CPW Migration Corridor Mapping

Michelle Cowardin - Wildlife Movement Coordinator

CPW Wildlife Commission

April 5, 2024

Photo credit: J. Fielder

Presentation Outline

- Migration Corridor Mapping
  - Purpose and Need
  - Data Review
  - Mapping Process
- Transportation Updates
  - Wildlife Transportation Alliance
  - Safe Passage Fund
  - Wildlife Crossing Project Updates

Photo credit: R. Spitzer

Migration Corridors

- Increased local, state and federal interest in migration corridors
  - 2018 DOI SO3362
  - 2019 Governor EO -Big Game Winter Range and Migration Corridors

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  - 2018 DOI SO3362
  - 2019 Governor EO -Big Game Winter Range and Migration Corridors
- 2021 CPW Wildlife Movement Coordinator position created
- Data Needs
  - Land use planning
  - Internal program needs
  - Habitat projects and land protection funding opportunities

GPS Collar Data

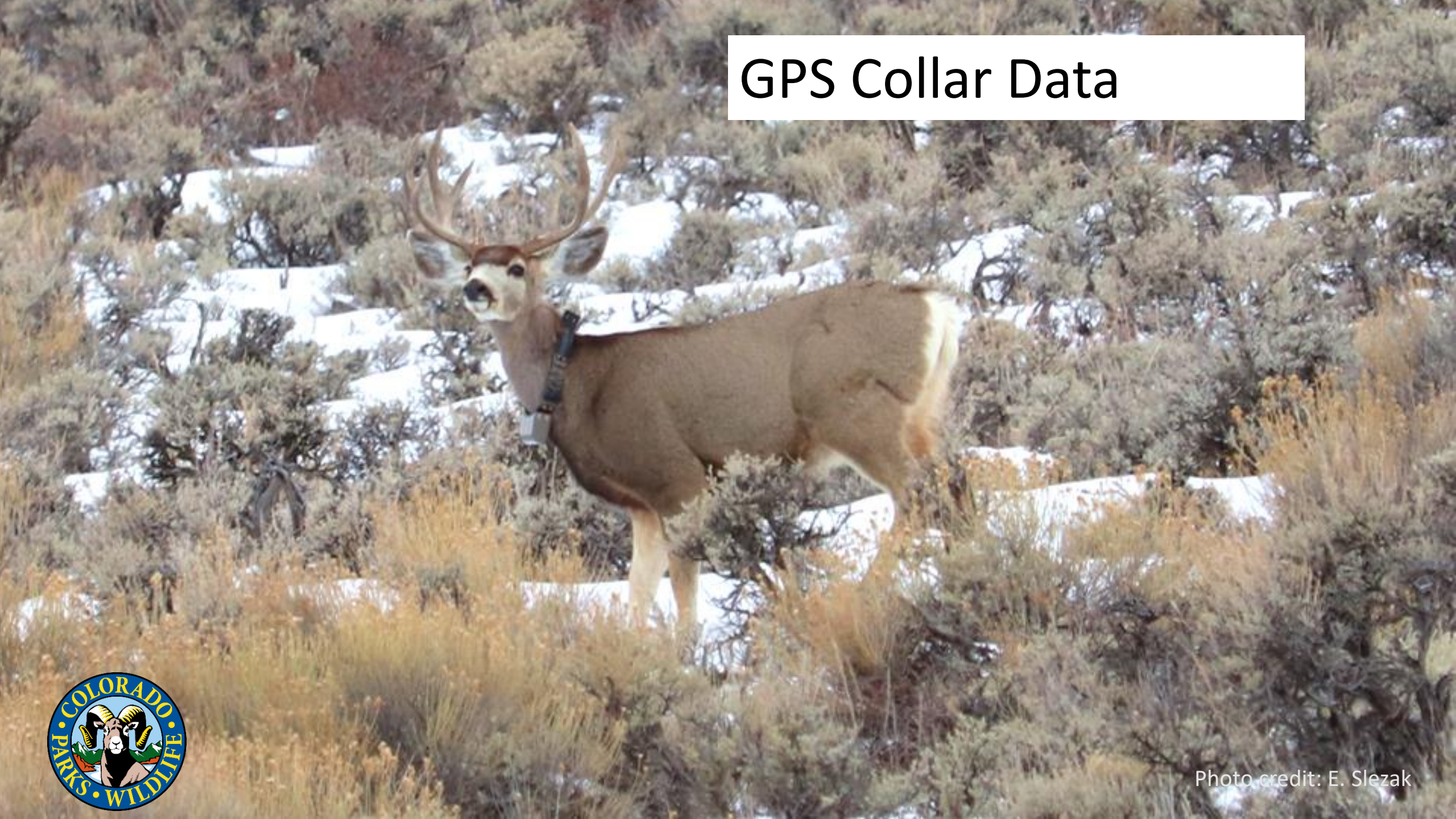


Photo credit: E. Slezak

Spring 2022 GPS Collar Data Gathering Effort*

Species	Total Collared Animals	Location Points Collected
Elk	758	1,780,148
Mule Deer	1020	2,078,776
Pronghorn	91	73,977
RM Bighorn Sheep	297	681,606
Desert Bighorn Sheep	104	359,237
	Total	**4,973,744**

*Beaupre, C. 2022. *Animal Sample Size Guidelines for Mapping Migrations and Distribution with GPS Collars.* MS in Ecology, Western Colorado University.

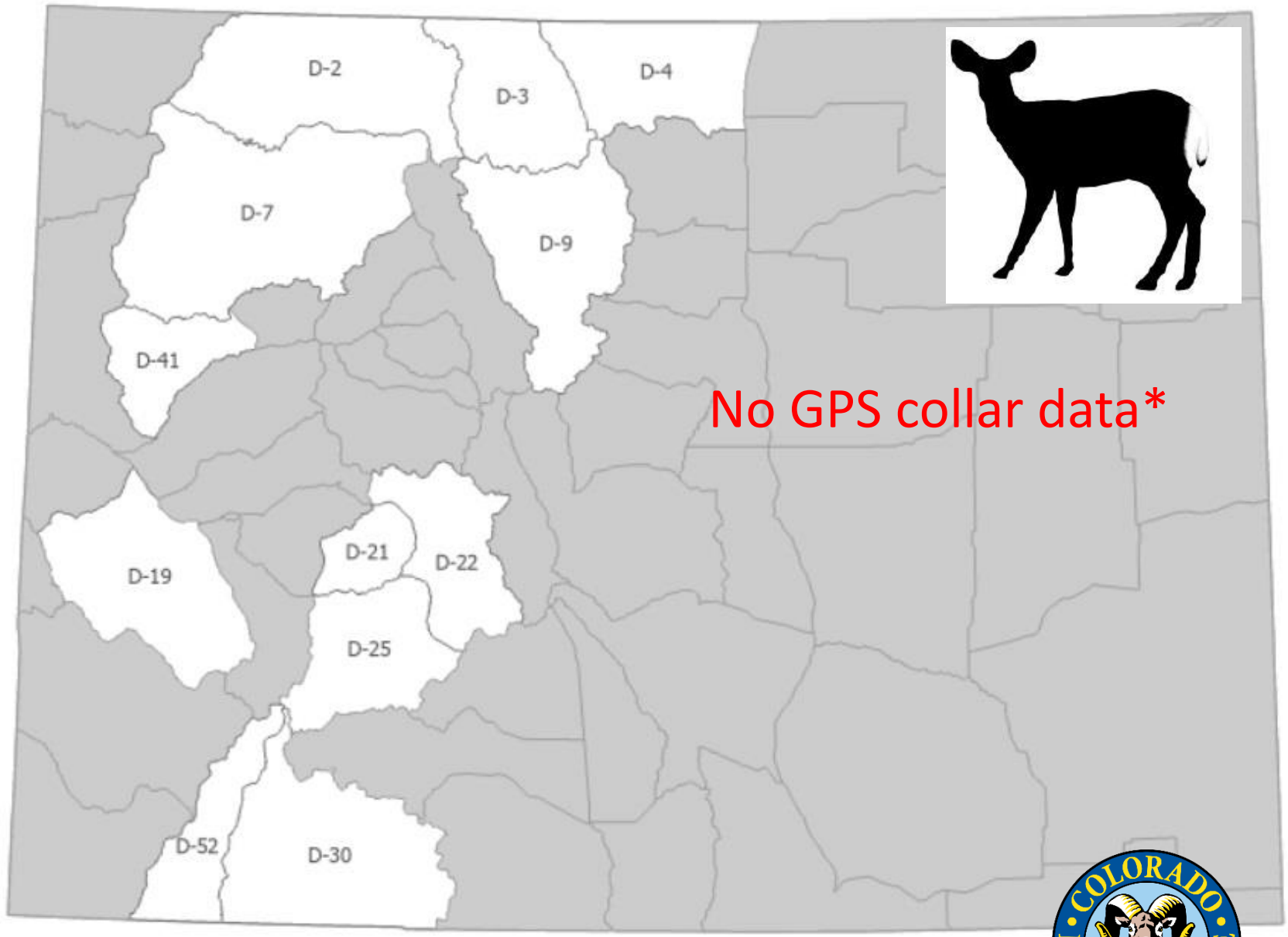
*Spring 2022 Analysis
Mule Deer GPS Collar Data

