

# Long-distance transboundary migration of pronghorn and proposed pronghorn studies in the Transboundary Area



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# pronghorn

Context

Pressures

Migration

Research

Migration research

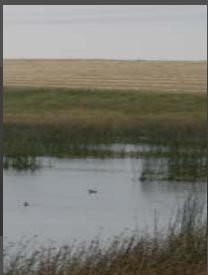
Conservation

Connectivity

Indicator

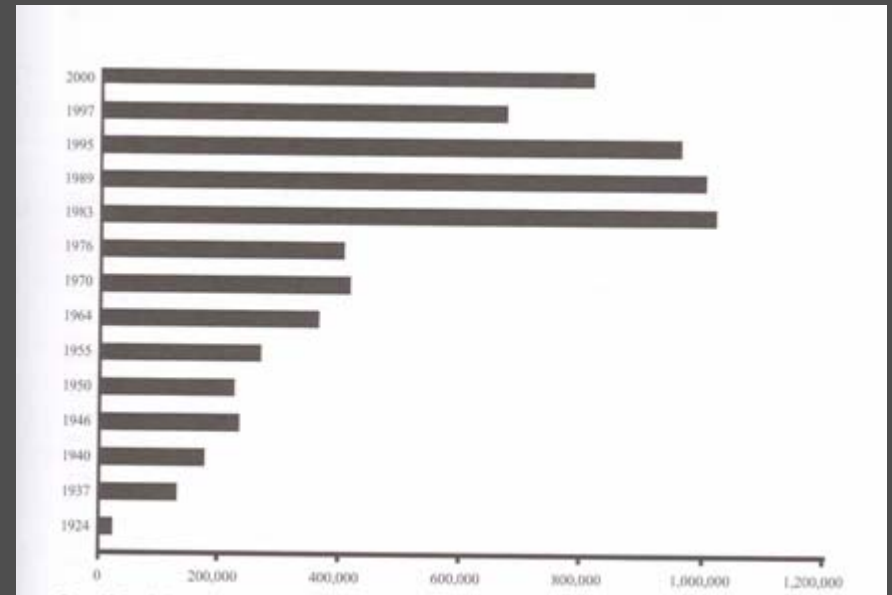
Northern Sage Steppe

Transboundary research



## pronghorn

- Only endemic ungulate
- Grassland/Sage obligate
- 35 million to 800,000
- Conservation successful



Total pronghorn populations 1924-2000  
(O'Gara and Yoakum 2004)



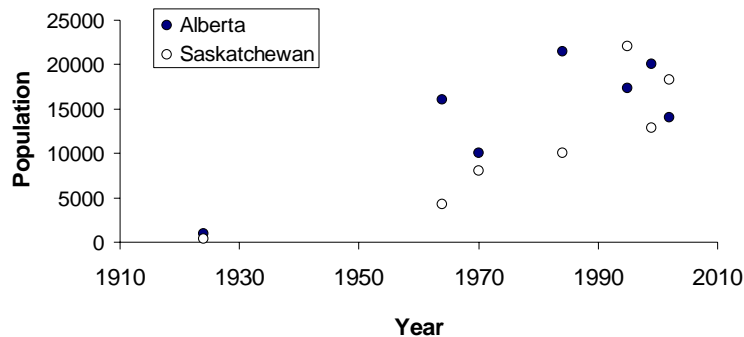
## pronghorn - historical

- Populations almost extirpated AB/Sask
- Original contraction
  - Hunting
  - Fencing
  - Land conversion

