DEPARTMENT OF THE INTERIOR
SECRETARIAL ORDER 3362

Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors

John C. Tull
S) 3362 Nevada/California Liaison
1 | SO 3362 OVERVIEW
   • Summary
   • Principles
   • Approach and objectives
   • Timeline and process
   • State Action Plans

2 | IMPLEMENTATION
   • Science funding (USGS, FWS)
   • Habitat funding (NFWF, PFW)
   • BLM related activities

3 | GOING FORWARD
   • Partnering with other state and federal agencies, other partners
   • SO 3362 in 2019
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“This Order directs appropriate bureaus within the Department of the Interior … to work in close partnership with the states … to enhance and improve the quality of big-game winter range and migration corridor habitat on Federal lands … in a way that recognizes state authority to conserve and manage big-game species and respects private property rights. … Additionally, this Order seeks … opportunities … to increase and maintain sustainable big game populations across western states.”
PRINCIPLES

Secretarial Order 3362

• Respect state authority for management of wildlife

• Respect the rights of private property owners

• Be pragmatic and move forward with implementation knowing SO3362 cannot be everything for everyone

• Keep focus on state-identified priority corridors, stopover areas, or winter habitats – avoid scattershot approach with limited cumulative value

• Fully embrace the conceptual and legal directive of “multiple-use” lands, as applicable

• Seek collaboration not polarization, actively and positively engaging landowners, non-governmental organizations, industry, and others through one-on-one interactions
**STATE-IDENTIFIED BIG GAME MIGRATION CORRIDORS FOR MULE DEER, PRONGHORN OR ELK**

- Close partnership with State Wildlife Agencies
- Recognize state authority and private property rights
- State developed plans identify 3-5 highest priority wildlife migration corridors for mule deer, pronghorn or elk
- Develop science to support identification and refinement of corridors, stopover areas, and winter habitats
- Identify and prioritize habitat restoration and conservation projects/seek funding
On February 8, 2018, Secretary Zinke signed SO3362, Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors across 11 western states.

Casey Stemler was chosen to serve as SO3362 Coordinator. Liaisons were established June 2018 from various DOI agencies.

State wildlife agencies responded to requests for 3-5 corridors and 2-3 research priorities. These were developed into state action plans in coordination with liaisons, October 2018.

Research priorities were funded using USFWS Science Applications funds. The Wildlife and Sport Fish Restoration program for Region 8 developed grants with Nevada and California.

Habitat funds were made available in spring 2019. NFWF managed a grant program with $2.65M from BLM, FWS-PFW, and private industry. FWS-PFW had additional funds directed to SO3362 actions on private lands.
State plans were intended to create focus, allow partnership development, and ultimately serve as the tool to accomplish conservation.

- Liaisons used state responses to assist development of individual state action plans.

- These plans were submitted to all respective state directors for approval. All 11 states plans were approved by October 17.

- Plans were shared with partners and partnership on implementation was encouraged.

- Reached out to assess state interest in holding state level meetings with partners.
NEVADA ACTION PLAN

Secretarial Order 3362

Priority Corridor #1: Mule Deer Migration
Nevada Management Area 10
Priority Corridor #2: Mule Deer Migration
Nevada Management Area 7
NEVADA ACTION PLAN

Secretarial Order 3362

Priority Corridor #3: Mule Deer Migration
Nevada Management Area 6
NEVADA ACTION PLAN

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Priority Corridor #4: Pronghorn Migration
Game Management Areas 1-3 (Northern Washoe)

Priority Corridor #5: Pronghorn Migration
Game Management Areas 6-7 (Northwest Elko)
NEVADA ACTION PLAN

Secretarial Order 3362

STATE-IDENTIFIED BIG GAME MIGRATION RESEARCH PRIORITIES

• Mapping crucial migration corridors for pronghorn in Nevada
  • GPS collars for 60 pronghorn in priority corridors #4 & #5
  • Capacity support for analytical needs for new and existing GPS data in Nevada
OUTLINE

1 | SO 3362 OVERVIEW
   • Summary
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SCIENCE FUNDING

Secretarial Order 3362

SOURCES OF FUNDING FOR RESEARCH/SCIENCE

• USGS – Corridor Mapping Team, Matt Kaufman, Wyoming Cooperative Fish and Wildlife Research Unit
  • $700,000 to support Brownian Bridge Movement Analyses of fine-scale GPS collar data and provide technical assistance, capacity, and troubleshooting

• USFWS – Science Applications
  • $3,000,000 distributed across the 11 states to fund top research priorities identified in the State Action Plans
• $282,975 for pronghorn collaring activities
• 60 pronghorn to be fitted with GPS collars in northern Nevada to identify migration corridors, important stopover areas, and winter/summer crucial habitats
• $80,000 for analytical support through USGS
HABITAT FUNDING

SECRETARIAL ORDER 3362

SOURCES OF FUNDING FOR RESEARCH/SCIENCE

- National Fish and Wildlife Grant Program
  - $2,750,000 – 2019 Improving Habitat Quality in Western Big Game Winter Range and Migration Corridors
    - BLM: $2,000,000 – Sage-steppe only restriction
    - USFWS Partners for Fish and Wildlife: $500,000 – Private lands restriction
    - ConocoPhillips: $250,000 – Unrestricted
  - USFWS – Partners for Fish and Wildlife Internal Funding
    - $1,500,000 for private lands actions supporting state-identified habitat project priorities
NEVADA HABITAT PROJECTS

