Golden Eagle Migration Monitoring - Goshutes, Nevada and Beyond

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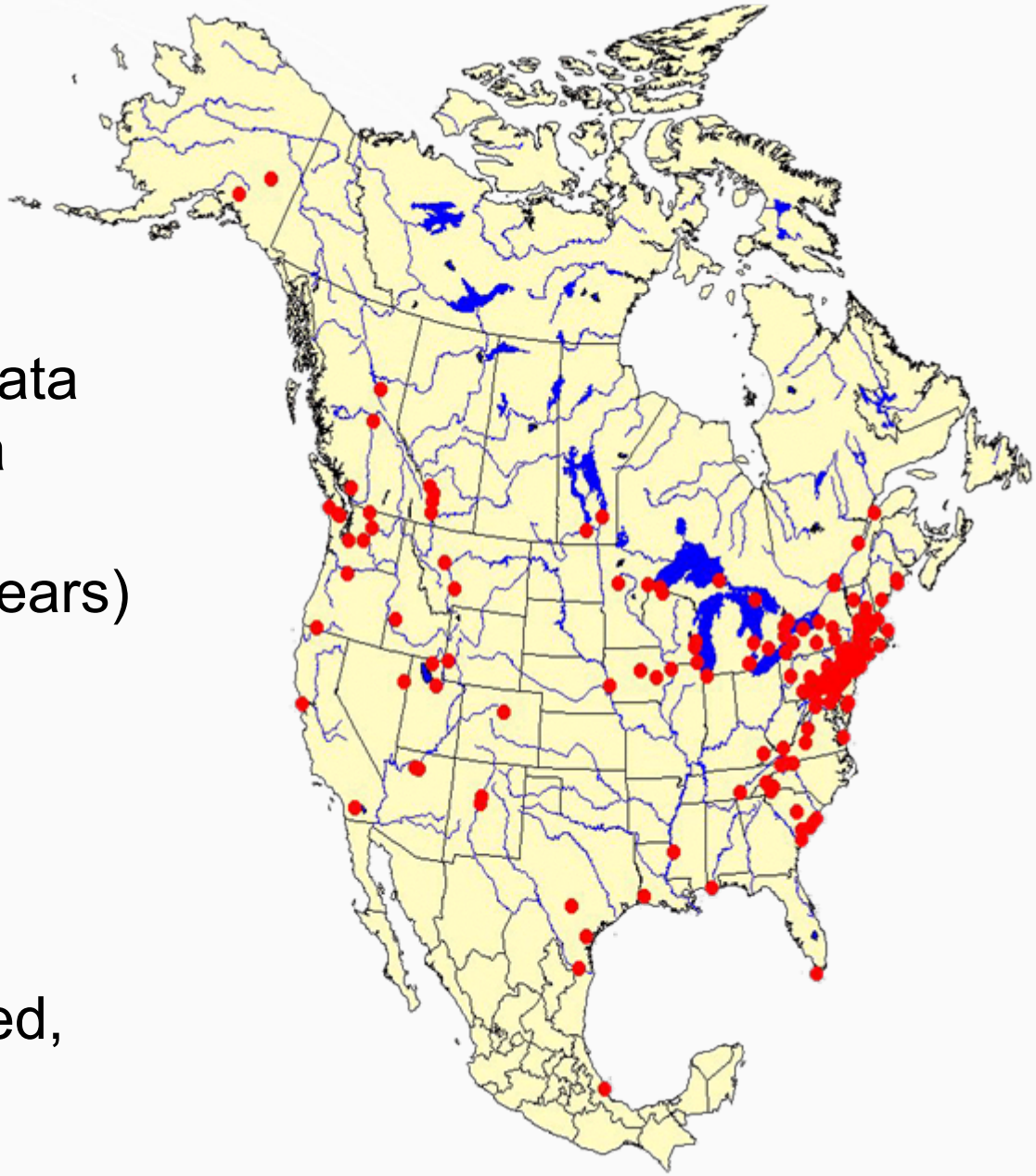
Migration Monitoring

- Counts are an efficient, cost-effective method of documenting regional population trends for raptor species
- Dual count/band sites provide researchers with access to birds for advanced research (e.g., PTTs, feather sampling, etc.)
- Sites provide opportunities to engage the public and promote grass-roots conservation

Raptor Migration Monitoring Sites



~155 sites with hourly data
~45 sites with daily data

Project histories (data years)
- >50 yrs: 3
- 25-50 yrs: 13
- 10-24 yrs: 27
- <10: ~155

Primarily volunteer-based, citizen-science projects

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The Goshutes Migration Site

- Standardized counts since 1983
- ~12,000-25,000 raptors/year
- One of the highest count sites in the West; designated WSA
- 130-340 GOEA/year

Goshutes Count

- Standardized protocols:
  - mid-Aug through end of Oct
  - 2 daily observers
  - established decision rules, observation hours, search patterns, optics, etc.
- Data recorded:
  - hourly species counts, weather, flight descriptions, etc.

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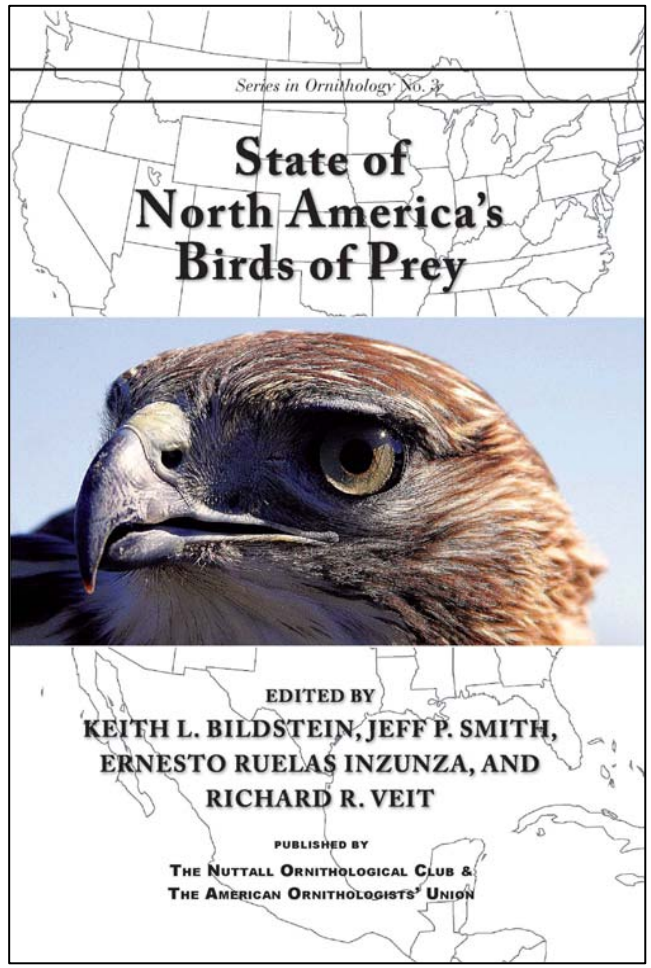
The Raptor Population Index (RPI) Project