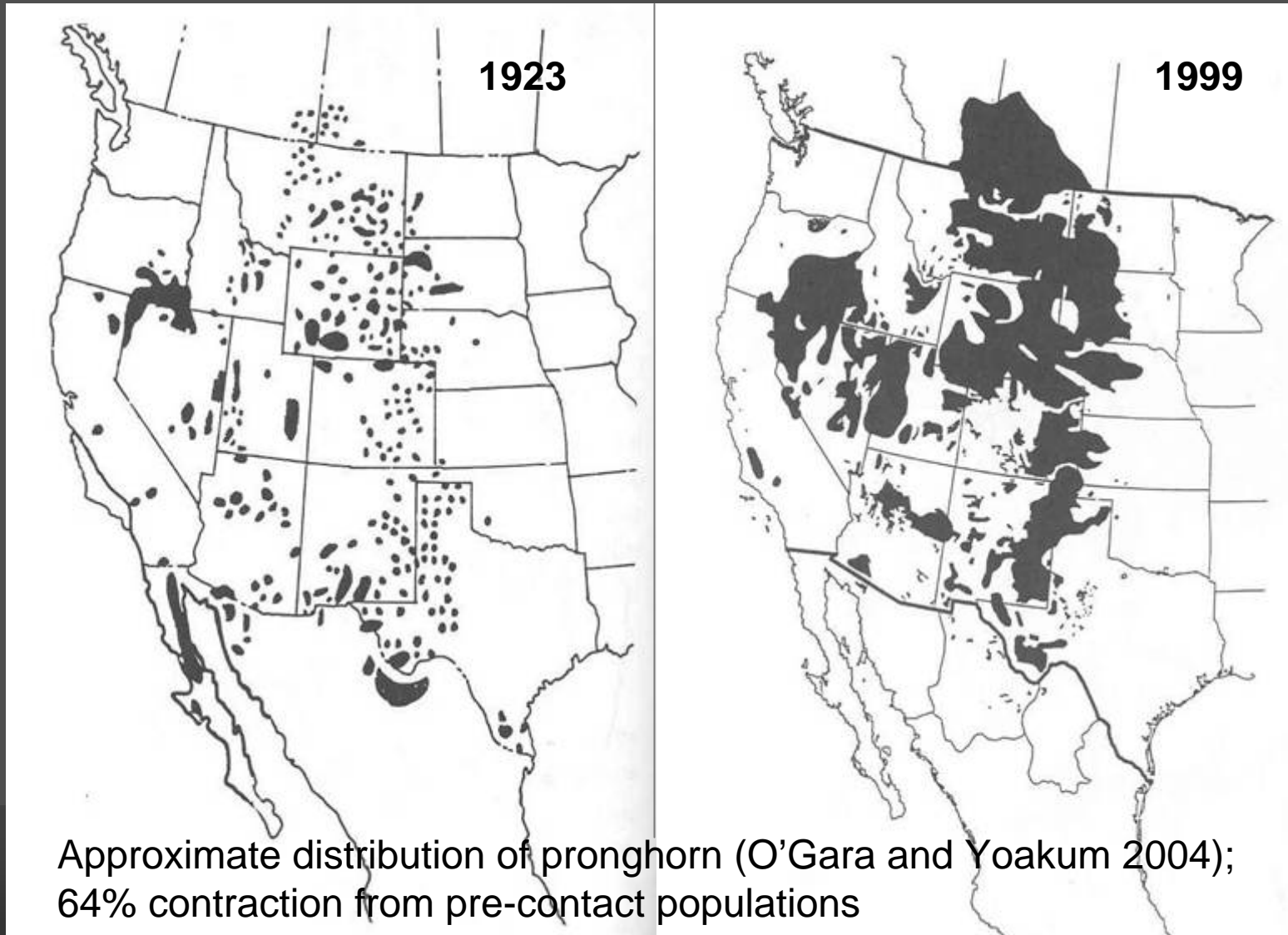


Early in the 20<sup>th</sup> Century, pronghorn were extirpated from large areas of their original range by agricultural settlers

**Pronghorn populations in Alberta and Saskatchewan  
1924 - 2002**



## pronghorn - historical



## pronghorn - pressures

- Habitat loss/reduced effectiveness
- Fragmentation



## pronghorn - pressures

Catastrophic declines during sporadic severe winters (1948-49, 1965, 1966-67, 1977-78, and 1995-96)



Pronghorn population estimates 1952-1989



## pronghorn - pressures

- Declines in abundance
- Relatively slow recovery

### Cumulative effects? Thresholds??

- Habitat loss to cultivation
- Drought and severe winters/climate change
- Oil and gas roads, disturbance, infrastructure
- Mining and mineral exploration
- Hunting
- Grazing
- Fencing
- Urban expansion and increased settlement
- Transportation infrastructure and traffic



## pronghorn – why?

1. Pronghorn are an indicator of ecosystem condition and will allow trends in terms of habitat loss and fragmentation to be assessed
2. There is an increasing doubt about the long-term conservation of robust pronghorn populations in the northern portion of their range in the face of landscape and climate change projections
3. Pronghorn are a regionally significant species of management and conservation interest