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• $308,239 through NFWF Grant Program
  • Ruby Mountains Conservation Easement for 2,100 acres as match in partnership with the Rocky Mountain Elk Foundation to benefit Area 10 mule deer, priority corridor #1
  • Middle Rock Creek and Izenhood post-fire habitat restoration for critical winter habitats to benefit Area 6 mule deer, priority corridor #3

• $245,863 through Partners for Fish and Wildlife
  • Harrison Pass Invasive Annual Grass Control Project (Deer Area 10)
  • Mary’s River Watershed Fence Improvement Project (Deer, Elk and Pronghorn Area 7)
  • Boulder Valley Big Game Migration Corridor Improvement Project (Deer and Pronghorn Area 6)
  • Beaver Flat Sagebrush Restoration Project (Deer and Pronghorn Area 6)
  • Bally Mountain Fence Improvement Project (Pronghorn Areas 1-3)
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GOING FORWARD

Secretarial Order 3362

• Additional Federal Partnering
  • USFS is committed to supporting habitat projects in state identified migration corridors
  • BLM uses SO3362 corridors for prioritizing national funds
• Additional Partnering
  • Nevada Department of Transportation and NDOW exploring a "Migration Summit” to examine transportation and planning issues, improved coordination, and cross-jurisdictional consideration of migration corridors
GOING FORWARD

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- Remain focused on 3-5 priority migration corridors
- Funding capacity from DOI agencies remains consistent
- BLM funding is no longer restricted to sage-steppe
- USFWS will continue to focus on science and private lands
- Liaisons will work with state agencies to refine existing corridors based on new data and analysis …
- … and develop focused habitat projects that will conserve or restore habitats in priority corridors
- Expand efforts with USDA and Department of Transportation
Wildlife Migration Corridors in Nevada

Cody Schroeder
Mule Deer and Pronghorn Staff Specialist
Nevada Department of Wildlife
Overview

Part I
• Background of migration science in Nevada
• Past marking and tagging studies
• Applied management for transportation

Part II
• SO 3362
• Nevada State Action Plan
• Mapping migration corridors
• Policy and planning
MOVEMENTS OF MULE DEER IN NORTHEASTERN NEVADA

GEORGE E. GRUELL, Nevada Fish and Game Department, Elko
NICK J. PAREZ, Nevada Fish and Game Department, Elko

Abstract. The migratory habits of mule deer (Odocoileus hemionus) in typical basin-and-range country of northeastern Nevada were studied for 6 years, 1955–60. In all, 789 deer were marked, 438 with bells, on 12 different winter ranges. Sightings and kill returns indicated that individual deer tended to return each year to the same winter and summer ranges. Often, deer wintering together scattered widely to different summer ranges, and deer on a particular summer range often moved to widely separated winter ranges. Many migrating deer traveled far past potential destinations; some fall migrants bypassed winter ranges 5 or 10 miles distant, and moved 80 or 90 miles farther. Migrants from other ranges did the same, only in opposite directions, thus forming a crisscross migration. There appeared to be little topographic orientation with respect to major drainages and mountain ranges. Management implications of the scattered, crisscross migrations are discussed.

Journal of Wildlife Management 1963 Vol. 27 No. 3
Unique Markers

Fig. 2. Basic symbols used on ear discs. Colors used were red, green, and black on a white background, and black on a yellow background.
Migration distances varied from 20 miles to > 100 miles
Hypothesized that mule deer used natural terrain features during migration periods
Distinct “crisscrossing” pattern was observed across several mountain ranges
Mule deer were often found on shared winter ranges
Distinct and separate summer ranges separated by over 100 miles
PATTERNS AND FACTORS IN MIGRATORY MOVEMENTS OF NEVADA MULE DEER

Mike Cox and Chet Van Dellen, NDOW

• 2011 WAFWA Deer and Elk Workshop in Albuquerque, New Mexico
• Presented GPS collar data for 72 mule deer marked between 2006-2011
• 6 study areas throughout NV
• Radio collars programmed to collect GPS fixes at 1 hour and 4 hour intervals during migratory periods for 2 years
General Migration Tendencies

- **Days**
  - Min 1 day
  - Avg 33 days
  - Max 147 days

- **Distance**
  - Min 13 miles
  - Avg 47 miles
  - Max 145 miles

- **Use of Stopovers**
  - 44% of migrations involved deer spending > 1 week in discrete “stop-over” or transition areas
Fig. 4. Movements of deer marked on winter ranges (squares) and subsequently identified on summer ranges (circles). Open circles represent animals recognized by sight observation; solid circles represent deer killed during hunting season.
2013 Mule Deer Movement Corridor Mapping

https://gis-ndow.opendata.arcgis.com/datasets/mule-deer-movement-corridors
Mule Deer Habitat Maps
updated as of 2014

https://gis-ndow.opendata.arcgis.com/
Migration Studies

Beginning in 2011 NDOW began a large-scale radio collaring effort to further quantify migration corridors in Nevada.

