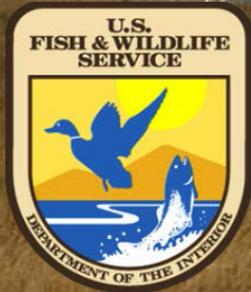


Predictive Models for Golden Eagle Conservation Planning and Renewable Energy Development in the Western United States



Brian Woodbridge, Coordinator
Western Golden Eagle Conservation Team
U.S. Fish and Wildlife Service, Yreka, CA

Objective: Develop reliable predictive models for...

- **Decision support tools** – support project siting, effects analysis at landscape scales (project footprint, Local Area Population)
- **Conservation prioritization** – land management planning
- **Risk Assessments** – spatial overlay of predicted eagle distribution with energy resource development potential



Three-season Modeling Approach

The distribution and abundance of Golden Eagles, and their potential for interaction with energy production and transmission infrastructure, vary seasonally.

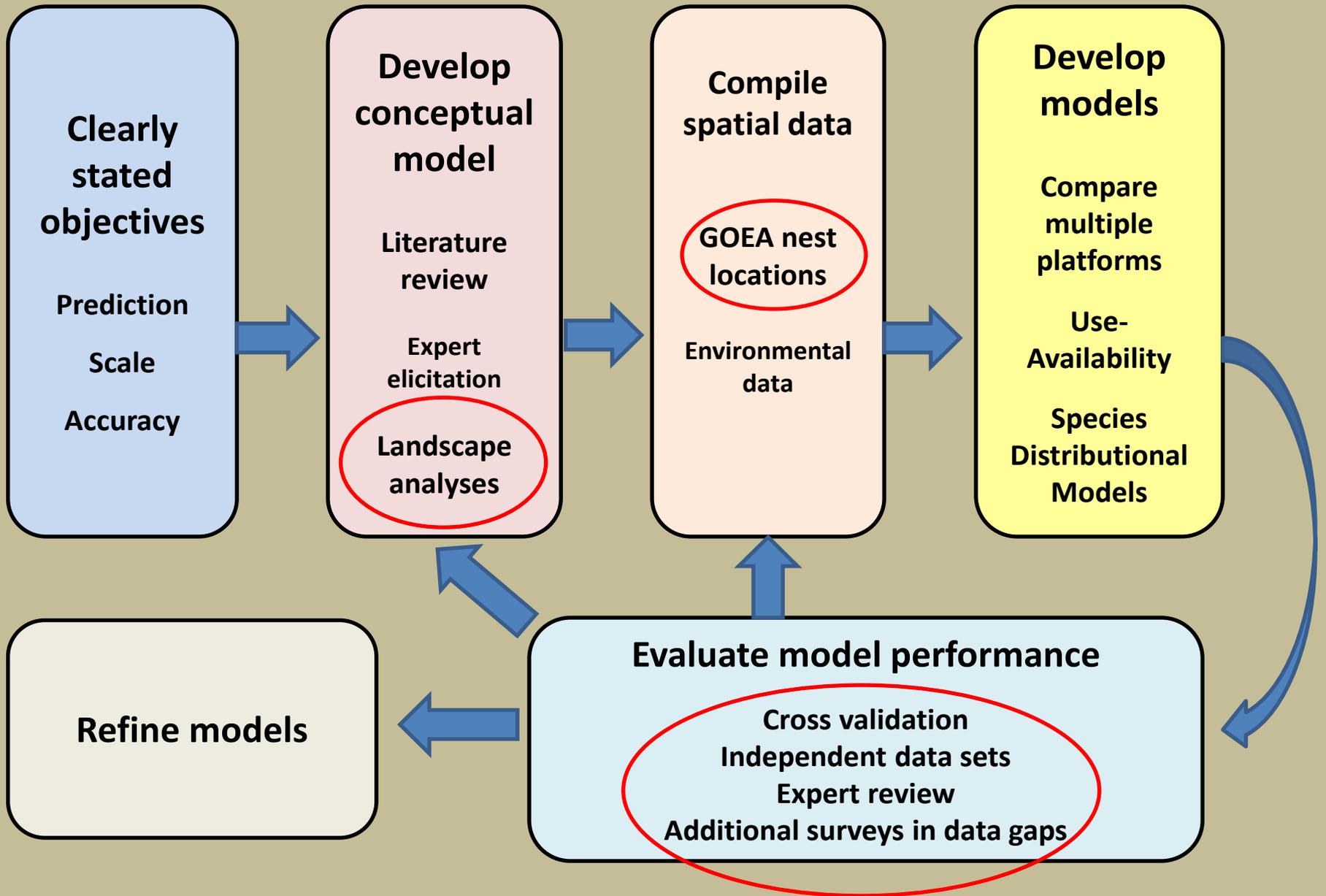
To incorporate seasonal patterns, we are developing models separately for :

