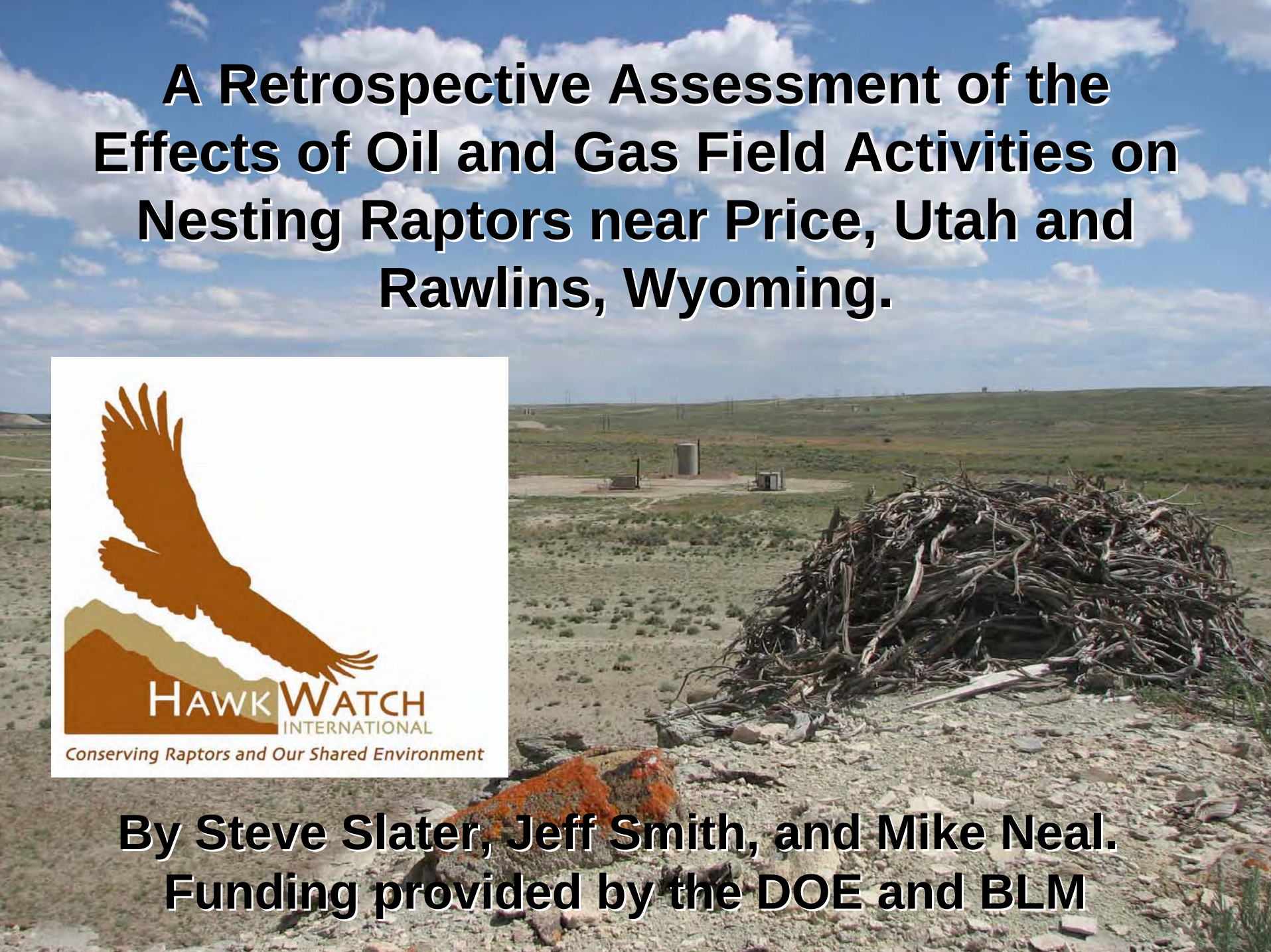
A Retrospective Assessment of the Effects of Oil and Gas Field Activities on Nesting Raptors near Price, Utah and Rawlins, Wyoming.



HAWK WATCH INTERNATIONAL

Conserving Raptors and Our Shared Environment

By Steve Slater, Jeff Smith, and Mike Neal.

