Potential Impacts From Energy Development – Lessons from Gas Fields

NORTWEST WIND ENERGY AND WILDLIFE WORKSHOP

Dale Strickland, PhD

Hall Sawyer, PhD

Western EcoSystems Technology, Inc.


Natural Gas
Wind Power
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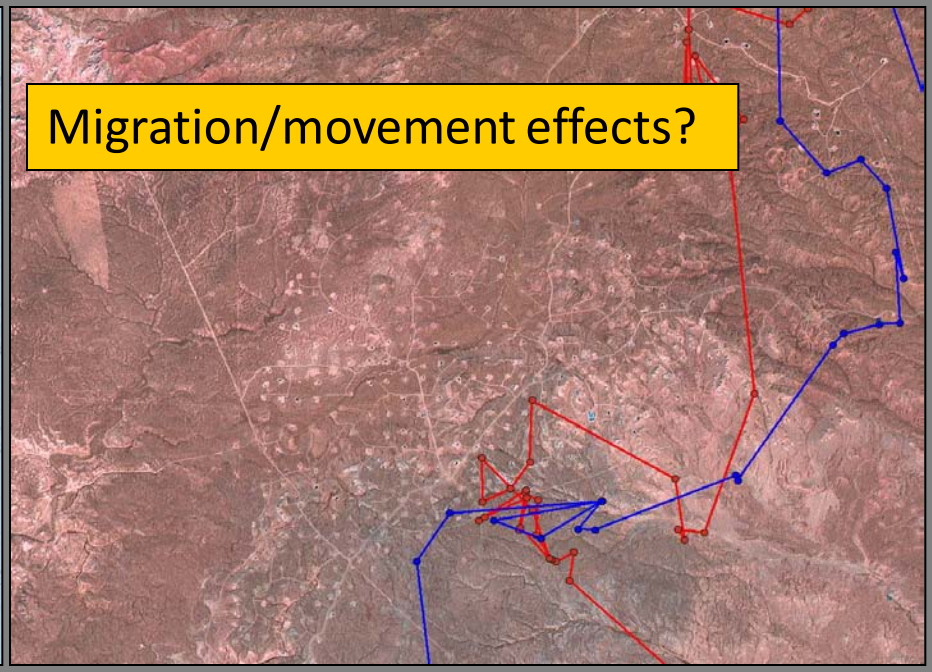
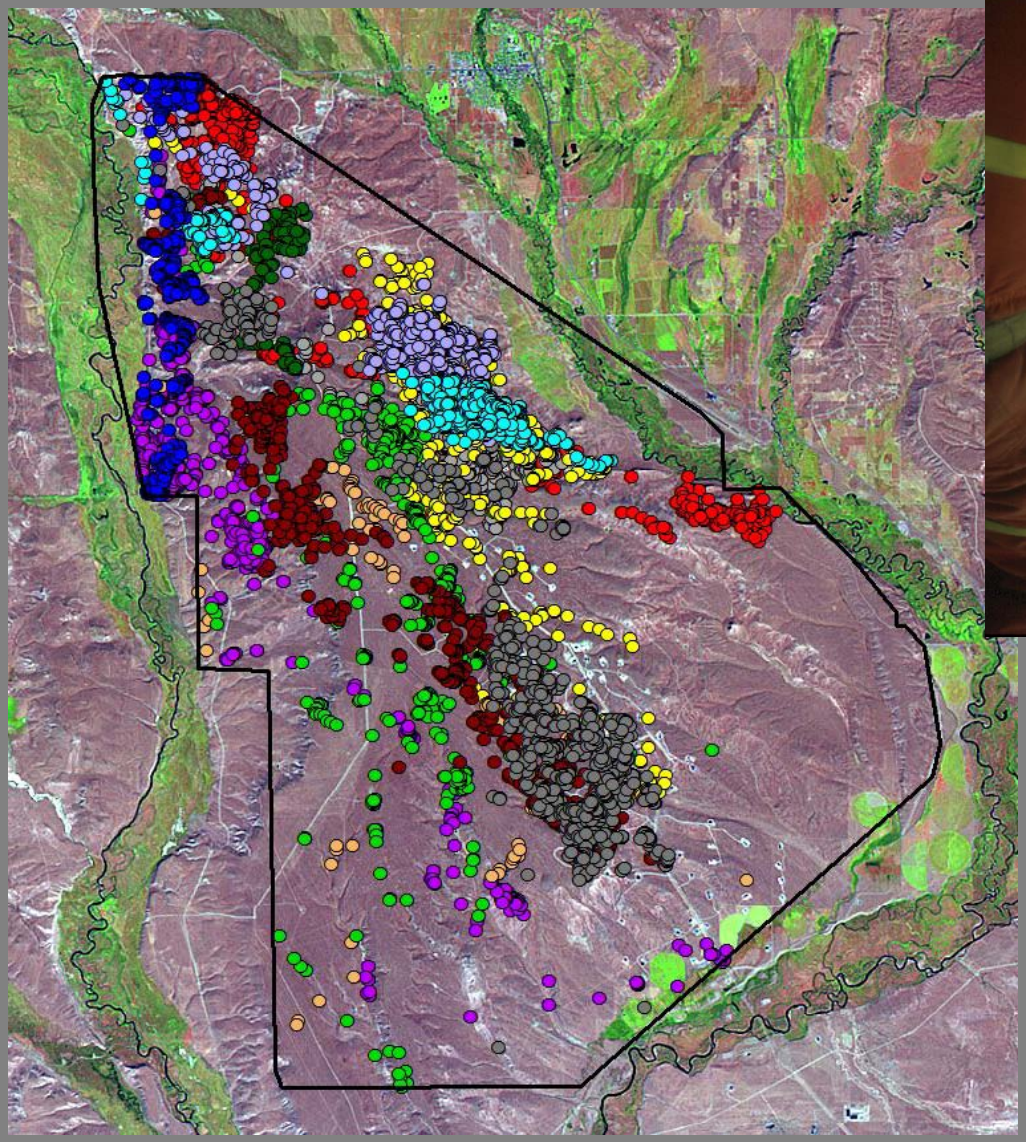
Image USDA Farm Service Agency
agery Date: Jul 11, 2006
41°18'39.24" N 110°49'47.62" W elev 7593 ft
Eye alt

Potential impacts of energy development on big game:

Data Gaps



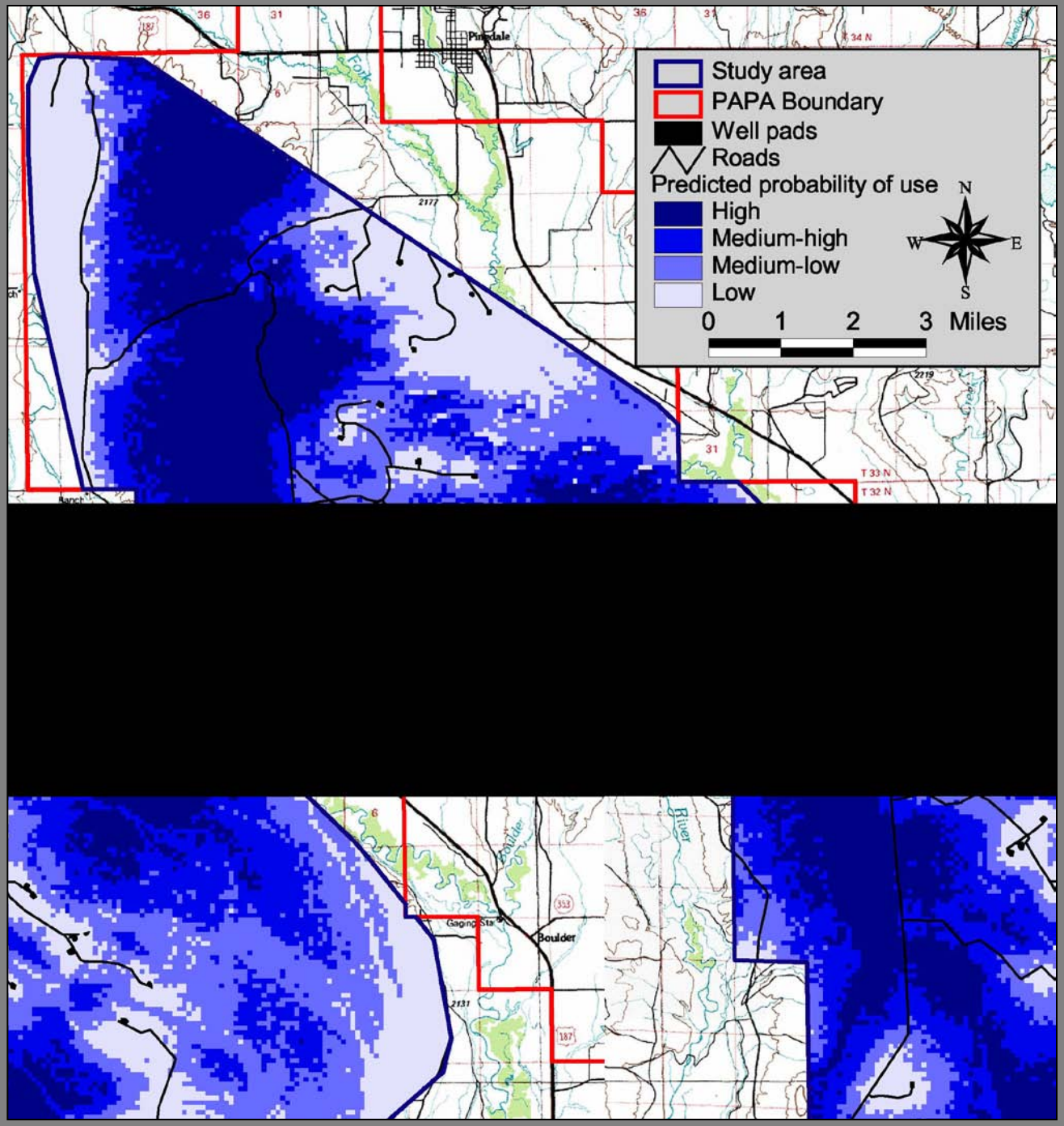
Indirect Habitat Loss



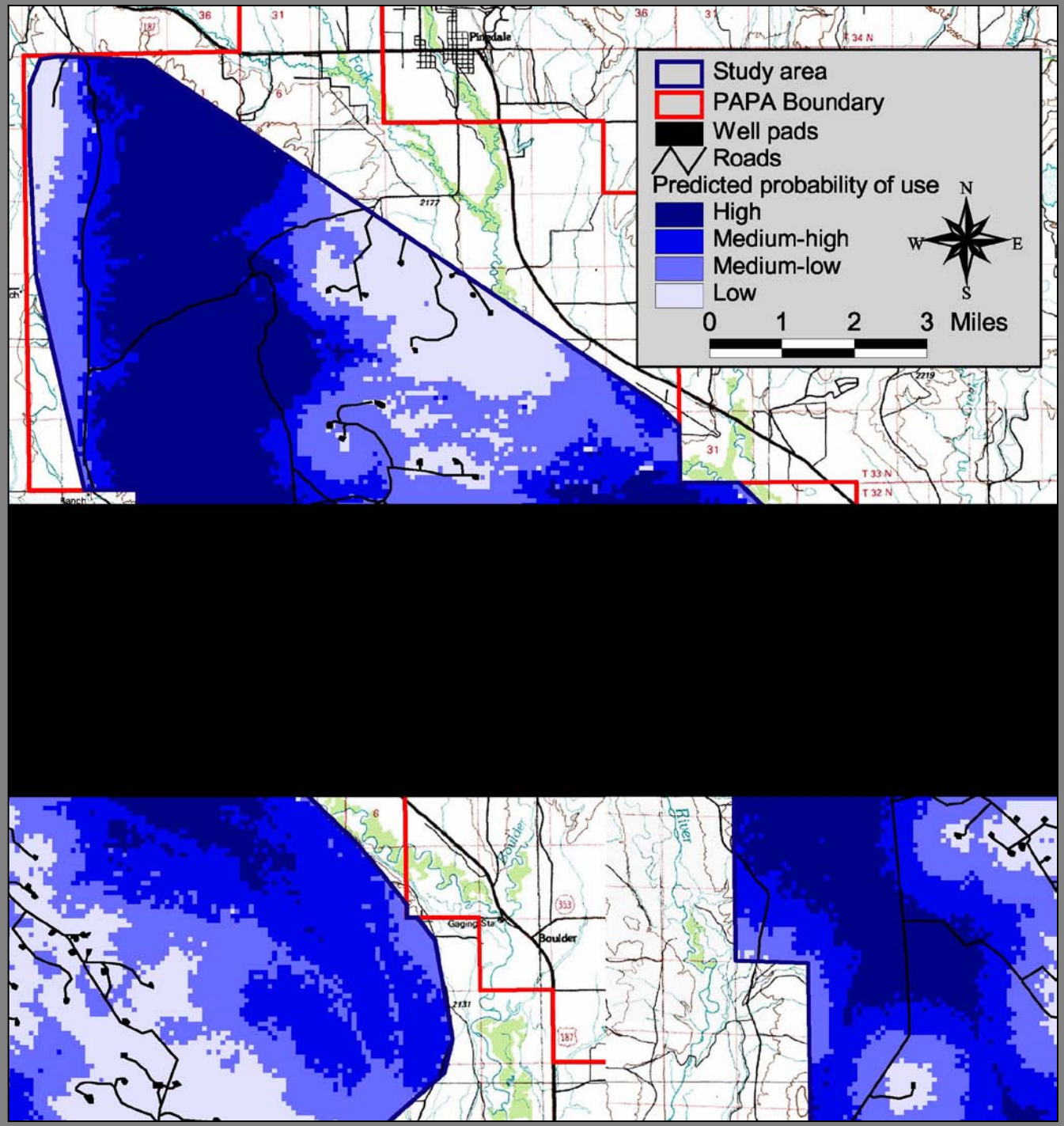
The goal is to make inference to a project area

Use GPS data collected from individually-marked animals to estimate a resource selection function (RSF).