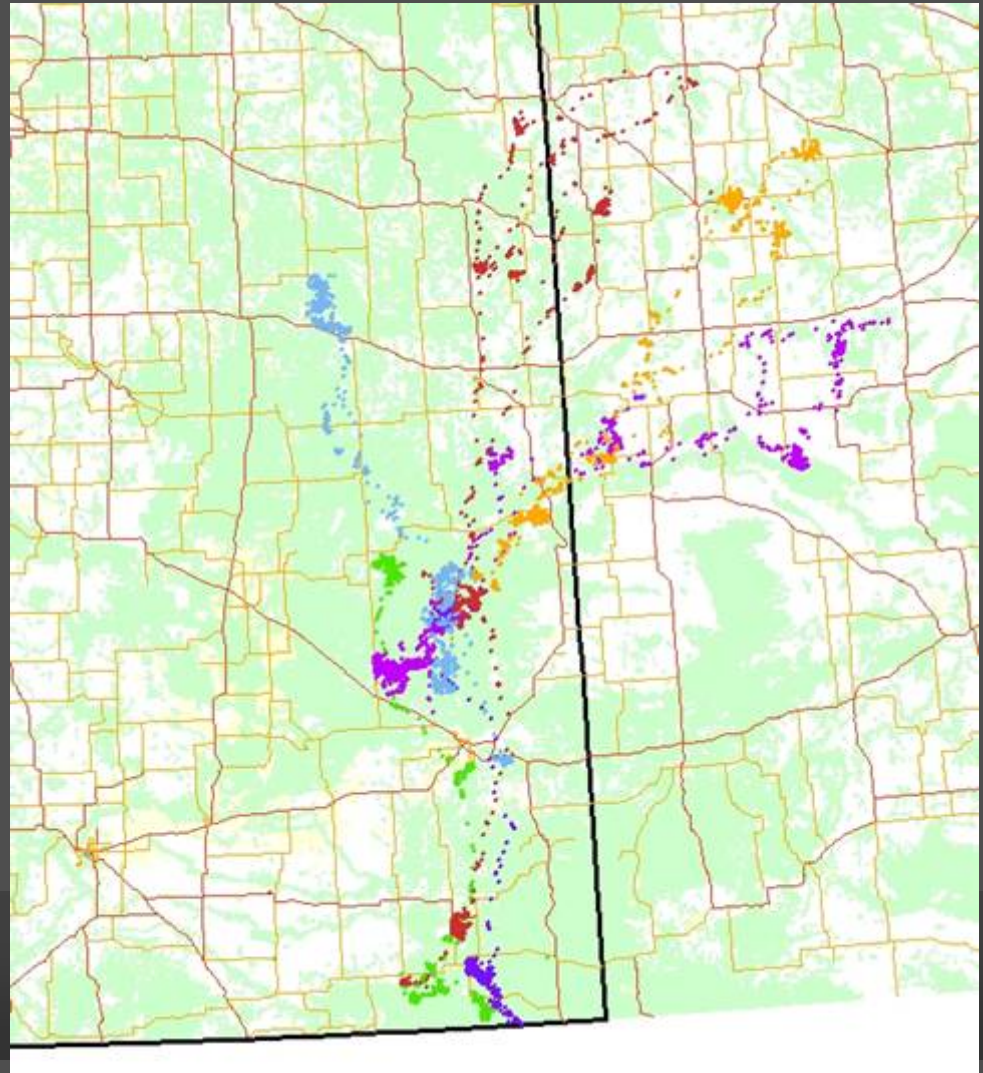
## pronghorn - migration

- Long-distance migration (LDM) is one of Earth's most dramatic, yet imperiled, ecological processes (Berger 2004)
- Berger 2004 analyzed 29 terrestrial LDM = outlook not good