Funding provided by the DOE and BLM

Release of 5 BLM Technical Reports:

available at www.hawkwatch.org

- TR 432 - Raptor Nesting Near Oil and Gas Development: An Overview of Key Findings and Implications for Management Based on Four Reports by HWI.
- TR 433 - An Assessment of the Effects of Oil and Gas Field Activities on Nesting Raptors in the Rawlins, Wyoming and Price, Utah Field Offices of the Bureau of Land Management.
- TR 434 - Artifical Nest Structures as Mitigation for Natural-Gas Development Impacts to Ferruginous Hawks (*Buteo regalis*) in South-Central Wyoming.
- TR 435 - Accipiter Use of Pinyon-Juniper Habitats for Nesting in Northwestern Colorado.
- TR 436 - Recommendations for Improved Raptor Nest Monitoring in Association with Oil and Gas Development.

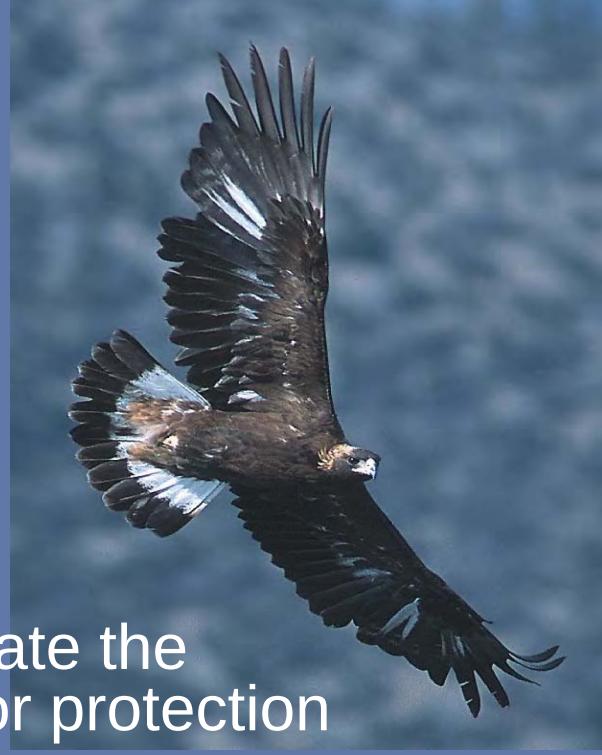
Research Need

- **Approximately 15 million has of BLM-managed land in the West leased for oil, gas, or geothermal energy production (BLM 2005).**
- **Few studies have specifically investigated the potential disturbance effects of O&G development to nesting raptors.**
- **The potential is suggested by studies of nesting raptors and other human activities, e.g.:**
  - **BAEAs and camping (Steidl and Anthony 2000)**
  - **FEHAs and foot approach (White and Thurow 1985)**

Research Need

- MBTA and BGEPA require federal land management agencies to prevent the “take” of raptors, their young, or nests.
- Land use plans commonly include spatial and/or temporal nest protection stipulations.
- Stipulations are based on limited data for many species and often vary by agency and locality.

Goals



- Compile historic data to evaluate the relationship between past O&G development and nesting raptors.
- Where suited, use historic data to evaluate the effectiveness of previously applied raptor protection buffers.
- Assess ability of Artificial Nesting Structures (ANS) to mitigate O&G disturbance for FEHAs.
- Assess strengths and weaknesses of historic data and provide recommendations for improvement.