- Partnership to facilitate continental-scale raptor migration monitoring of population trends
- SNAPB: first major RPI status and trends product



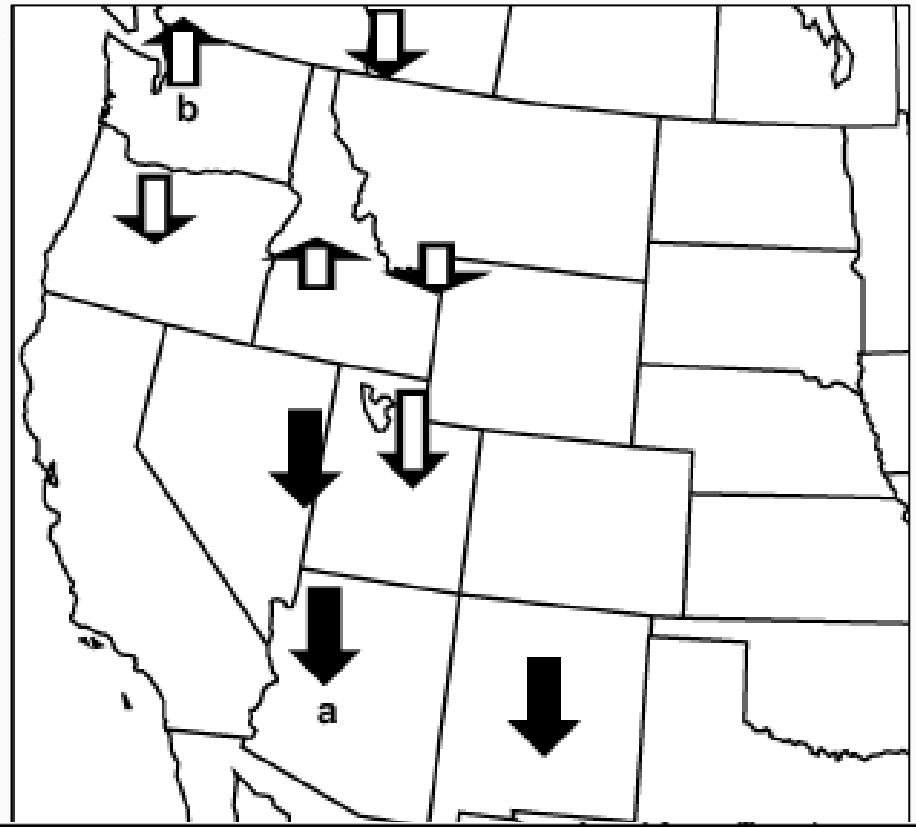
HawkWatch International
Conserving Raptors and Our Shared Environment

HMANA

Bird Studies Canada
Études d'oiseaux Canada

Hawk Mountain

Golden Eagle
Fall 1995-2005



Population Trend	Trend Magnitude (symbol height)
Significant* Increase	|trend| ≤ 1
Significant Decrease	1 < |trend| ≤ 5
Non-significant Increase	|trend| > 5
Non-significant Decrease	
*$P \leq 0.05$	