## pronghorn - migration

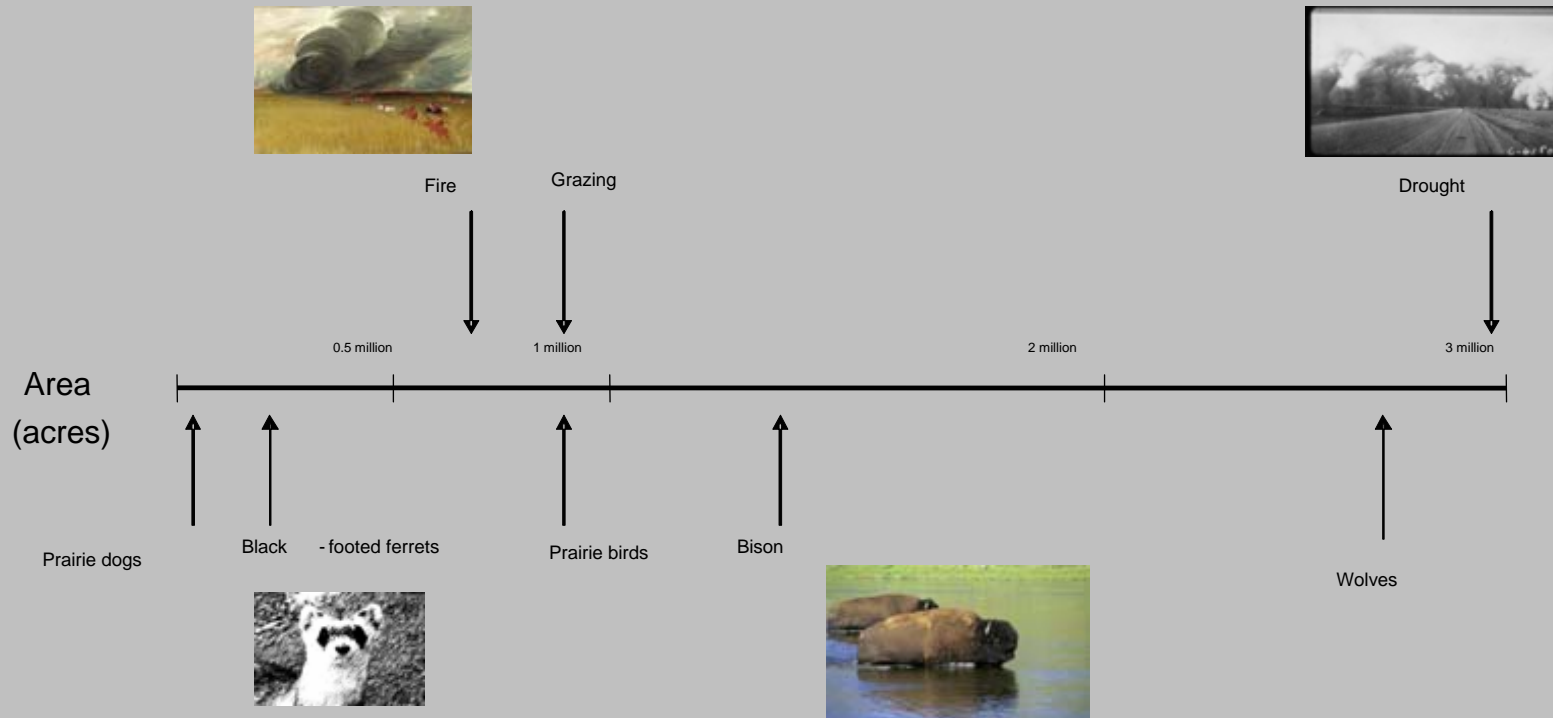
- Pronghorn operate at very large extents in the NSS
- Documented by Martinka 1968 Mark-recapture of wintering herds
- Severe winters
- Anecdotal evidence
- 41 GPS collared (2003-5)  
+23 GPS (2006-7)
- Largest movement = 445km



# pronghorn – scale

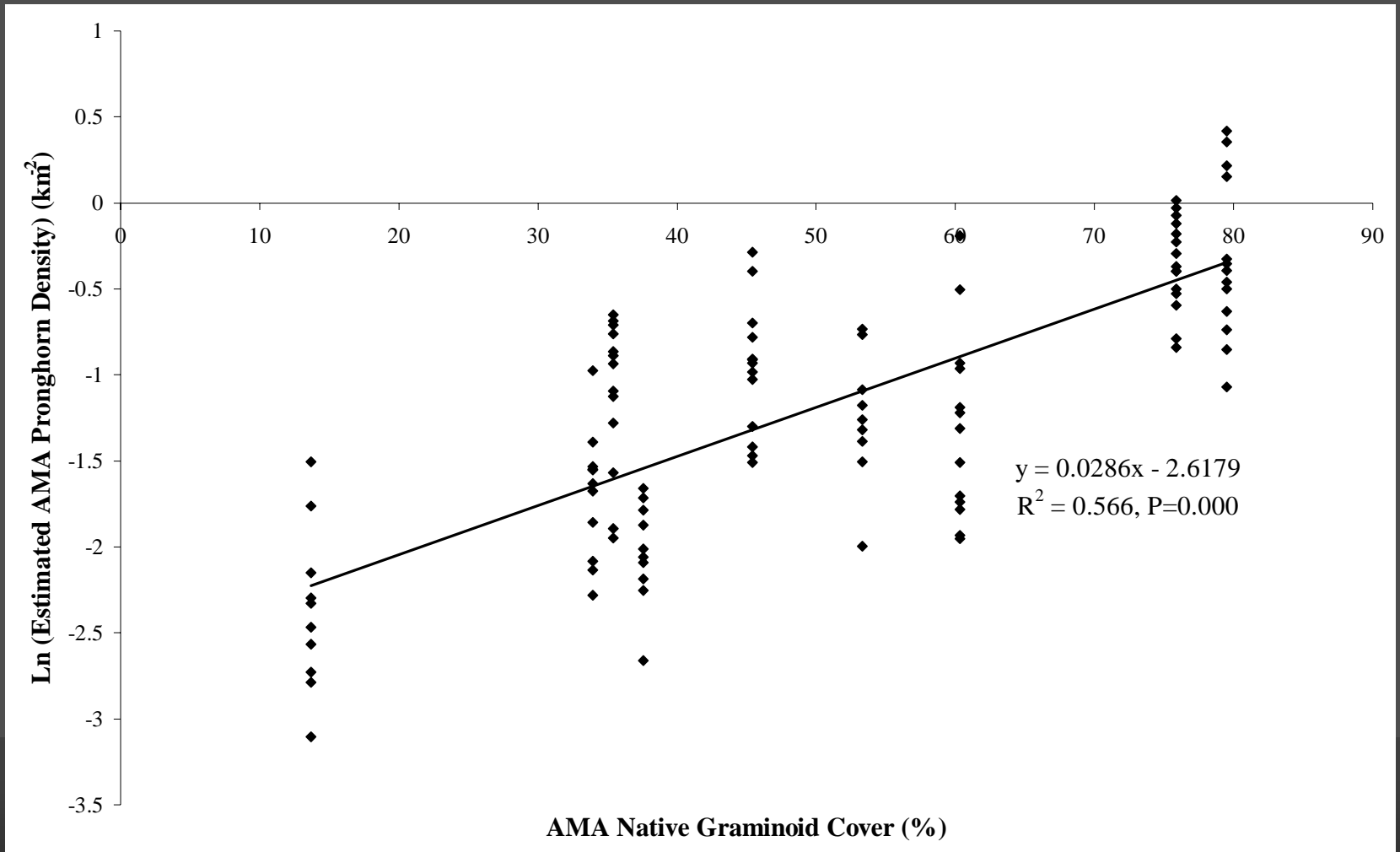
Assessing cumulative effects = appropriate scale?