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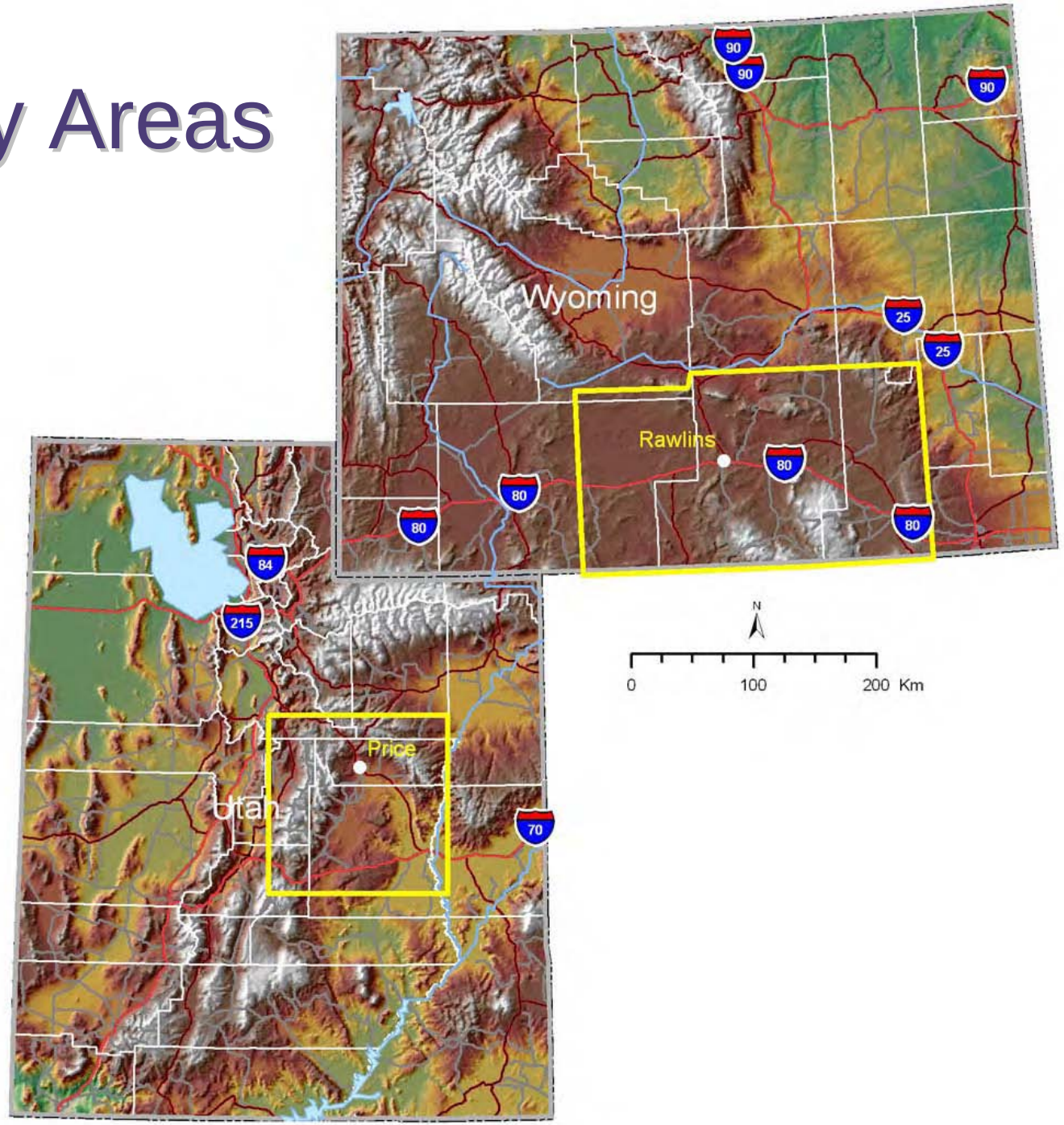
Study Areas


Wyoming
Rawlins
Utah
Price
90
90
90
25
25
80
80
80
80
84
215
70
N
0
100
200 Km

Price Study Area

- Canyons and cliffs are common topographic features in the area.
- Predominantly pinyon-juniper habitat.
- Annual helicopter surveys (May) conducted between 1998-2006 in relation to CBM activities.
- Focused on GOEAs, the most common nesting raptor in the area.
- 0.8-km nesting season buffer.

Rawlins Study Area

- Rolling topography and rocky escarpments.
- Primarily sagebrush-grassland and desert shrub vegetation.
- Area supports one of the largest known breeding FEHA pops (Olendorff 1993).
- Rapid expansion of O&G in the 1980s; concurrent raptor surveys (primarily ground-based).
- 0.8-km nesting season buffer.

Rawlins Study Area

- FEHAs began attempting to nest on O&G structures, and commonly failed.

- Between 1987-2002, 105 Artificial Nesting Structures (ANSs) were erected for mitigation.

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Methods

- Compiled existing raptor and O&G data on an annual basis:
  - Price Study Area: 1998-2006
    - 264 GOEA, RTHA, and PRFA territories.
    - 1,177 wells in 2006 (160-ac spacing).
  - Rawlins Study Area: 1978-2006
    - 1,109 GOEA, FEHA, RTHA, and PRFA territories.
    - 4,268 wells in 2006 (160-ac spacing).