From Farmer et al. 2008. State of North America's Birds of Prey

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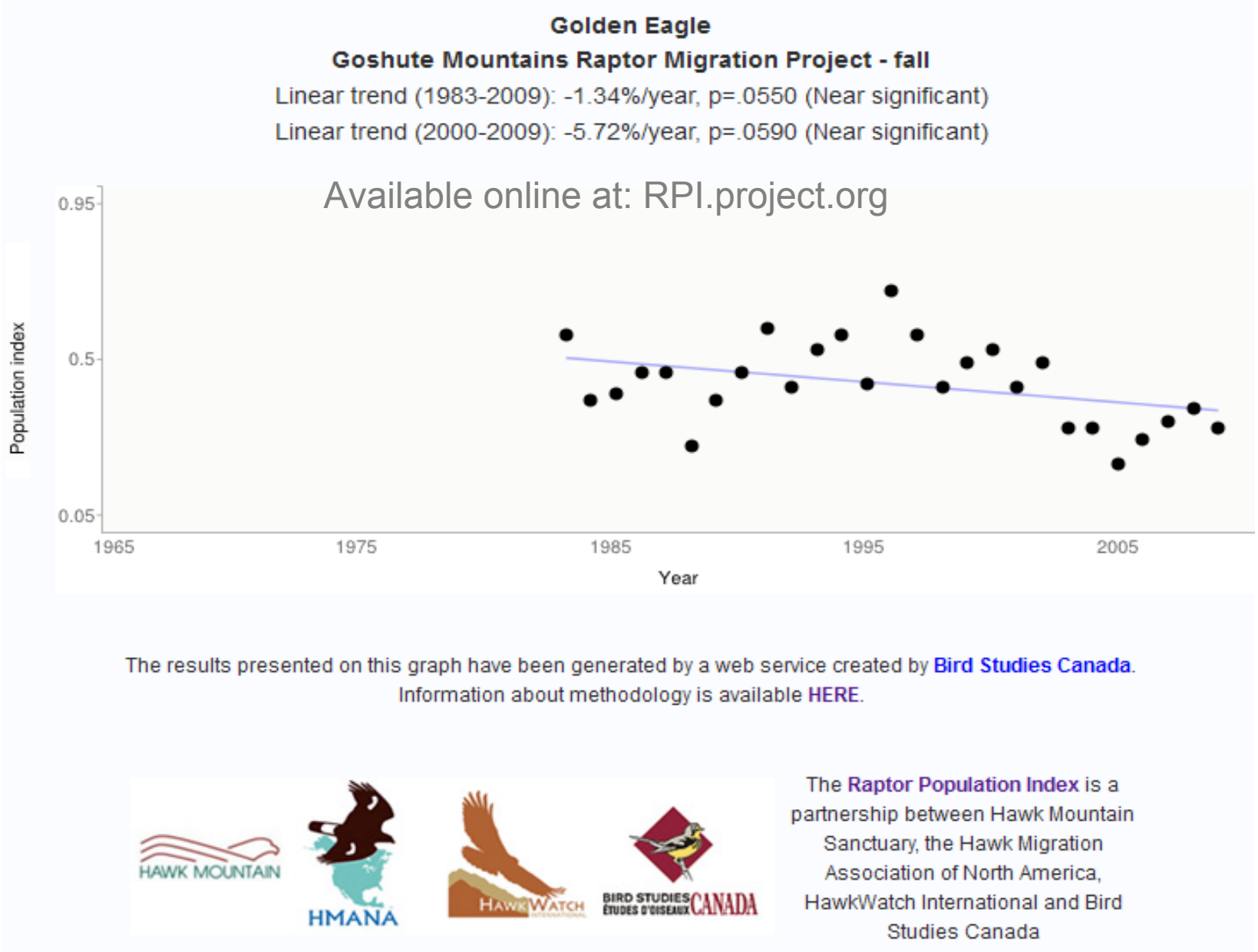
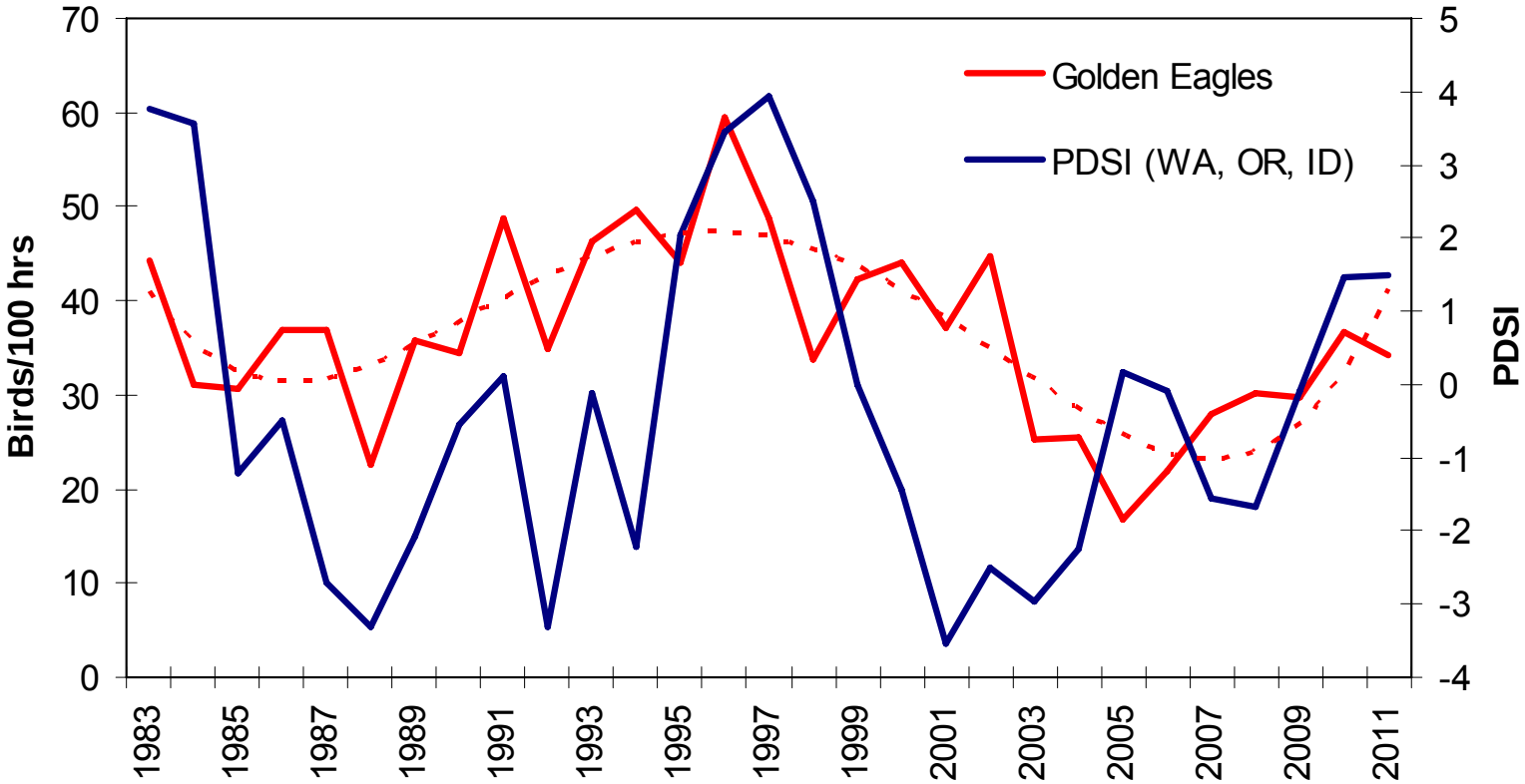
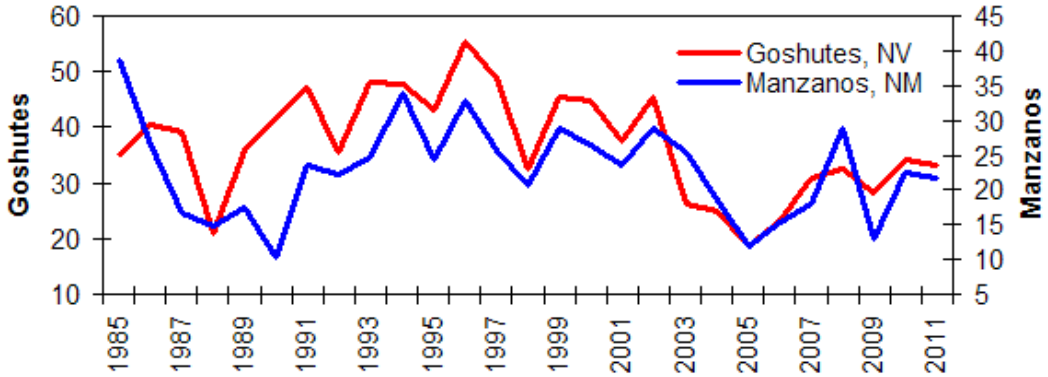


