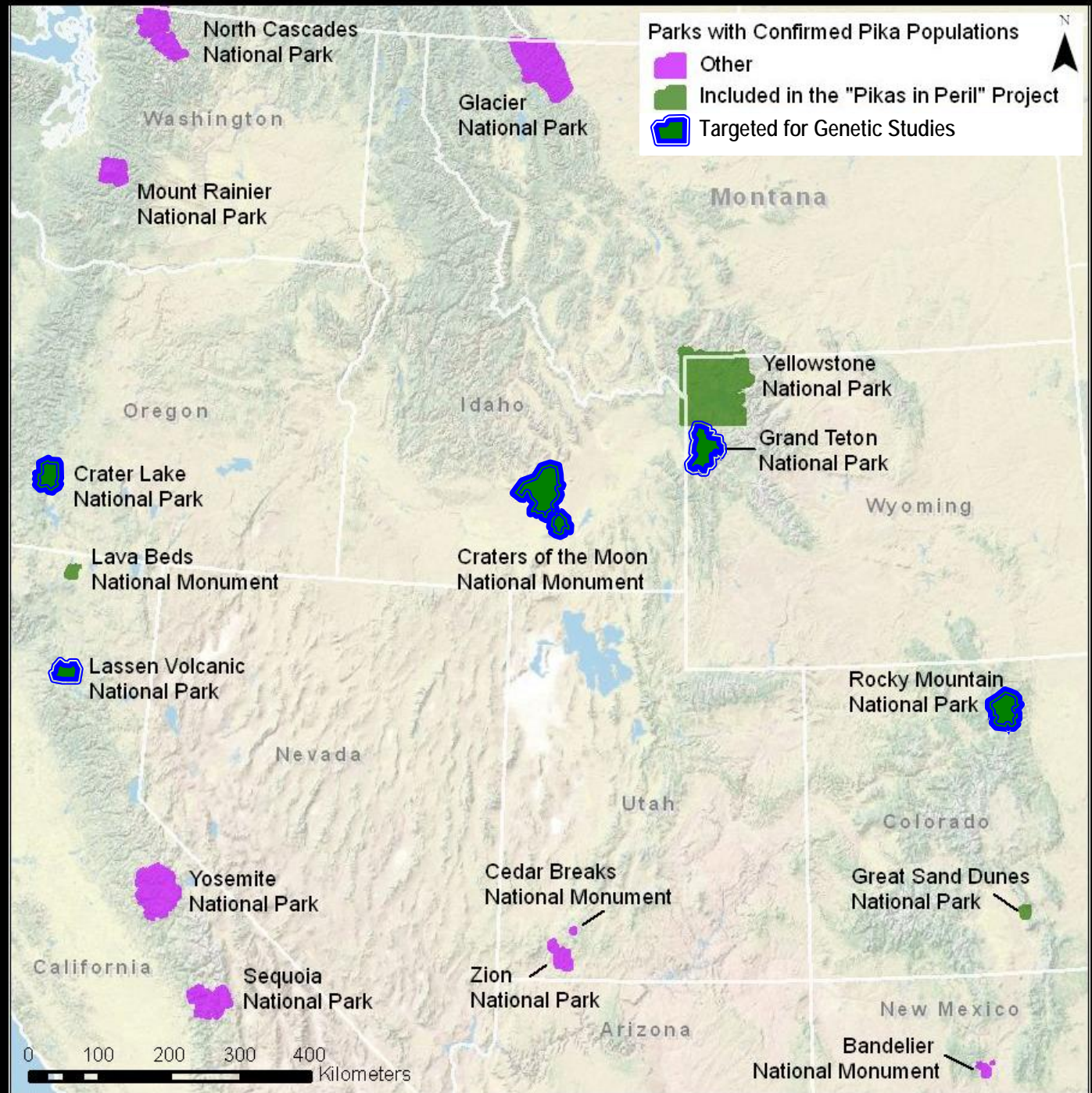


# Project Overview



- **Pikas in Peril: Multi-regional vulnerability assessment of a climate-sensitive sentinel species**
  - Funded in 2010 by the NPS Climate Change Response Program
  - Principal Investigators: Chris Ray, Mackenzie Jeffress, Clinton Epps and Susan Wolff
  - Goals: Assess the American pika's vulnerability to future climate scenarios projected for the western United States, support the interpretive mission of the NPS, and involve citizens in park science
  - Following methods described in NPS pika monitoring protocol (Jeffress et al. 2011)
- [http://science.nature.nps.gov/im/units/ucbn/monitor/pika/pika\\_peril/](http://science.nature.nps.gov/im/units/ucbn/monitor/pika/pika_peril/)

## Parks with confirmed pika populations

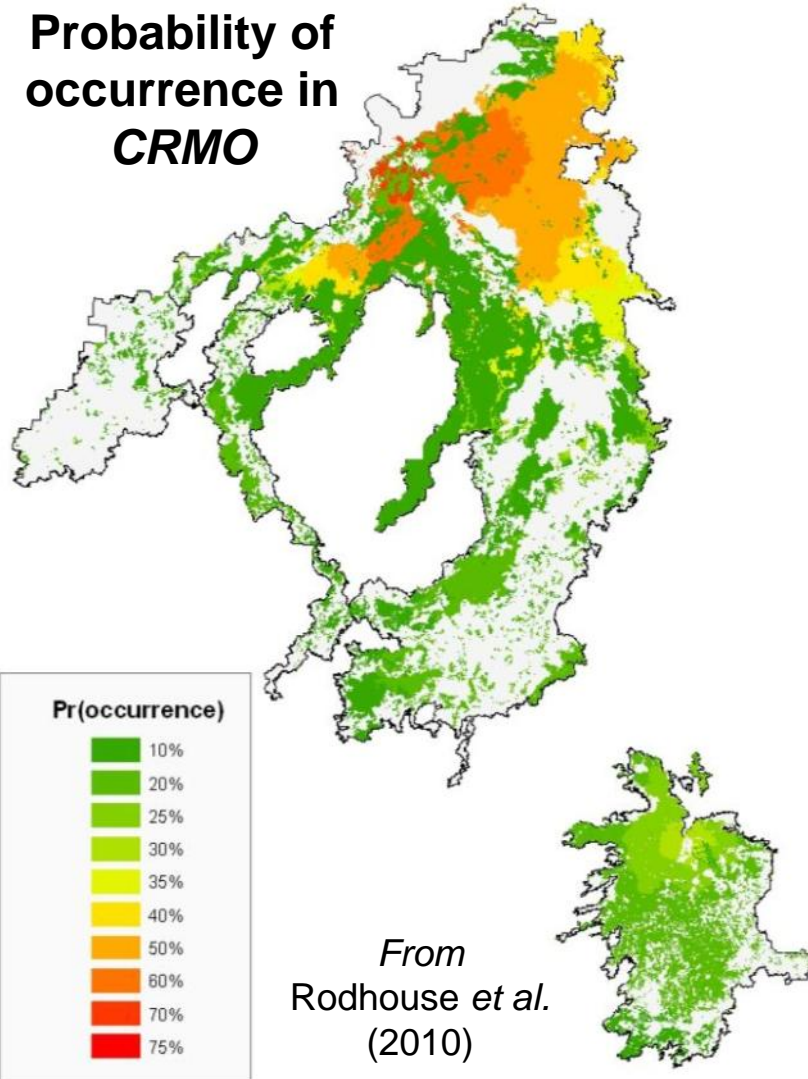




# Objectives



Probability of  
occurrence in  
*CRMO*

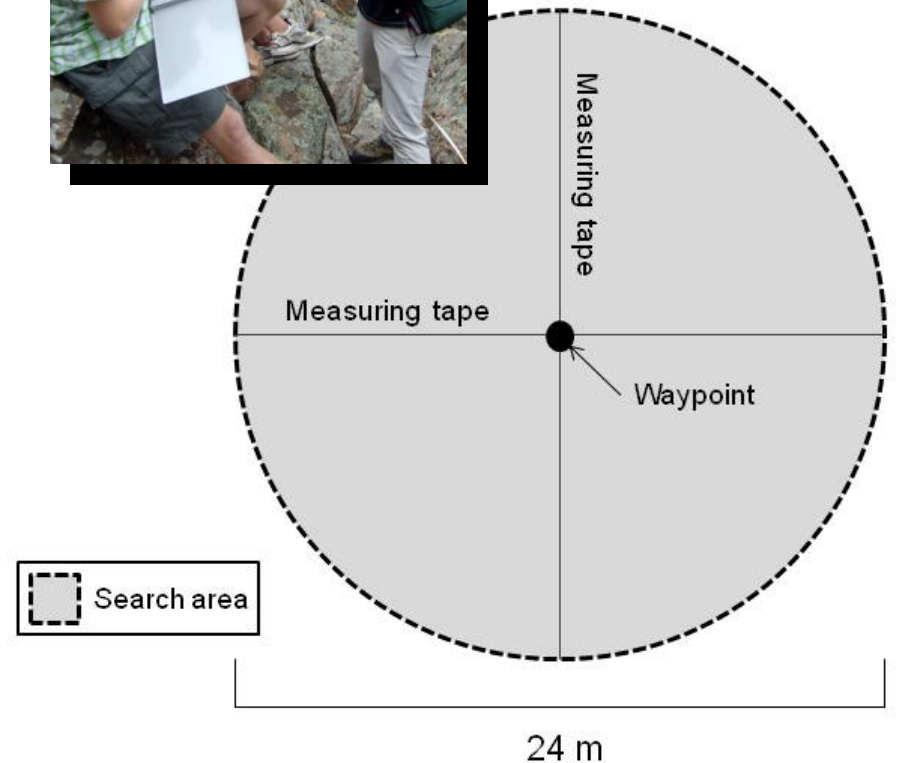


1. Document pika occurrence patterns and predict pika distribution in 8 parks
2. *Measure gene flow and model connectivity of pika populations within 5 park units.*
3. *Project climate change effects on the future distribution, connectivity and vulnerability of pika populations in each park.*



