

### Golden Eagle Migration Monitoring - Goshutes, Nevada and Beyond

Dr. Steve Slater, HawkWatch International Dr. Jeff Smith, H.T. Harvey & Associates



WATCHABLE WILDLIFE SITE GOSHUTE RAPTOR MIGRATION AREA

CONCENTRATION OF MIGRATING BIRDS OF PREV IN THE GOSHIDTE RAPTOR MIGRATION AREA, SITE OF THE LARGEST KNOWN ORGANIZATION DEDICATED TO THE STUDY OF RAPTORS, IN COOPERATION WITH BLM, CONDUCTS AN ANNUAL COUNT AND BANDING OF THE BIRDS EACH FALL FROM LATE AUGUST THROUGH OCTOBER.

IT IS COMMON DURING THE HEIGHT OF THE MIGRATION IN SEPTEMBER TO OBSERVE OVER 200 HAWKS, EAGLES AND FALCONS IN ONE DAY. THE OBJECTIVE OF THE COUNT AND BANDING SYUDY IS TO INVESTIGATE THE MIGRATION PATTERNS AND POPULATION TRENDS OF THE BIRDS. THIS INFORMATION IS ALSO VALUABLE TO BLM SINCE THE RAPTORS ARE LONG RANGING AND AT THE TOP OF THE FOOD CHAIN, MAKING THEM EXCELLENT INDICATORS OF THE HEALTH OF HABITATS ADMINISTERED BY BLM AND OTHER FEDERAL AGENCIES

FROM THIS POINT ON, YOU WILL BE TRAVELING WITHIN THE GOSHUTE PEAK WILDERNESS STUDY AREA, AND NO MOTOR VEHICLES ARE PERMITTED BEYOND THIS SIGN. PLEASE - DO YOUR PART TO PPEERVE THE NATURALNESS OF THE AREA BY STAYING ON DESIGNATED TRAILS, PACKING OUT YOUR GARBAGE, TAKING ONLY PICTURES AND LEAVING ONLY FOOTPRIMES.

NO WATER IS AVAILABLE ON TOP OF THE MOIJNTAIN FOR VISITORS. THE 2.5 MILE HIKE TO THE TOP IS MODERATELY STRENUOUS, WITH AN ELEVATION GAIN OF OVER 1,500 FEET. PLEASE, NO PETS.

FOR FURTHER INFORMATION, CONTACT THE CANO DISTRICT-BUREAU OF LAND MANAGEMENT AT (702) 753-0200.

## **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.)

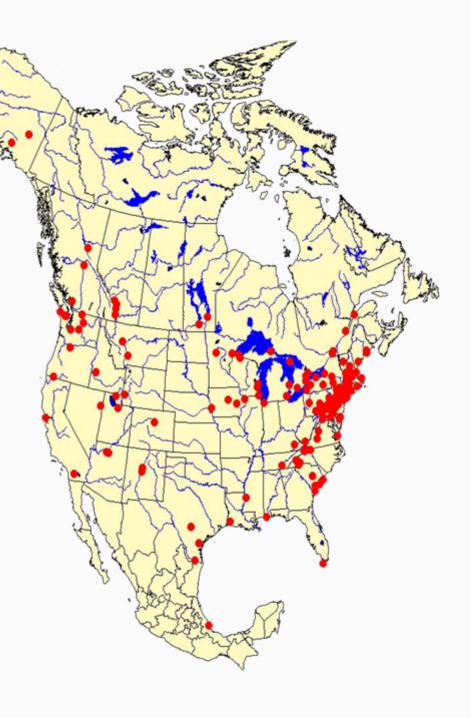
Sites provide opportunities to engage the public and promote grass-roots conservation