Approximate Minimum Dynamic  
Area for NGP Processes and Species



# pronghorn - migration

- High affinity to grasslands (Sheriff 2006)



## pronghorn - migration

Dimorphism in life history  
- Agriculture vs native?

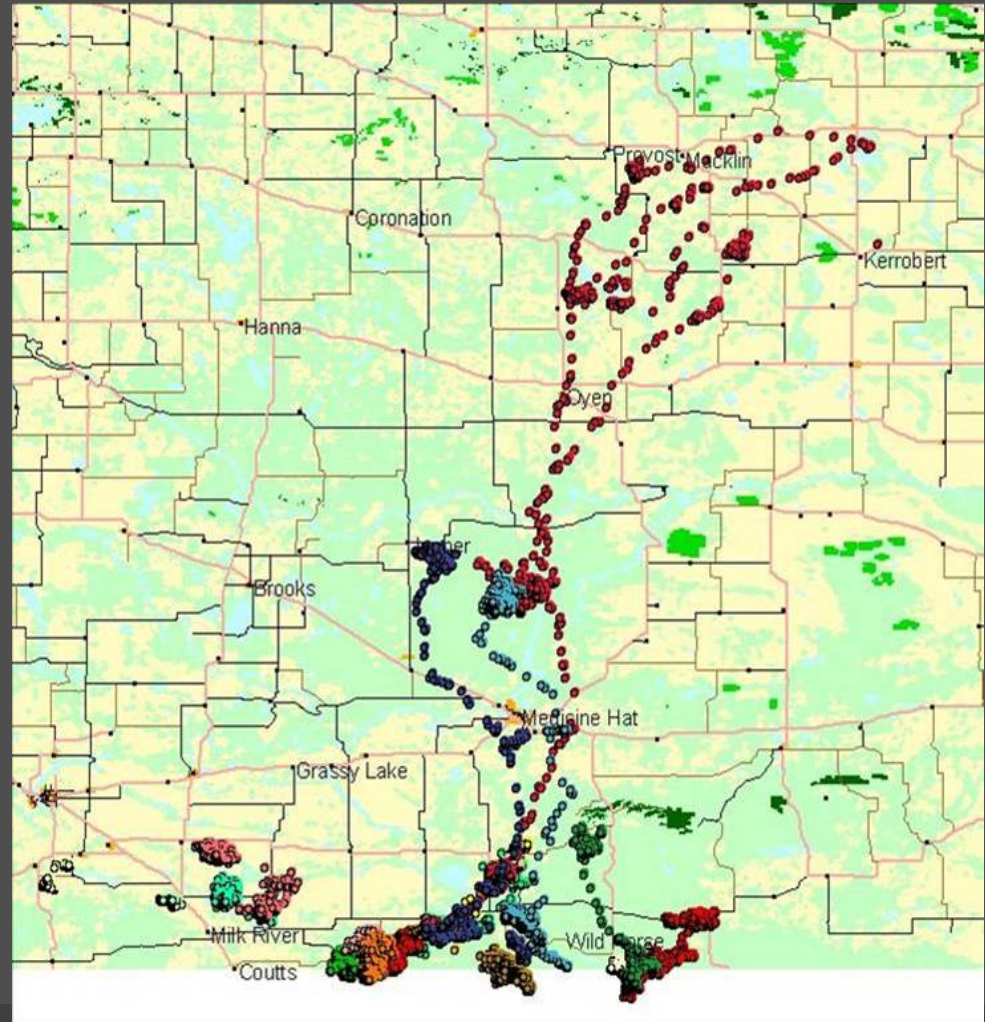
Source/Sink?