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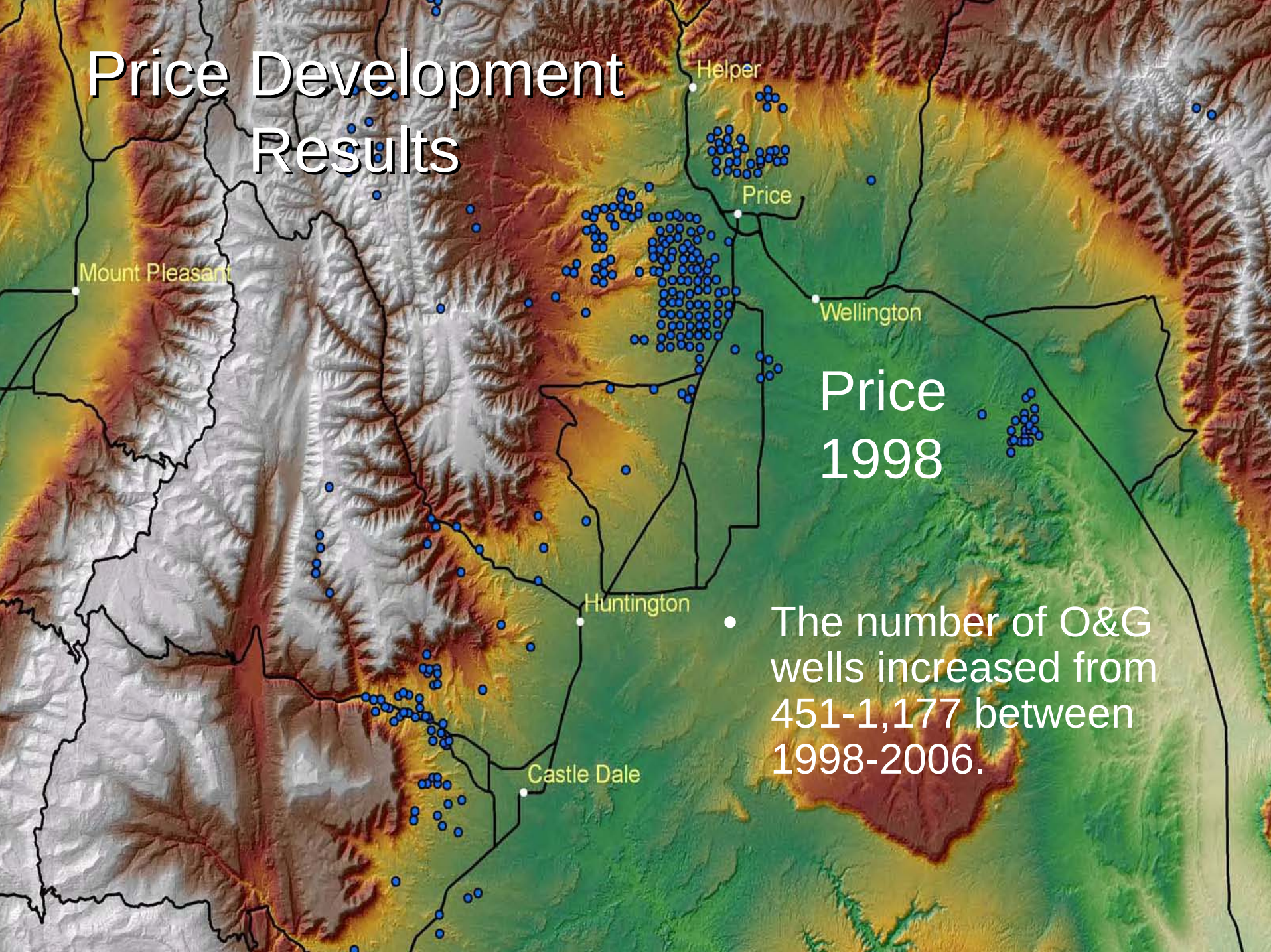
Methods