### 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



### **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.

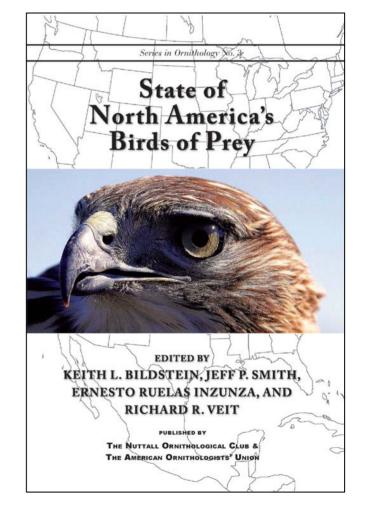


### The Raptor Population Index (RPI) Project

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

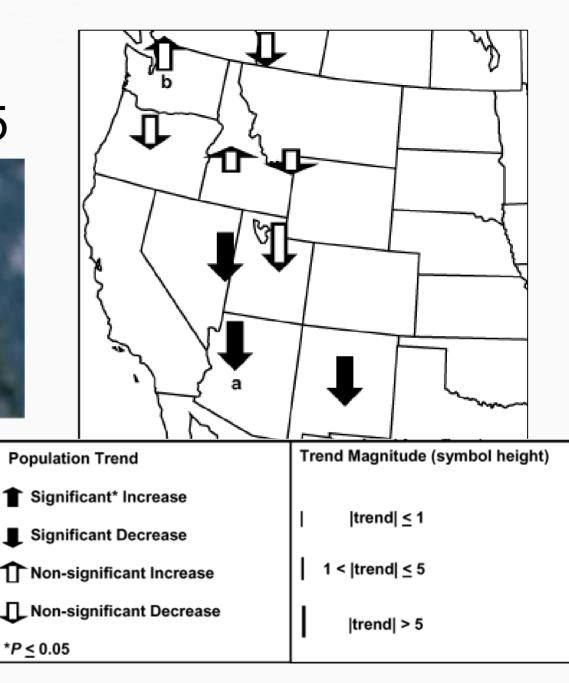


HAWK MOUNTAIN

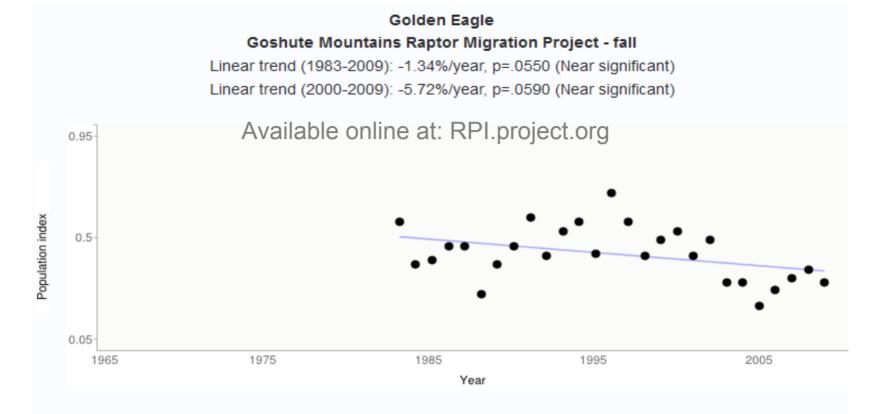


### Golden Eagle Fall 1995-2005





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

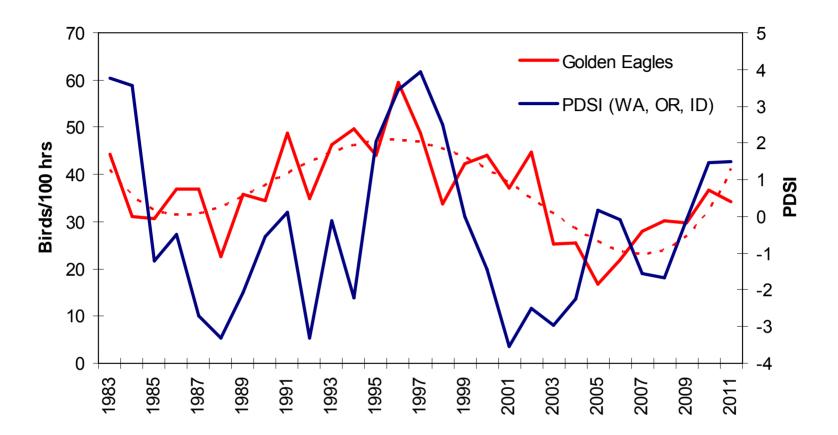


The results presented on this graph have been generated by a web service created by Bird Studies Canada. Information about methodology is available HERE.