# Methods: Surveys

- Establish plots during the “haying” season
  - Late June – early October
  - Each plot = 24 m in diameter
- Survey plots
  - 1-2 surveys/plot
  - 20-30 minutes/survey
  - Record pikas and pika sign
  - Record habitat variables
- Collect genetic samples during plot surveys and in transit between plots

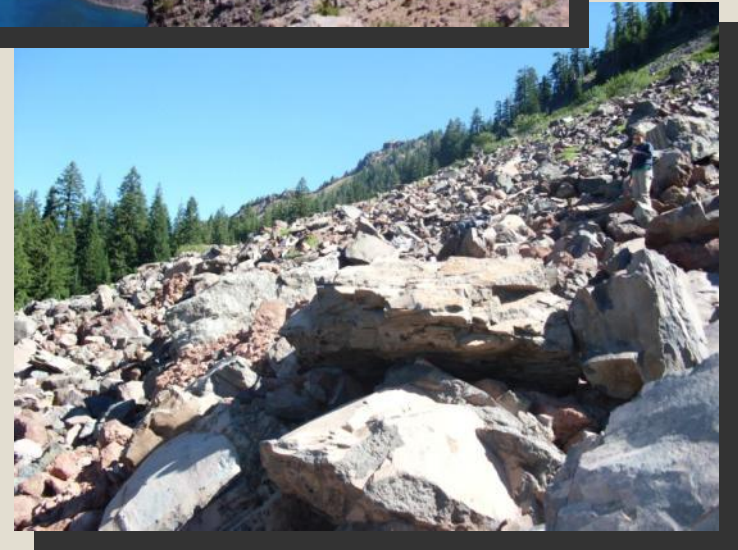


# 2010 Results – Crater Lake NP

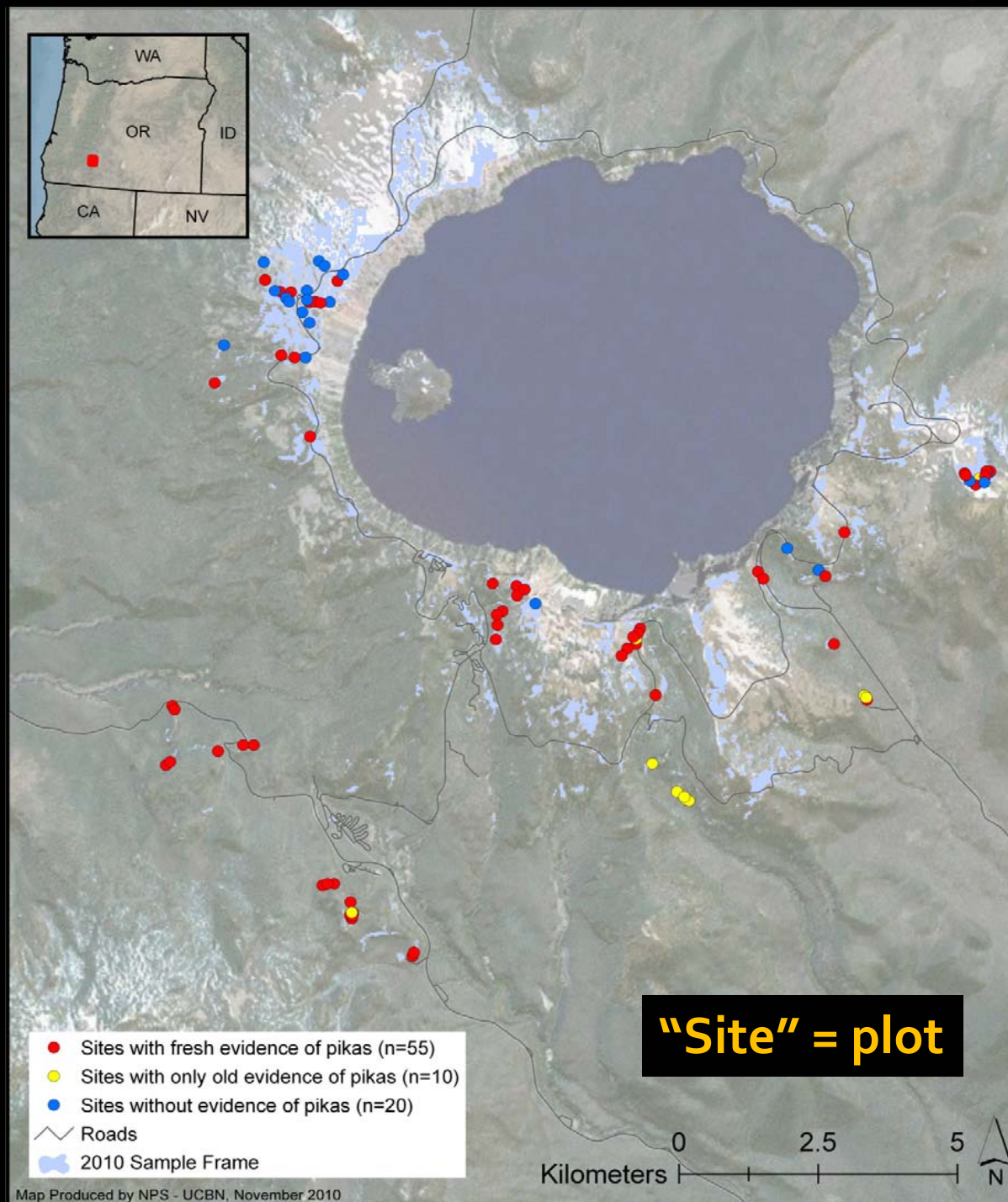
## RESULTS - CRLA

Survey period	Aug-Sep
# plots surveyed	85
% “occupied”	65%*
Elevation range (m)	1170-2429
# genetic samples	190

*\* Occupancy data are not yet adjusted for detection error*



**2010  
occupancy  
survey  
results  
CRLA –  
Crater Lake  
NP**





# 2010 Results – Craters of the Moon NMP

## RESULTS - CRMO

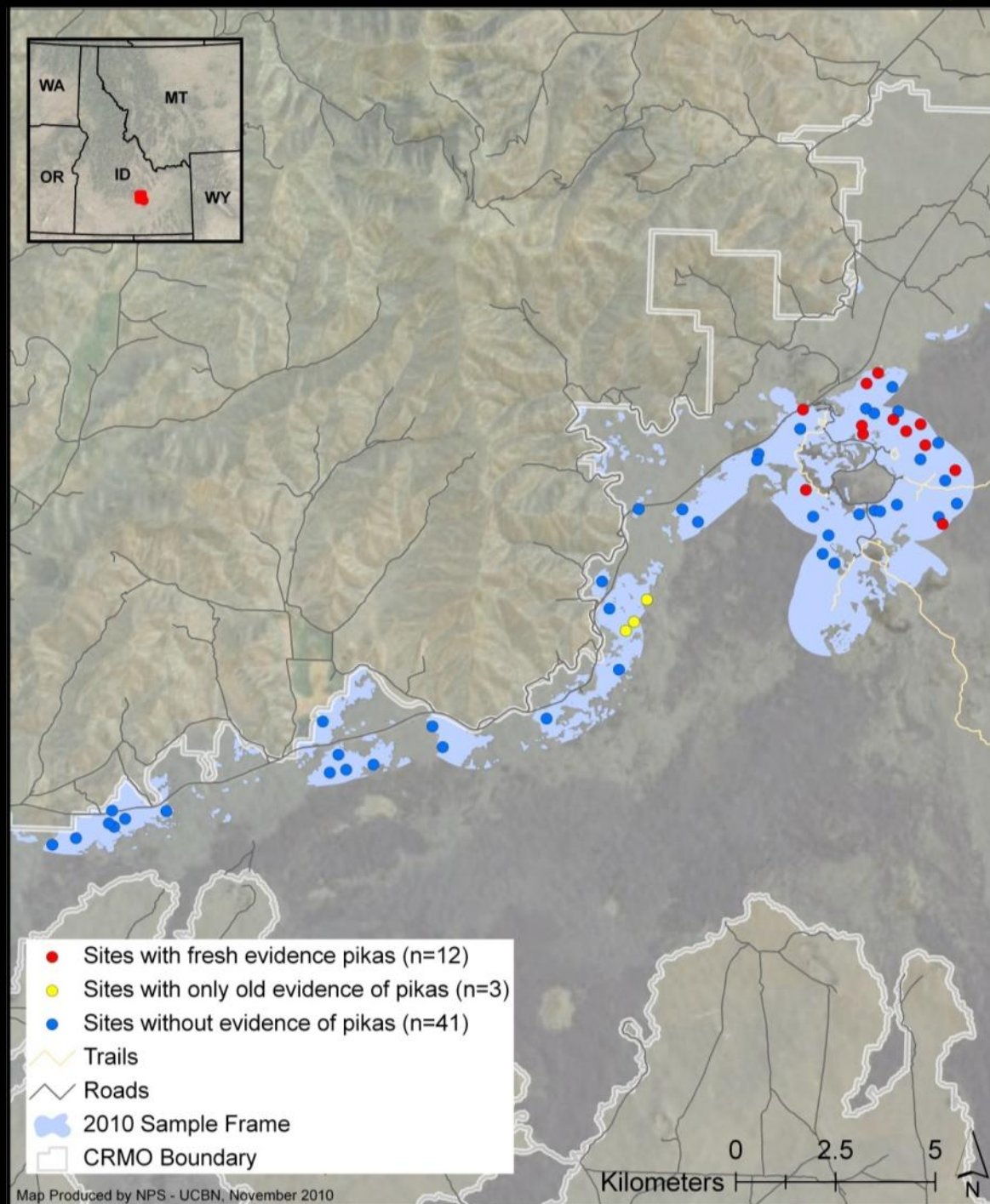
Survey period	Jul & Sep
# plots surveyed	56
% occupied	21%*
Elevation range (m)	1511-1833
# genetic samples	11