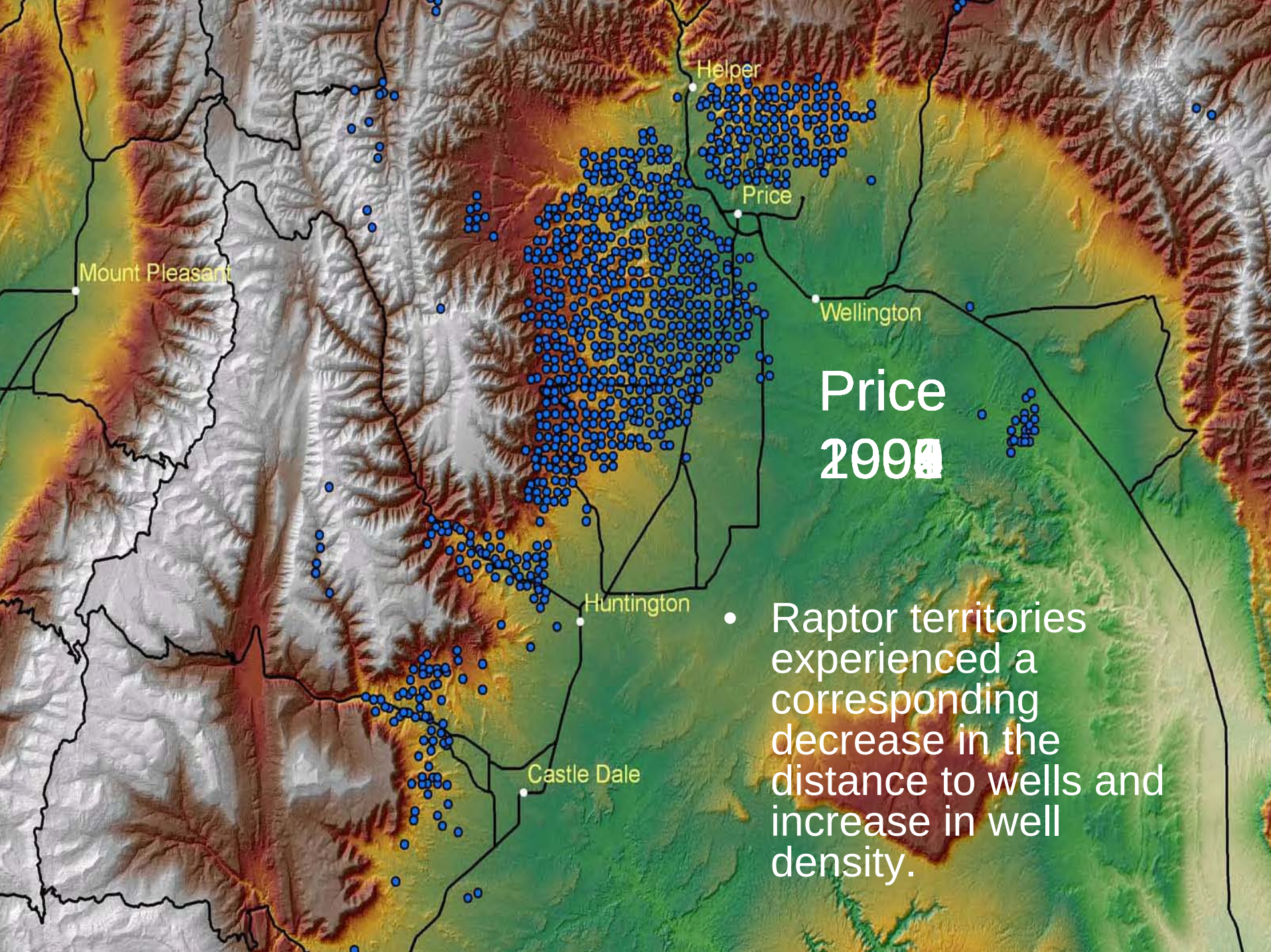
- Classified roads to type (O&G vs. other) and wells to nesting season year.
- Compiled available vegetation and local, annual climatic data.
- Used GIS to assess vegetation coverage and distance and density of roads and wells within 0.8 and 2.0-km radii of territories.
- Simplified development and vegetation variable sets with PCA.
- Used model selection procedures (AIC) to assess territory and nest status in relation to development, vegetation, and climate variables.