Thresholds to migration?

Current landscape status?

Importance to pronghorn

Importance to conservation





## pronghorn - research

**Katherine Sheriff (2006) Modeling Temporal And Spatial Variation In Pronghorn Antelope Population Dynamics In Southern Alberta In Relation To Environmental Gradients**

**Tobin Seagel (In preparation) Habitat Selection Of Pronghorn In Relation To Industrial Development Using Aerial Survey and GPS Relocations**

**Paul Jones and Mike Grue (In process) Resource Selection By Pronghorn Antelope In The Grassland Natural Region Of Alberta (Progress reports are available)**

**Mike Sutor (In process) Pronghorn Antelope Migration Ecology And Connectivity In The Northern Great Plains**

**Aune, Kunkel, Forrest, Gogan, Sullivan, Eslinger, et al., (Beginning!)**

## pronghorn – migration research

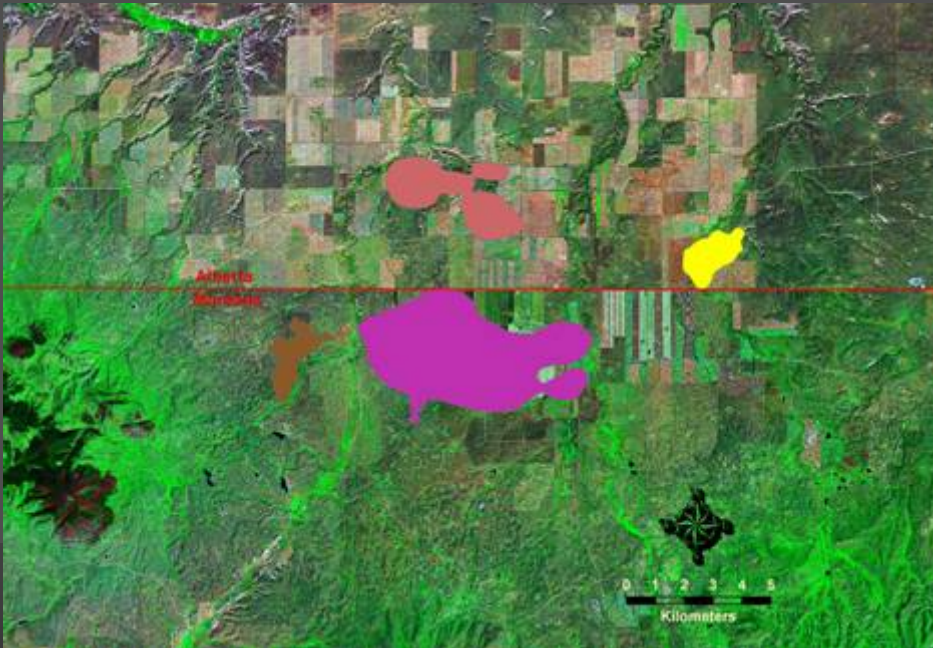
- *Understand ecology and mechanics of pronghorn movement with a particular emphasis on migration and differences between life history groups (i.e. LDM, short migration, residents).*
- *Assess the functional connectivity of pronghorn habitat in the current distribution of GPS collared individuals.*
- *Apply landscape connectivity parameters across Northern Sage Steppe Study area to determine key refuges, corridors, and areas for concentrated effort.*