Initially 3 study areas were identified:
- Ruby Mountains
- Simpson Park Mountains
- Carson Front Range - Tahoe Basin

Additional study areas were added due to on-going NEPA and monitoring plans from 2012-present:
- Carlin Trend – Area 6
- Pequop Mountains
- Central Nevada (Area 13, Area 14)
- Northern Washoe County
- Spring Mountains big game study (SR-160)
Research Article

Overpasses and Underpasses: Effectiveness of Crossing Structures for Migratory Ungulates

NOVA O. SIMPSON,1 Natural Resources and Environmental Sciences, University of Nevada, Reno, 1664 N. Virginia St, MS 186, Reno, NV 89557, USA
KELLEY M. STEWART,2 Natural Resources and Environmental Sciences, University of Nevada, Reno, 1664 N. Virginia St, MS 186, Reno, NV 89557, USA
CODY SCHROEDER, Nevada Department of Wildlife, 6000 Sierra Center Parkway #120, Reno, NV 89512, USA
MIKE COX, Nevada Department of Wildlife, 6000 Sierra Center Parkway #120, Reno, NV 89512, USA
KARI HUBER, Nevada Department of Wildlife, 6000 Sierra Center Parkway #120, Reno, NV 89512, USA
TONY WASLEY, Nevada Department of Wildlife, 6000 Sierra Center Parkway #120, Reno, NV 89512, USA
Crossing Structures

- Animal-hit database
- 50% Est. reporting rate
- Documented by UNR
Wildlife Safety Features – SR 160
12 of 58 study animals have successfully crossed SR 160 (21%).

Crossings or attempted crossings most frequently occurred at mileposts 18.5, 20, and 22.

Male mule deer and bighorn sheep were more likely to cross and did so more frequently than females.

At least one collared animal (mule deer) was hit on SR-160 during study, possibly another collared deer hit near MP 21.
Policy and regulation

• SO 3362
• State Wildlife Action Plans
• Migration Corridors
• NEPA
• Monitoring Plans for Mule Deer
Secretarial Order 3362

- Signed by Secretary of Interior February 2018
- Provided a framework for cooperation between local, state, and federal agencies
- Each state tasked with developing a plan to identify and prioritize migration corridors and winter range for big game
  - Mule deer
  - Pronghorn
  - Elk
- Funding for research to collect data and map corridors where knowledge gaps occurred
Challenges to Migration

Identified following challenges:

• Barriers and impediments to movement corridors
• Increased traffic on roadways
• Residential development
• Wildfire and changing habitat dynamics
• Invasive species
• Drought conditions
• Impacts to “stop-over” habitats
Nevada State Action Plan 2018

Top 3 priority migrations for mule deer
• Area 6 Independence – Tuscarora Mtns
• Area 7 Pequop Mountains
• Area 10 Ruby Mountains

Top research needs
• Mapping pronghorn migration corridors
• Analysis of existing mule deer telemetry data using best available science
Pronghorn Migration Study Areas

[Map showing study areas in Nevada]
During a 2017 pronghorn survey, NDOW counted over 1,000 pronghorn in this group near Elko, Nevada.
Migration
Corridor Mapping
USGS
Brownian Bridge Movement Model

Winter Range Maps Pequop Herd

Data from 2012-2019

67 individuals
218 migration sequences
Area 6
Migration Corridors
Ruby Mountain Corridor
Truckee-Reno Mule Deer Corridor
Implications for policy and planning

Nevada currently has no formal protections for migration corridors for any species

NDOW works with federal agencies (i.e. BLM, USFS) on National Environmental Policy Act (NEPA) processes
Provide technical review of EA, EIS, to assess impacts to wildlife movements and migration corridors

NDOW has several monitoring projects for mule deer to assess any potential impacts and ensure safe passage of movement corridors
### Long Canyon Mule Deer Monitoring Plan
- Pequop migration corridor
- Record of Decision (ROD) signed 2014
- Mule Deer Monitoring Plan

### Bald Mtn Mule Deer Monitoring Plan
- Record of Decision signed 2016
- MOU between NDOW, BLM, Kinross Gold Corporation signed 2016
- MOU outlines a plan to implement Mule Deer Monitoring Plan for 5 years
- Plan obligates seasonal monitoring of up to 30 GPS radio collars
- Adaptative management framework
- Triggers to ensure efficient passage of mule deer through mine boundary
Mule Deer Restoration and Research Projects

- $25 million dollars spent on sagebrush habitat restoration by Heritage Program since 1996
- Benefits mule deer and many other wildlife species
- Over 800 mule deer radio-collared by NDOW since 2010
- Currently monitoring ~185 GPS collars
- Map crucial habitat and corridors
- Survival rates
- Collect information on body condition
Thank You!
Animals & Roadways; Science, Infrastructure, and Education

Nova Simpson
Nevada Department of Transportation
Environmental Services Division
Environmental Services

Air Quality

**Biological Resources**

Cultural Resources

Hazardous Materials

Socio/Economic Impacts

Storm Water Division

Traffic Noise
Environmental Services

Primary Purpose is Environmental Compliance

*Federal Laws*
National Environmental Policy Act (NEPA)
Endangered Species Act (ESA)

*State Laws*
State Protected Species Statutes
State Noxious Weed Statutes
Road Ecology

Interaction of Wildlife and Roads
Ability to Move, Access Resources, Behaviors, Gene Flow
**Collaboration**

**Primary Goals and Objectives**

**Transportation**
Provide safe and effective transportation corridors.

**Natural Resource**
Manage habitat, land-use, or wildlife populations.

**Overlapping Interests**

*Animal-Vehicle Collisions*

*Habitat Connectivity*

[Link](http://www.environment.fhwa.dot.gov/wvctraining)
# Statewide Prioritization of Animal-Vehicle Conflicts