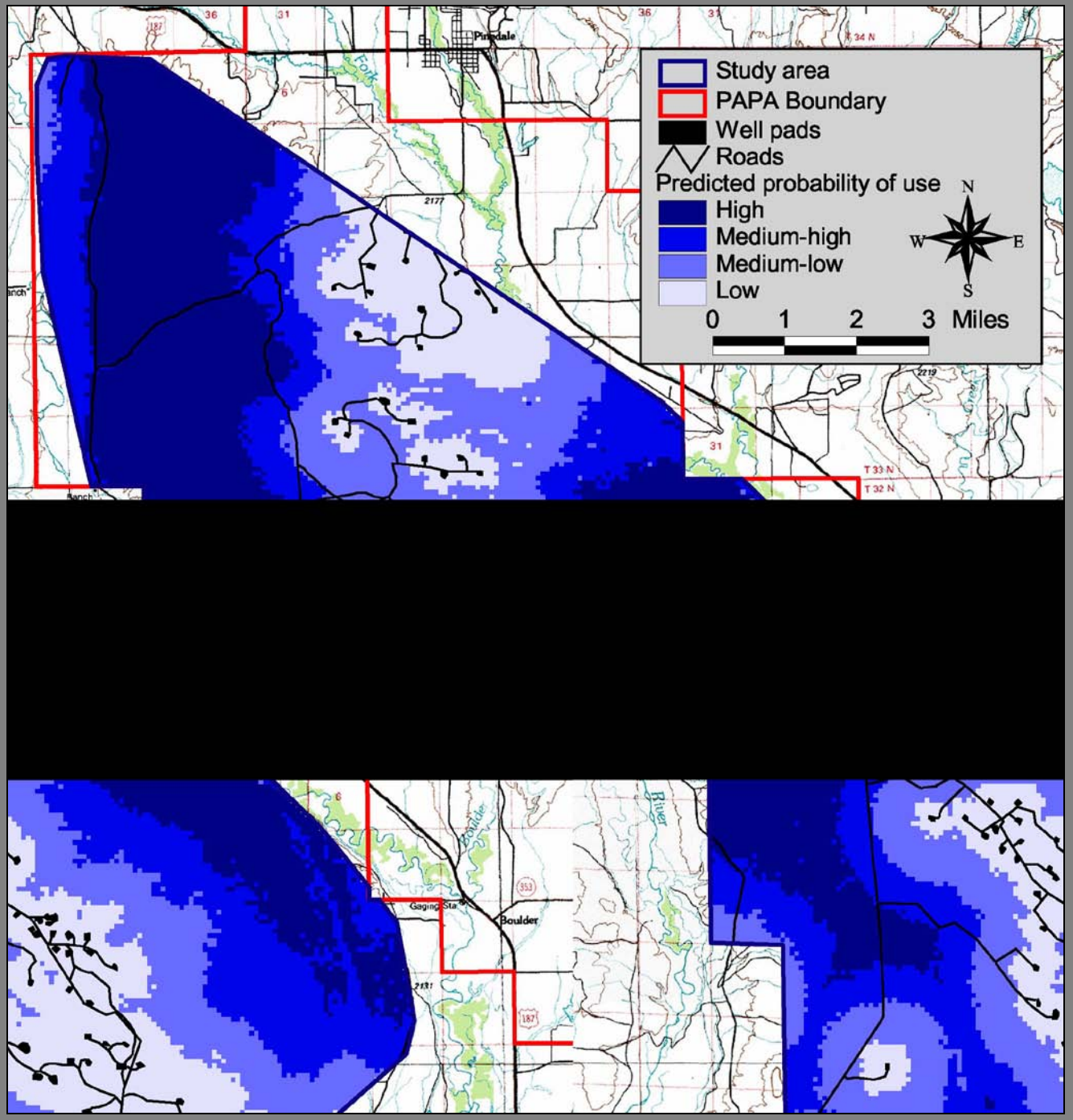
Predicted Deer Use Year 1 of Development (2000-01 winter)



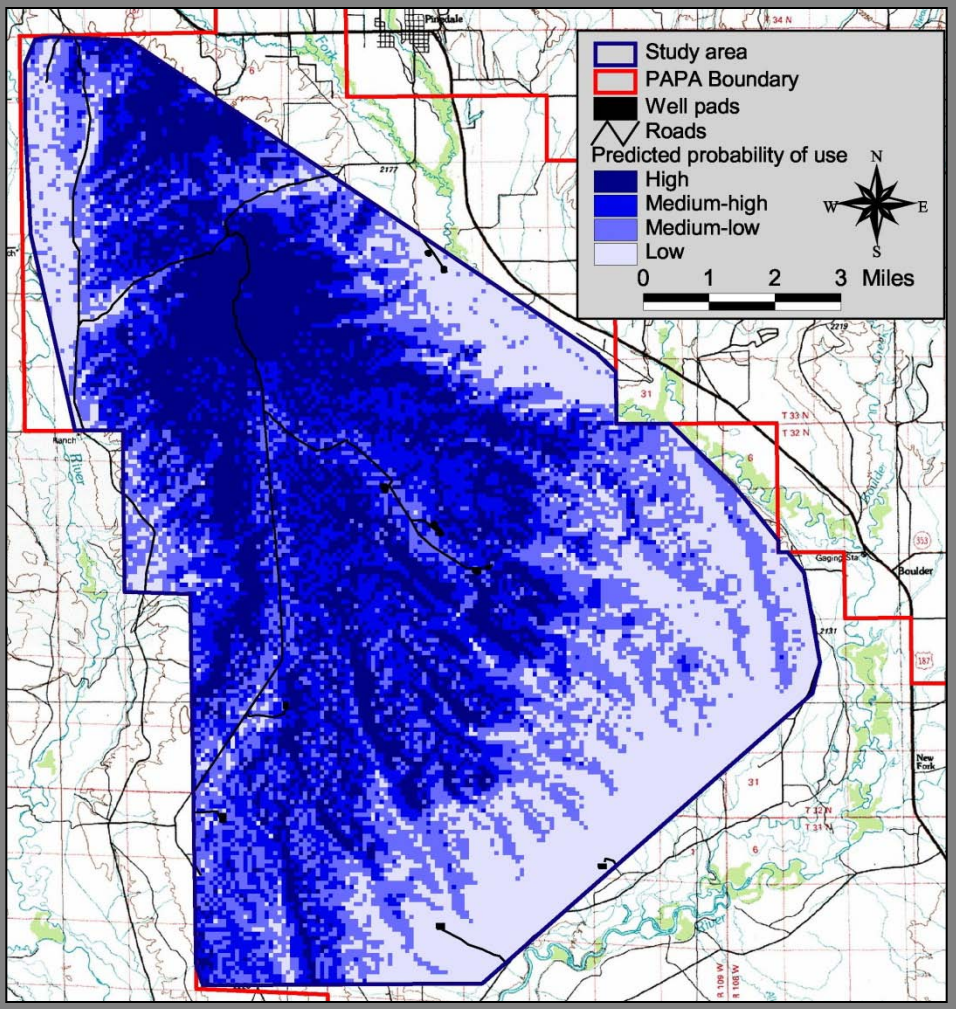
Predicted Deer Use
Year 2 of
Development
(2001-02 winter)