*\* Occupancy data are not yet adjusted for detection error*



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2010 occupancy  
survey results  
*CRMO – Craters  
of the Moon  
NMP*





# 2010 Results – Grand Teton NP



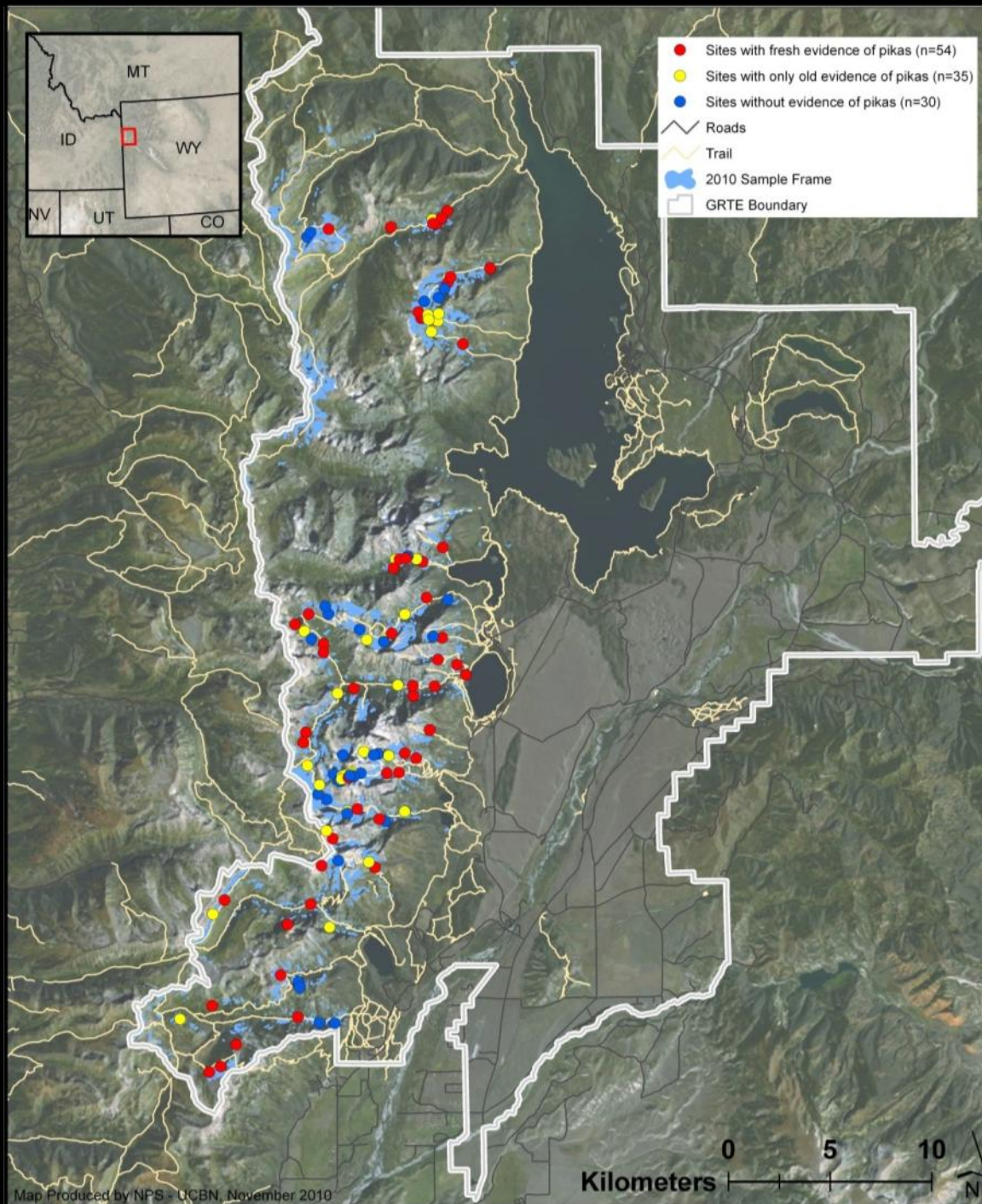
Photos: Chris Paige (NPS)

## RESULTS - *GRTE*

Survey period	Jul-Oct
# plots surveyed	119
% "occupied"	45%*
Elevation range (m)	2092-3635
# genetic samples	112

*\* Occupancy data are not yet adjusted for detection error*





**2010  
occupancy  
survey results  
*GRTE – Grand  
Teton NP***

# 2010 Results – Great Sand Dunes NPP

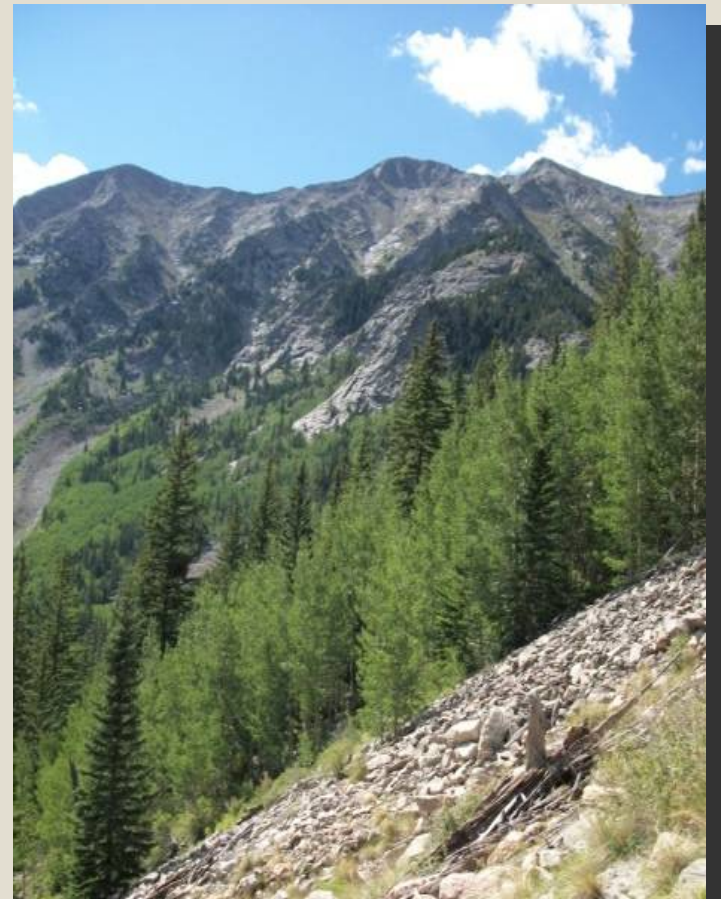
*\* Occupancy data are not yet adjusted for detection error*



## RESULTS - GRSA

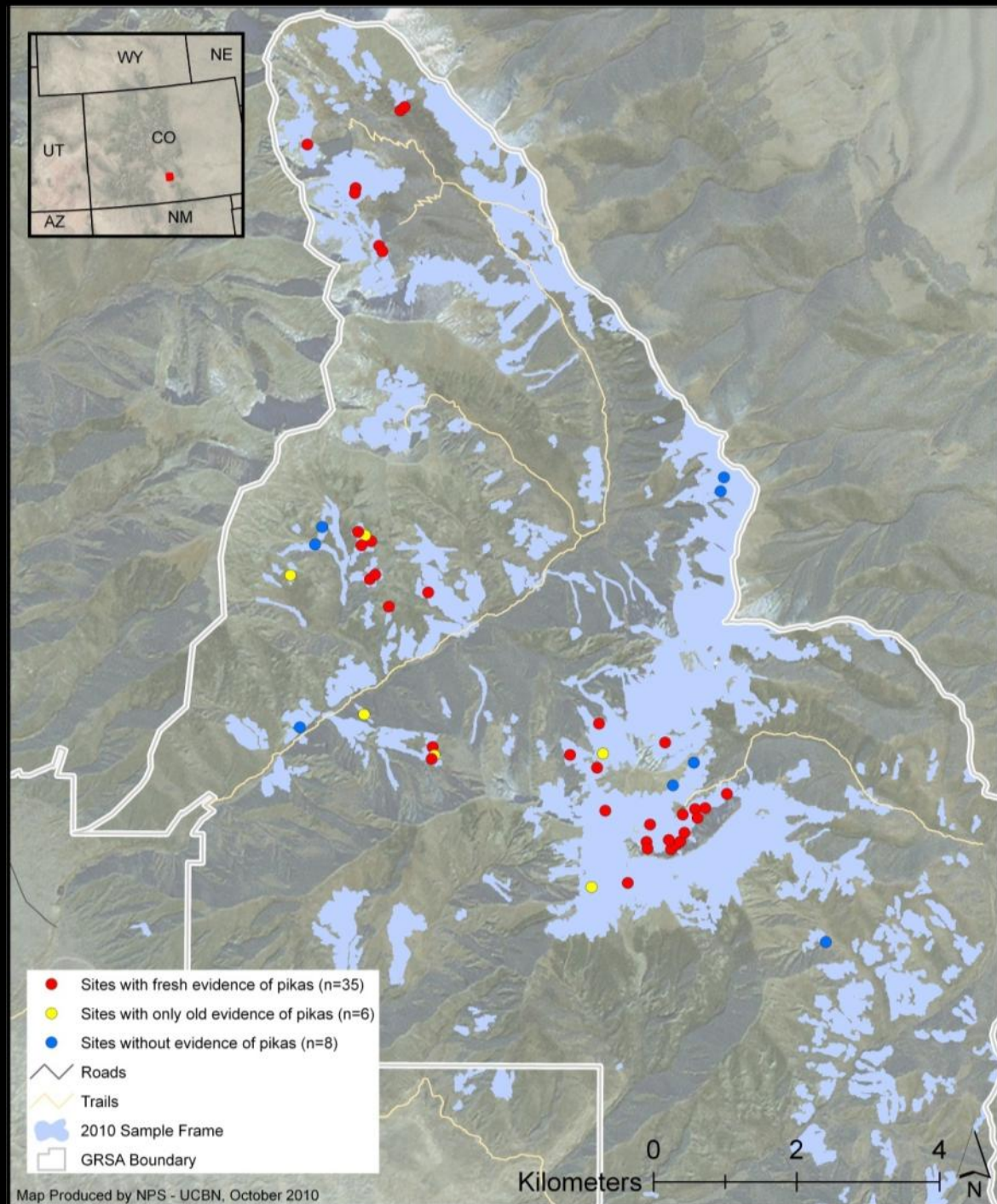
Survey period	Aug-Oct
# plots surveyed	49
% "occupied"	71%*
Elevation range (m)	2811-3832