<table>
<thead>
<tr>
<th>Project Manager</th>
<th>Research Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nova Simpson</td>
<td>Dr. Patricia Cramer</td>
</tr>
<tr>
<td></td>
<td>Ellie Leydsman McGinty</td>
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<tr>
<td></td>
<td>Dr. Fraser Shilling</td>
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<td></td>
<td>Chris Gerrard</td>
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<tr>
<td>NDOW Staff</td>
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<td>Brian Wakeling</td>
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<td>Cody Schroeder</td>
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<tr>
<td>NDOT Staff</td>
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<td>Chris Young</td>
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<tr>
<td>Paul Harmon</td>
<td>PD Kiser</td>
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<tr>
<td>Tara Smaltz</td>
<td>Manju Kumar</td>
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<tr>
<td>Lee Bonner</td>
<td>Ken Chambers</td>
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<td>Mark Costa</td>
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<td></td>
<td>Chris Wright</td>
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<td></td>
<td>Jason Gonzalez</td>
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<tr>
<td></td>
<td>Nick Bacon</td>
</tr>
<tr>
<td></td>
<td>Ken Mammen</td>
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</tbody>
</table>
Objectives

1. Summarize NV crash data
2. Merge Data from NDOT and NDOW
3. Prioritize Conflict Areas
4. Conduct Benefit-Cost Analyses
5. Create GIS files of Conflict Areas
6. Provide a Planning Process
7. Provide Description of Potential Funding Sources
8. Utilizing this report for support
District 1 = 0.96
District 2 = 4.28
District 3 = 16.22

Percent of Accidents Related to Animals in the Roadway
Percent of Accidents Related to Animals in the Roadway

<table>
<thead>
<tr>
<th>County</th>
<th>%</th>
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<tbody>
<tr>
<td>Carson City</td>
<td>3</td>
</tr>
<tr>
<td>Churchill</td>
<td>10.5</td>
</tr>
<tr>
<td>Clark</td>
<td>0.3</td>
</tr>
<tr>
<td>Douglas</td>
<td>5.6</td>
</tr>
<tr>
<td>Elko</td>
<td>14.7</td>
</tr>
<tr>
<td>Esmeralda</td>
<td>7.7</td>
</tr>
<tr>
<td>Eureka</td>
<td>15.5</td>
</tr>
<tr>
<td>Humboldt</td>
<td>16.6</td>
</tr>
<tr>
<td>Lander</td>
<td>13.5</td>
</tr>
<tr>
<td>Lincoln</td>
<td>46.5</td>
</tr>
<tr>
<td>Lyon</td>
<td>10.6</td>
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<tr>
<td>Mineral</td>
<td>15</td>
</tr>
<tr>
<td>Nye</td>
<td>9.9</td>
</tr>
<tr>
<td>Pershing</td>
<td>10.8</td>
</tr>
<tr>
<td>Storey</td>
<td>14.1</td>
</tr>
<tr>
<td>Washoe</td>
<td>1.8</td>
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<tr>
<td>White Pine</td>
<td>23.8</td>
</tr>
<tr>
<td>Totals</td>
<td>2.4</td>
</tr>
<tr>
<td>Type of Animal</td>
<td>Number Crashes Reported with Each Species 2006-2016</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Fatal</td>
</tr>
<tr>
<td>Deer</td>
<td>1</td>
</tr>
<tr>
<td>Cow (Cattle)</td>
<td>2</td>
</tr>
<tr>
<td>Horse</td>
<td>5</td>
</tr>
<tr>
<td>Dog/Coyote</td>
<td>3</td>
</tr>
<tr>
<td>Elk</td>
<td>1</td>
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</table>
## Animal-Vehicle Annual Crash Costs

<table>
<thead>
<tr>
<th>Type of Crashes</th>
<th>Total of Type in 11 years 2006-2016</th>
<th>Annual Average</th>
<th>Nevada DOT 2016 Comprehensive Societal Cost Per Occurrence</th>
<th>Total Average Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Damage Only</td>
<td>4,944</td>
<td>450</td>
<td>$10,221</td>
<td>$4,599,450</td>
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<tr>
<td>Injury Crash Type C or Unknown Severity</td>
<td>383</td>
<td>34.8</td>
<td>$63,434</td>
<td>$2,207,503</td>
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<td>Injury Crash Type B</td>
<td>278</td>
<td>25.3</td>
<td>$112,708</td>
<td>$2,851,512</td>
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<tr>
<td>Injury Crash Type A</td>
<td>65</td>
<td>5.9</td>
<td>$308,595</td>
<td>$1,820,711</td>
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<td>Fatality</td>
<td>14</td>
<td>1.3</td>
<td>$5,839,241</td>
<td>$7,591,013</td>
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<tr>
<td>Total</td>
<td>5,683</td>
<td>516</td>
<td>Not applicable</td>
<td>$19,070,189</td>
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</tbody>
</table>
Prioritization

NDOT Safety Data

Crash Prioritization Maps
Animal
Wildlife
Horse
Cattle
AADT, Carcasses, % AVC

GIS Analysis = Getis Ord
Prioritization + Collaboration

NDOT Safety Data

Crash Prioritization Maps
- Animal
- Wildlife
- Horse
- Cattle
- AADT, Carcasses, % AVC
Prioritization + Collaboration

NDOT Safety Data
- Crash Prioritization Maps
  - Animal
  - Wildlife
  - Horse
  - Cattle
  - AADT, Carcasses, % AVC

NDOW Ecological Data
- Wildlife Habitat & Corridor Maps
  - Mule Deer
  - Elk
  - Pronghorn
  - Bighorn
  - Bear

Priority Map Based on Safety & Ecological Data
## Prioritization with Safety & Ecological Data

**Safety Data = 50 Points**
- Animal Crashes
- Fatal Animal Crashes
- Animal Crashes w Injuries
- Number of Carcasses
- AADT
- Percentage of Crashes that are Animal Related