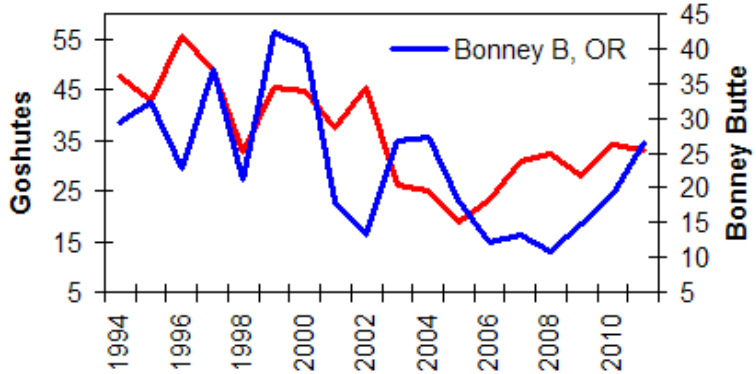
*Annual indices and trend estimates produced with Generalized Additive Models (Poisson distribution, log-link function)

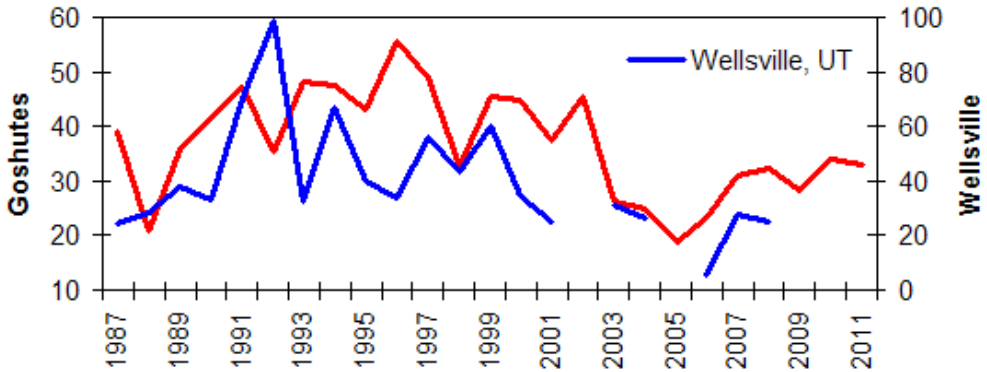
Goshutes long-term Golden Eagle trends

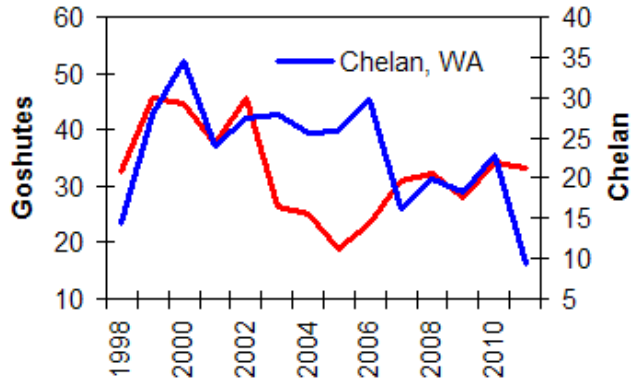


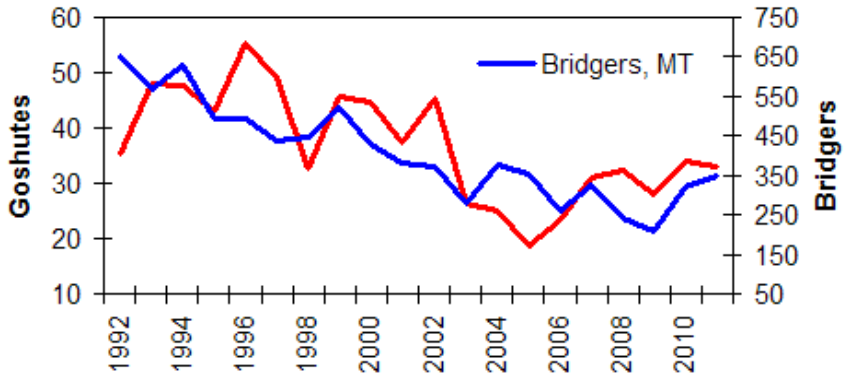
Polynomial regression adjusted R^2= 54.8%; cyclic pattern