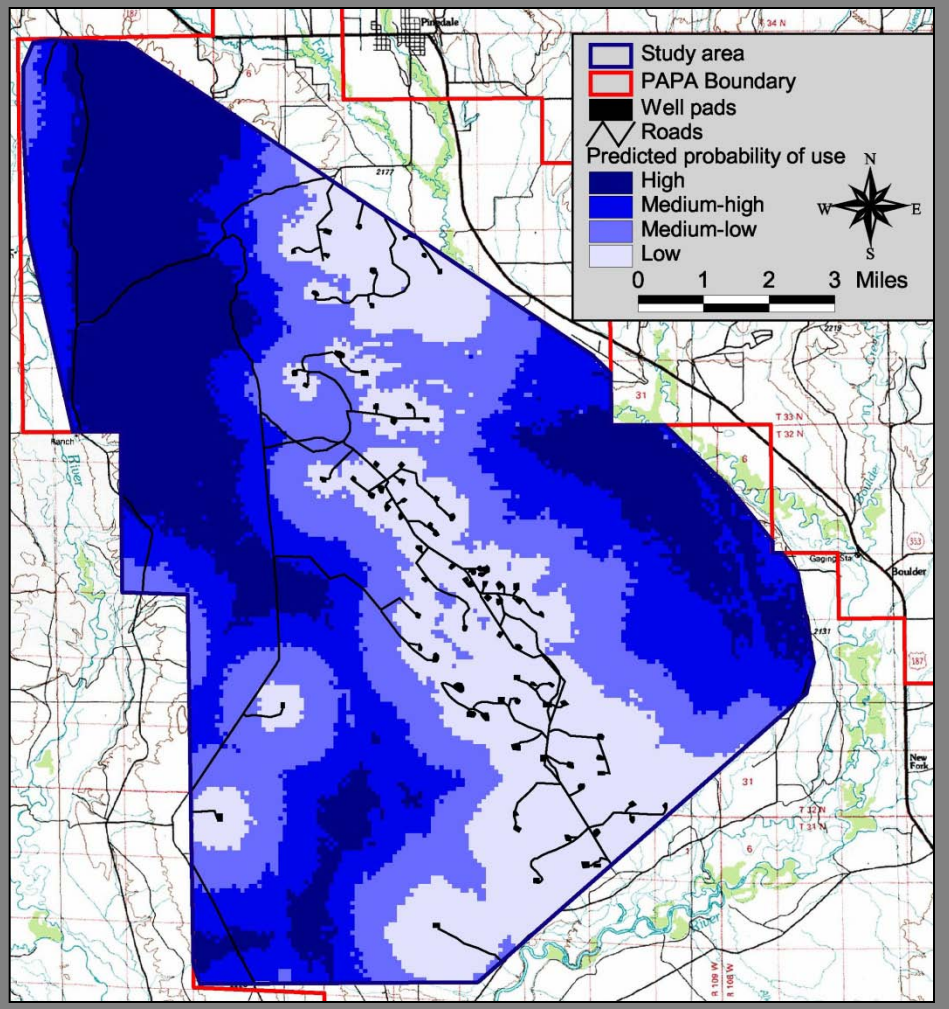
Predicted Deer Use Year 3 of Development (2002-03 winter)



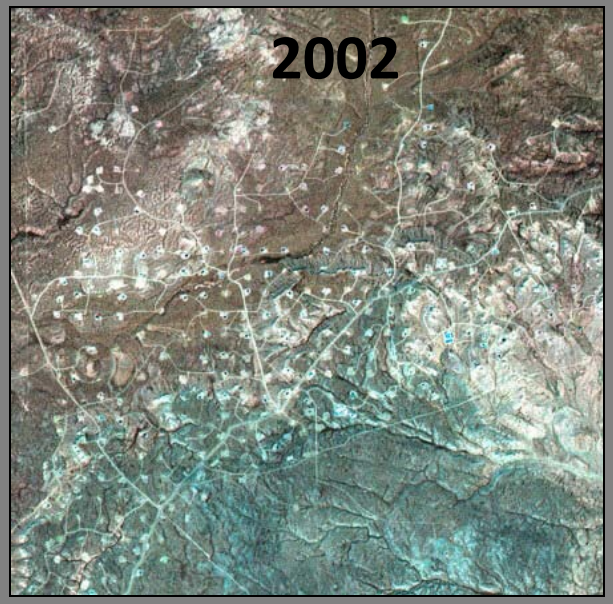
Predicted Deer Use
Before Development



Predicted Deer Use
Year 3 of Development



MIGRATION IMPACTS?



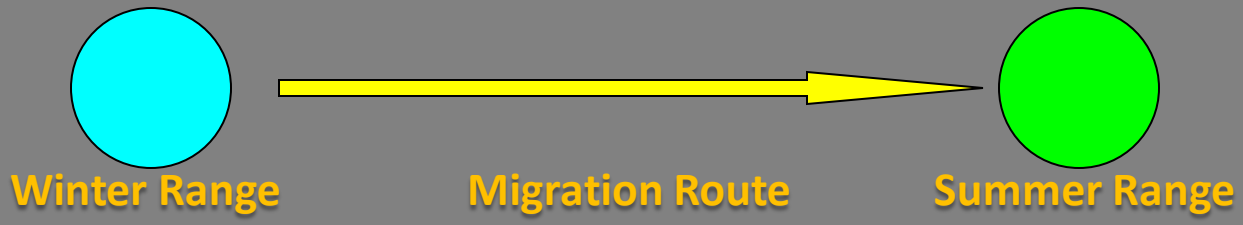
Western Wyoming supports ~100,000 mule deer, of which > 90% are migratory

<u>Impact assessment and land-use planning limited by:</u>

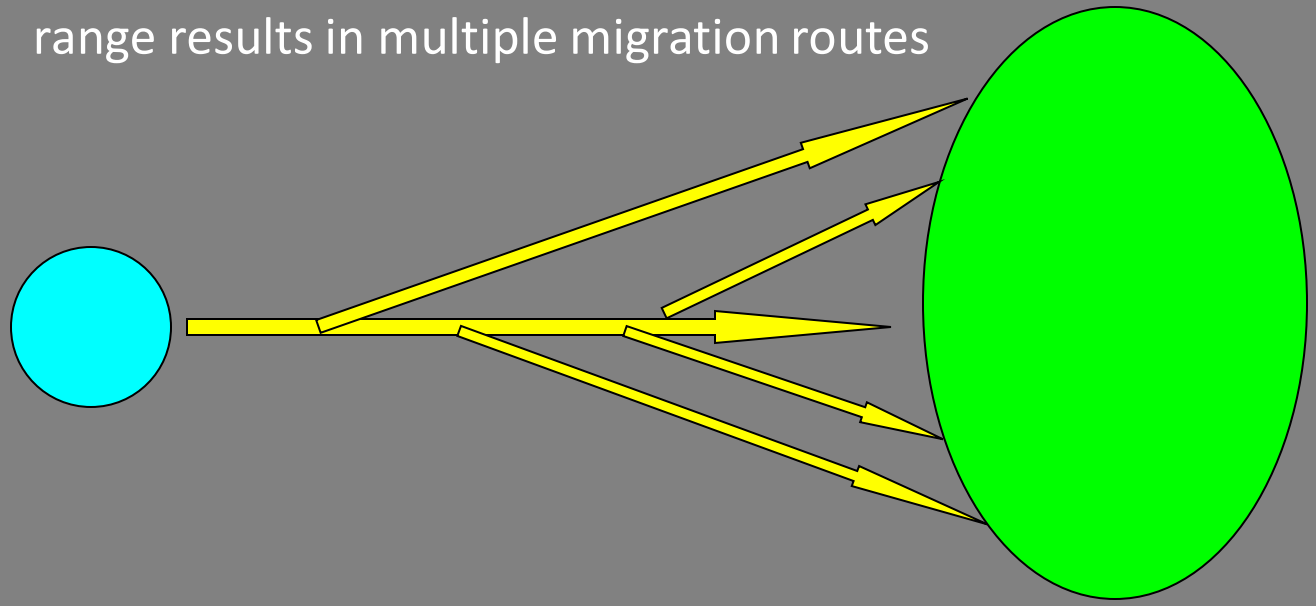
- Inability to identify where migration routes occur or prioritize them

MIGRATION BACKGROUND

Scenario A: Small winter and summer range results in one distinct migration route