**Ecological Data = 50 Points**
- Mule Deer Habitat
- Mule Deer Corridors
- Elk Habitat
- Bighorn Habitat
- Bighorn Corridors
- Pronghorn Habitat
- Bear Habitat
- Horse Priority Hotspots
- Cattle Priority Hotspots
## Prioritization with Safety & Ecological Data

<table>
<thead>
<tr>
<th>Safety Information -GIS Layer</th>
<th>Ecological Information-GIS Layer</th>
</tr>
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<tbody>
<tr>
<td>GIS information</td>
<td>Mule deer habitat</td>
</tr>
<tr>
<td>Number of AVC Crash locations</td>
<td>5</td>
</tr>
<tr>
<td>Number of AVC Crash locations</td>
<td>Mule deer movement corridors</td>
</tr>
<tr>
<td>Number of AVC related human fatalities in location</td>
<td>5</td>
</tr>
<tr>
<td>Number of crashes with human injury</td>
<td>Number of Horses Crashes</td>
</tr>
<tr>
<td>Number of crashes with human injury</td>
<td>7</td>
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<tr>
<td>Number of WVC carcasses</td>
<td>Number of Cattle Crashes</td>
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<tr>
<td>AADT</td>
<td>5</td>
</tr>
<tr>
<td>Percentage of crashes that are WVC</td>
<td>Elk distribution</td>
</tr>
<tr>
<td>Total for Safety map</td>
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<tr>
<td>Bighorn sheep habitat</td>
<td>Pronghorn distribution</td>
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<tr>
<td>Total for Safety map</td>
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<tr>
<td>Bighorn movement corridors</td>
<td>Bighorn sheep habitat</td>
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<tr>
<td>Total Points for Ecological Map</td>
<td>5</td>
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<tr>
<td>Black bear habitat</td>
<td>2</td>
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<tr>
<td>Total Points for Ecological Map</td>
<td>50</td>
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Wildlife and Safety Improvements along US 93 and I-80; A Landscape Scale Approach to Habitat Connectivity and Traffic Safety in Elko County, Nevada.
Available GIS Data

Legend
- Mule Deer Movement Corridors (NDOCW 2013)
Wildlife and Safety Improvements along US 93 and I-80: A Landscape Scale Approach to Habitat Connectivity and Traffic Safety in Elko County, Nevada.

Plan Project Limits

Legend
- Wildlife Fencing
- Deer-Vehicle Collisions Data (2006-2010) Value:
  - High
  - Low
- Mule Deer Movement Corridors (NDOW 2013)
Agency Collaboration

- Data Collection & Analysis
- Project Design & Construction
- Research
- Hunting Laws

Percentage of Approaches that Were Successful Crossings

- 10 Mile Underpass (1)
- 10 Mile Overpass (2)
- 10 Mile Underpass (3)
- HD Summit Underpass (4)
- HD Summit Overpass (5)
NDOT & UNR Research

Dayton Horse Crossing on US 50
NDOT & UNR Research

USA Parkway
NDOT Research

Pooled Funded Study

- Alaska DOT
- ARC Solutions
- Arizona DOT
- California DOT
- Iowa DOT
- Minnesota DOT
- Nevada DOT
- New Mexico DOT
- Ontario Ministry of Transportation
- Oregon DOT
- Parks Canada
- Washington DOT

The Wildlife Vehicle Collision (WVC) Reduction and Habitat Connectivity
(Transportation Pooled-Fund Project TPF-5(358))
Nevada is Moving Forward

Mule Deer Migration Route
- US 93 (2010 & 2011)
  - 2 Overpasses
  - 3 Underpasses
  - 1 Underpass (2015)
- I-80 @ Silver Zone (2013-2014)
  - 1 Overpass
- I-80 @ @ Pequop Summit (2017)
  - 2 Overpasses
  - 2 Multi-Use Underpasses

Bighorn Sheep
- Boulder City Bypass (2018)
  - 1 Overpass
  - 4 Underpasses
- SR 160 (2019)
  - 1 Underpass

Wild & Feral Horses
- Dayton (2013)
  - 1 Underpass
- USA Parkway (2017)
  - 2 Underpasses
Education

- Publications
- Professional Meetings
- Community Meetings
- University Research
- Neighboring States
- National Webinars
- Boy Scouts of America
- K-12 Presentations
Education in the Classroom

Donna Wood w/ Hunter Lake
Thank you students of Hunter Lake Elementary for “bridging the gap” with

Create
Remarkable
interesting

Teach
Techniques

Responsible
Ecosystem

Connections
Roads

Outdoors
Structures

Safety
Influence

Nature
Globally

Science

PBL
Project
Based
Learning

STEM
Science
Technology
Engineering &
Mathematics
**Animal Crossings**

- 2.4 million collisions
- Every 60 seconds, deer-vehicle collisions
- At least 2,000 car-animal collisions
Critter Crossing's for Animals
CRITTER CROSSINGS

In The Classroom
Market to National Audiences

Conferences

The Wildlife Society’s Annual Conference, Cleveland, Ohio, October 2018.
Big Game and Highways Workshop, Salt Lake City, UT, January 2019.
Market to National Audiences

Workshops


National Science Teachers Association, National Harbor, MD, November 2018

Hopes?
Improve Driver Responsiveness
Increase Willingness to Invest in Wildlife
Encourage National Development & Deployment
Lessons learned lead to opportunities for improvements!