Price Development Results



Price
1998

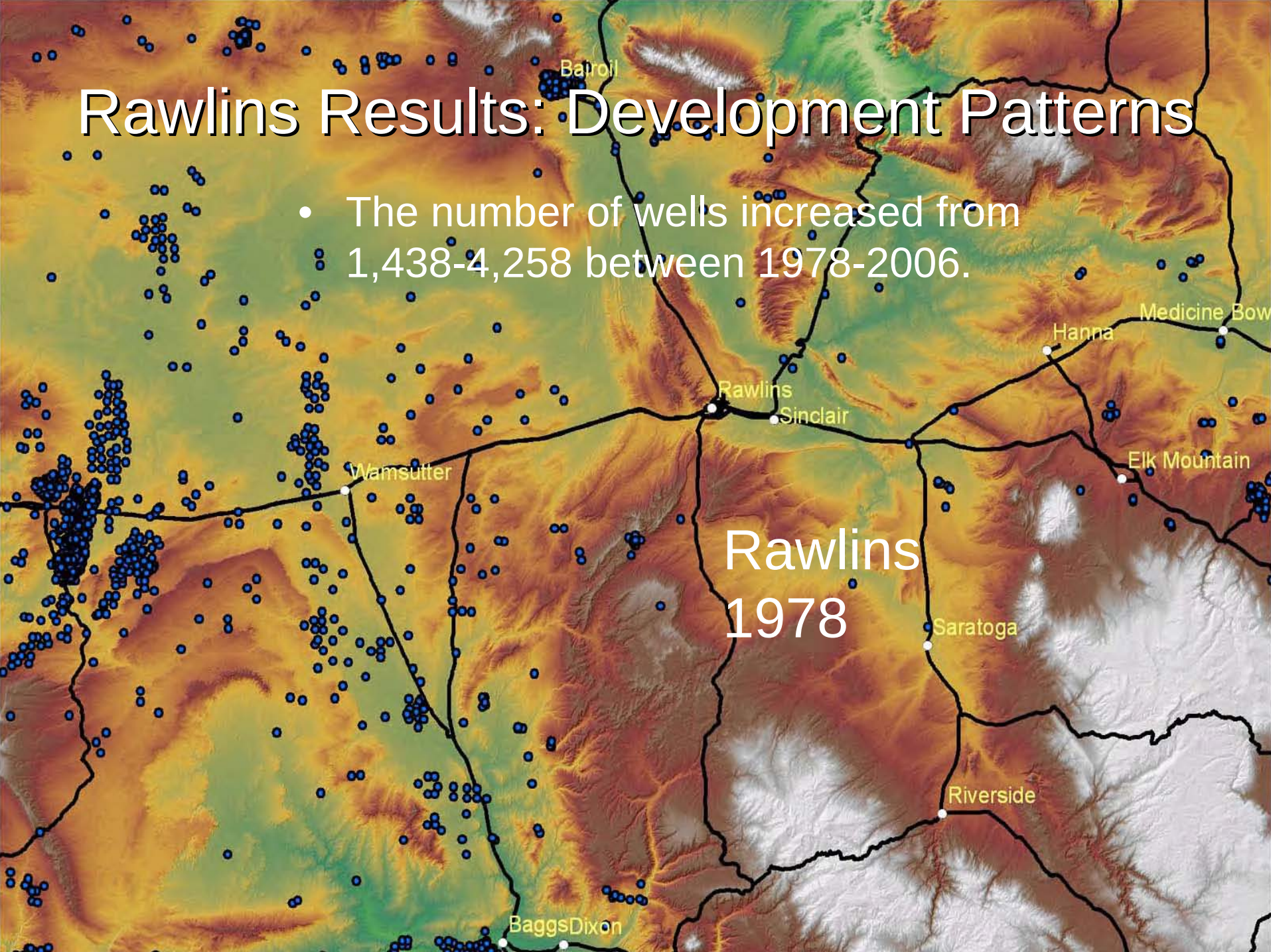
- The number of O&G wells increased from 451-1,177 between 1998-2006.