*Genetic analyses are not funded for GRSA*



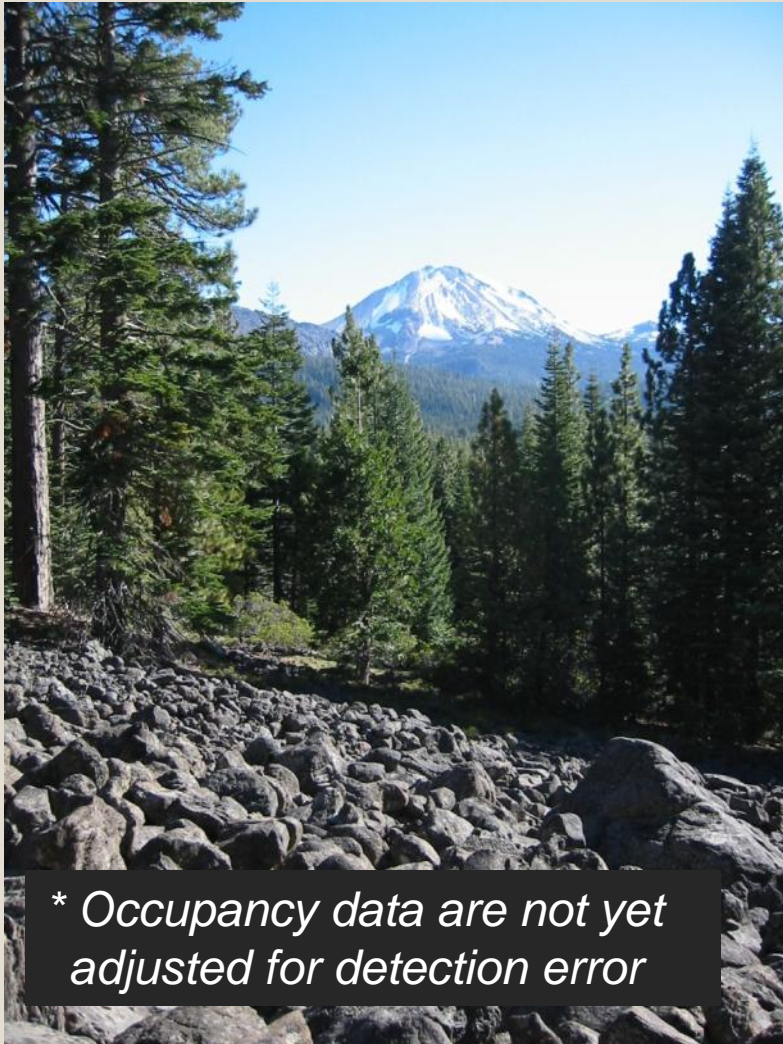


**2010  
occupancy  
survey results  
GRSA – Great  
Sand Dunes  
NPP**





# 2010 Results – Lassen Volcanic NP

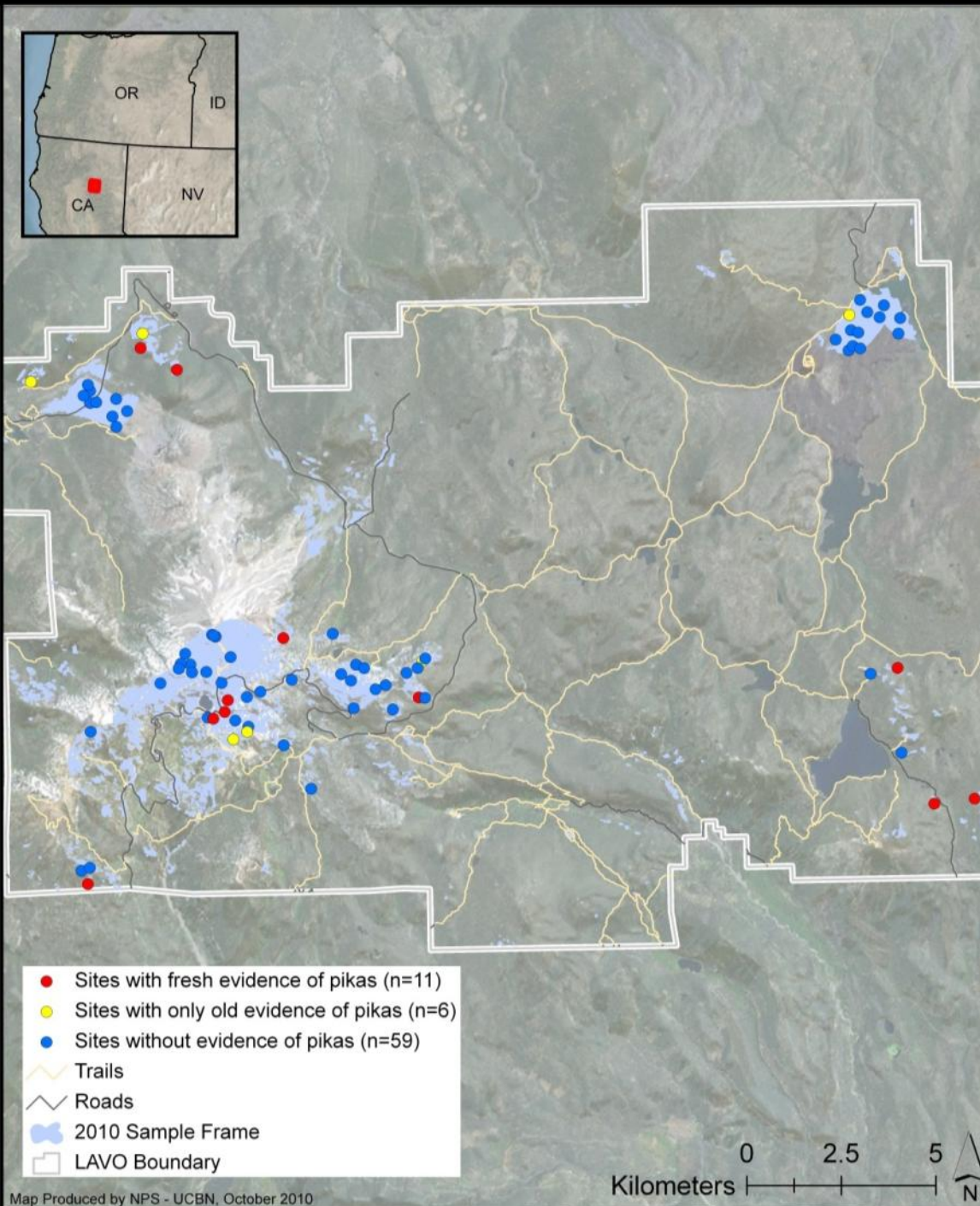


*\* Occupancy data are not yet adjusted for detection error*



## RESULTS - LAVO

Survey period	Jul-Sep
# plots surveyed	76
% "occupied"	15%*
Elevation range (m)	1840-3091
# genetic samples	15