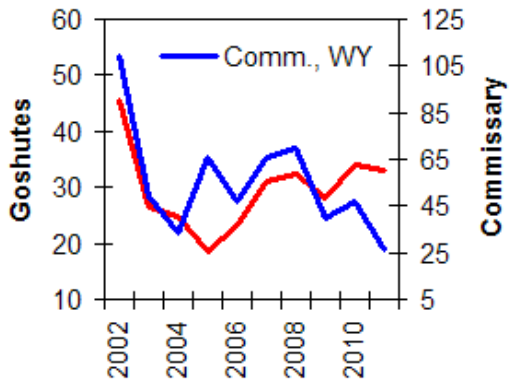

Goshutes, NV
Manzanos, NM
Goshutes
Manzanos


Bonney B, OR
Goshutes
Bonney Butte

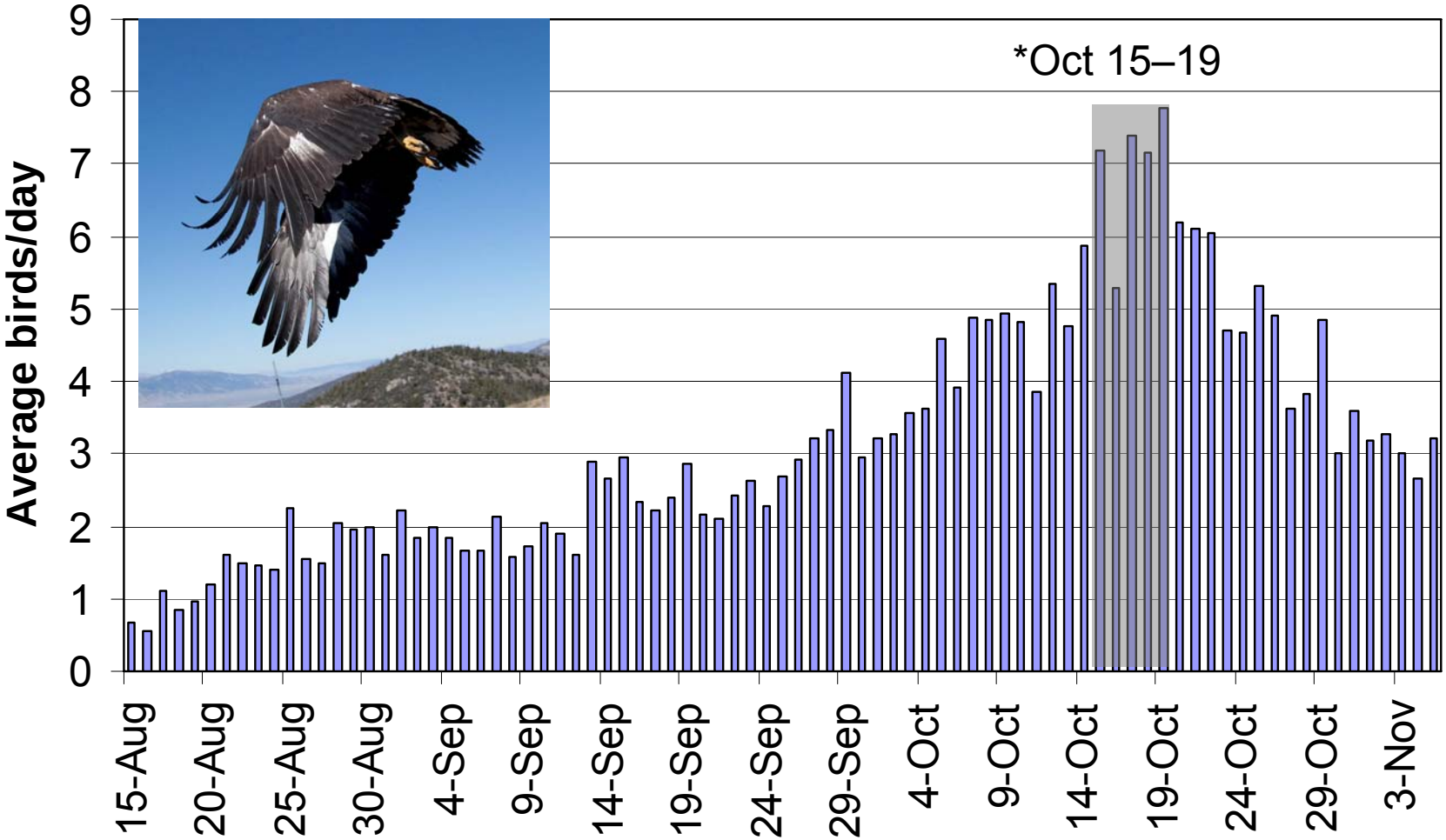

Wellsville, UT
Goshutes
Wellsville


Chelan, WA
Goshutes
Chelan

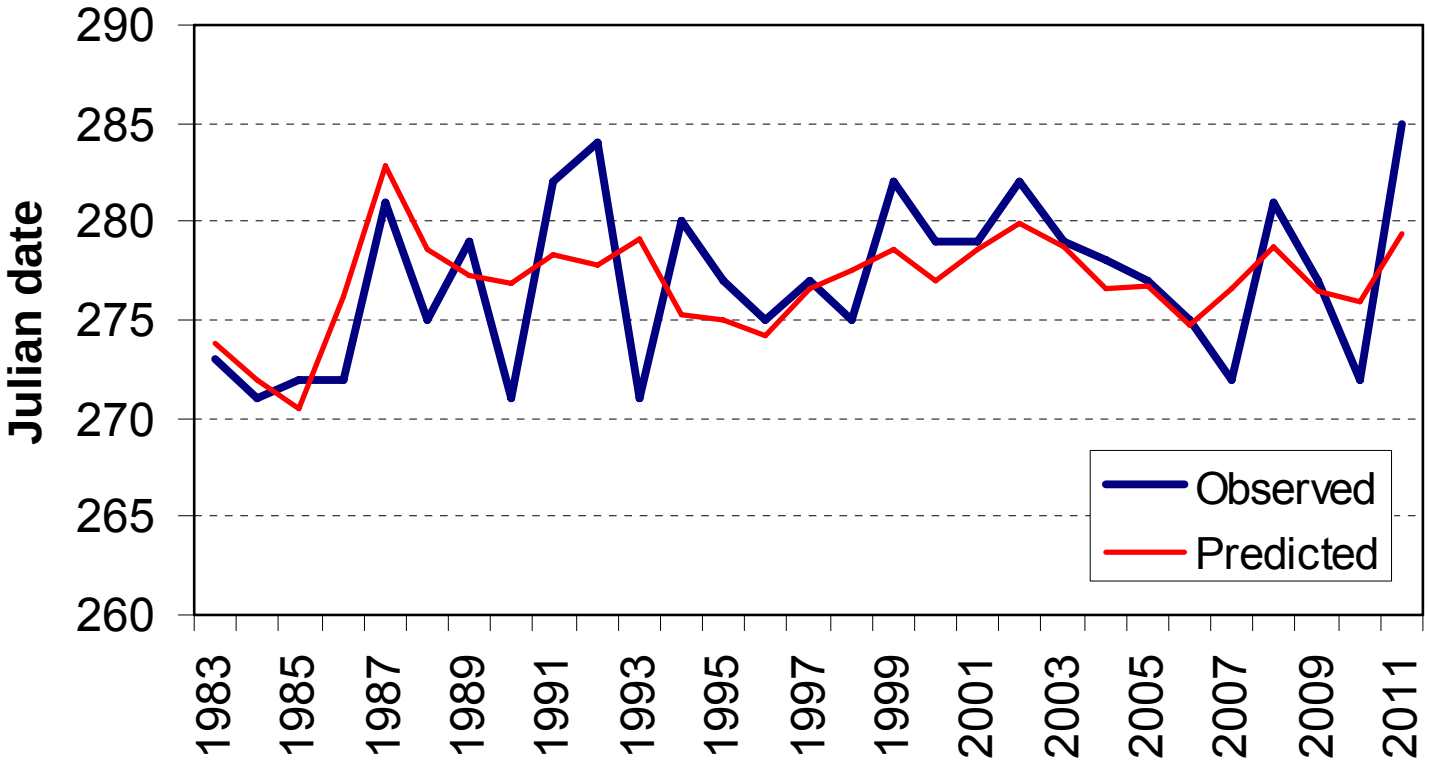

Bridgers, MT
Goshutes
Bridgers


Comm., WY
Goshutes
Commissary

Average Golden Eagle Passage
Goshutes, NV 1983-2011



Golden Eagle Passage in Relation to Weather

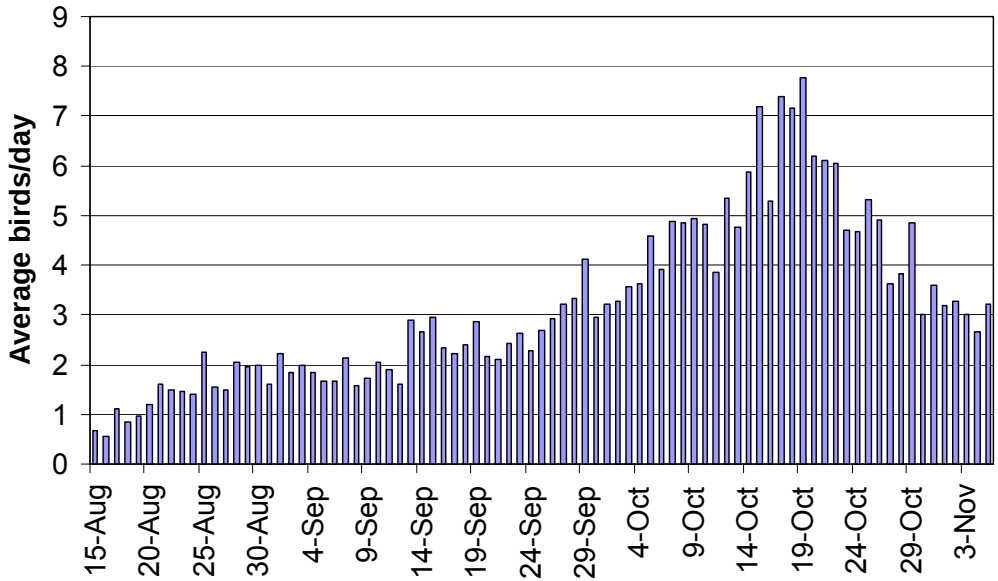


No significant year effect (P = 0.12)