2,078,776 points

1,020 migrating individuals

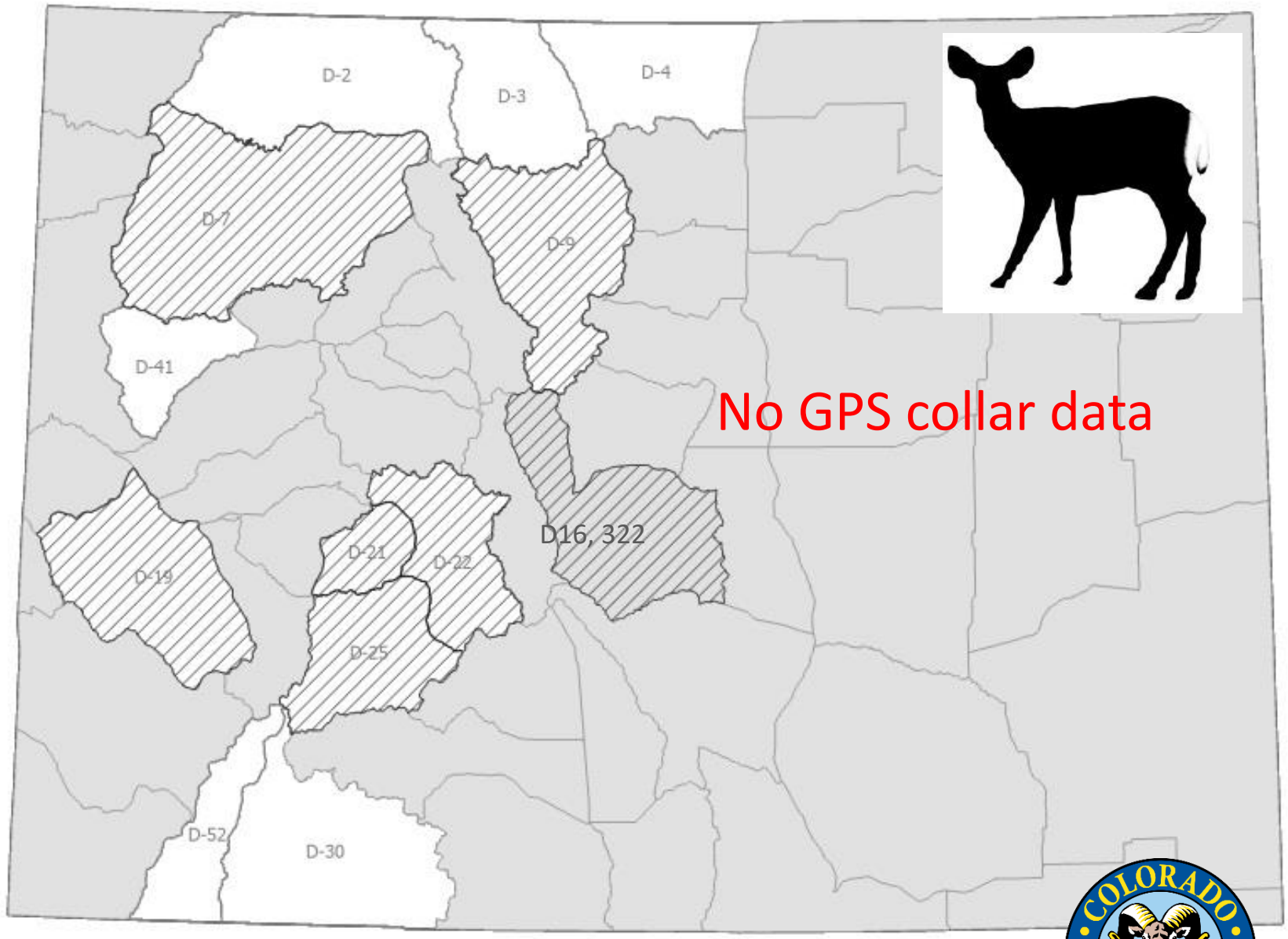
Gray = No GPS Data

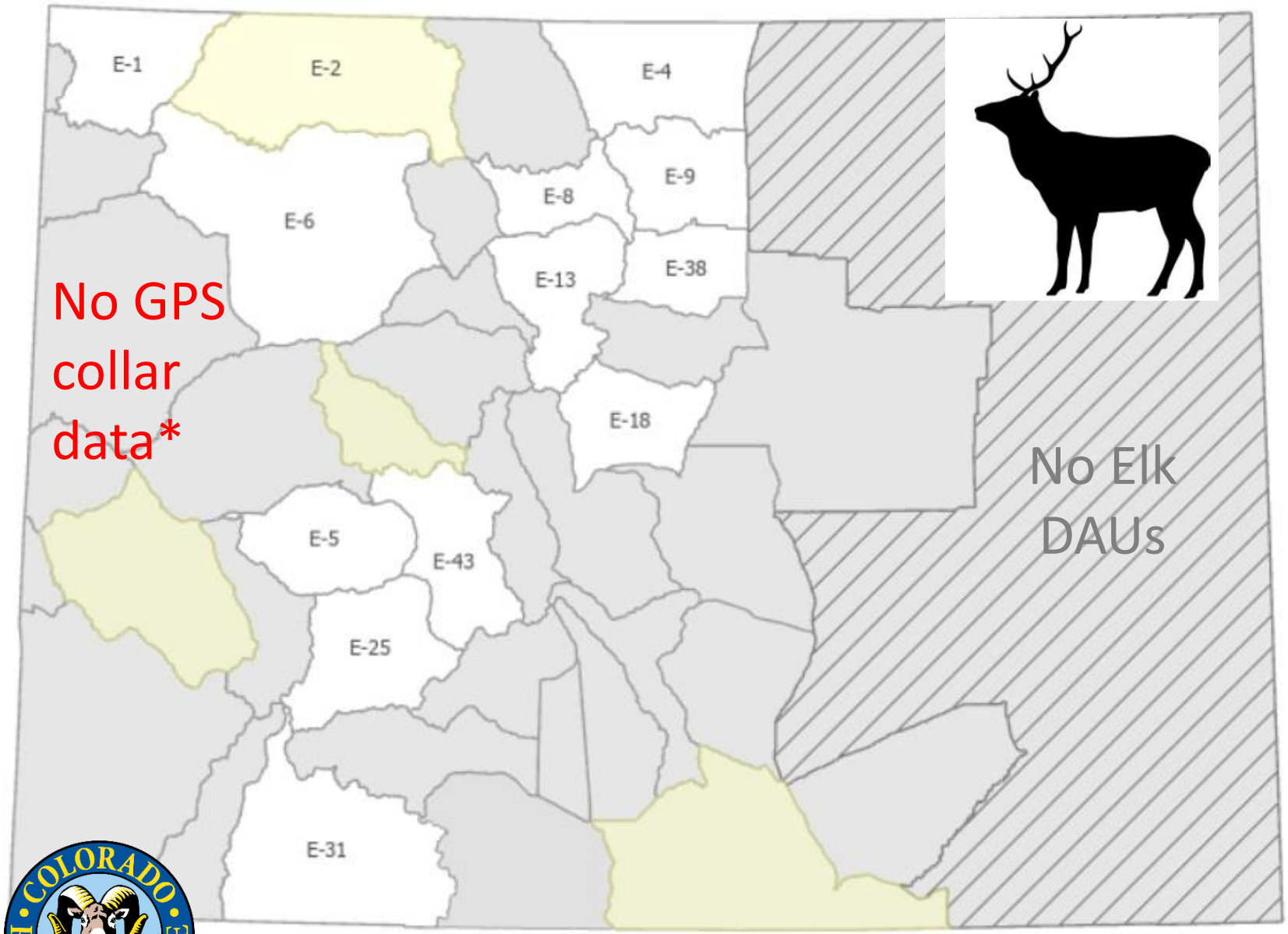
D30: data collected in collaboration with the Southern Ute Indian Tribe



CPW Mule Deer Survival Study Analysis Units

- Study objective: herd survival
- Study start dates: 1997 - 2007
- Transitioning from VHF to GPS collars
- GPS fix rate 12-13 hours to maximize collar life





*Spring 2022 Analysis Elk GPS Collar Data

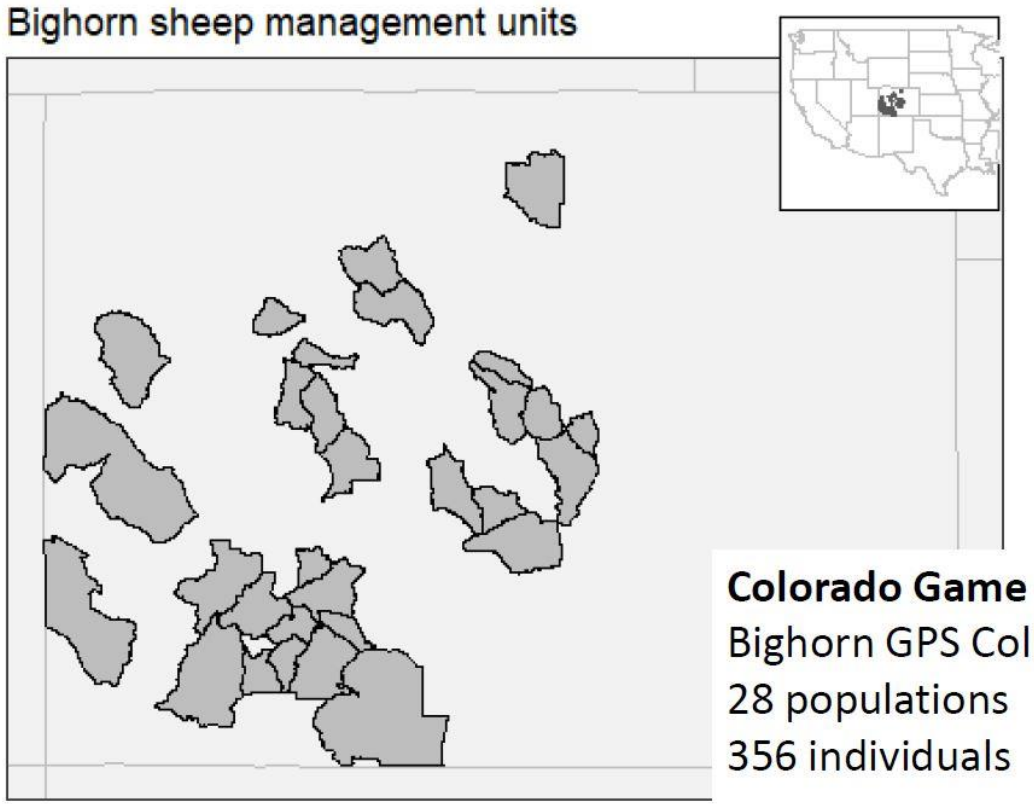
1,780,148 points

758 migrating individuals

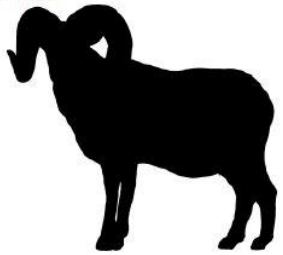
Gray = not sampled

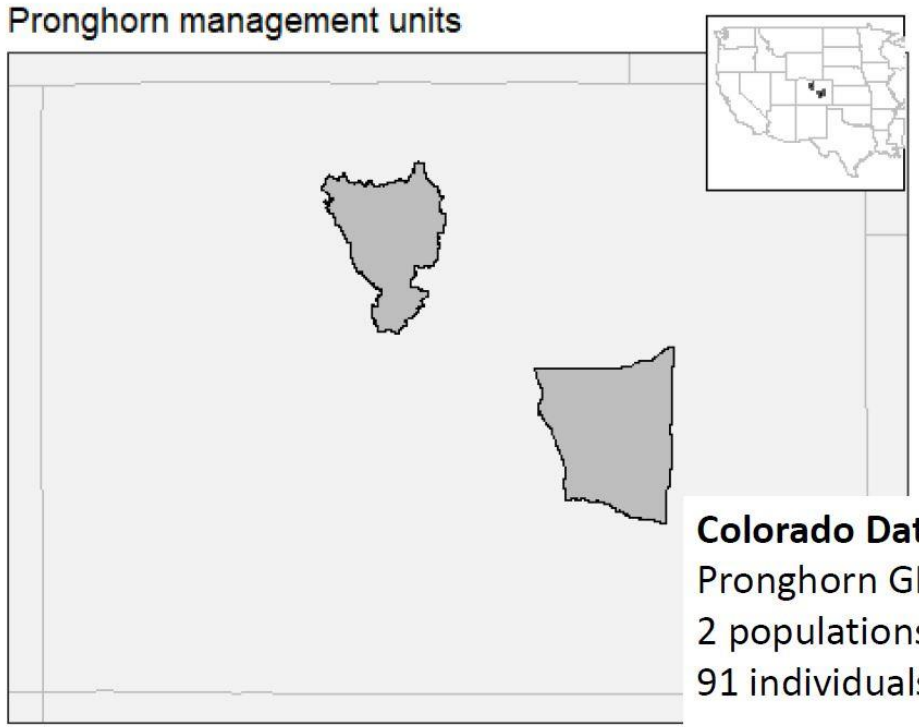
E31: data collected in collaboration with the Southern Ute Indian Tribe