**2010  
occupancy  
survey results  
*LAVO –  
Lassen  
Volcanic NP***

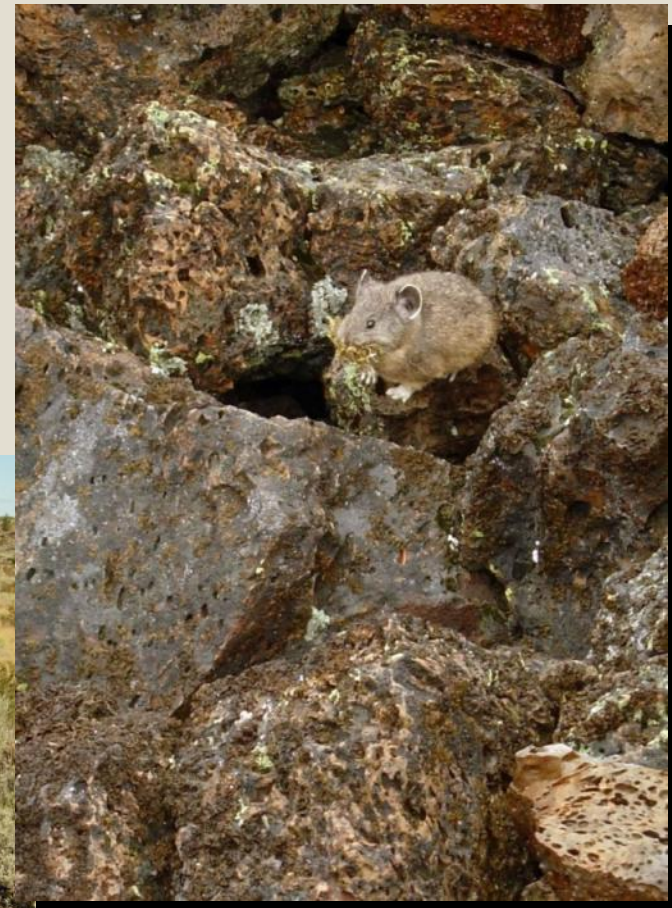


# 2010 Results – Lava Beds NM

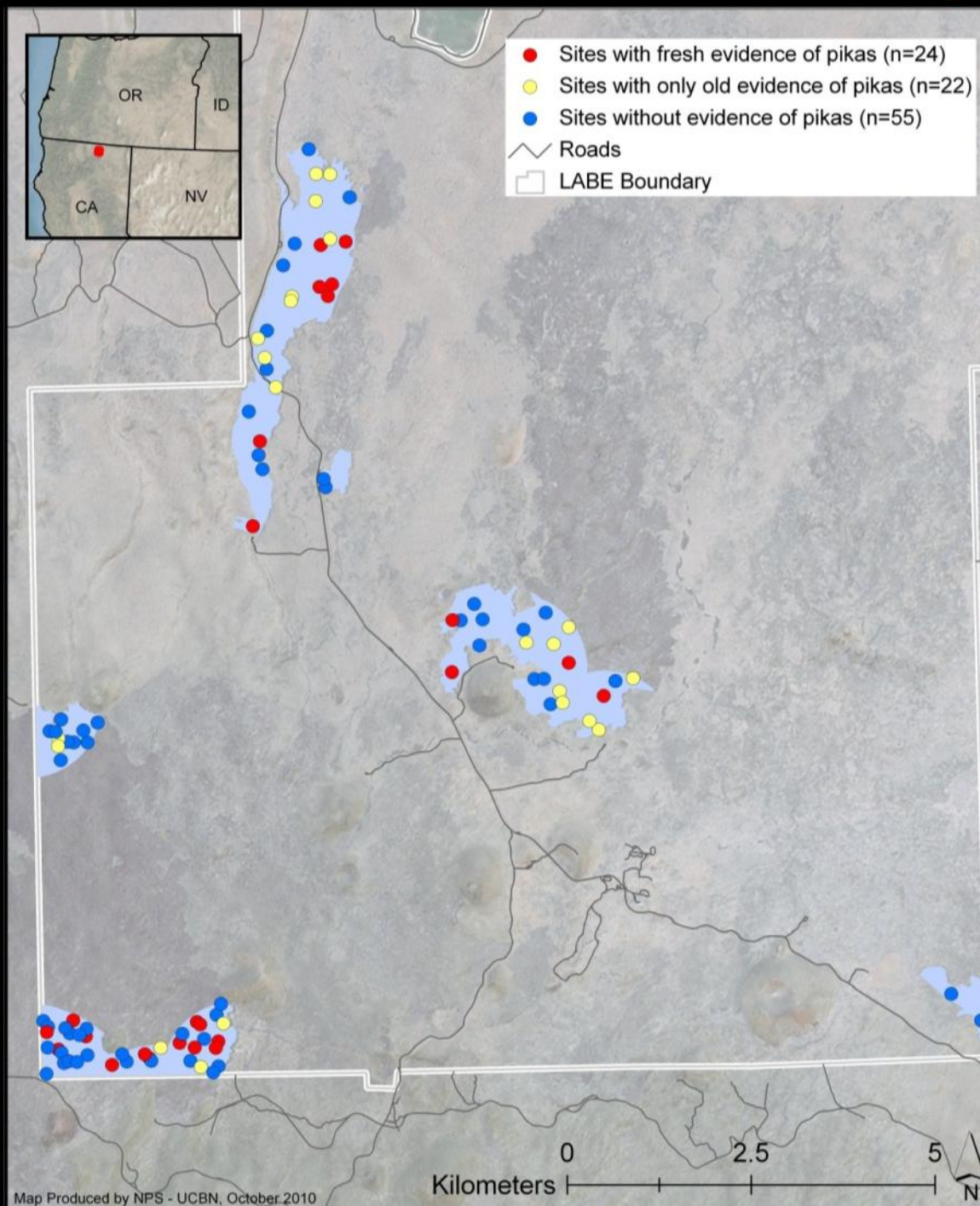
## RESULTS - LABE

Survey period	Jun & Sep
# plots surveyed	101
% “occupied”	24%*
Elevation range (m)	1249-1717
<i>Genetic analyses are not funded for LABE</i>	

*\* Occupancy data are not yet adjusted for detection error*







**2010 occupancy  
survey results  
*LABE – Lava Beds  
NM***

# 2010 Results – Rocky Mountain NP



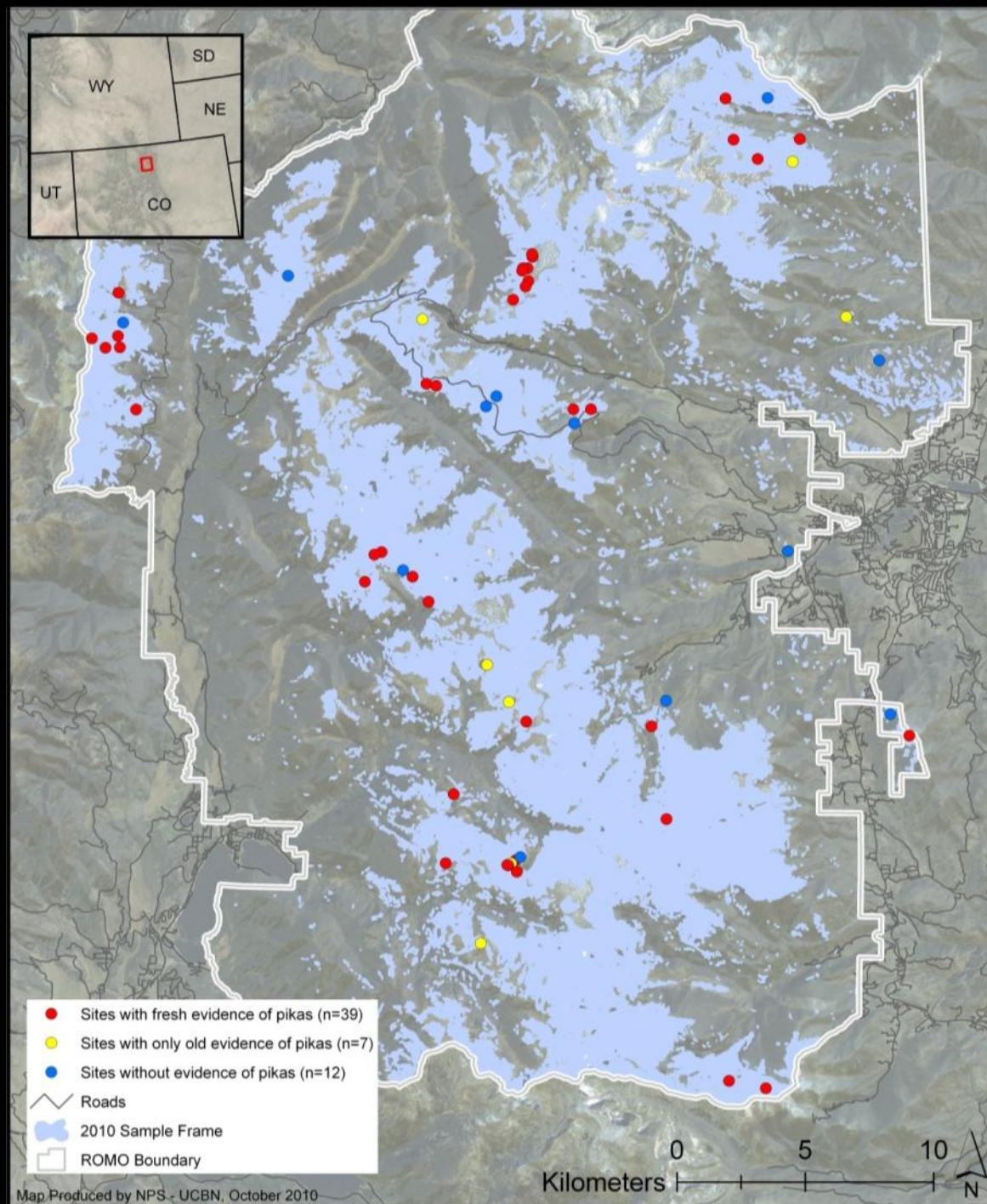
## RESULTS - ROMO

Survey period	Jul-Oct
# plots surveyed	58
% "occupied"	67%*
Elevation range (m)	2572-3795
# genetic samples	59