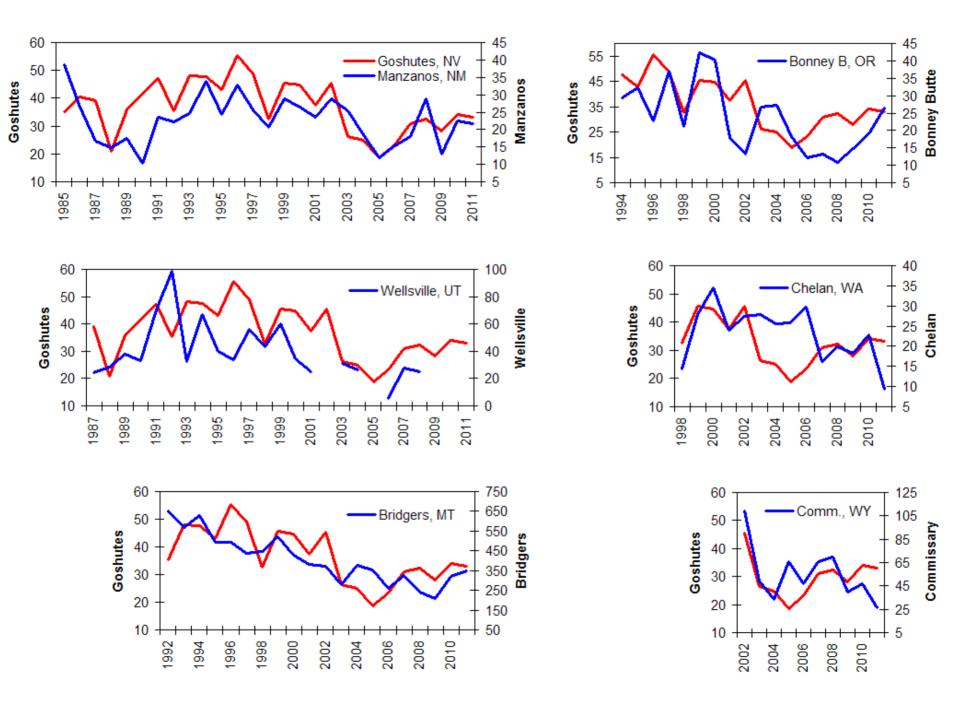


\*Annual indices and trend estimates produced with Generalized Additive Models (Poisson distribution, log-link function)

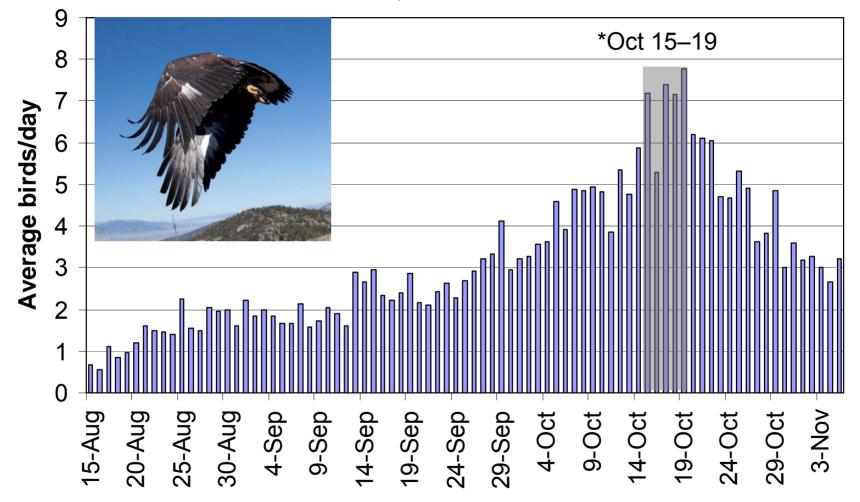
#### **Goshutes long-term Golden Eagle trends**



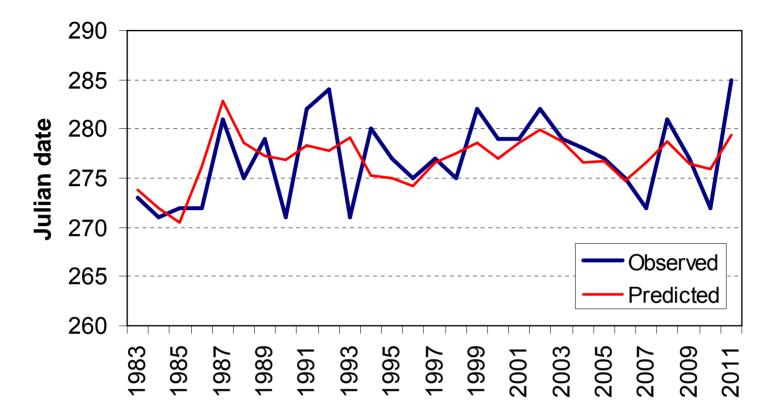
Polynomial regression adjusted R<sup>2</sup>= 54.8%; cyclic pattern