Bighorn Sheep GPS Collar Data
Range 2007-2022 Studies

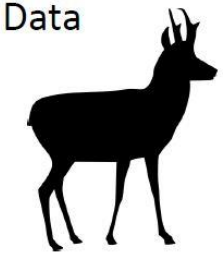


Colorado Game Management Units
Bighorn GPS Collar Data
28 populations
356 individuals





Colorado Data Analysis Units
Pronghorn GPS Collar Data
2 populations
91 individuals



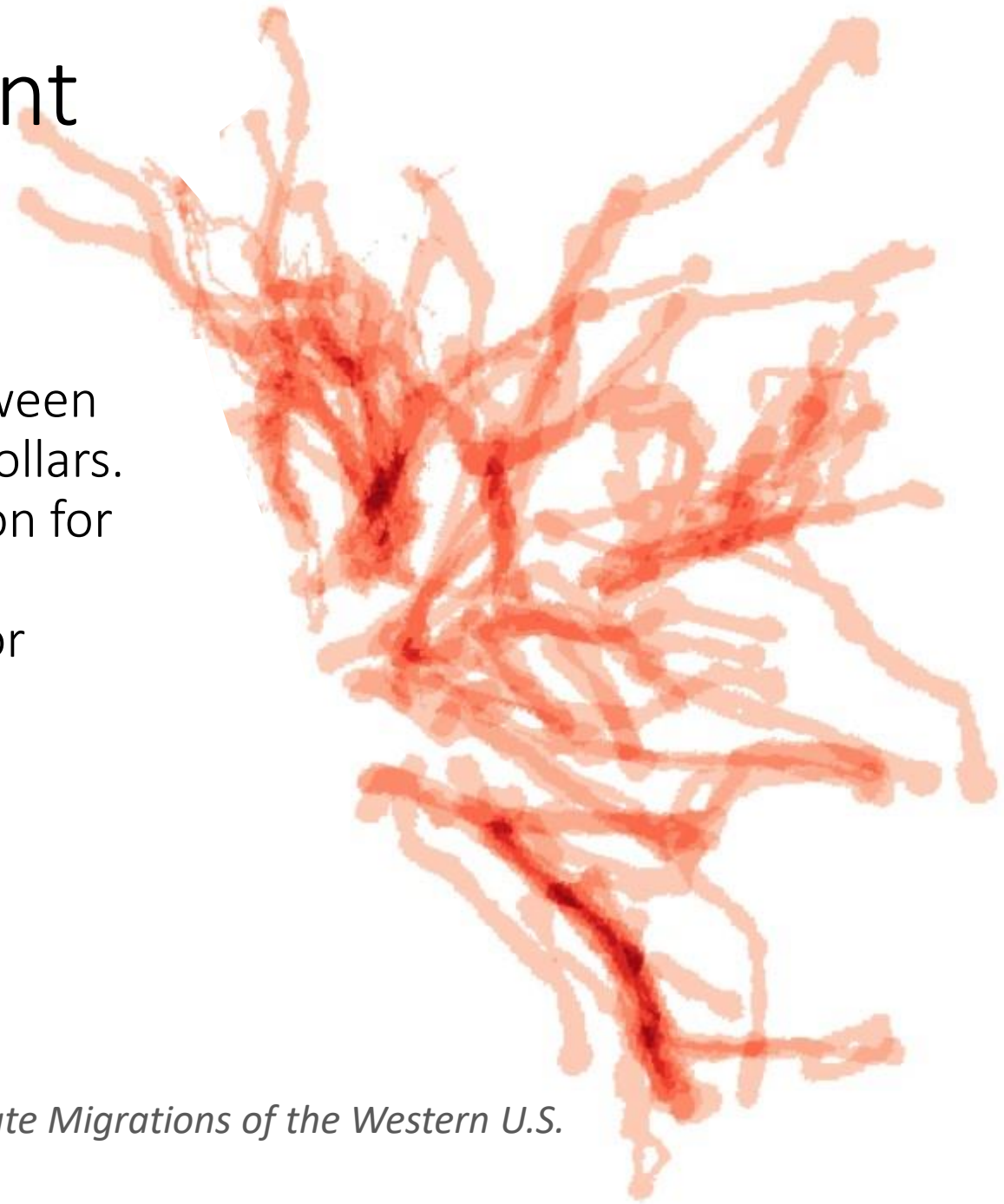
Pronghorn GPS Collar Data
Range 2016-2022

Migration Analysis

Photo credit: CPW

Brownian Bridge Movement Models (BBMM)*:

- Estimates the expectant movement path between identified migration points collected by GPS collars.
- Produces a heat map for each animal migration for each season and year.
- Stacks heat maps for all individuals in a herd or defined sub-herd.



**Horne et al. 2007. Ecology*
**Sawyer et at. 2009. Ecological Applications*
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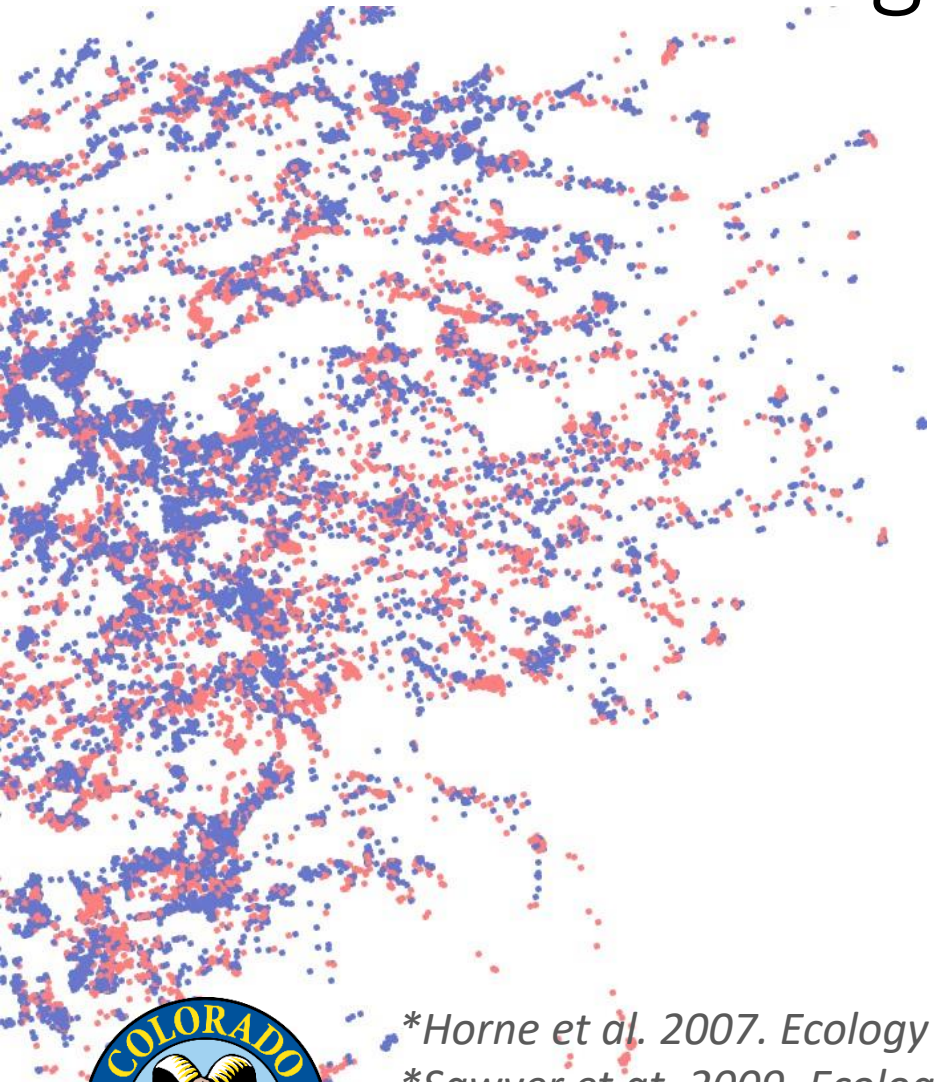