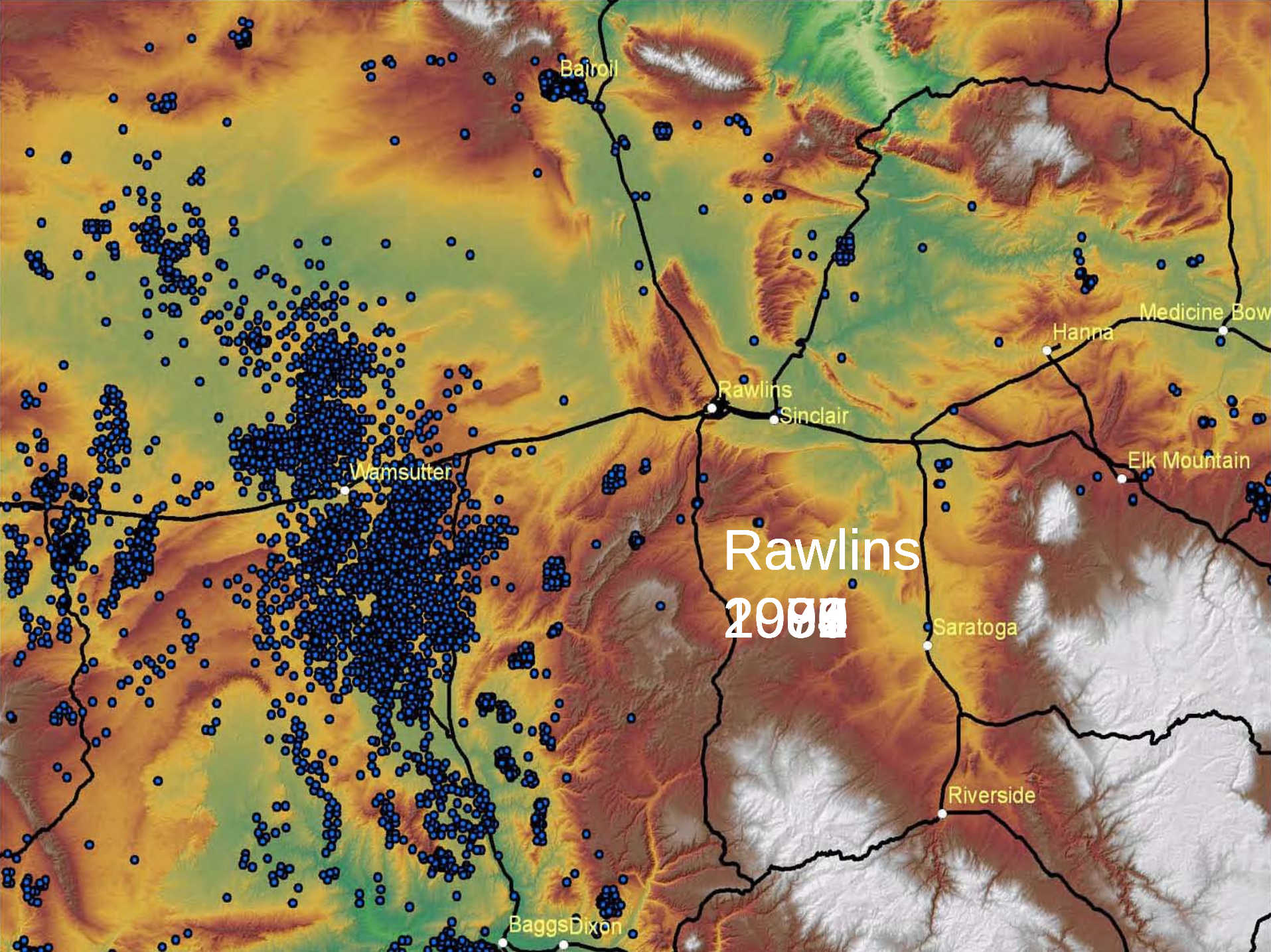


- Raptor territories experienced a corresponding decrease in the distance to wells and increase in well density.

Rawlins Results: Development Patterns

- The number of wells increased from 1,438-4,258 between 1978-2006.




Bairoil
Medicine Bow
Hanna
Rawlins
Sinclair
Elk Mountain
Wamsutter
Rawlins
Saratoga
Riverside
Baggs
Dixon

Price Results

- The breeding status of GOEA, RTHA, and PRFA was:
  - Negatively related to O&G development at either the 0.8 or 2.0-km scale (GOEAs both).
  - Related in some was to vegetation factors.
  - Positively related to wetter current year conditions, but drier pre-nesting winters.

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Rawlins Results

- Breeding status GOEA, RTHA, FEHA, and PRFA was:
  - Negatively related to O&G development at either the 0.8 or 2.0-km scale (more consistent negative relationships than in Price).
  - Positively related to non-O&G development at one of the scales.
  - Associated in some way to vegetation factors, especially landscapes with more forest, grassland, and/or agriculture, but less sagebrush.
  - Positively related to “drought recovery” years…wetter years with more winter precipitation and on the heels of drier years.

Conclusions

- Vegetation and climate variables influenced relationships with development and generally influenced breeding status of all species in both study areas.
- Our analyses would likely have benefited from greater climatic detail and prey data.
- A number of other data limitations likely limited our strength of inference…but no better-suited datasets currently exist.