1. Breeding Distribution and Habitat
2. Winter Distribution and Habitat
3. Movement and Migration



I. Golden Eagle breeding distribution and habitat suitability





Conceptual Model Development

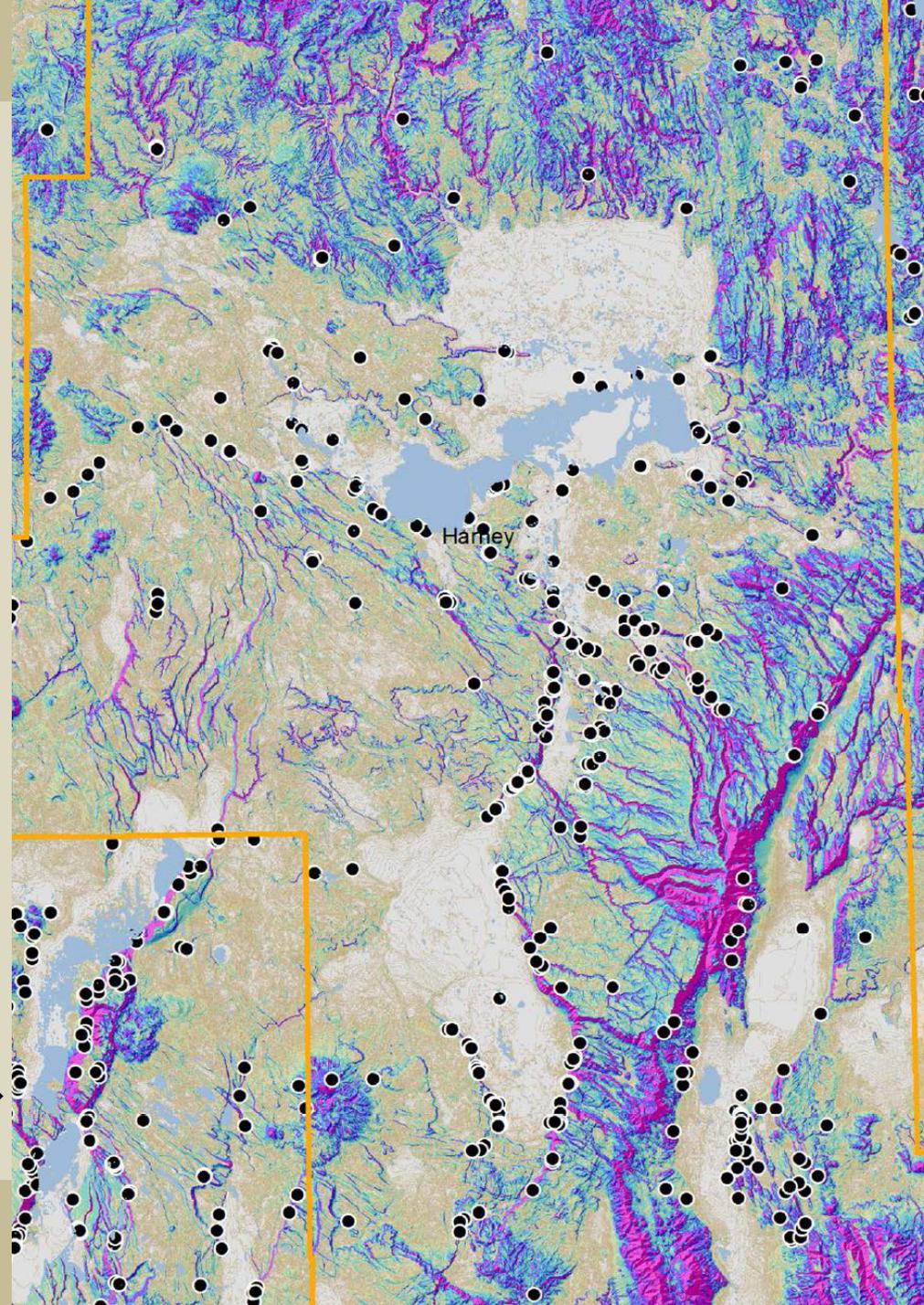
Nest substrates and terrain features