*\* Occupancy data are not yet adjusted for detection error*



2010 occupancy  
survey results  
*ROMO – Rocky  
Mountain NP*





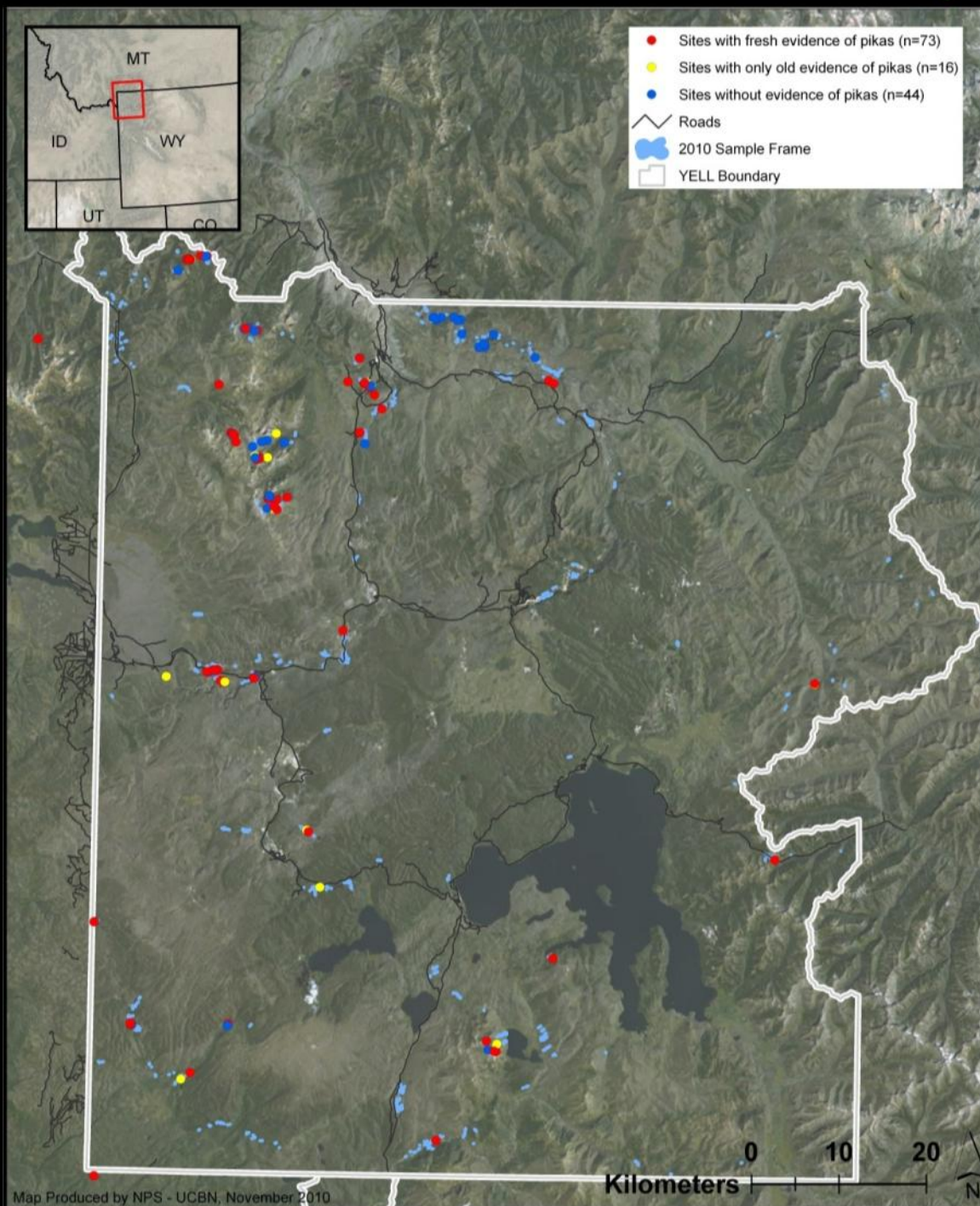
# 2010 Results – Yellowstone NP



## RESULTS - YELL

Survey period	Jun-Sep
# plots surveyed	133
% "occupied"	54%*
Elevation range (m)	1636-2936
<i>Genetic analyses are not funded for YELL</i>	

*\* Occupancy data are not yet adjusted for detection error*

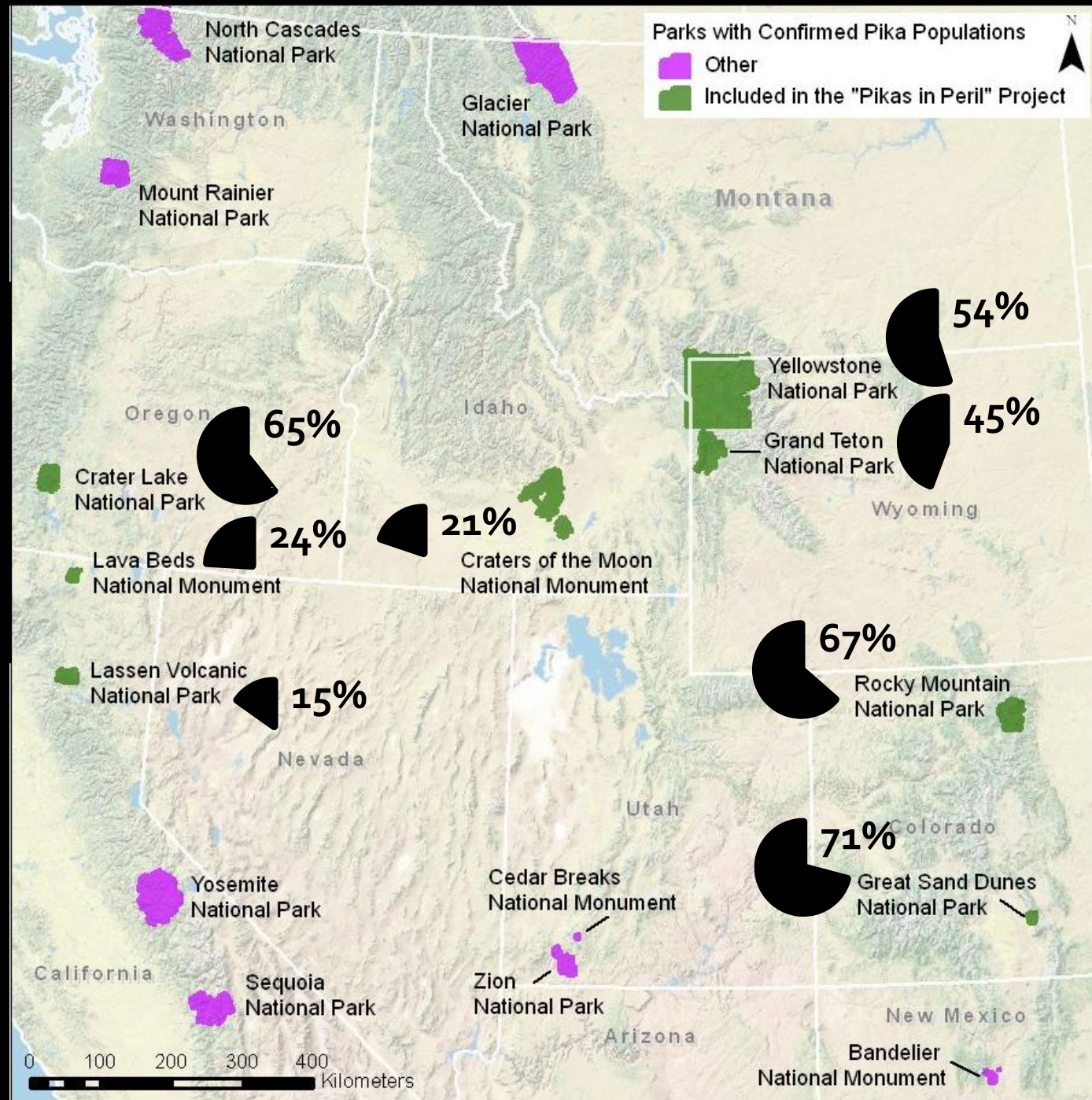


**2010  
occupancy  
survey results  
YELL –  
Yellowstone  
NP**



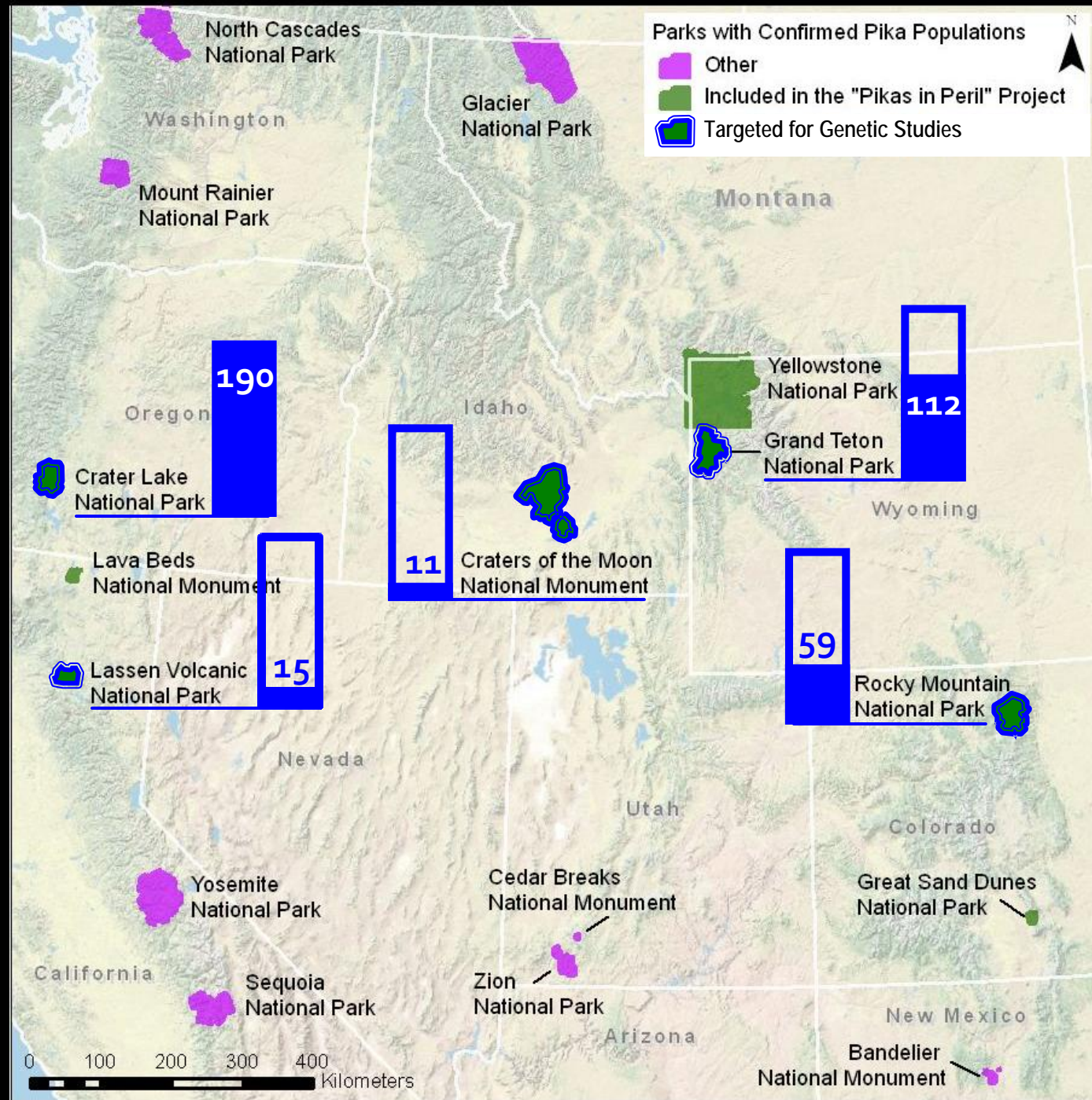
# 2010 occupancy\* survey results for targeted parks