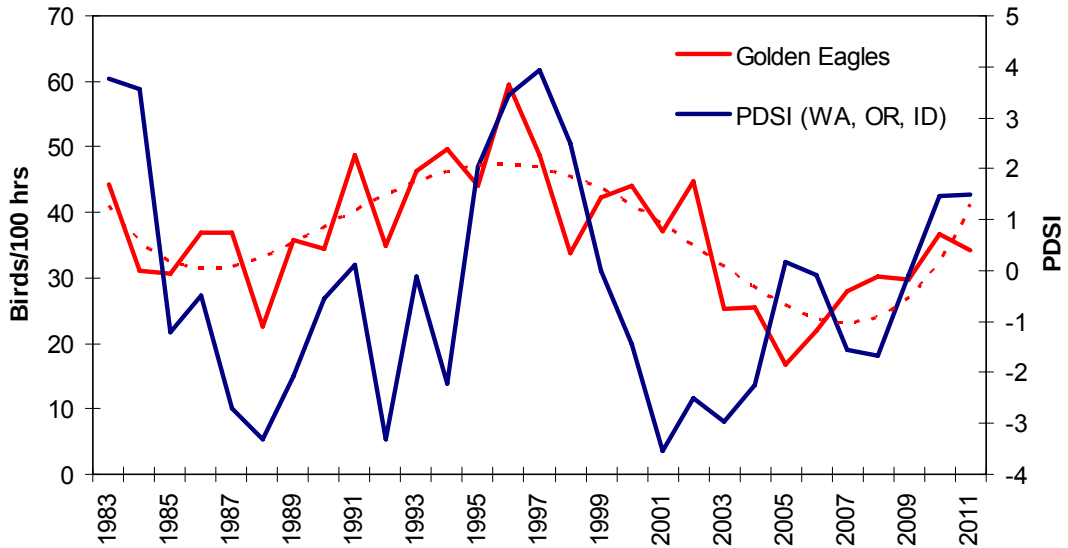
Aug-Nov precipitation and average temperature significantly influenced annual median passage date (P = 0.004; adj. R^2 = 29.8%)

Passage = 232 - 1 (inches precipitation) + 1 (average temp F)

Average Golden Eagle Passage
Goshutes, NV 1983-2011



Goshutes long-term Golden Eagle trends



Goshutes Banding and Tracking

78 Golden Eagles banded

4 re-encounters

13 fitted with PTTs between 1999-2006

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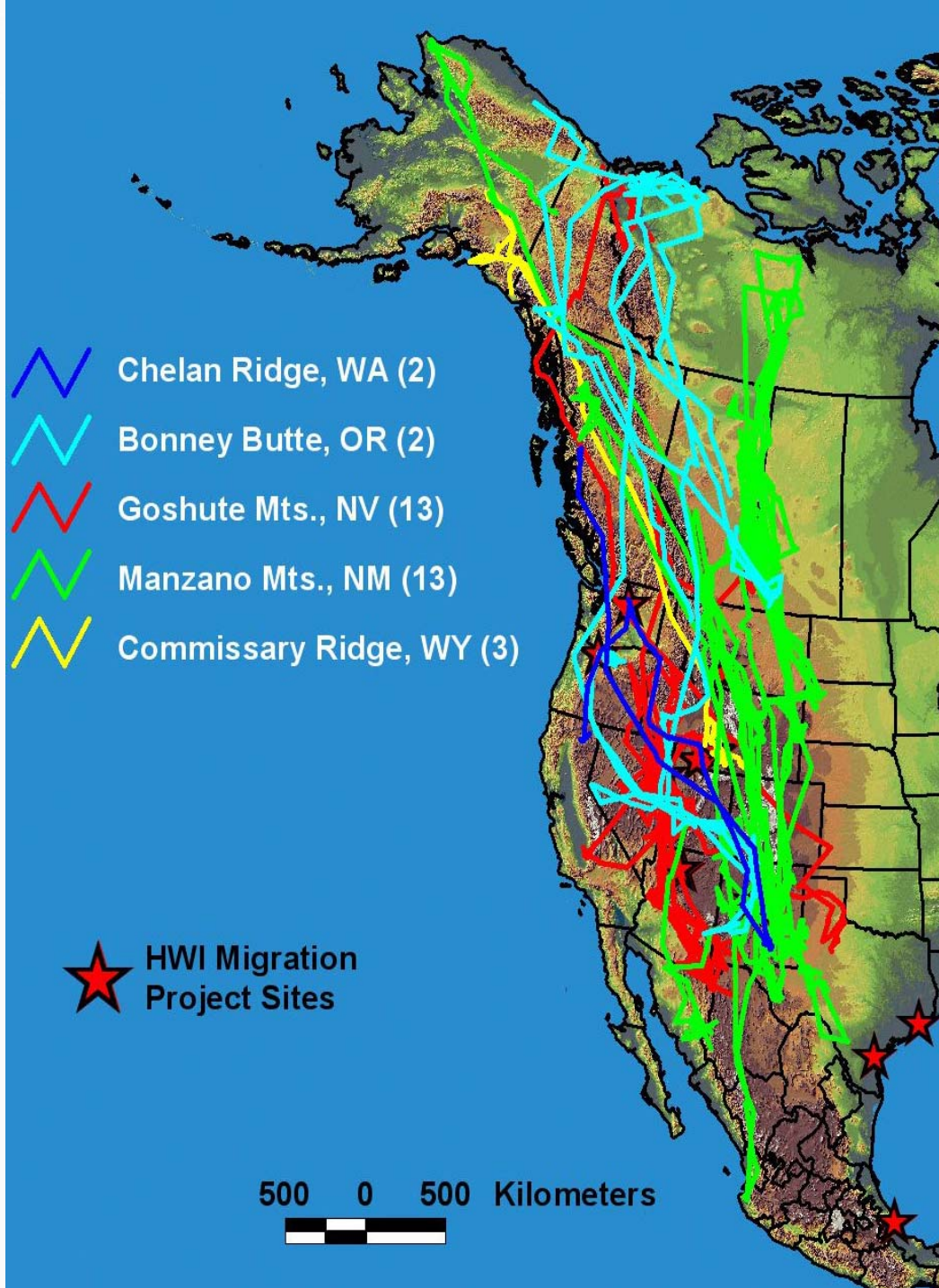
Tracking