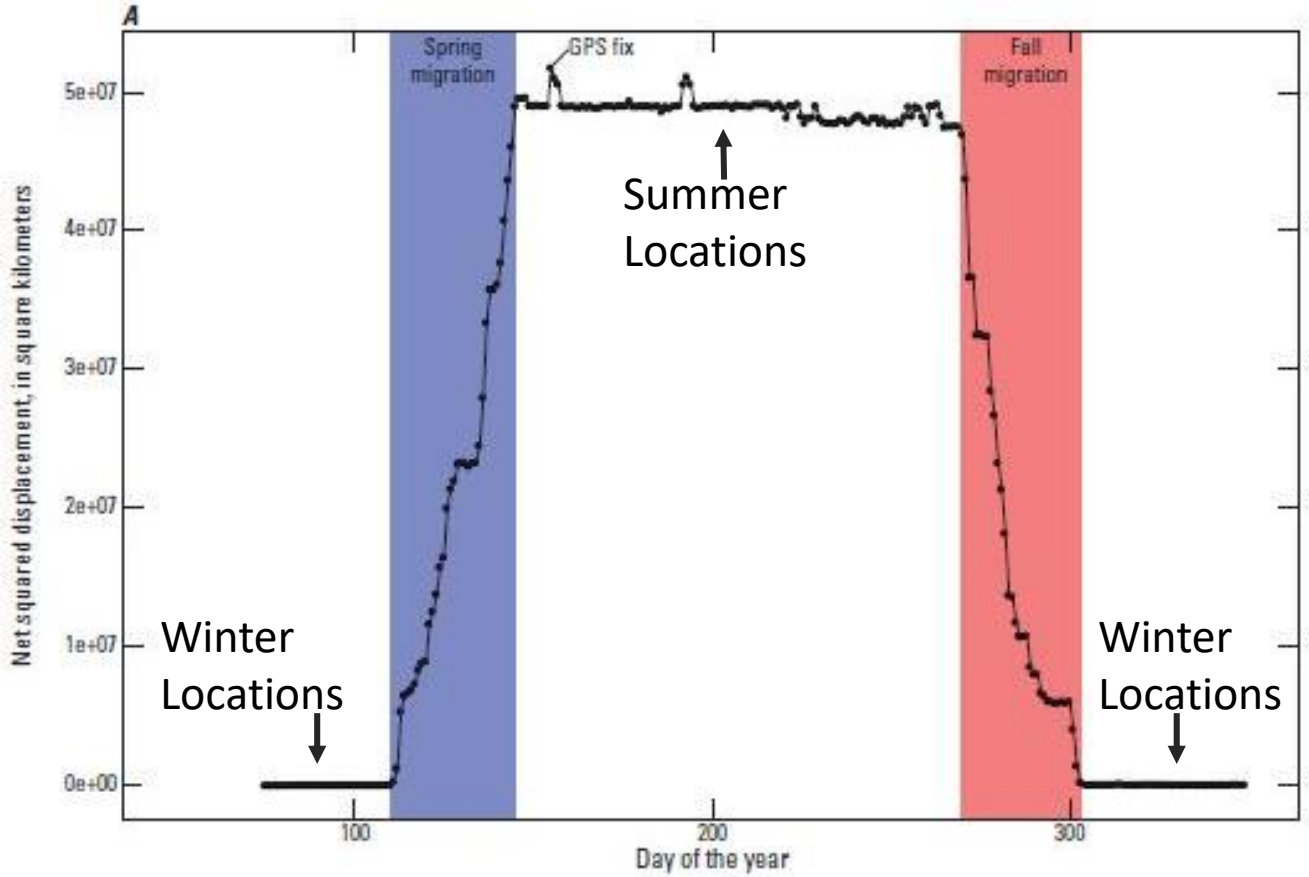

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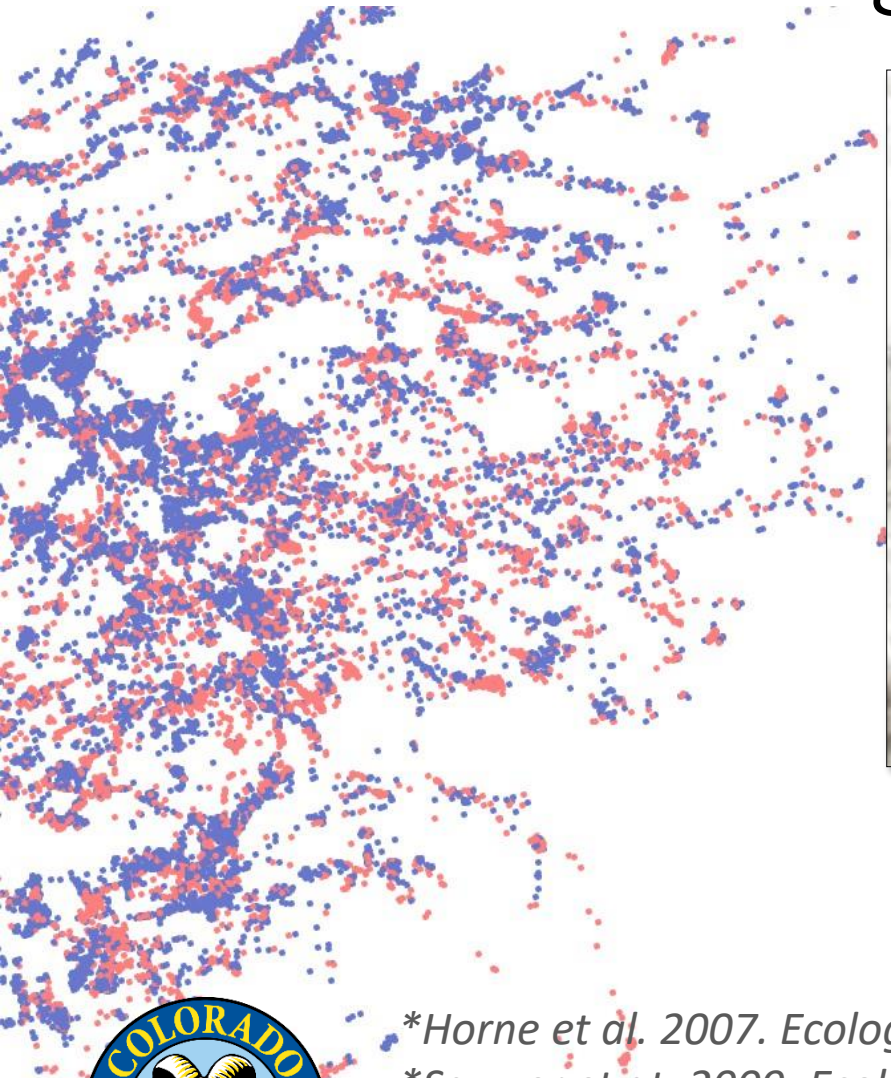

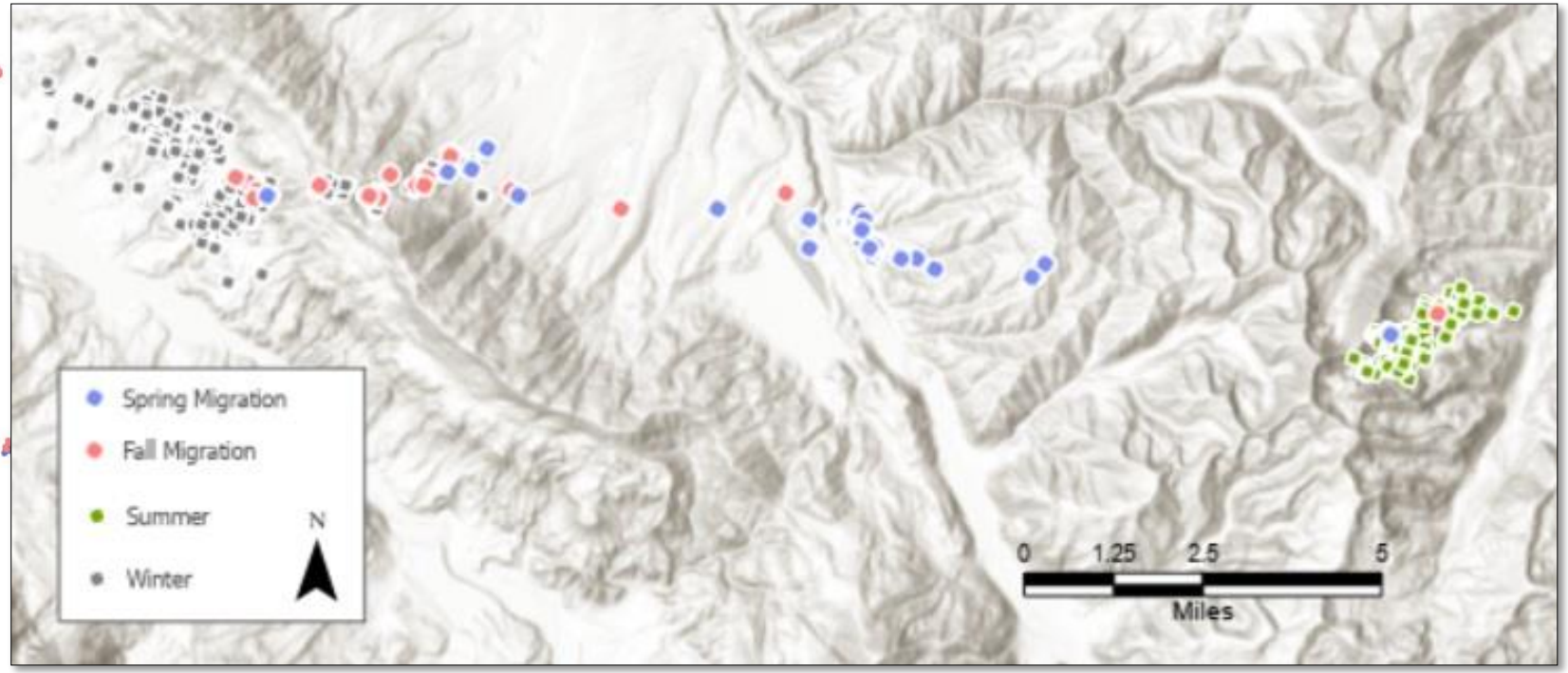

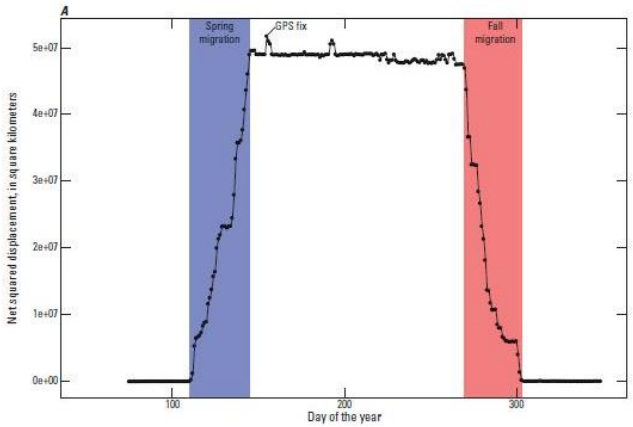

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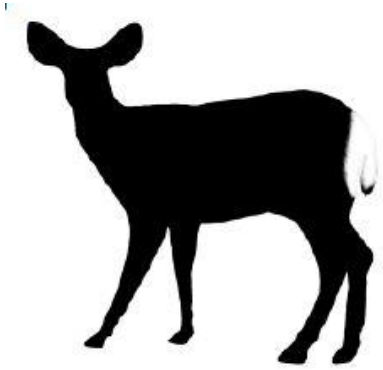
Brownian Bridge Movement Models (BBMM*):