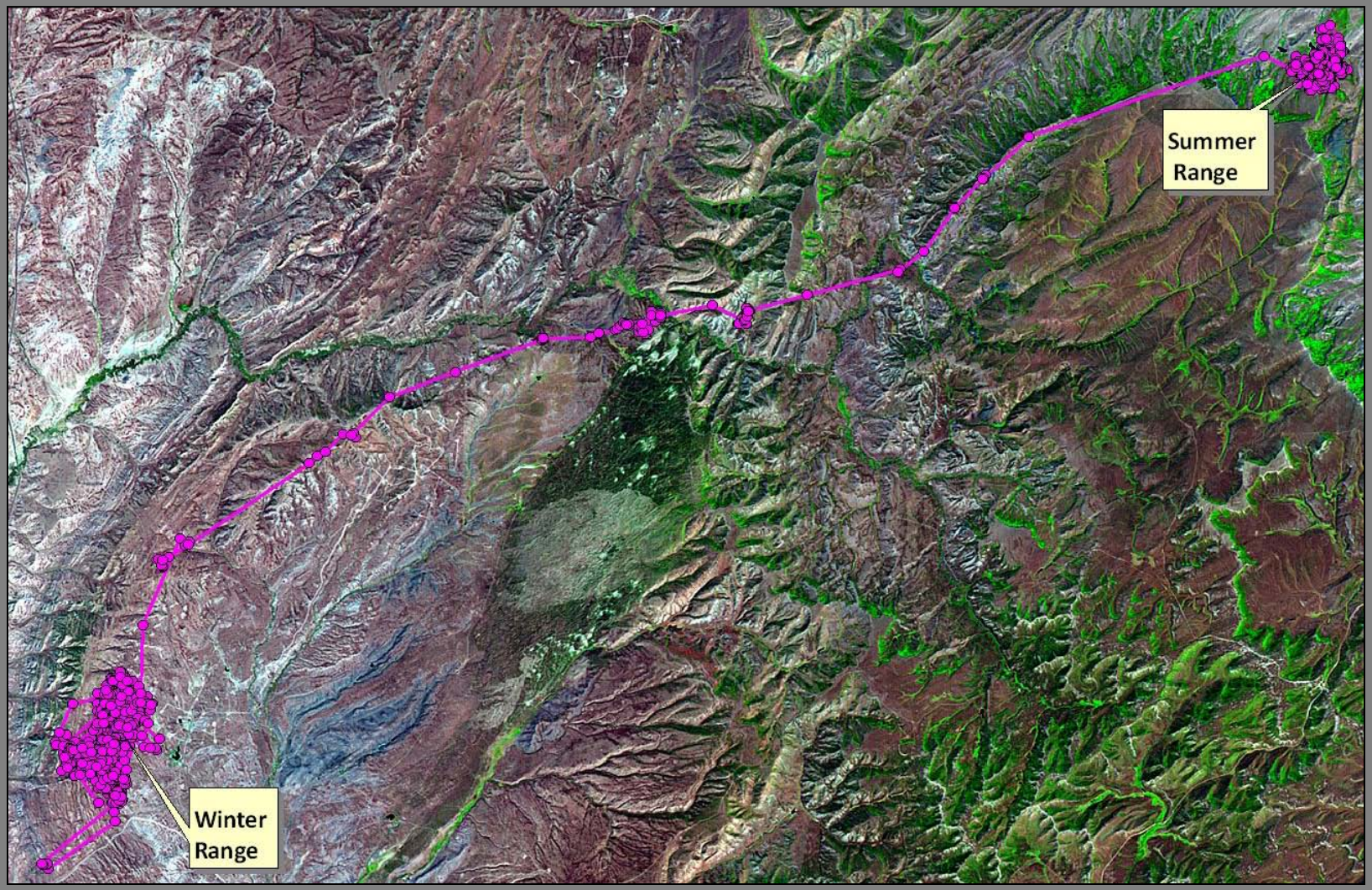
Scenario B: Small winter range and large summer range results in multiple migration routes



MIGRATION BACKGROUND

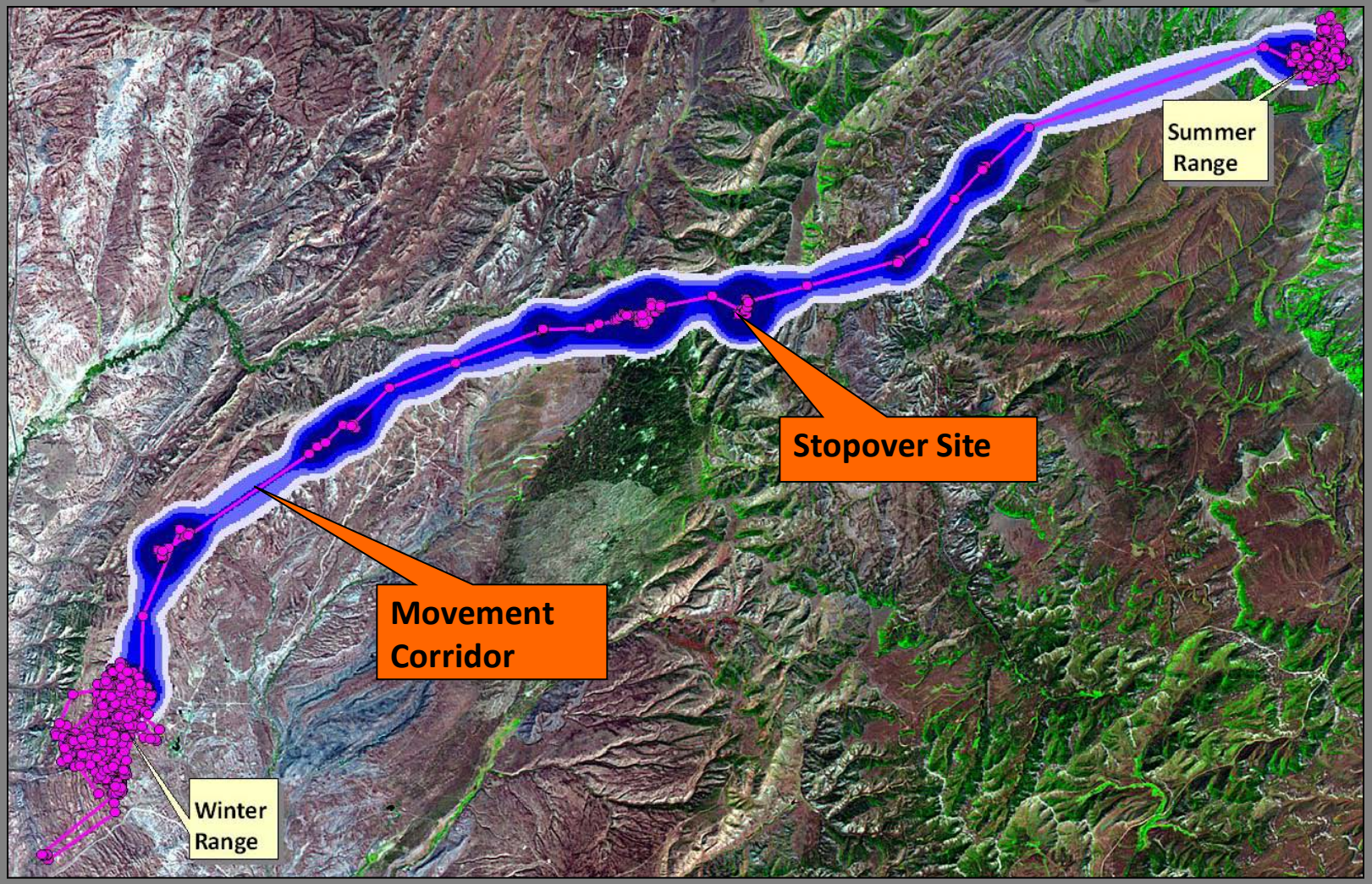
Connecting the dots is great, but…..