*\* Occupancy  
data are not  
yet adjusted  
for detection  
error*





**2010  
genetic  
sampling  
in  
targeted  
parks**



# Detection probability

- High detection by independent observers
  - GRSA and ROMO crew:  $p \geq 0.92$
  - CRLA, LABE, and LAVO crew:  $p = 0.89$
  - Discrepancies: Only in plots where just a single “fresh” fecal sample was found (not very often)
- Potential effects of timing/season
  - Preliminary analyses suggest that detectability was lower in some of the earliest surveys
  - Surveys in 2011 will begin later in the season (after June 30)



# Future analyses and timeline

- Occupancy modeling
  - 2010+2011 data
  - Detection rates
- Habitat associations
  - Ecology
  - Topography
  - Climate
- Genetic analyses
- Vulnerability analyses

Activity	Timeline
Preliminary data analysis, analyze genetic samples	Right now
Second year of field surveys/sample collection	Summer / Fall 2011
Occupancy modeling, genetic modeling and vulnerability analyses	Winter / Spring 2012
Complete reports and predictive distribution modeling/mapping	2012

# Future analyses – habitat associations

- Occupancy modeled as a (logistic) function of
  - elevation, slope gradient, aspect
  - rock size, crevice depth, rock shade
  - vegetation cover/classes, presence of water
  - marmot/woodrat presence
  - climatic variables!



# Comparisons with previous data

- Previous data are available from identical or “similar” studies in...
  - Craters of the Moon NM&P
  - Lava Beds NM
  - Southern Rockies

# Comparisons with previous data – Craters of the Moon NM&P

## RESULTS - *CRMO*

Survey period	Jul-Sep
# plots surveyed	56
% occupied	21%*

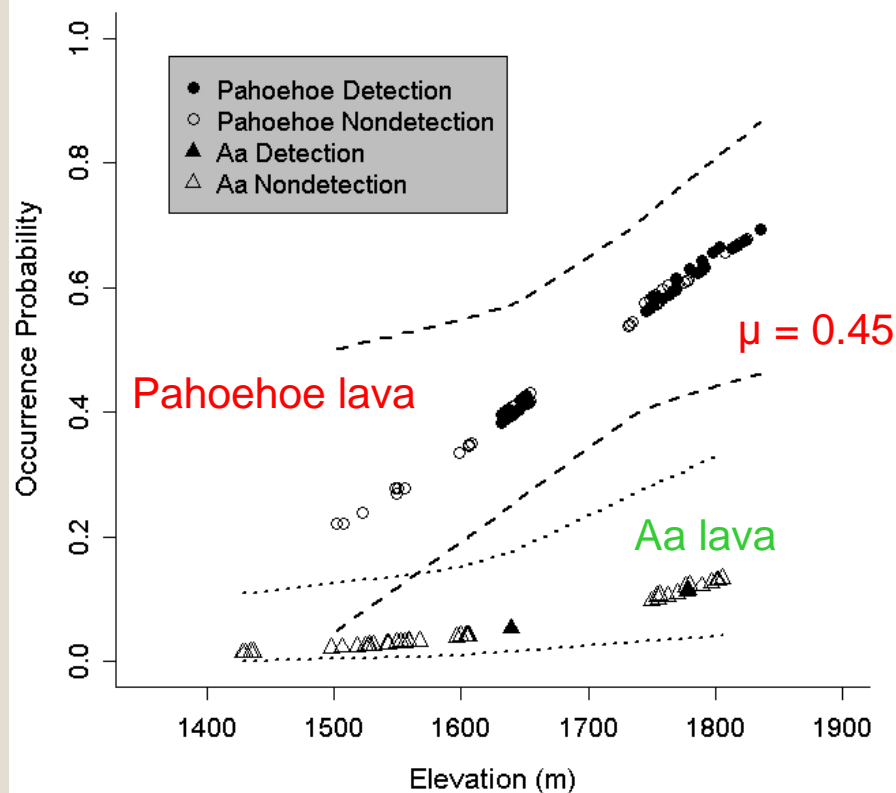
- But...occupancy was higher in more complex lava landscapes



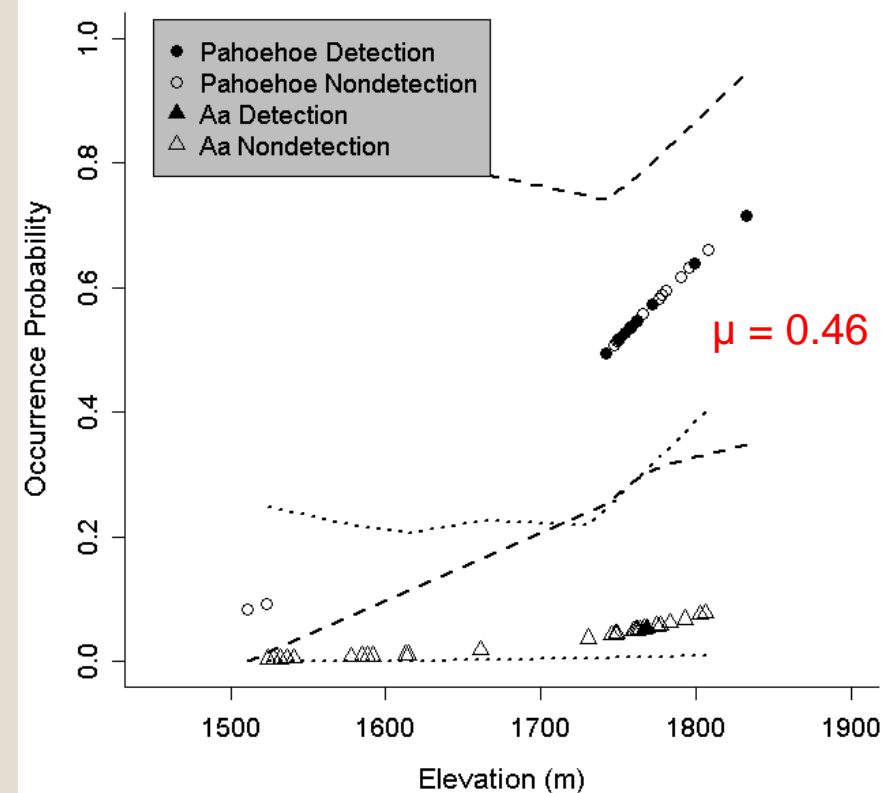


# Comparisons with previous data – Craters of the Moon NM&P

2007-2009 inventory work (Rodhouse et al. 2010)



2010 survey results



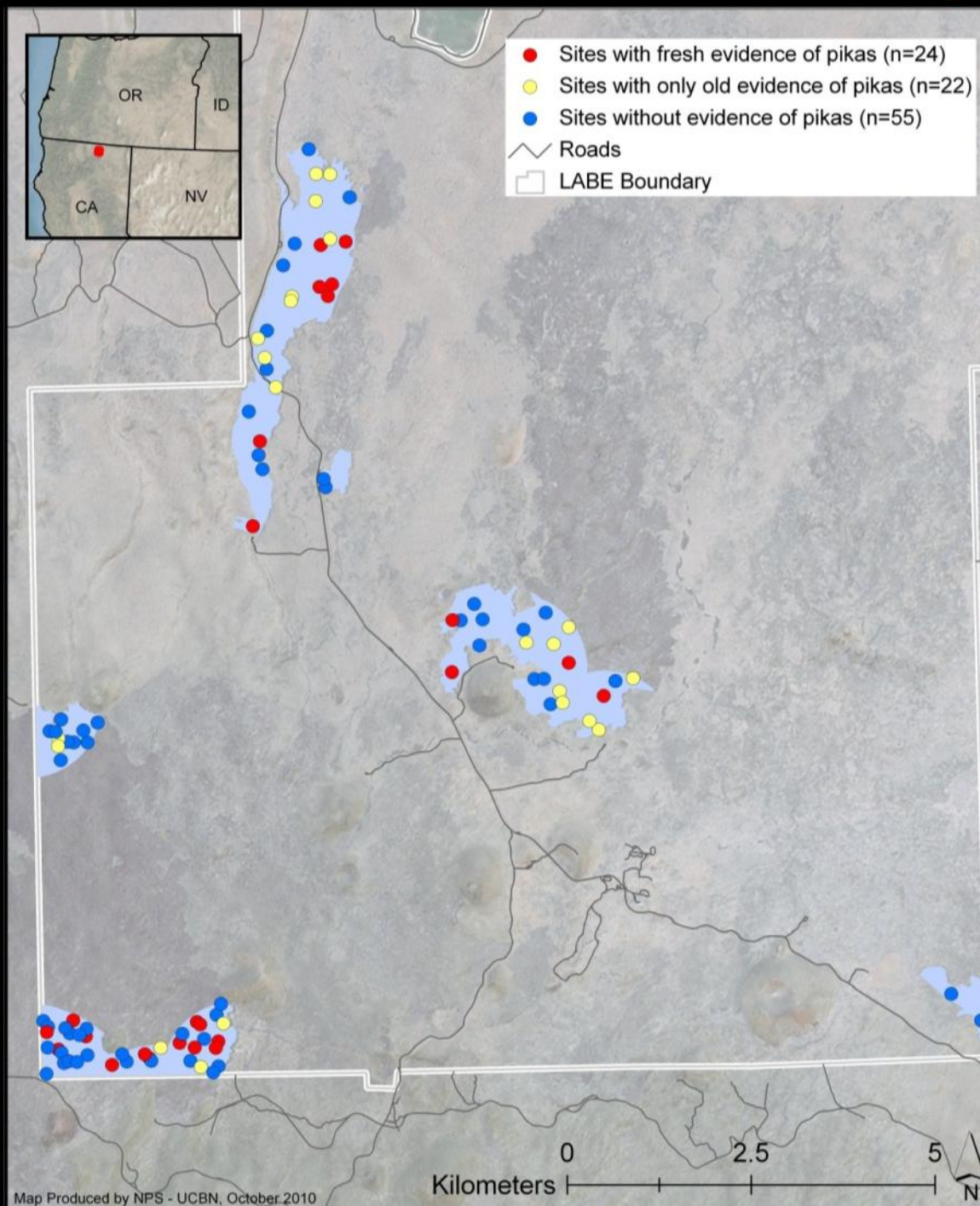
# Comparisons with previous data – Lava Beds NM