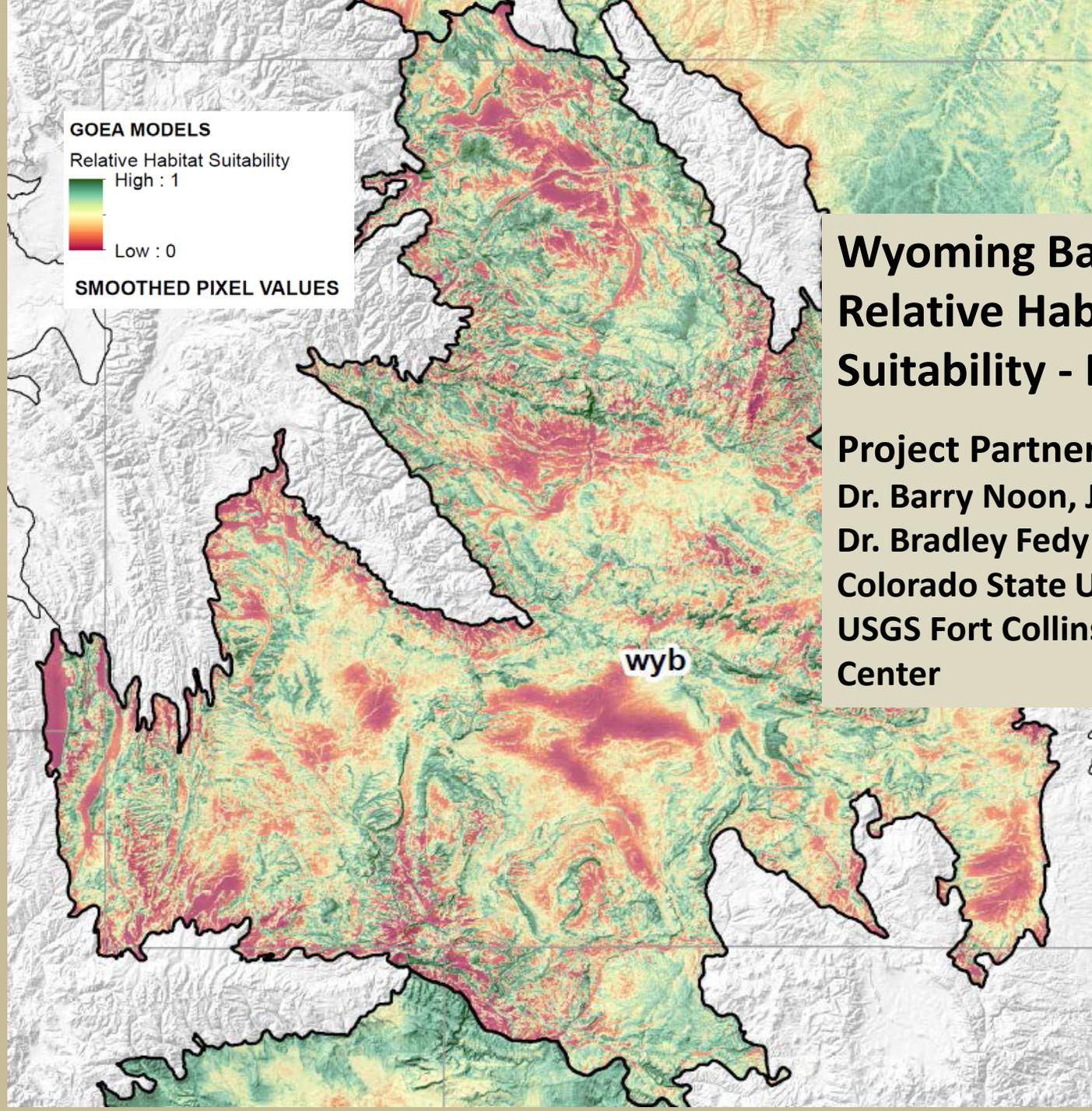
Diet, prey species habitat associations

Vegetation types, primary
productivity (NDVI), climate

Spatial Scales: Nest area (120 m) and
territory (4km²) based on telemetry,
nearest-neighbor distances