#### Average Golden Eagle Passage Goshutes, NV 1983-2011



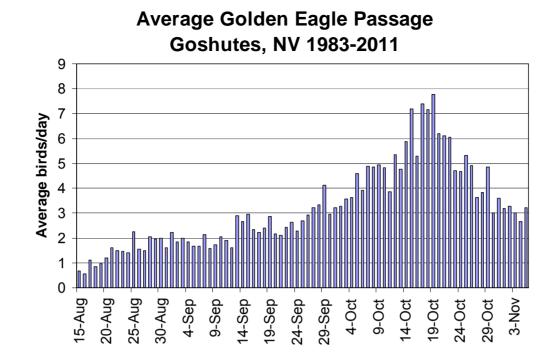
#### **Golden Eagle Passage in Relation to Weather**



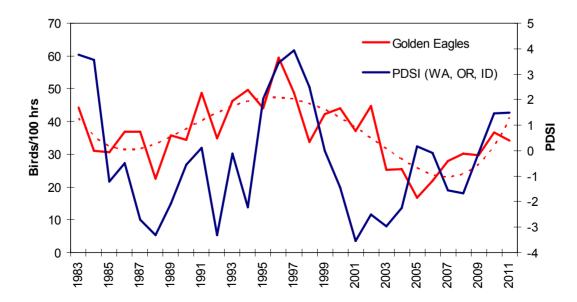
No significant year effect (P = 0.12)

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)



**Goshutes long-term Golden Eagle trends** 



Goshutes Banding and Tracking

78 Golden Eagles banded

4 re-encounters

13 fitted with PTTs between 1999-2006





# 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



Chelan Ridge, WA (2) Bonney Butte, OR (2) Goshute Mts., NV (13) Manzano Mts., NM (13) Commissary Ridge, WY (3)

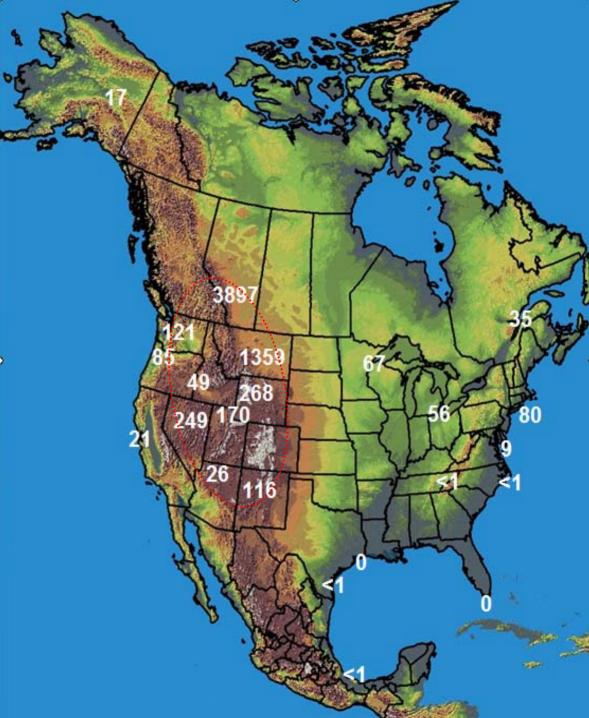




0 Kilometers

Average Golden Eagle fall migration volume at North American watch sites





HWI Exploratory Migration Sites

Plumas NF Southern CA Baja, CA Eastern NV Spring Mtns, NV

- NO = 0 eagles
- LOW= < 0.2/hr
- Med = 0.2 0.9/hr
  - High =  $\geq 1/hr$

## **Ridgetop Modeling**

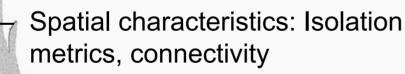




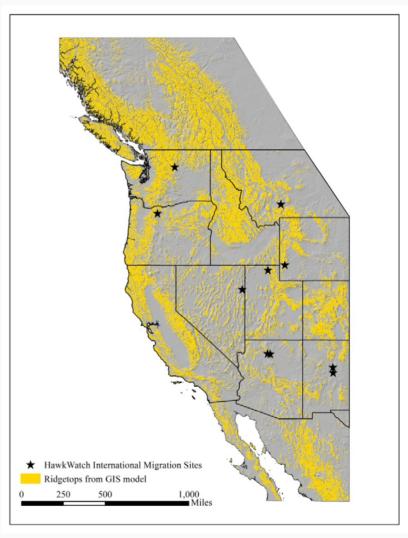
- Translation of fall migration data into landscape-scale model of migration potential
- Identify characteristics of ridges that make them attractive to migrants
- Final products will be web-accessible tools for conservation and energy development planning

# Ridgetop Modeling: Approach

- Develop landscape-scale metrics to model characteristics using Maxent and GAMs
  - Physical characteristics: slope position, ruggedness, ridge length and direction, area



 Falls of 2013-14: ground-truth predictive models by executing migration counts on ridge tops identified from the model





- 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?