- No area associated with the line (Is the route 10 m wide or 1 km wide?)
- No means to combine individual migration routes to make population-level inference



NEW METHODOLOGY (i.e., Brownian bridge movement model):

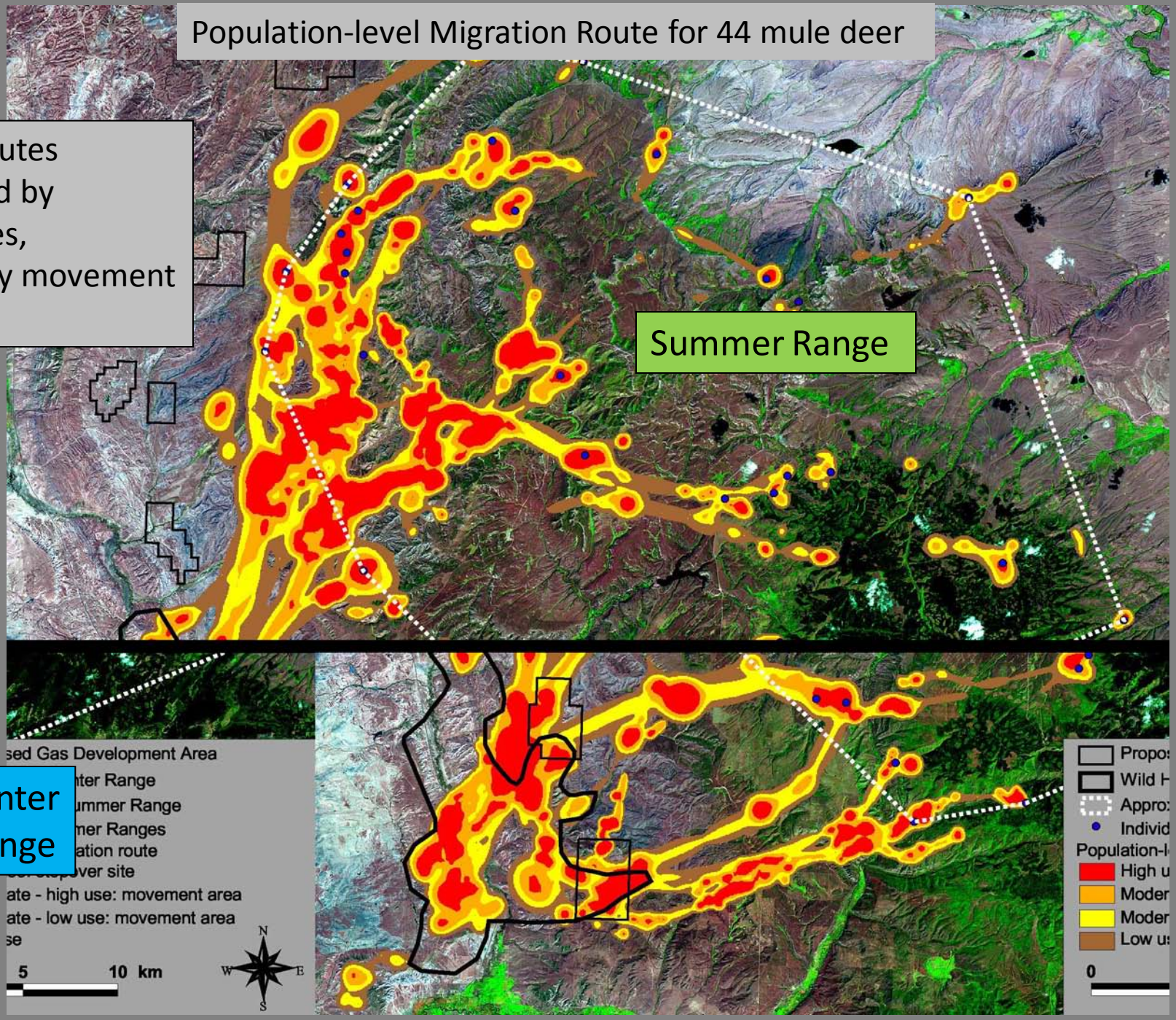
- Utilization distribution (UD) estimated for each migration route
- UD values can be categorized as high, medium, or low to differentiate movement corridors from stopover sites
- Individual UDs combined to estimate a "population-level" migration route



RESULTS

Population-level Migration Route for 44 mule deer

Migration routes characterized by stopover sites, connected by movement corridors



MIGRATION RESULTS

Analogous to stopover sites used by migratory birds

MIGRATION RESULTS

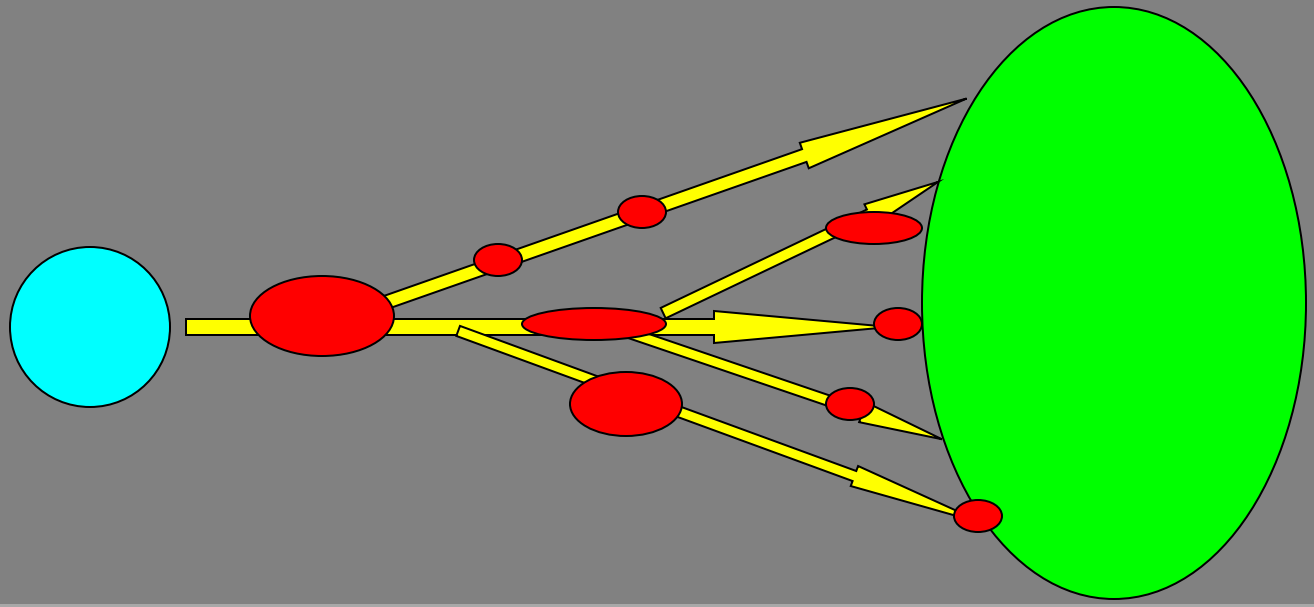
Are stopover sites affected by development differently than movement corridors?