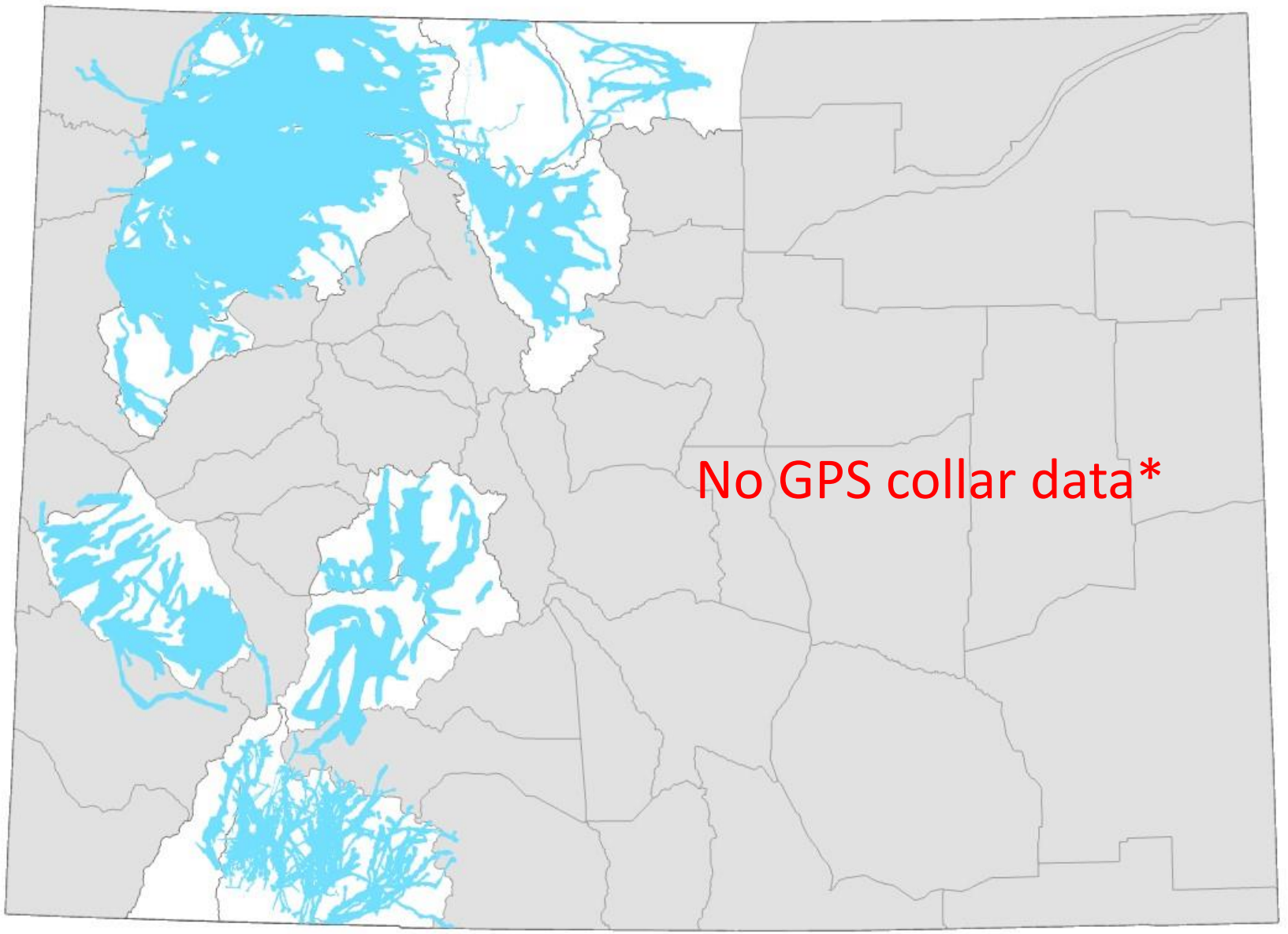
- Results are based on GPS point locations.
- Width of corridors are affected by time interval or GPS collar fix rate between points.
- BBMM does not extrapolate environmental variables to ‘model’ the migration corridors.

**Horne et al. 2007. Ecology*
**Sawyer et at. 2009. Ecological Applications*
**Kauffman et al. 2020. Volume 1: USGS Ungulate Migrations of the Western U.S.*

Photo credit: Wayne Lewis

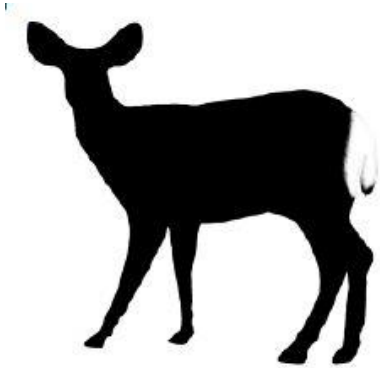


Migration Range: *Spring 2022 BBMM Analysis of Mule Deer GPS Collar Data



BBMM Migration Range

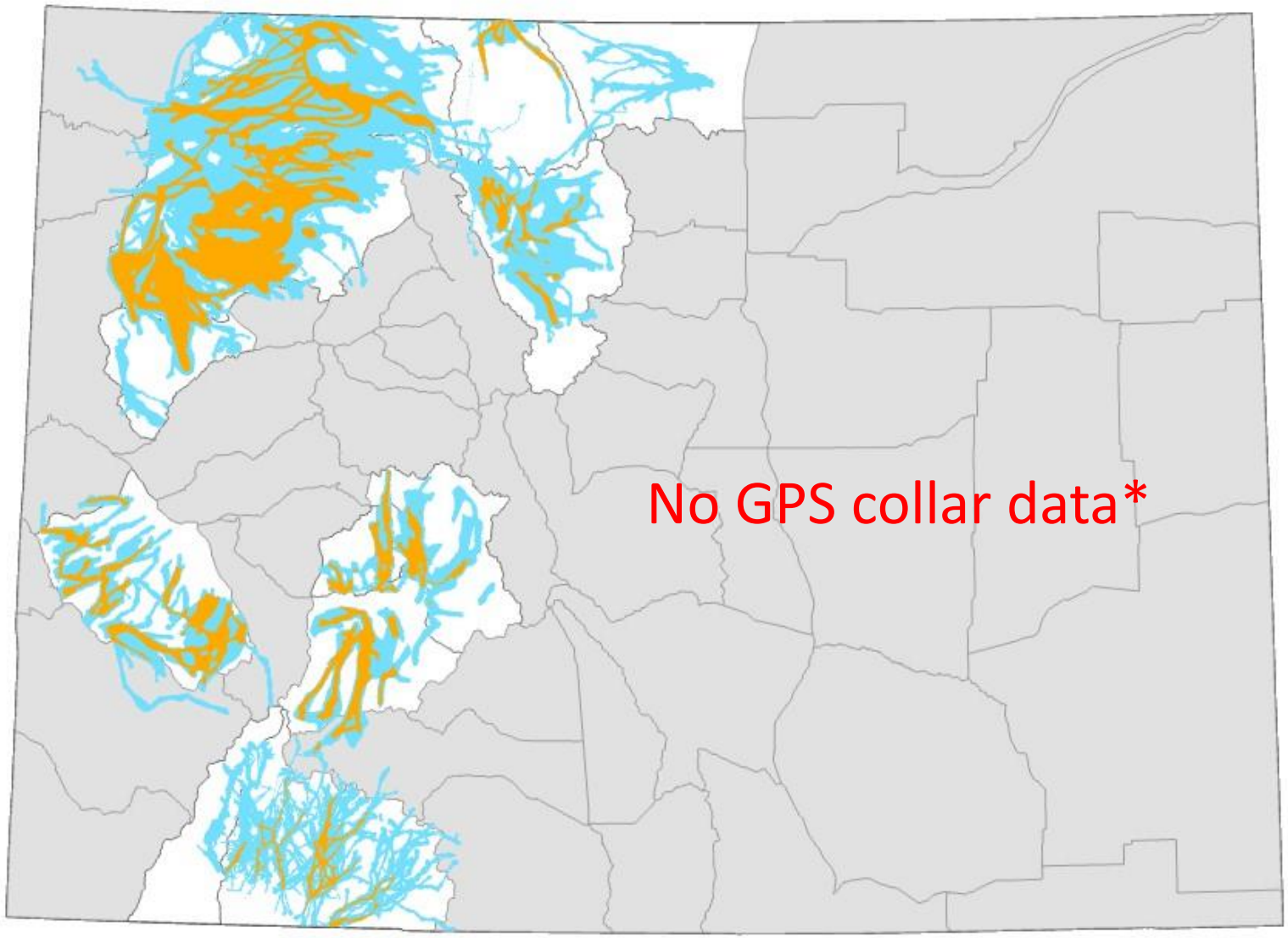
Migration Range: An area suitable for use by migrating animals to move between seasonal ranges, regardless of the number of individuals.



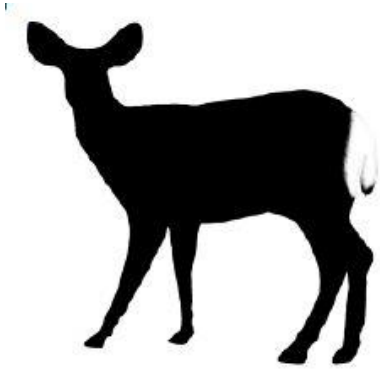
*Spring 2022 BBMM Analysis of Mule Deer GPS Collar Data