Manuscript in preparation by Jeff Smith describing movement ecology of 33 eagles tagged by HWI at western sites...see poster

No movement documented along California coast



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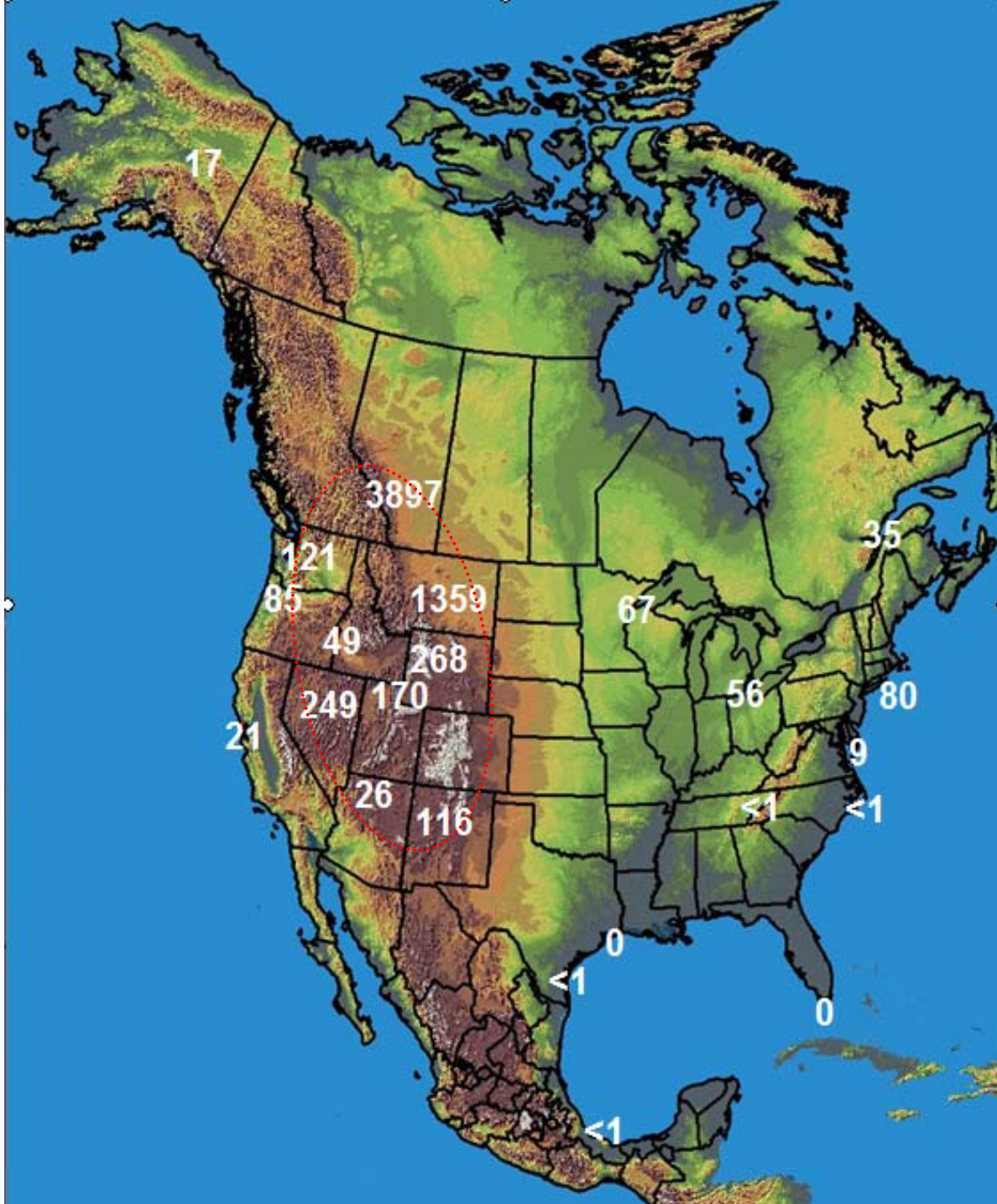
Average Golden Eagle fall migration volume at North American watch sites



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HWI Exploratory Migration Sites