Construction Pros and Cons
- Standard Bridge Design vs. Arches
- Concrete Arches vs. Steel Arches
- Ecological Timing

What Functioned and What Didn’t Work?
- Fence Ends and Escape Ramps

Early Coordination Efforts with Partners
- Funding Opportunities
- Policy – No Hunting Law

Public Outreach Before and After
- Inform and Prove with Research

Crash and Carcass Data
- Collection Methods
- Doesn’t Show Avoidance Behaviors
Lessons learned lead to opportunities for improvements!

Continued Research

Species Specific
  • Use of Infrastructure
  • Overpass vs. Underpass
  • Multi-Use vs. Single Use
  • Availability vs. Use
  • Sizes and Ratios
  • Cattle Guards
  • Baiting

Active Warning Systems
  • Lidar
  • Radar
  • Infrared Cameras
Lessons learned lead to opportunities for improvements!

Statewide Assessments

Prioritization of Wildlife-Vehicle Conflict in Nevada
- Dr. Patty Cramer, PhD
  & Christopher McGinty, MS
- Utilized crash data and ecological data to prioritize the conflict areas.

US Davis Hotspot Tool
- Dr. Frasier Shilling, PhD
- Utilized crash data to highlight the conflict areas.
- Provided several summary graphics.
FUTURE GOALS

**NDOT Action Items**

- Update Statewide Analysis every 5 Years
- Integrate Conflict Areas into NDOT Planning
  - State Transportation Improvement Plan (STIP)
  - County and City Coordination Efforts
- Continue Research to Reduce Animal-Vehicle Conflicts
  - International Pool Fund Study
  - New and Emerging Technologies
- Continue Education Outreach
  - Critter Crossings in the Classroom

**Small Scale Goals**

- Conservation Easements
- Education
- Research
- Create New Opportunities
- Citizen Science
- Early Coordination
- Reach Out to Experts
FUTURE GOALS

Personal Wish List

Continue to Build Meaningful Partnerships
Wildlife Mitigation Consideration with New Developments
Formal Budget for Wildlife Mitigation
Thank you!

Nova Simpson, nsimpson@dot.nv.gov
Public Private Partnerships: Paving the Way to Implementation

Renee Callahan
Senior Policy Officer,
Center for Large Landscape Conservation
Executive Director, ARC Solutions
Goals for Today

1. Background
2. What is a PPP?
3. Case studies
4. Ingredients for success
Total U.S. Crashes Versus Crashes Involving Animals, 1990–2004

(Huijser et al. 2008)
If we build them, will they come?
ROADWAYS & WILDLIFE

A SOLUTION
Highways are safer when wildlife are separated by crossing structures, such as overpasses, underpasses and fencing.

THE PROBLEM
- Roadways fragment habitat, restricting wildlife’s access to food, water, shelter and mates.
- Wildlife crossing attempts increase wildlife-vehicle collisions.
- Wildlife-vehicle collisions are costly and too often fatal.
- Restricted movements can decrease genetic diversity and wildlife’s ability to adapt to a changing climate.

EFFECTIVE? Absolutely!
Data collected from studies of crossing structures with wildlife fencing throughout North America indicate up to an 86-97% DECREASE in wildlife-vehicle collisions upon affected roadways.

HOW TO HELP
- Investigate highway projects in your state and their potential to make roads safer for wildlife and people.
- Recommend science-based mitigation measures to your State Department of Transportation.
- Consider joining a local conservation group working to reduce the barrier effect of roads on habitat connectivity.
- Get involved with county or local-level initiatives that create safe passage for wildlife and motorists.

Every Year in the United States
1-2 Million Wildlife-Vehicle Collisions Cause...

> 200 human fatalities
> 26,000 injuries
~ $9.7 Billion in costs

Average Cost of a Collision by Species (In 2016 US Dollars)
- Deer: $20,079
- Elf: $7,600
- Moose: $35,327

% Reduction in Collisions
- Reflectors: 0%
- Whistles: 0%
- Standard Warning Signs: 0%
- Fencing: Underpasses: 26%

WORTH THE COST? Yes!
The costs of collisions to society often outweigh the costs of building wildlife crossing structures. Placing structures along road segments with as few as 5.1 deer collisions per mile per year creates net public benefits.

Produced by Alyson Morris, Rob Ament and Renee Callahan
For More Information Please Visit: arc-solutions.org

ARC
The Center for LARGE LANDSCAPE CONSERVATION
#1 barrier to crossing structures?
The power of public-private partnerships

Total US Giving: 2008-2018
(in billions of dollars)

SOURCE: Giving USA Foundation | GIVING USA 2019
WYOMING:
Teton County Highways

3 MOOSE KILLED
NXT1 ML
Photo Credit: CLLC, GYC, JHCA, JHWF, Y2Y
Panel Credit: Darin Martens, USFS/WYDOT
### Data/Prioritization:

**County-wide Wildlife Crossing Master Plan**

#### RECOMMENDED WILDLIFE CROSSING PRIORITY RANKINGS

<table>
<thead>
<tr>
<th>Site number on map</th>
<th>Land Security</th>
<th>Political Viability</th>
<th>Key Partner Support</th>
<th>Technical Feasibility</th>
<th>Long Term Solution</th>
<th>Master Plan Score*</th>
<th>Avg. Rank</th>
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*Note: Master Plan Score is a composite score based on various factors such as land security, political viability, key partner support, technical feasibility, and long-term solution.
Funding:
$10 million Special Purpose Excise Tax

Vote For
WILDLIFE CROSSINGS ON SPET
NOW THROUGH NOV 5

Photo: Josh Metten
COLORADO: Highway 9 South of Kremmling

Blue Valley Ranch-September 9, 2016
Highway 9 (con't)