BBMM Migration Corridors

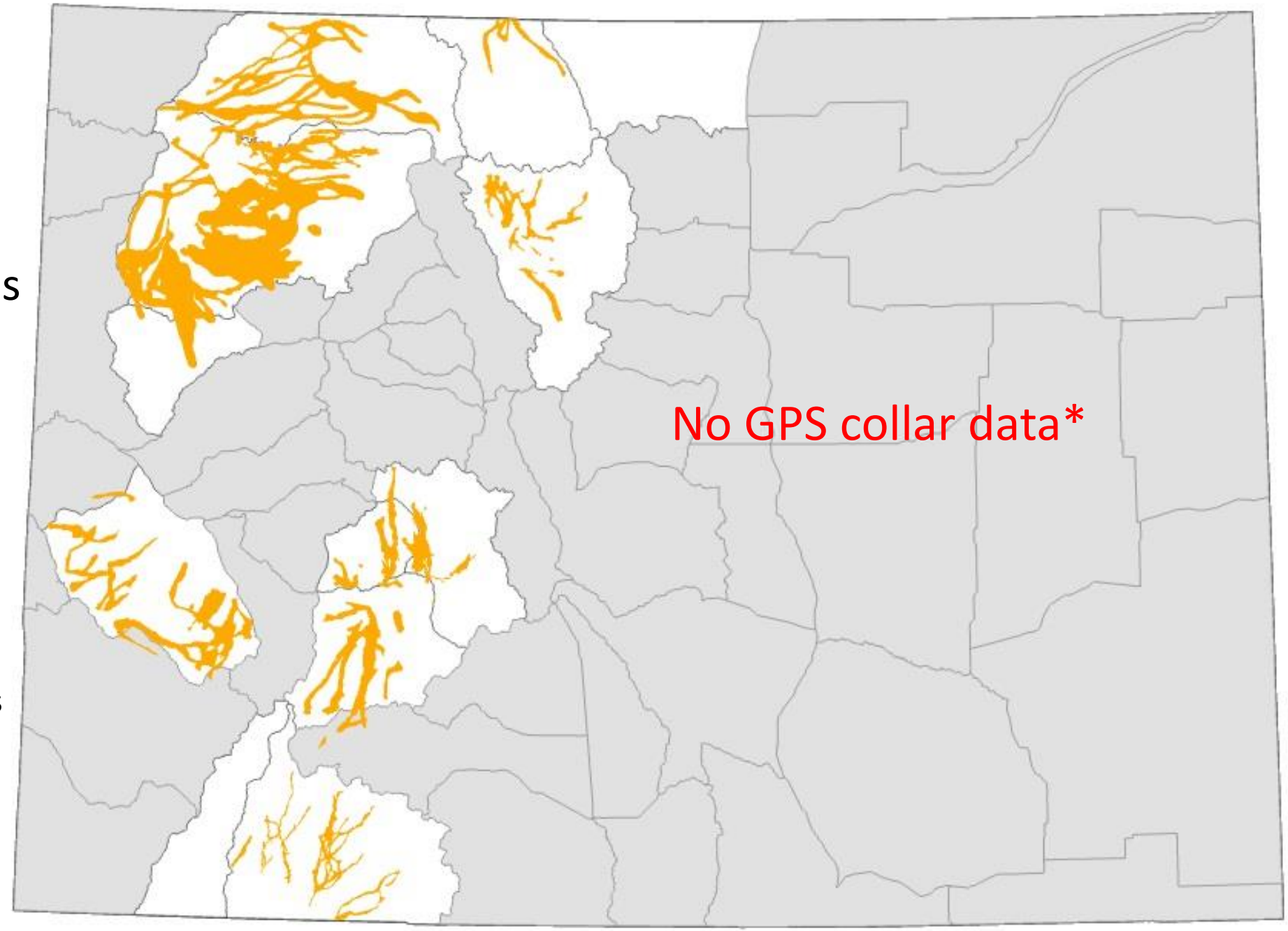
BBMM Migration Range



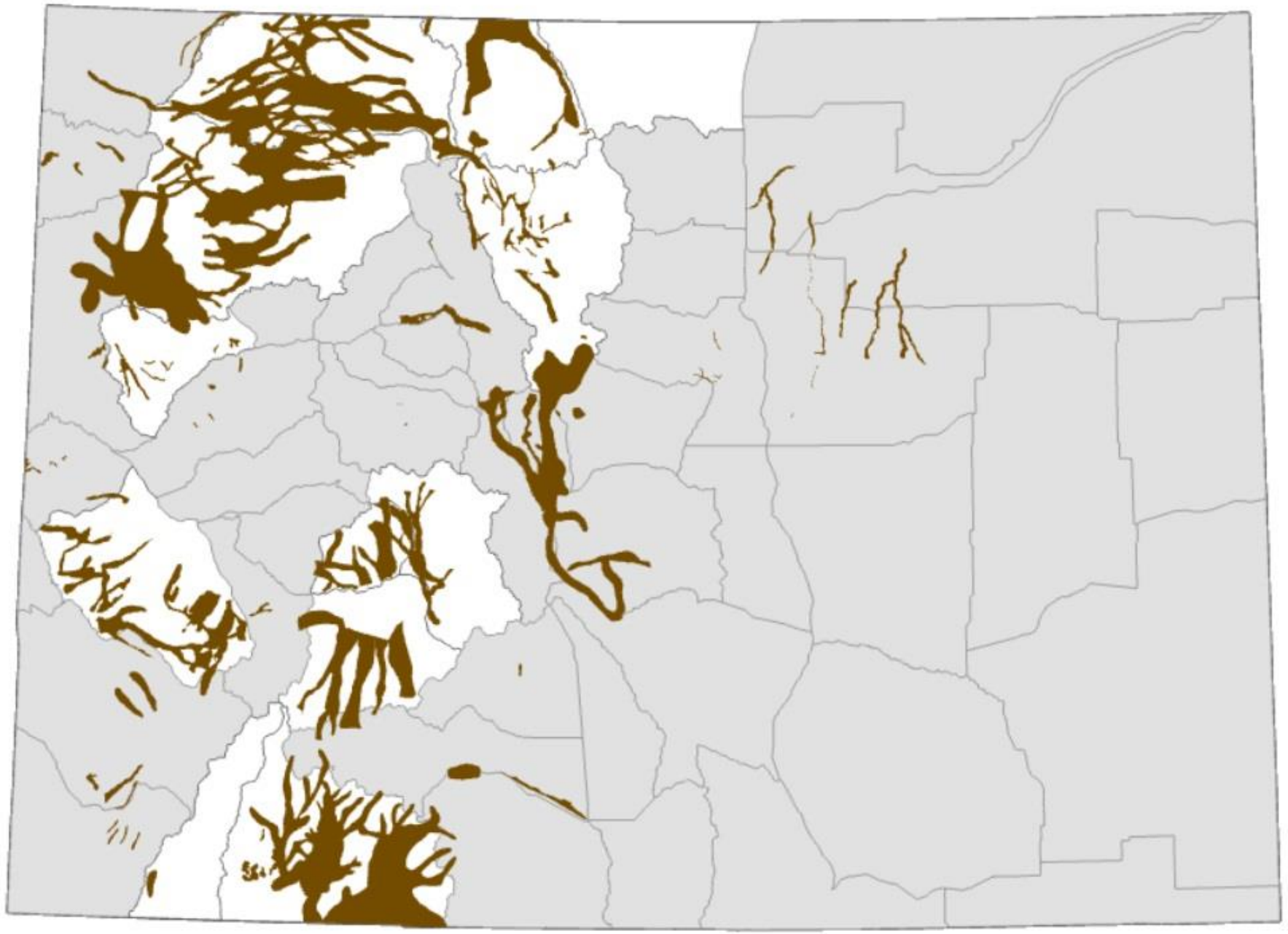
Migration Corridor: A specific geographic area that facilitates movement between seasonal habitat ranges and receives higher use than the surrounding landscape, relative to herd or population use, and loss of which would disrupt migration.



*Spring 2022 Analysis Mule Deer GPS Collaring Projects in only 12 of 52 DAU



BBMM Migration Corridors



Best Available Mule Deer Migration Corridor Data Combines a Data Driven Approach and Staff Mapping

2023 CPW Species Activity Map (SAM) Mule Deer Migration Corridors

Photo credit: CPW

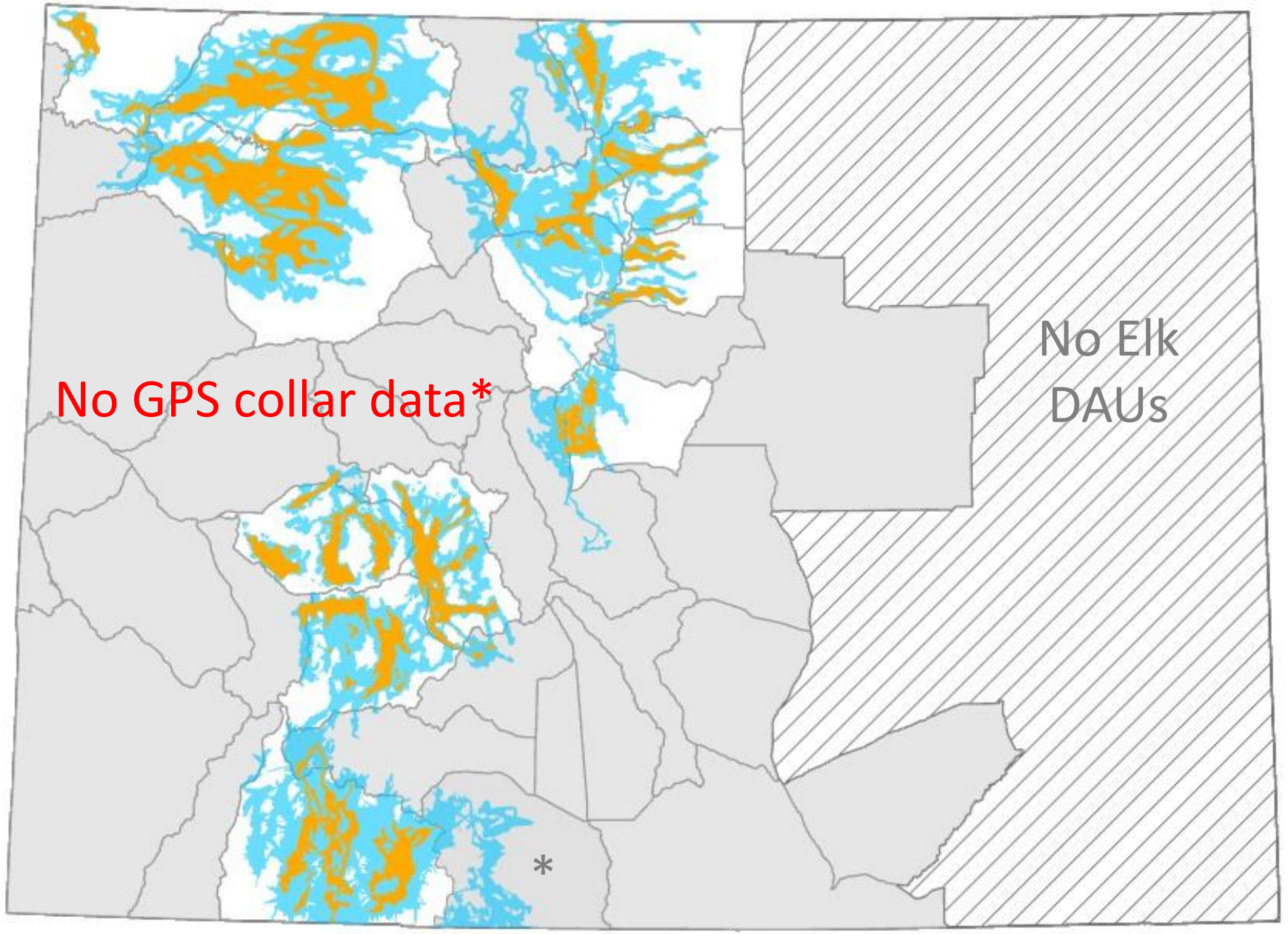
*Spring 2022 Analysis Elk GPS Collar Data