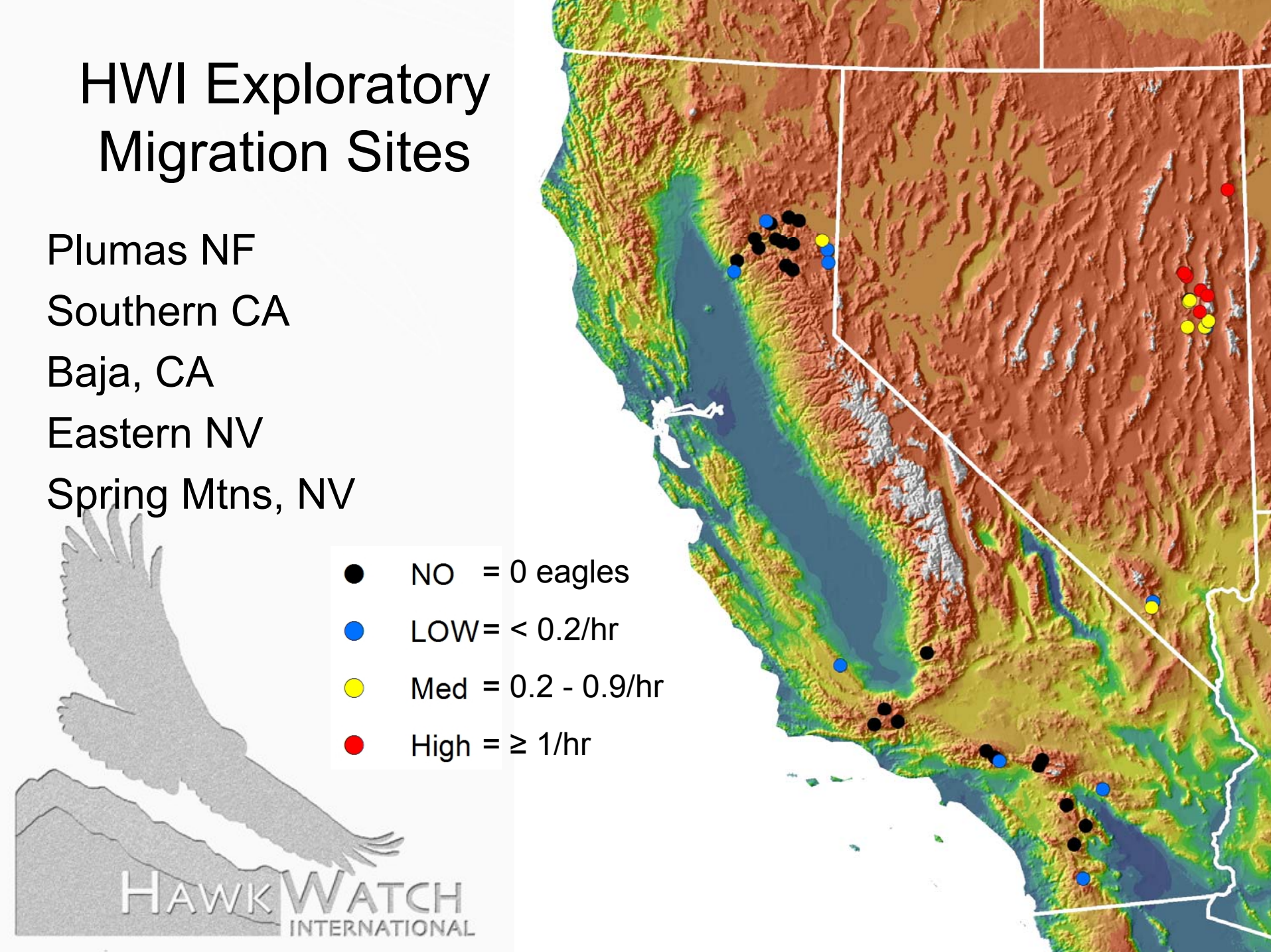
Plumas NF

Southern CA

Baja, CA

Eastern NV

Spring Mtns, NV



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Ridgetop Modeling

- Translation of fall migration data into landscape-scale model of migration potential
- Identify characteristics of ridges that make them attractive to migrants
- Final products will be web-accessible tools for conservation and energy development planning

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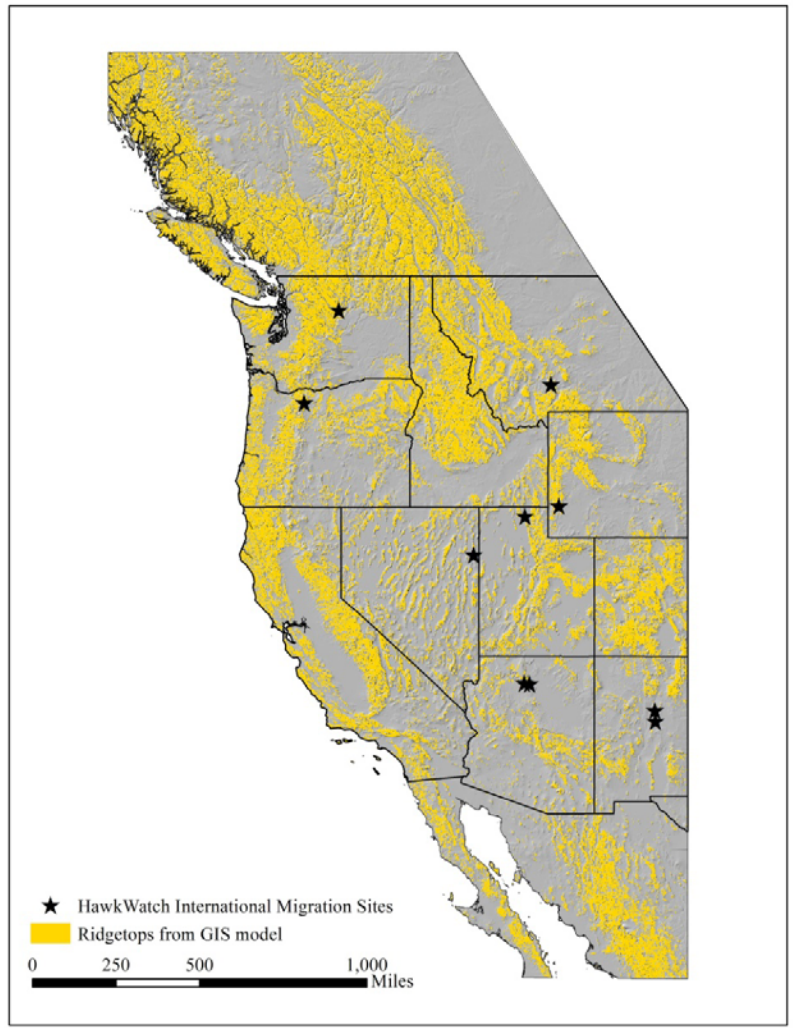
Ridgetop Modeling: Approach

- Develop landscape-scale metrics to model characteristics using Maxent and GAMs
  - Physical characteristics: slope position, ruggedness, ridge length and direction, area
  - Spatial characteristics: Isolation metrics, connectivity
- Falls of 2013-14: ground-truth predictive models by executing migration counts on ridge tops identified from the model



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Conclusions

- Western migration data suggests long-term declines in Golden Eagle counts at watch sites
- Counts and passage dates influenced by climatic conditions

- Forthcoming tracking publication and ridge modeling efforts will provide valuable context for long-term migration data


Questions?