Should we manage the two types of migratory segments differently?

e.g., where do we build the road?

Segment Type		Management Strategy
Stopover	→	Minimize habitat loss and human disturbance
Movement corridor	→	Maintain connectivity

REFINED CONCEPTUAL MODEL



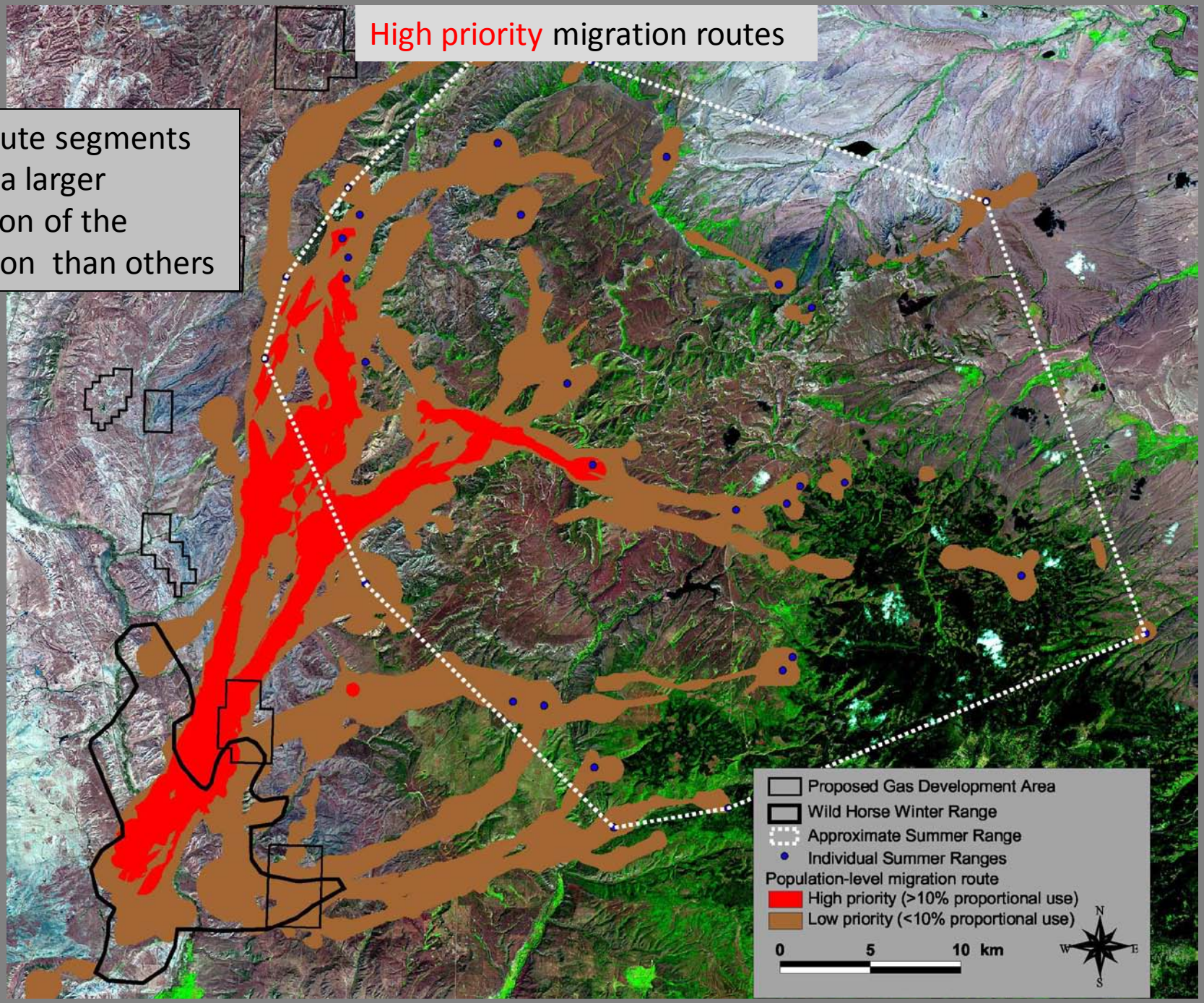
Winter Range **Migration Route(s)** **Summer Range**

stopovers and corridors

When multiple routes exist, how do we prioritize?