Example: Cliff index





Wyoming Basin Relative Habitat Suitability - Breeding

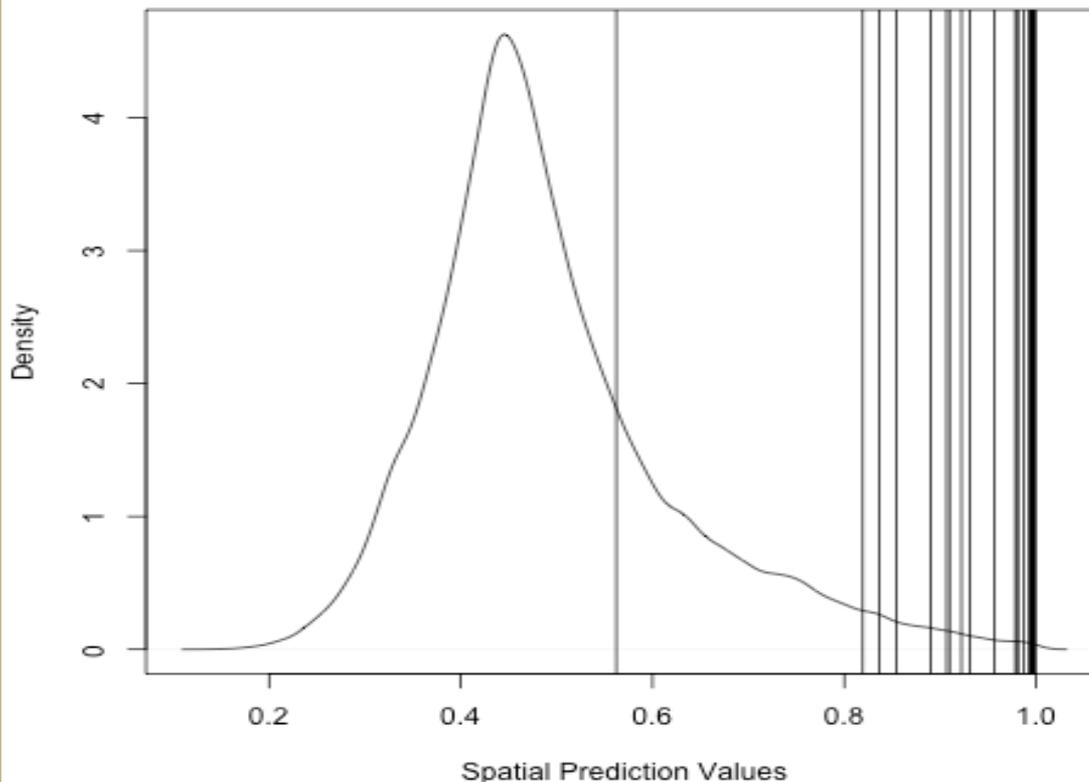
Project Partners:

**Dr. Barry Noon, Jason Tack,
Dr. Bradley Fedy
Colorado State University
USGS Fort Collins Science
Center**

Evaluating model performance

Model predictions evaluated with expert reviews, testing with independent data sets, strategic surveys

Wyoming Basin IPP (lasso penalized)