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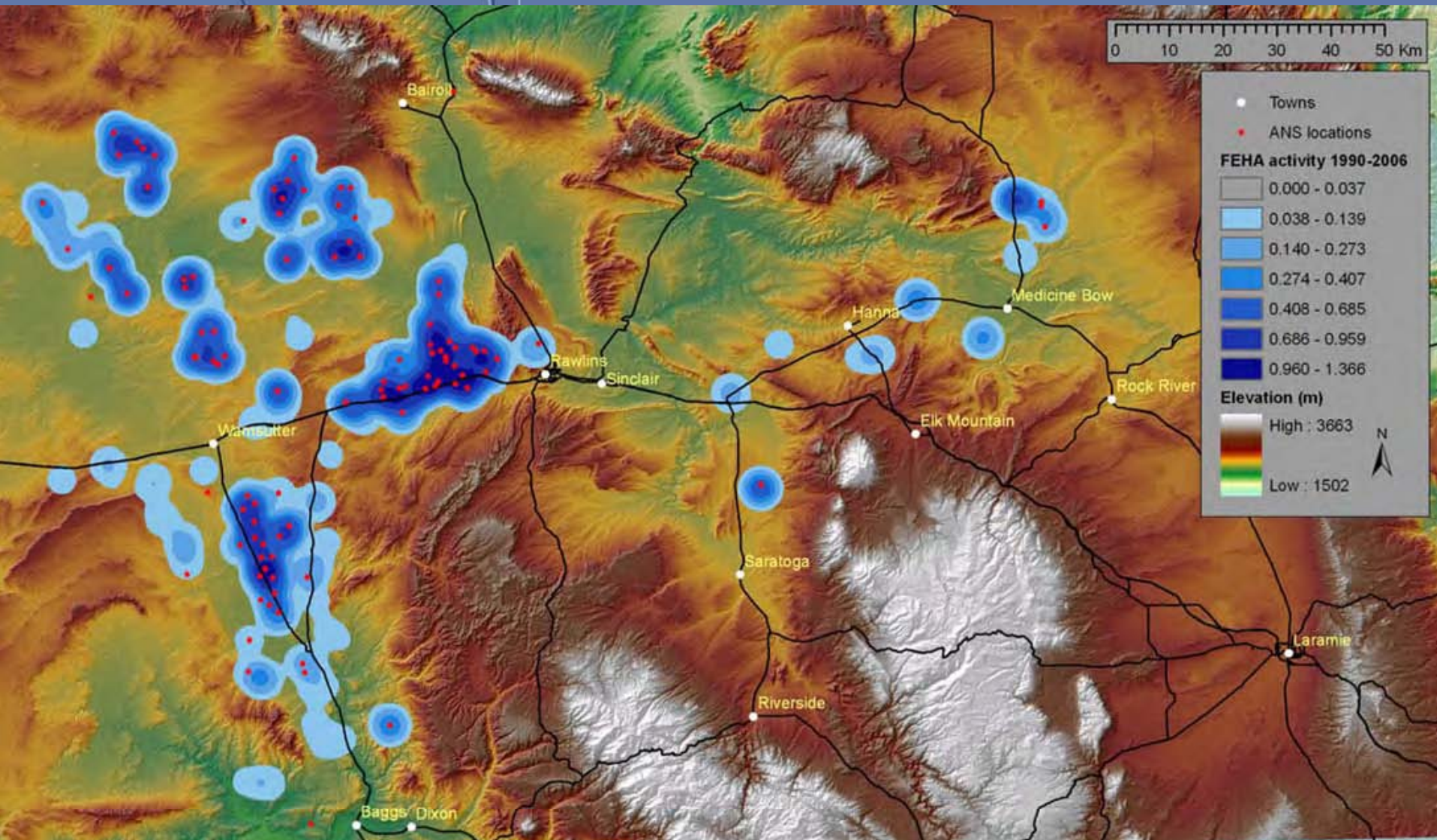
Conclusions

- **Found negative relationships with O&G development in both Price and Rawlins…especially for species with larger sample sizes.**
- **Current stipulations (0.8 km) should not be reduced given negative relationships at this scale for Price GOEAs and Rawlins FEHAs, RTHAs, and PRFAs.**
- **Current stipulations may not be sufficient for some species, given negative relationships at the 2.0-km scale for Price and Rawlins GOEAs and Rawlins PRFAs.**
- **Unfortunately, we were unable to effectively evaluate potential population-level impacts of development.**

ANS and FEHAs

Kernel density of active nests after installation of ANSs



Effectiveness of ANS for FEHAs

- **Rapid shift to ANS was likely due to their location in attractive foraging habitat lacking natural nest sites.**
- **In contrast to other territories, ANS territories exhibited + relationships with O&G development.**
- **Found greater use and production at inaccessible nest sites, including ANS.**
- **Many FEHA territories now consist of a single nest site, most commonly an ANS.**
- **Lacking research on post-fledgling period to assess survival in a potentially dangerous matrix of heavily trafficked O&G roads.**

Improved Raptor Nest Monitoring

- Recommendations arose largely from issues and data limitations encountered during retrospective analyses:
  - Basic data standards and record keeping
  - Survey design and rigor
  - Available ancillary data (e.g., road and well data, veg, etc.)
- Our recommendations are related to O&G development, but should be of value to any monitoring program:
  - E.g., standardized terminology (Steenhof and Newton 2007) and data recording
- Provide example datasheets and links to a relational Access database (available at www.hawkwatch.org)

Acknowledgements

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