- 2001 – BVR approaches CDOT
- No funding available
- 2005 – BVR begins to collect carcass data
  - CDOT’s WVC data is only a subset, ~60% of BVR’s data
- 2005-2015 – BVR records 600+ carcasses in 10.5 miles
  - 97% are mule deer

Sources: CDOT, Blue Valley Ranch
$9.2 million in 45 days

THE CITIZENS FOR A SAFE HWY 9
WOULD LIKE TO THANK OUR GENEROUS SUPPORTERS
FOR MAKING THIS DREAM A REALITY

Barbara & Jonathan Hinsberger
Vilko Hurkalo
Terry Hollingworth
Todd Heald
Pam Hamlin Hutton
Lavonne & Mickey Hummer
Diane Huffine
Maggie & Bill Hunter
H. Donald Hyer & Partners, PC
Angela, Tony & Kathy Johnson
Dana & Leslie James
Richard & Ann Kemp
William & Carolyn Kemp
Lisa Kendall
James & Betty Knaus
Kirkland Construction
John Knaus
Kronprinz Fire District
Elk Ranch
Lemmon Crane
Lori Lebow
Jeff & Shari Leign
Robert Leister
Jeff & Sharon Leinaway
Larry & Kathy Lunsford
Tom Lytle
Mail Adventures
Allison Hanks
All & Kim Mangold
Brady & Kirby Mark
Tim & Marlene McCaulley
Middle Park Hospital Partnership Committee
Middle Park Hospital Foundation
Hastings Memorial Hospital
Good Shepherd Medical Center
Summit County
Dr. David Rice
Mountain Parks Electric
Glen Hower
Summit Foundation
Karen & Chris Murphy
Hicks Ranch
Susan & Phil Neidhoefer
Paul Neibaker
Northwest Hospitality
Hockett Construction
Adan D. Harding
Paul & Dona Ridenour
Bill Ridenour
Robert & Pam Ridenour
Chad Parker
Gwen Padjou
Phill Proctor
Chris Poulson
Glenda Pumphrey
Fred & Carol Peterson
Jeff McComb
Alicia Pires
Elizabeth Pock
Carrie Risto
Carl Richard
Stuart & Marty Richardson
Josh Rosehart
Mark & Karen Richwine
McKee Family
Refined Cattle Co., LLC
Bill Robins
Mike & Mary Robinson
Redwood Gray, LLC
Richard & Sara Rosene
Rose Residential Construction
Bill Rook
Bill & Judy Ruhala
Scott & Loretta Schaefer
Shawn & Debbie Schaff
Katherine & Todd Schaller
Meadowbrook Village
Kurtis Scott
Nancy Scott
Select Super Market
Kara Shadle
Nancy Shawer
Jim & Judy Sheehan
Lyle & Amy Simon
Rich Simon
David & Shea Gallegos-Simmer
Sandy Spalding
Linda & Robert Spalding
Clearence Sparks
Sondra Sage
Paul Sage
George Stark
Jethro Stine
Steamboat Hot Shop
Castle & Clay Construction
Gary & Sherry Stebbins
Michael & George Stevens
David & Helen Stoff
Donna Sorensen
Summit County Government
William Turner
Graehl Veterinary Clinic
Cameron Taussig
Lukas Tjarkos
Linda Taylor
CJ Terlutter
Tricia Traynor
The Western Lake Trail
Breckenridge Elementary School
Breckenridge Horsemen
Bruce Wong
Trinton Adams Foundation
True North
Linda Urban
Linda Urban (Dept of Agriculture)
Pete Vartan
Cim & Johny Wacker
Lisa Wacker
Teresa Walchek
Lisa Watts
Western Land Group
Belleview White
Briana White
Christina Wiemer
Nina Wilson
Sheena & Egan Worringer
Vicki Knecht
Success!

- Colorado’s 1<sup>st</sup> (two) wildlife overpasses!
- 5 large underpasses
- 10 miles of fencing
- 61 escape ramps
- Plus pedestrian gates & cattle/access guards
- Moose, pronghorn, elk, white tail & mule deer, black bear, red fox, bobcat, coyote, badger, big horn sheep, jackrabbit

Bottom line: 90% reduction in WVCs in the first year…

Source: CDOT
But wait there’s more!

- Led to stronger working relationships...which led to
- June 2017 Wildlife & Transportation Summit
  - Outcomes & Recommended Action Items
    - Develop a Wildlife and Transportation Steering Committee(s)
    - Establish Partnerships and Develop Outreach Strategy
    - Consolidate and Integrate Data and Technology
    - Determine and Identify Consistent Funding
    - Advance Public Education of Wildlife and Transportation Issues

*Providing Safe Passage for People and Wildlife in Colorado*

Photo Credit: CDOT
COLORADO: I-70, site of ARC Design Competition
Genesis of ARC

Underpass: Creek bridge
Underpass: Box culvert
Underpass: Open span 4 x 12 m
Underpass: 4 x 7 m
Overpass: 50 m wide

Photographs by Tony Clevenger
ARC Competition – and the winner is HNTB with Michael Van Valkenburgh Associates
Wildlife Crossings: The New Norm for Transportation Planning

By Angela V. Kostevek, Robert J. Alpert

ARC SPECIAL PUBLICATION

NEW THINKING • NEW METHODS • NEW MATERIALS • NEW SOCIETY

Innovate:

ACR is an international network of multidisciplinary professionals dedicated to finding new ways to improve safety, wildlife habitat, and human well-being and communicate these solutions to the public.

Educate:

Develop a sustainable future by teaching people about the need for wildlife crossings and how they can help make a difference.