# pronghorn – migration research

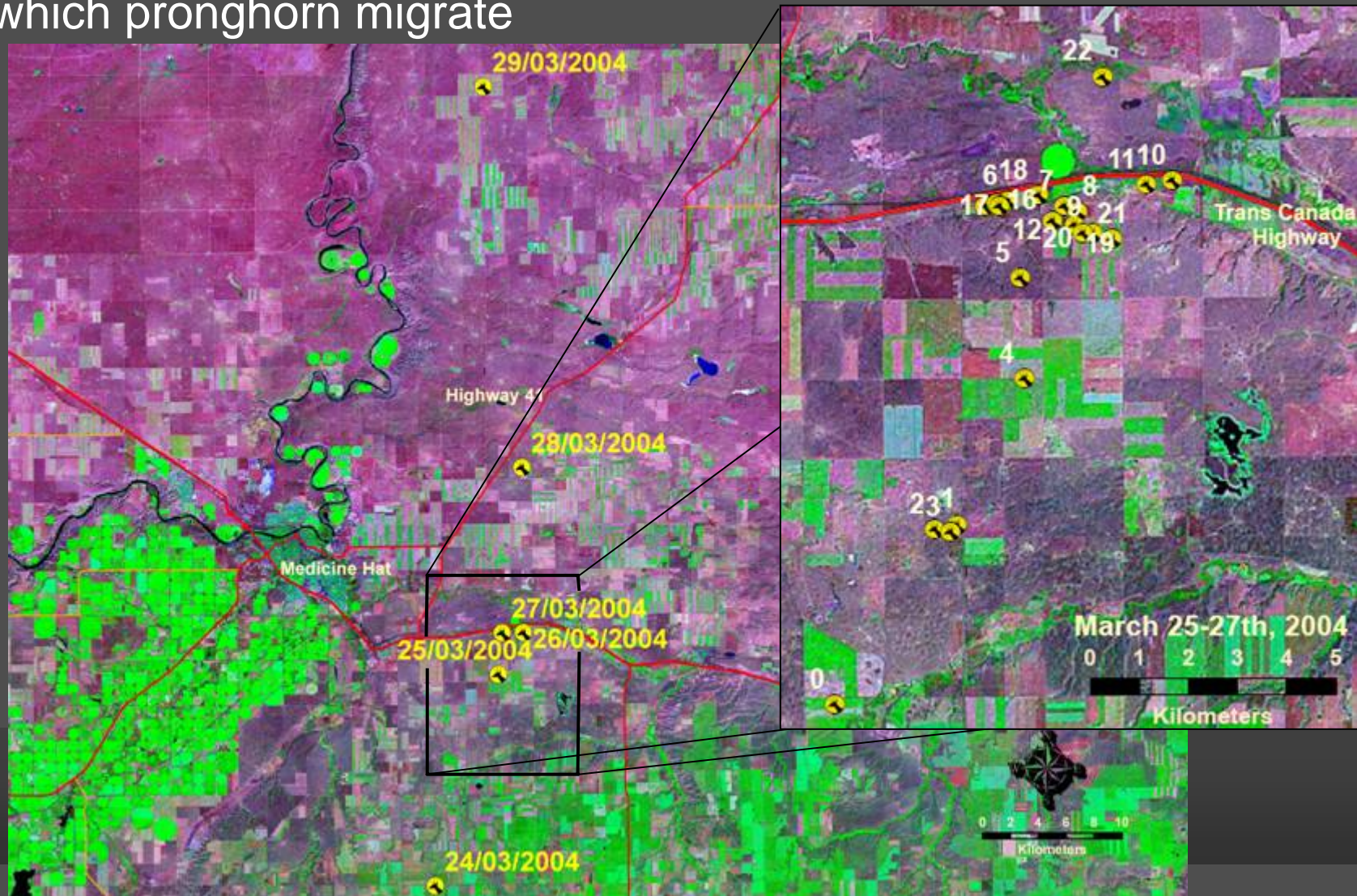
Examine:

- Home range, movement parameters, displacement
- Develop approach to classify migrators/residents/others
- Fawning/Early summer range
- Examine landscape effects on movement parameters



# pronghorn – migration research

The cumulative effect of disturbances may influence the degree to which pronghorn migrate



## pronghorn – migration research

- West AB = no migration, high disturbance, low density
- East AB = various LH, low disturbance, high density

- Fences?
- Highways?
- Human density?
- Habitat?
- Hunting?
- Cumulative?



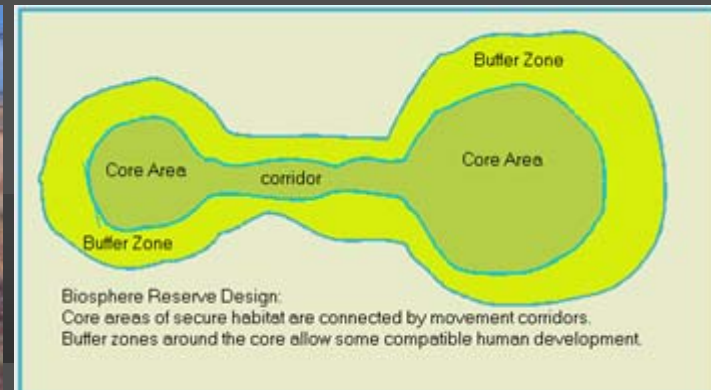
## pronghorn - conservation

- Residents and bad weather (shifting climate?)
- No migrators = lack of movement capability in area?
- Reduced resilience (narrowing of diversity) means narrowing prospects in northern distribution (O’Gara and Yoakum 2004)
- Key is to understand thresholds in relation to spatial disturbance



## pronghorn - connectivity

- To conserve, we must begin to understand responses  
Non-Barrier: Gavin, Seagel, Berger
- Will identify: potential sources/sinks  
cores and corridors  
filters and barriers  
areas of conflict – thresholds
- Logical step is to assess landscape and map it
- Where are opportunities, where are threats?