<b>2010 RESULTS - LABE</b>		
Survey period	Jun 19-29	Aug 29-Sep 2
N	101	50 (resurveys)
% “occupied”	7 %*	36 % *

**2006 plot use by pikas in Lava Beds National Park**  
after omitting sites with low search time (<20 mins)

	May-July		September-November	
	Occupancy	N	Occupancy	N
Cave sites	79 %	14	42 %	19
Flow sites	77 %	44	62 %	21





**2010 occupancy  
survey results  
*LBE – Lava Beds  
NM***

# Lava Beds Pika Study Locations

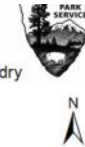
0 0.5 1 2 Miles

## Roads

— Paved  
- - - Unpaved  
... Trail

## Misc.

□ Park Boundary  
■ Lava



## Lava Sites

### Criterion & Detections

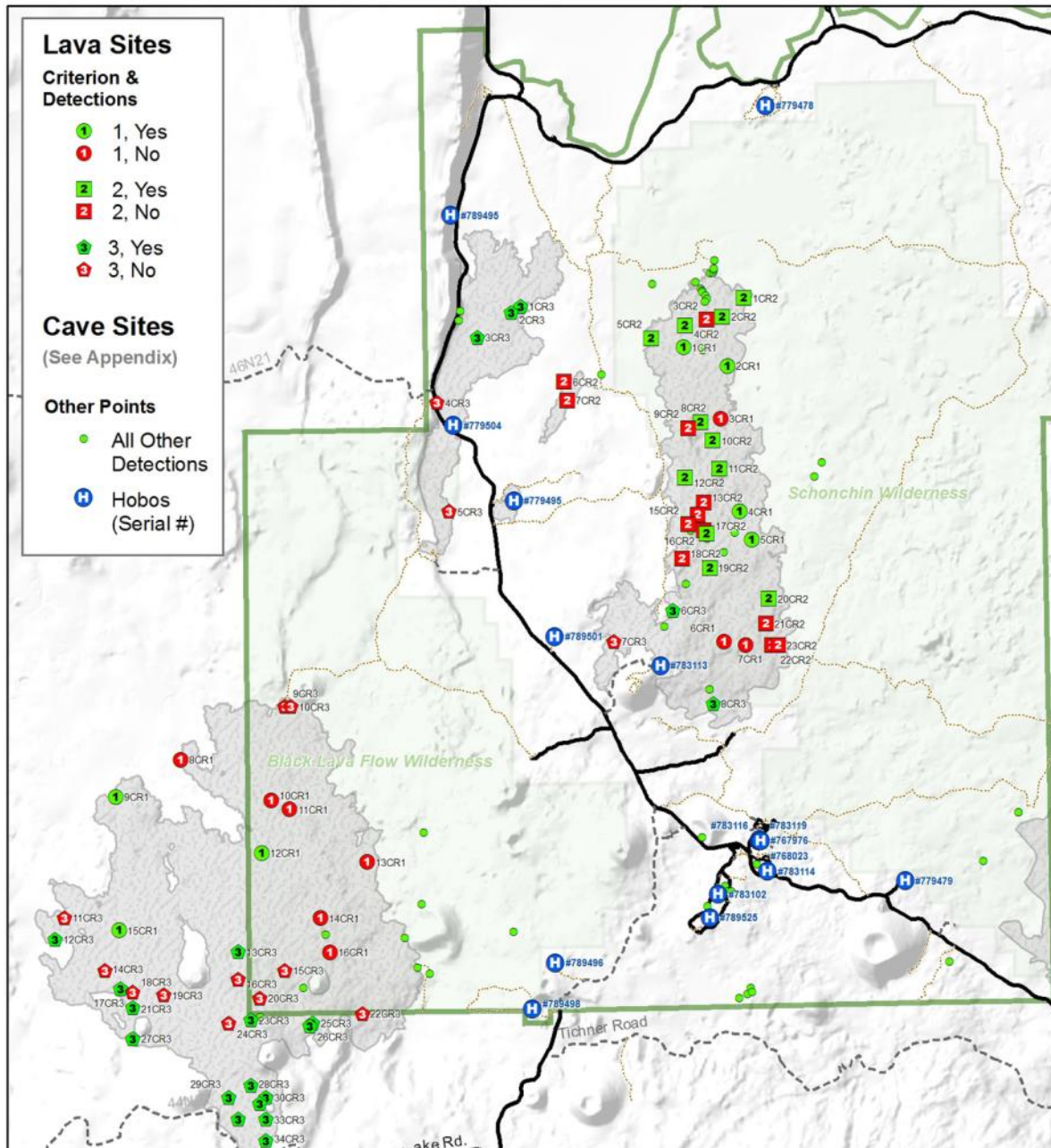
- 1, Yes
- 1, No
- 2, Yes
- 2, No
- 3, Yes
- 3, No

## Cave Sites

(See Appendix)

## Other Points

- All Other Detections
- H Hobos (Serial #)



2006 (Sep-Nov)  
occupancy survey  
results  
*LAVE – Lava Beds  
NM*

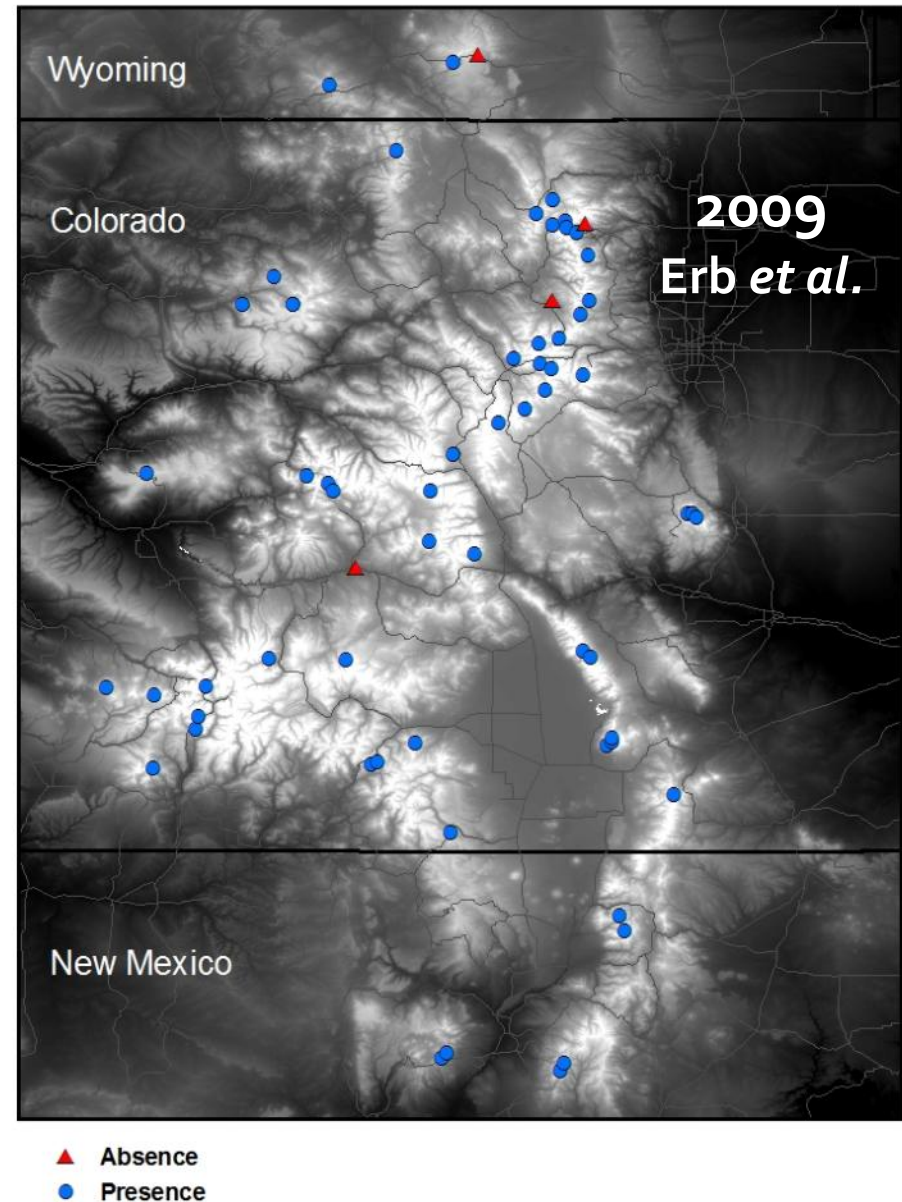


# Comparisons – Southern Rockies (ROMO & GRSA)

- Occupancy was high in unrelated studies in 2009 and 2010

## Occupancy 2010

ROMO	67 %*
GRSA	71 %*



# Acknowledgements

- **Other Key Players:** Mike Britten, Lisa Garrett, Kerry Gunther, Thomas Rodhouse, Billy Schweiger, Kathi Irvine, Jessica Castillo, Liesl Peterson, and Tom Olliff
- **NPS Inventory and Monitoring Network staff:** Greater Yellowstone, Rocky Mountain, Upper Columbia Basin
- **Park staff** including but not limited to resource managers, interpreters and superintendents
- Over 30 **field technicians** in 2010!



University  
of Idaho



OSU  
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