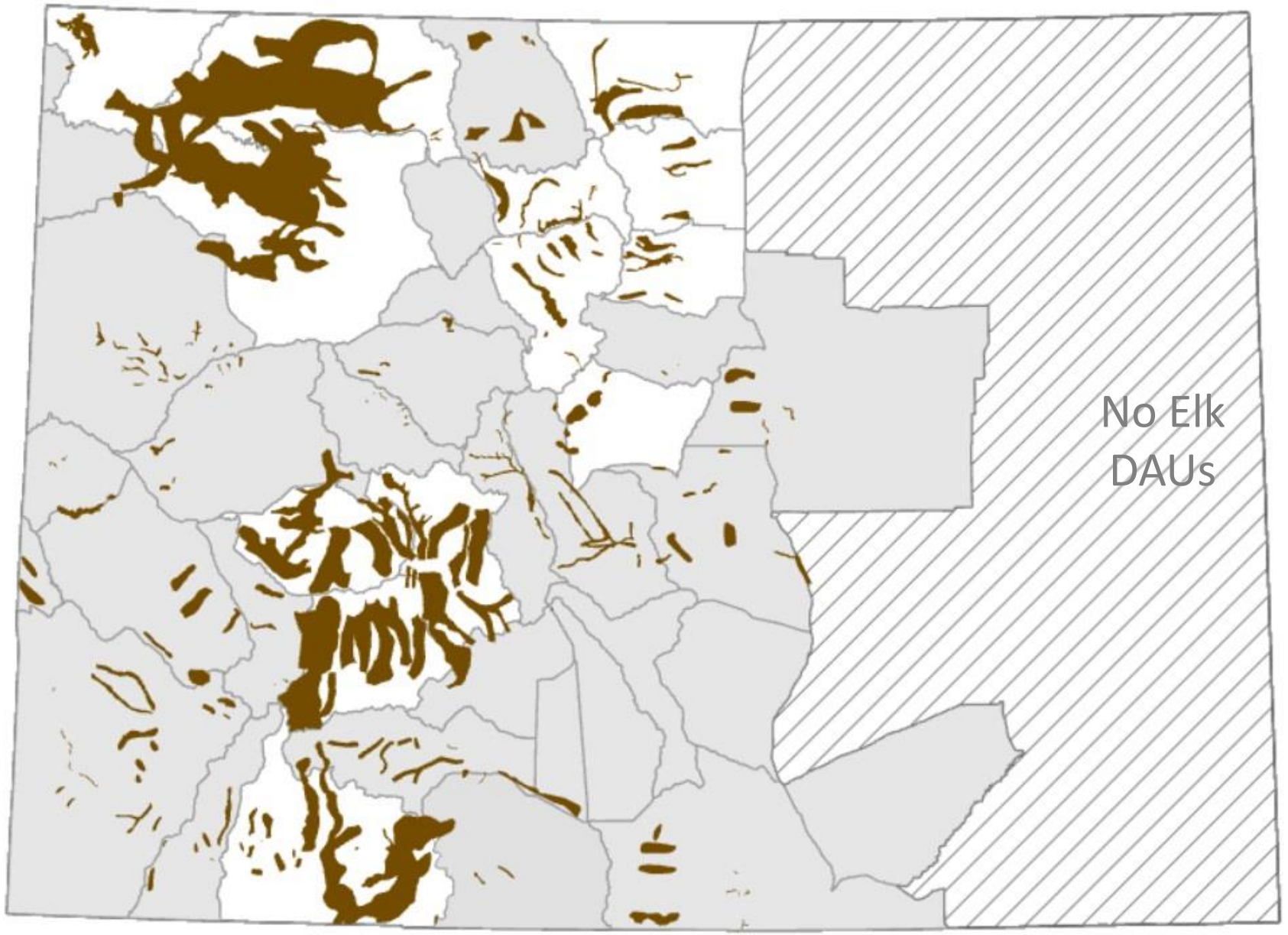
BBMM Migration Corridors

BBMM Migration Range

Gray = No GPS Data

Note: E-31 in collaboration with SUIT





Best Available Elk Migration Corridor Data Combines a Data Driven Approach and Staff Mapping

2023 CPW Species Activity Map (SAM) Elk Migration Corridors

Migration Data Wrap-up

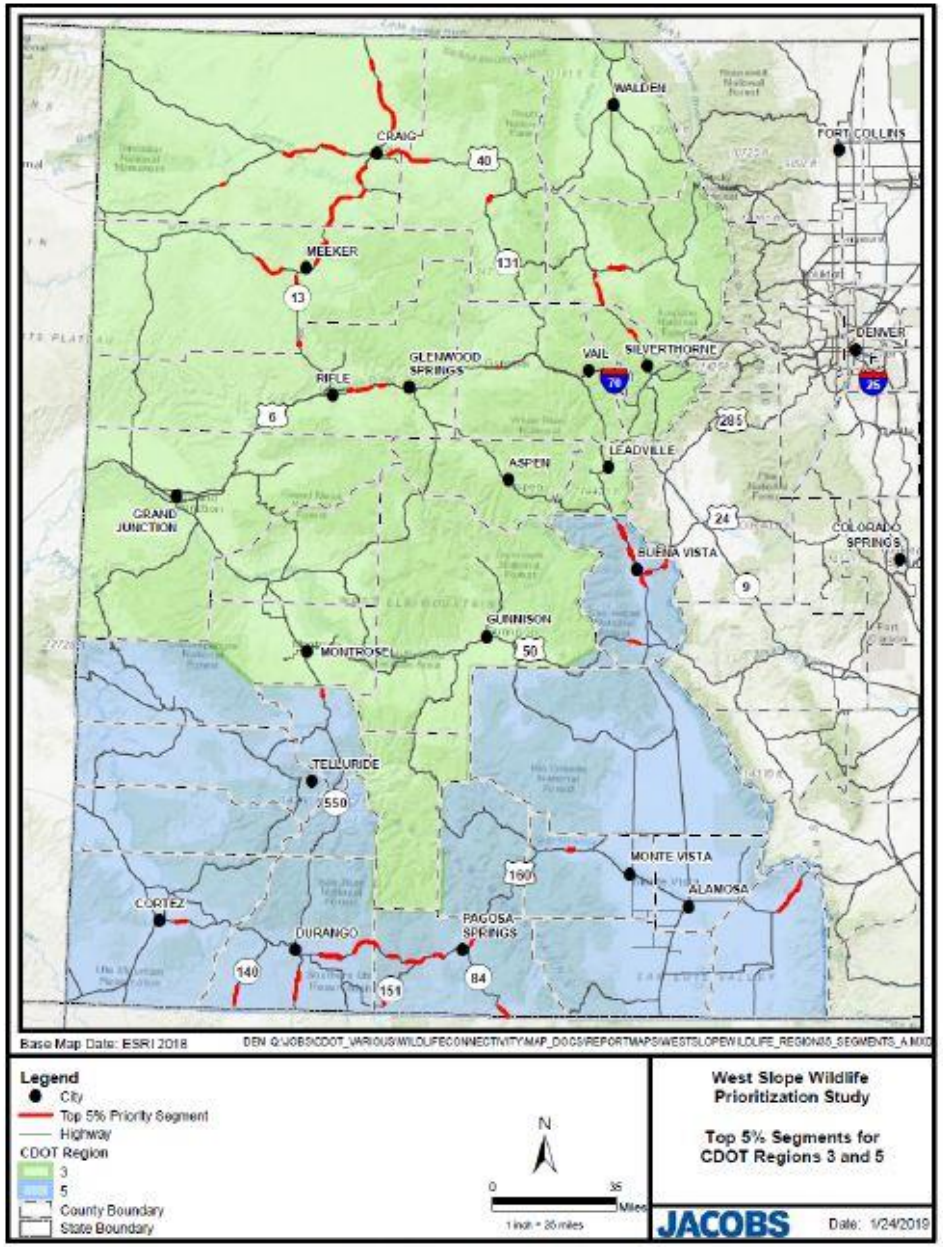
- 2022 was our first iteration of conducting a statewide migration corridors analysis
- 2024-2025 we will repeat the BBMM analysis adding new data
- Staff review and mapping continues to be vital to the process for CPW to maintain a statewide migration corridor data layer

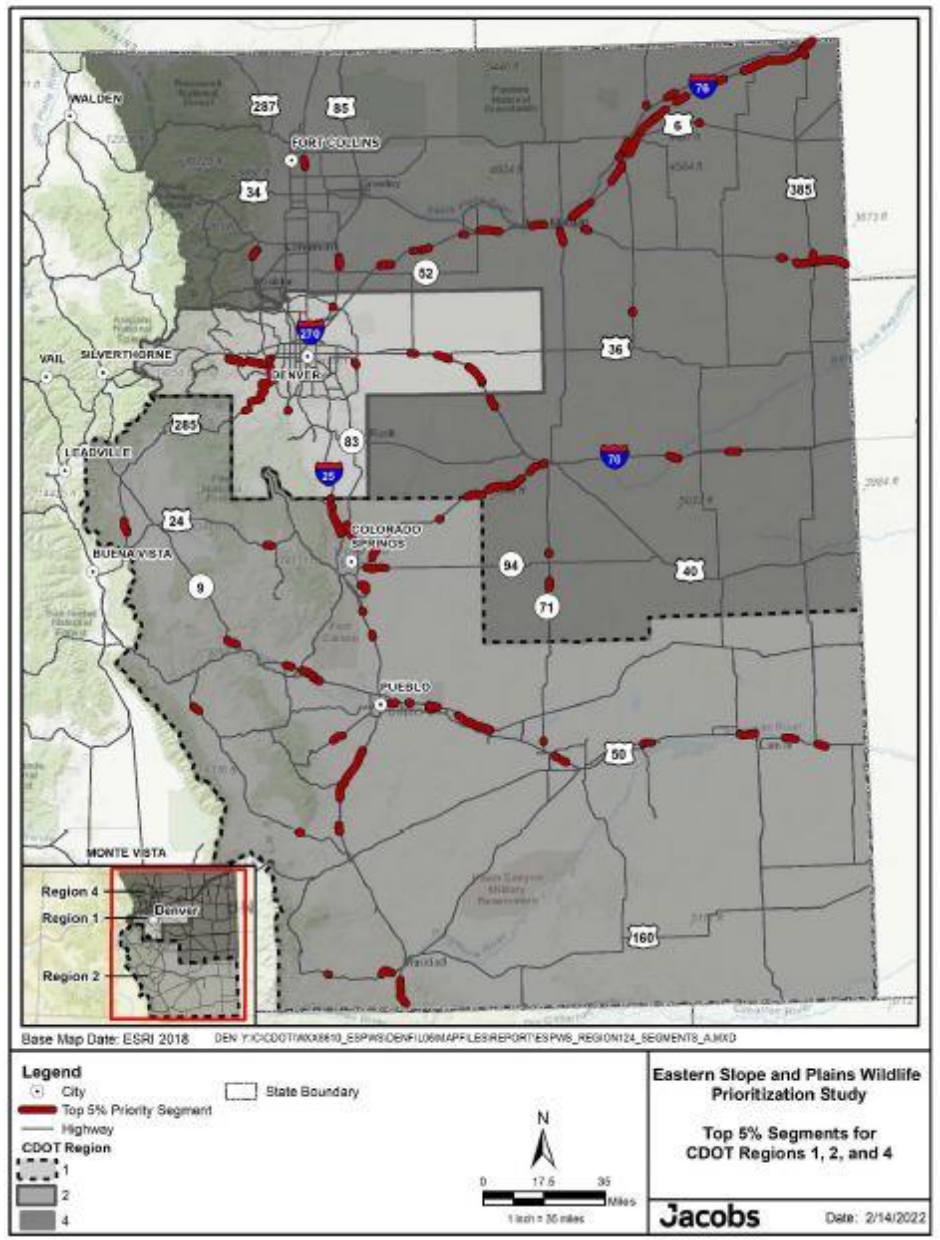
Photo credit: CPW

Colorado Wildlife and Transportation Alliance

(www.coloradowta.com)