## pronghorn - indicator

- Endemic vertebrates most sensitive to change in ecological drivers = indicator species (Knopf and Samson 1996)

Obligate grassland species - representative

Remains widely distributed

Sufficient abundance to measure responses

Known to undertake LDM

Sensitive to land use (habitat selection, demography, movements)

Charismatic, esthetic value

Higher social tolerance than elk or deer

Valued as big game species

Listed by Alberta – Sensitive: climate influences dynamics; limited distribution in Alberta

Sufficient background data available for formulating adaptive management

Ongoing population monitoring



## pronghorn – Northern Sage Steppe (NSS)

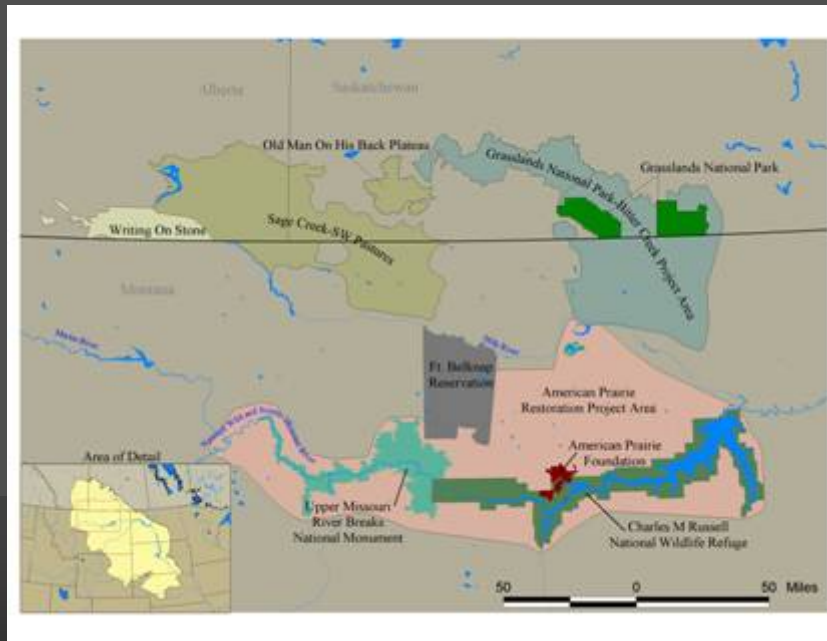
- Apply AB thresholds to whole landscape (AB/Sask/Montana)
- Test with replicate study and refine accordingly
- Results of this study and others (RSF, Population) will be integrated and replicated in Montana



## pronghorn – NSS conservation

Primary question is one of landscape ecology and scale:

1. How large for success
2. Configuration of landscape components
3. What scales do mammal populations function - metapopulation?
4. Ecologically effective densities and distributions for resilience
5. Costs of prairie degradation and benefits of restoration



## pronghorn – Transboundary Research

- Montana's hypotheses more refined:
- **Large mammal predator prey systems require space (sensu Bergerud) prey needs space to space away from predators, predators require space to support necessary prey abundance – fencing, roads, dams, ag prevent that, therefore:**
  - **Fawn recruitment and pronghorn density will differ in areas differing in levels of fragmentation especially as caused by fencing and roads;**
  - **Human developments/fragmentation have limited the space necessary for populations to perform at robust levels;**
  - **Pronghorn populations are at low levels of resilience in fragmented landscapes;**
  - **Source populations of pronghorn in large tracts of native grass sustain sink populations of pronghorn in fragmented landscapes.**

## pronghorn – Transboundary research outcomes

- Estimate potential carrying capacity of landscapes with various levels of fragmentation
- Estimates of size of area, juxtaposition, and fragmentation thresholds to sustain high density source subpopulations of pronghorn that serve as buffers to increasing temporal and spatial sinks
- Estimate resiliency of high density source subpopulations to mortality and surrounding sinks
- Map of potential constellation of stepping stones of high quality habitat to ensure migration and connectivity for pronghorn from the Missouri to the Red Deer rivers
- Estimates of how large and of what configuration of cores, buffers, corridors, sinks, and sources needed across the landscape to sustain long term viability of robust pronghorn populations in the NGP
- Determine landscape management strategies necessary to sustain long term viability of robust pronghorn populations in the NGP

# pronghorn – way forward