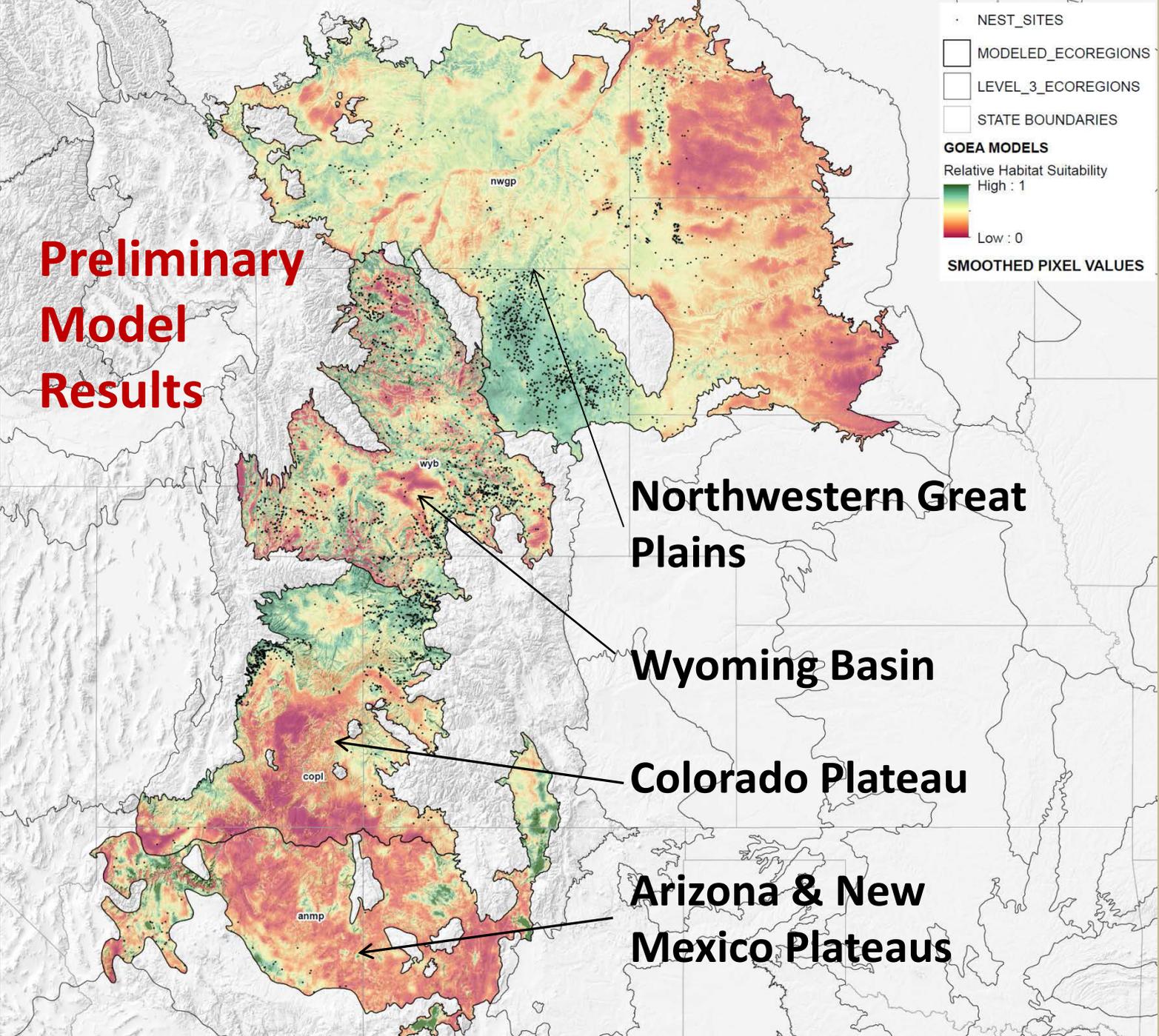
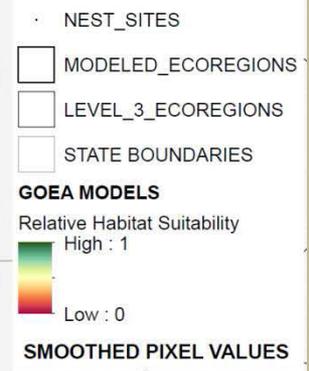


Testing with independent data:

25 nests from randomized surveys (R. Oakleaf 2011)

24 (96%) nests fall within top 10% of the WY Basin landscape

**Preliminary
Model
Results**



**Northwestern Great
Plains**

Wyoming Basin

Colorado Plateau

**Arizona & New
Mexico Plateaus**

II. Golden Eagle distribution and habitat use in winter

- **Development and comparison of predictive models based on:**
 - AKN eBird data
 - Christmas Bird Count
 - Midwinter Eagle Count
 - Satellite telemetry

Project partners:

Leo Salas and Sam Veloz, Point Blue Conservation Science, Petaluma, CA



III. Golden Eagle movements and migration

Objective: Develop predictive models and maps of movement patterns, highlighting landscapes used disproportionately by migrating eagles.

Meta-analysis of satellite telemetry data sets for GOEA in North America



Telemetry meta-analysis: project status

- **Obtained telemetry data for over 425 individual Golden Eagles**
- Deployed > 100 additional PTTs in 2013-2014
- Continue to pursue additional data sets (!)
- Currently compiling databases, QA/QC
- Expect to begin analysis in March 2015



Product Availability

- **Timeframe** – Ecoregional models posted individually as completed, beginning in May 2015. West-wide composite model expected in Fall 2015
- **Availability** – will be publicly available at USFWS (ECOS-IPAC) and WGET websites



Stay the Course

For more information...

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