Transportation Prioritization Studies





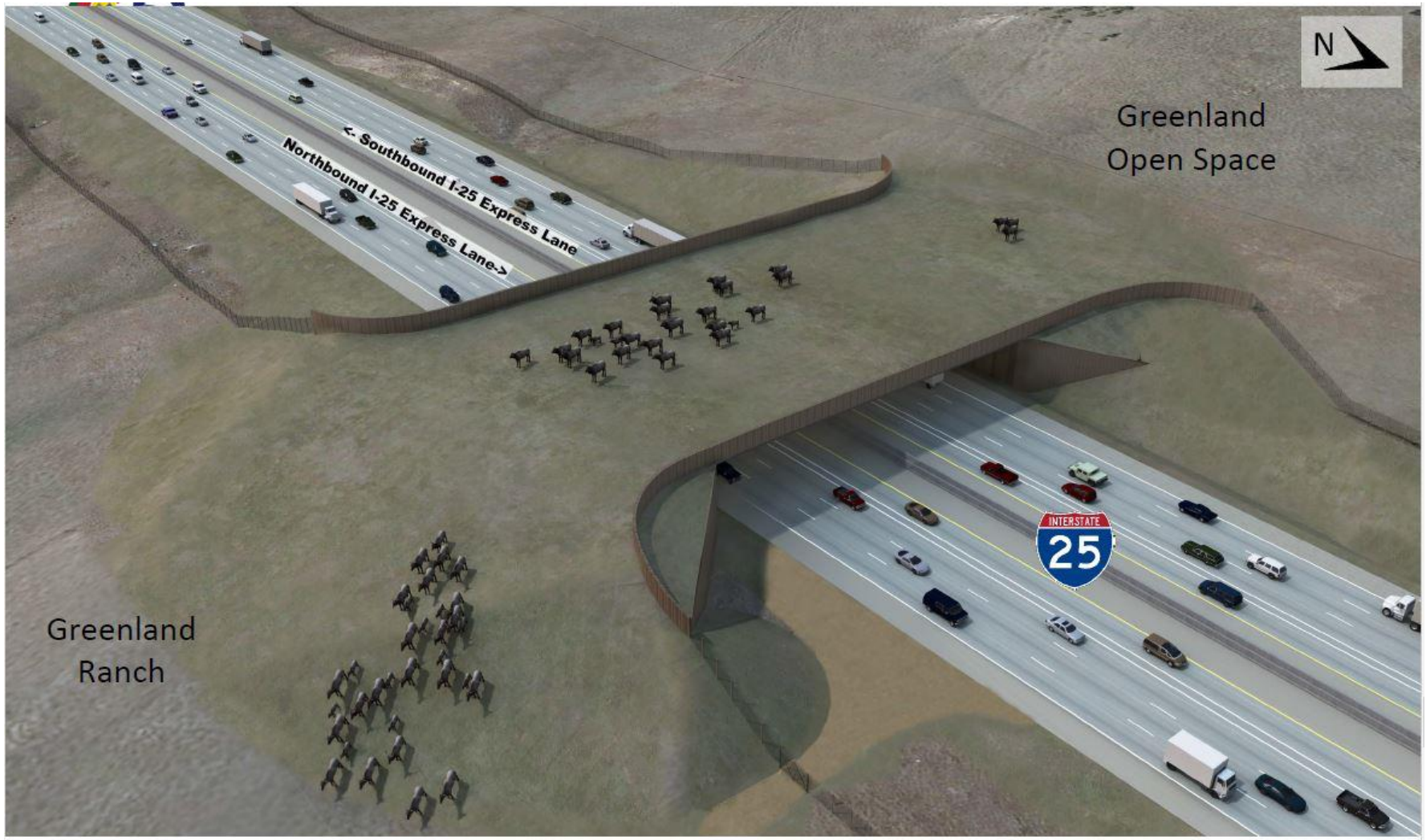
2022 Wildlife Safe Passage Fund
(SB22-151)

- Provide safe road crossing for connectivity of wildlife and reduce wildlife-vehicle collisions.
- Provide funding for wildlife crossing project needs (design, construction, monitoring, land conservation efforts, maintenance) and match for federal grants related to wildlife crossing projects.
- CDOT to consult with CPW and WTA
- 2022 - $5m
- 2023 - $1m

SB 151 Funding - Implementation

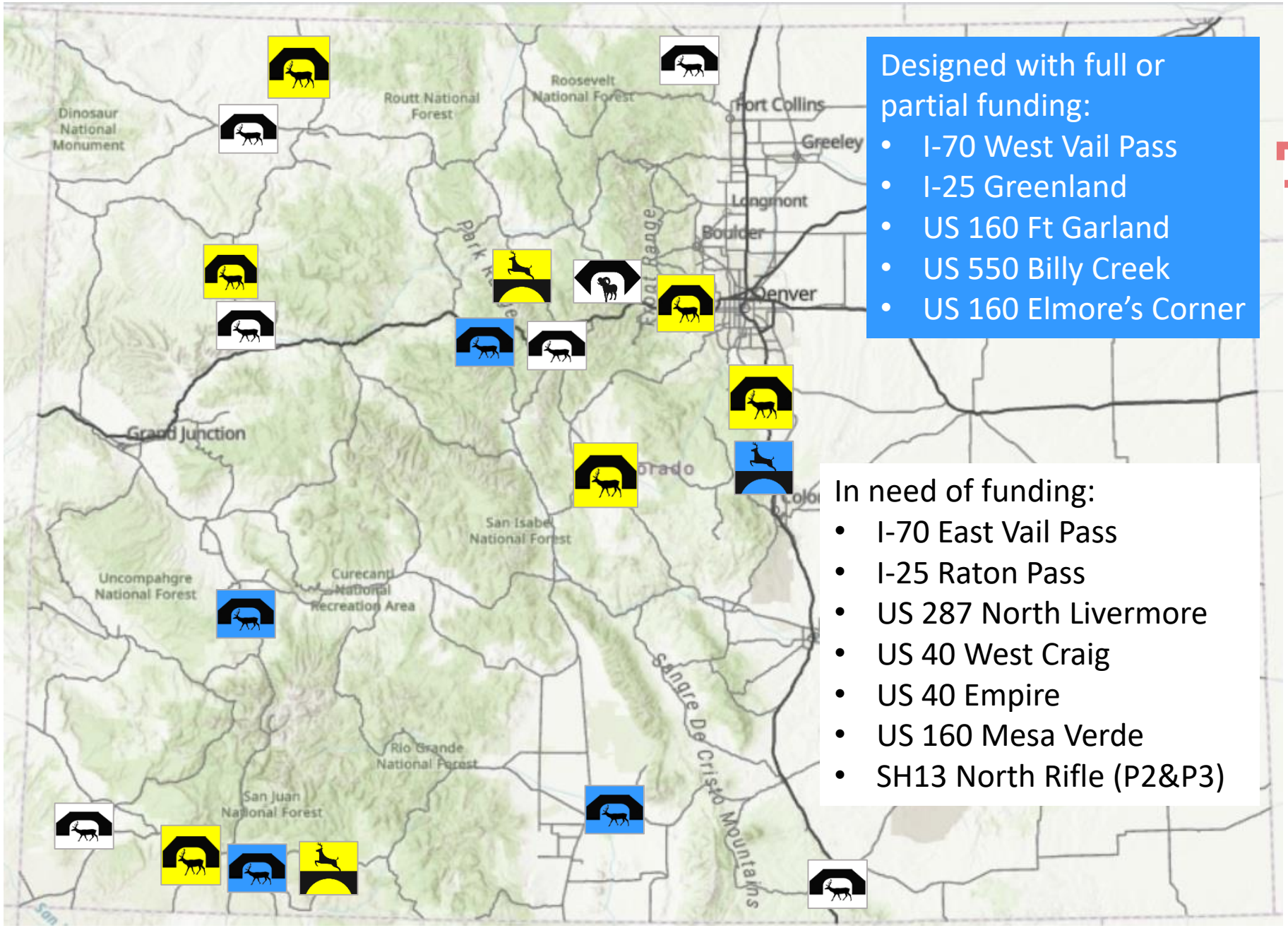
- **Current Construction Needs:**
  - CO 115, Rock Creek, Fencing, *($500,000)*
  - CO 13, North of Craig, Radar Detection *($150,000)*
  - CO 13, North of Craig, Zapcrete *($325,000)*
- **Upcoming Construction Needs**
  - US 550, Billy Creek, Underpass Fencing *($500,000)*
- **Potential Corridor Improvements**
  - US 285, Conifer, Fencing *($500,000)*
- **Design for Future Improvements**
  - I70, East Vail Pass *($750,000)*
  - I25, Raton Pass *($750,000)*
- **Additional Uses**
  - Continued Alliance Operational Funds *($250,000)*
  - Grant Match Opportunities *($1,275,000)*

I-25 Greenland Overpass
Received $22m from IIJA Wildlife Crossing Pilot Program



Visualization of wildlife overpass. Looking south from MP 165.4

Wildlife & Transportation Projects



Designed with full or partial funding:

- I-70 West Vail Pass
- I-25 Greenland
- US 160 Ft Garland
- US 550 Billy Creek
- US 160 Elmore's Corner

In need of funding:

- I-70 East Vail Pass
- I-25 Raton Pass
- US 287 North Livermore
- US 40 West Craig
- US 40 Empire
- US 160 Mesa Verde
- SH13 North Rifle (P2&P3)

Completed Projects:

- SH 9 Kremmling
- SH 13 North Craig
- SH 13 North Rifle
- US 160 East Pagosa
- US 550 Durango
- US 285 Buena Vista
- I-25 Monument
- I-70 Genesee

CDOT

COLORADO PARKS WILDLIFE


ICOET
2025
International Conference on
Ecology and Transportation
COLORADO
PARKS • WILDLIFE
CDOT


Thank you
Photo credit: J. Fielder

https://www.youtube.com/watch?v=Gv1LFT5FzFA