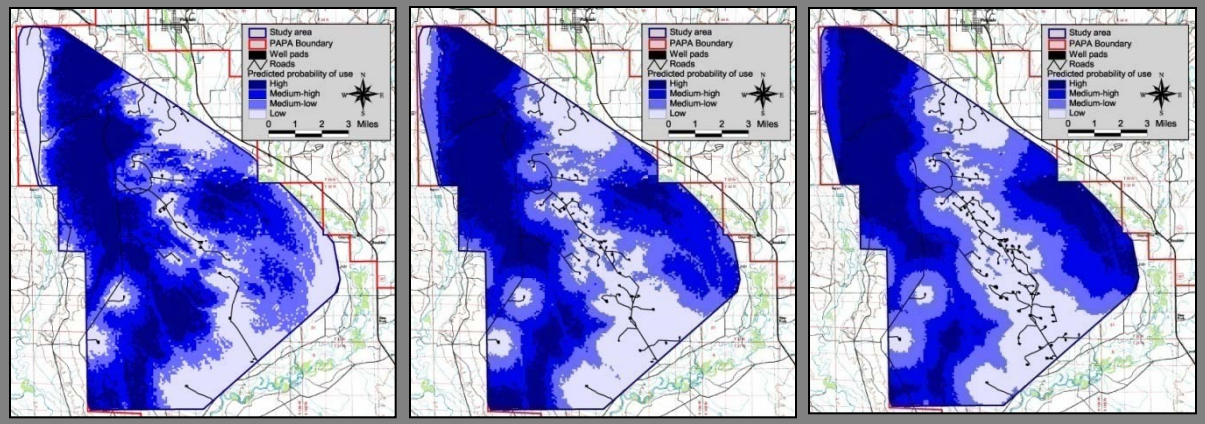
RESULTS

Some route segments used by a larger proportion of the population than others



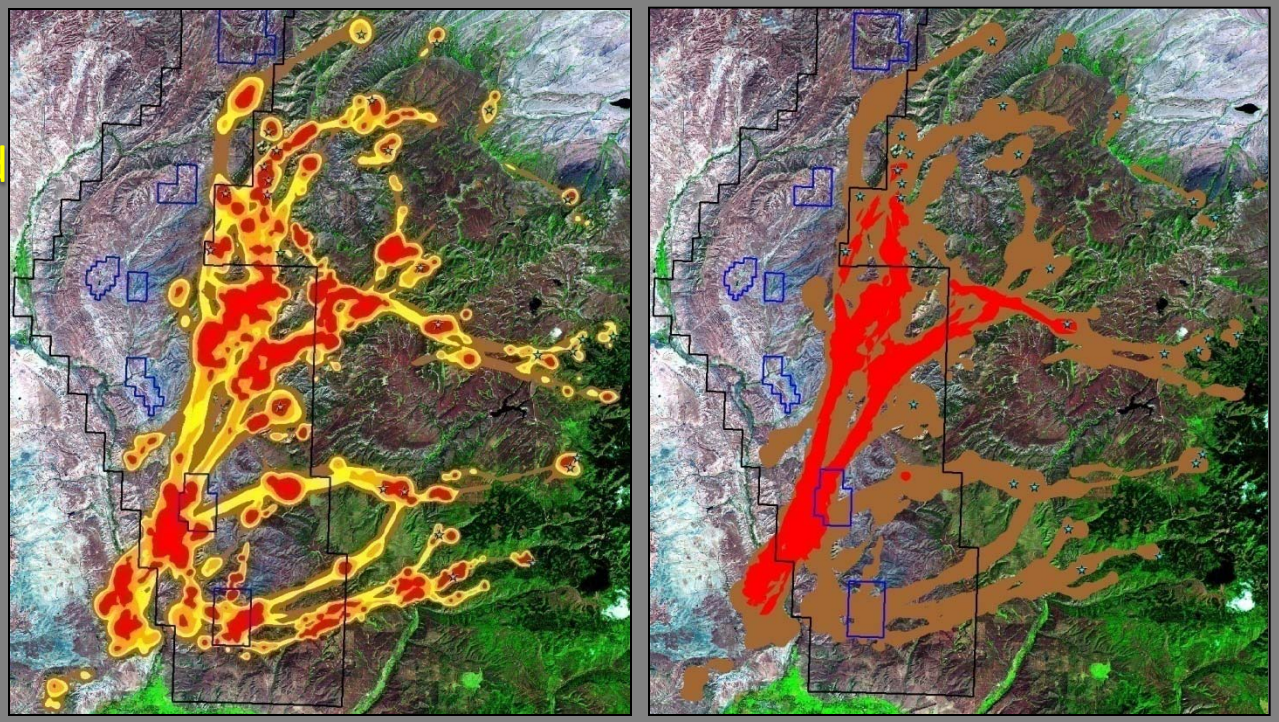
SUMMARY

1. Indirect habitat loss and behavioral response can be assessed via multi-year GPS study



2. GPS data can be used to estimate population-level migration routes and distinguish between stopovers and movement corridors

3. Within population-level migrations, routes can be prioritized



Wind and Gas Disturbance Parameters (from C. Hagen ODFW)

Variable	Gas	Wind
Structure height	**4-60 m**	**66-122 m**
Noise @ 0.25 miles	**52 db(A)**	**35 db(A)**
Compressor	**37 db(A)**	**NA**
Haul roads	**40 db(A)**	**?**
Maintenance visits	**1 per day-well**	**1 per 6 months per turbine**
Road density	**3.13 km / km2**	**1.6 km/km2**
% permanent disturbance	5-10%	1%-5%

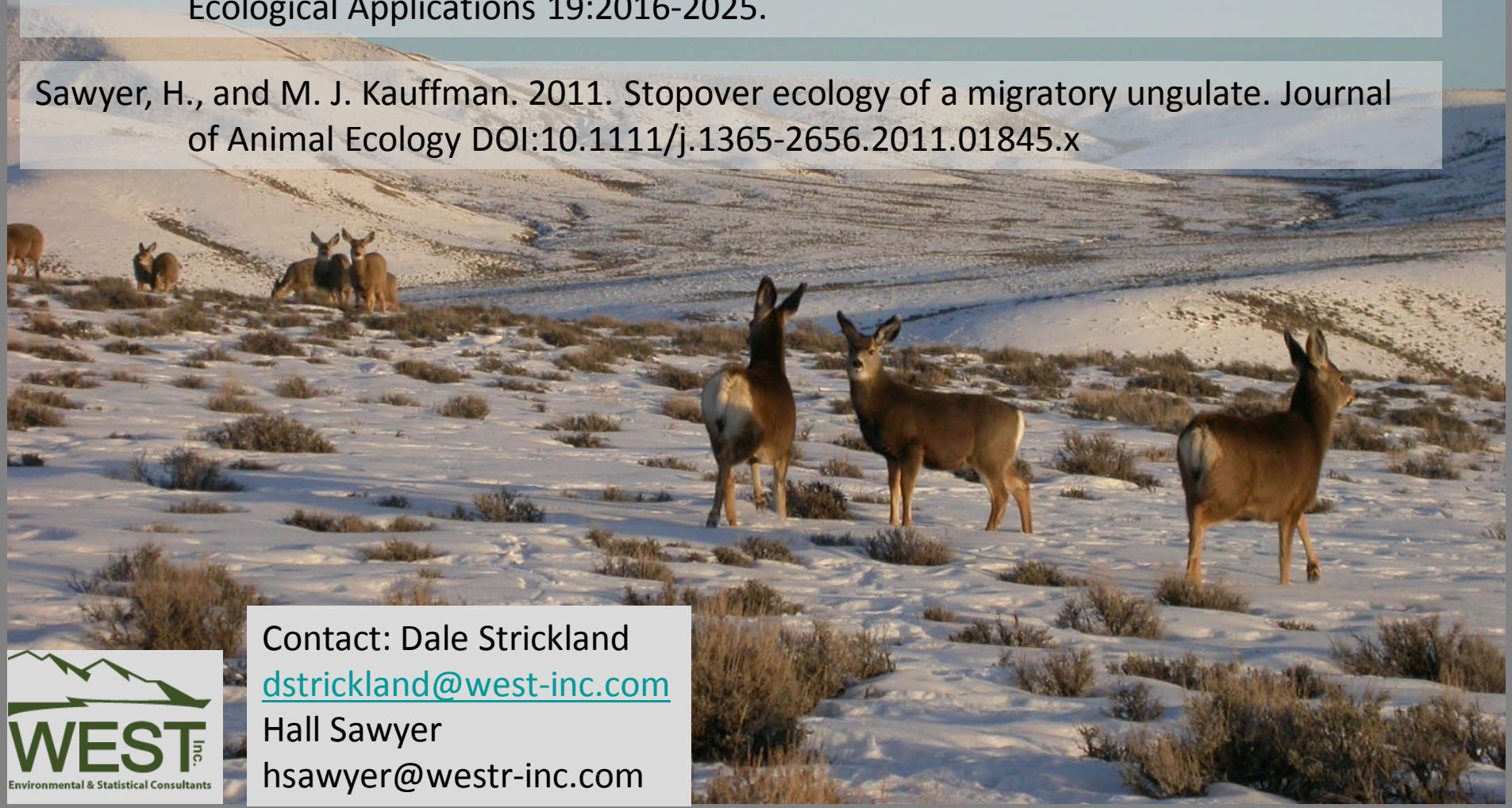
Summary Of Wind and Big Game

- Few studies, no effects detected, no peer reviewed studies
- Qualitatively impacts may be similar to oil and gas
- Quantitatively the two are likely different (relative levels of traffic and noise)
- Avoidance distances in gas study directly related to the amount of traffic (40%-60% reduction when trucks replaced with pipelines)
- Big unknown is effect of vertical structure with moving parts

Sawyer, H., M. J. Kauffman, and R. M. Nielson. 2009. Influence of well pad activity on the winter habitat selection patterns of mule deer. Journal of Wildlife Management 73:1052-1061.

Sawyer, H., M. J. Kauffman, R. M. Nielson, and J. S. Horne. 2009. Identifying and prioritizing ungulate migration routes for landscape-level conservation. Ecological Applications 19:2016-2025.

Sawyer, H., and M. J. Kauffman. 2011. Stopover ecology of a migratory ungulate. Journal of Animal Ecology DOI:10.1111/j.1365-2656.2011.01845.x



Contact: Dale Strickland
dstrickland@west-inc.com
Hall Sawyer
hsawyer@westr-inc.com

WEST Inc.
Environmental & Statistical Consultants