Promote:

Prepare a plan to help communities and individuals make a difference in wildlife crossing projects.

Visit arc-solutions.org to learn more about ARC Solutions and become part of the solution.

The American Society of Landscape Architects presents the Honor Award in Communications to ARC Solutions for Championing Connectivity: How an International Competition Captured Global Attention for Inspired Innovation in Wildlife Crossing Design.

2017 Professional Awards

The Case for a Nationwide Commitment to a Systematic Network of Highway Crossings for Wildlife
ARIZONA:  
*Pima County State Route 77*

- Citizens of Pima County approved a 0.5 percent sales tax for 20 years.
- A portion of the tax revenue is set aside to protect and enhance wildlife connectivity across the county’s road system.
ARIZONA/UTAH:  
Highway 89 near Kanab

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<th>Amount</th>
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<tr>
<td>Arizona Game and Fish Department and Sportsmen</td>
<td>$130,000</td>
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<tr>
<td>Utah Department of Wildlife Resources and Sportsmen</td>
<td>$100,000</td>
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<td>Grand Staircase Escalante National Monument (FHWA grant)</td>
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<td>Grand Staircase Escalante National Monument (Staff Support)</td>
<td>$10,000</td>
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<td>Utah Department of Transportation</td>
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<td>Kane County (estimated)</td>
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<td>Mule Deer Fdn-Sportsmen for Wildlife: Signs &amp; Fence Maintenance</td>
<td>$2,000</td>
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<tr>
<td>Partnership Total</td>
<td>$2,517,000</td>
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Credit: P. Cramer, USU, UDWR and UDOT
MONTANA:
Highway 206 in the Flathead Valley

Whitney Ranch Donation: 80 acres conservation easement
Local funding drive for $165,000 mitigation project:

Whitneys
Flathead County Commissioners
American Wildlands
Yellowstone to Yukon Conservation Initiative
Wildlife Land Trust
Northern Rockies Conservation Cooperative
Friends of the Wild Swan
Swan View Coalition
Montana Backcountry Hunters and Anglers
16 individuals and ranches
Montana Department of Fish, Wildlife and Parks
MDT Community Transportation Enhancement Grant
WASHINGTON:
I-90 near Snoqualmie Pass

Photo credit: Washington DOT
WASHINGTON: I-90 near Snoqualmie Pass
IDAHO: State Highway 21 near Boise Wildlife Management Area
MONTANA: Highway 93 on the Flathead Reservation

© Kylie Paul
CALIFORNIA: Highway 89 Stewardship Team

Partners include:
• Sierra County Fish and Wildlife Commission
• Sierra County
• USDA Forest Service: Tahoe National Forest & Pacific Southwest Research Station
• California Department of Fish and Game
• California Department of Transportation
• University of California Cooperative Extension
• UC Berkeley-Sagehen Creek Field Station
• California Deer Association
• University of California, Davis
CALIFORNIA:
Liberty Canyon Wildlife Crossing

Credit: National Wildlife Federation and Liberty Canhon project partners
UTAH:
Parley’s Summit near Park City

PARK CITY’S WILDLIFE IS UNDER ATTACK

Credit: Save People Save Wildlife

IN 2014 ALONE, 144 ANIMALS WERE KILLED BY AUTOMOBILE COLLISIONS ALONG THE I-80 CORRIDOR FROM SLC TO WANSHP INCLUIDNG ELK, DEER AND MOOSE
NEVADA
Highway Safety Structures

Credit: Nevada DOT
Wildlife-Vehicle Collision Reduction and Habitat Connectivity
Pooled Fund Study Now Open!

This pooled fund study will build upon the collaborative efforts of public and private partners, including the Federal Highway Administration, NV Dept of Transportation, ARC (Animal Road Crossings) Solutions, and the Western Transportation Institute at Montana State University.

Participating study members will have an opportunity to develop, review and select national and regional research projects that:

- Explore the effectiveness of new mitigation measures.
- Evaluate improvements to existing mitigation measures.
- Assess mitigation for particular species of conservation interest.

Images courtesy of:
Nevada Department of Transportation
Tim Torell w Tim Torell Photography,
www.digitawildlifeimages.com
Structure and Processes for Wildlife Transportation Planning
Matt Skroch
Wildlife Considerations in Transportation and Community Planning
October 15, 2019
The Take-aways, first

• Nevada already has world-class projects under its belt, where do you go from here?
• Don’t reinvent the wheel – great templates and ideas from nearby states.
• Institutionalize your effort.
• Create process and structure inclusive of stakeholders outside of government.
• Leverage partnerships to build support, collect data, and raise money.
Value Proposition

• Conserving wildlife
  – Successful, migrating herds of many ungulates are healthier, more resilient than non-migrating herds.

• Saving taxpayers money
  – Projects in collision hotspots “pay” for themselves many times over.

• Improving driver safety
  – We consistently see 80-90% decrease in wildlife-vehicle collisions in places where infrastructure is improved/retrofitted for wildlife passage,
A Hot Topic

- Western Governors’ Association resolution 2019-08
- Wildlife and transportation legislation passed in Oregon and New Mexico
- 1 west-wide and 3 state – now 4 – wildlife and transportation summits (all “firsts”)
- Governor’s executive order in Colorado
- Governors advisory group and forthcoming executive order in Wyoming
- Department of Interior Secretarial Order 3362
- $250m for wildlife connectivity currently in bipartisan highway bill reauthorization passed out of Senate committee.
Montana Wildlife & Transportation Summit (Dec. 2018)

Purpose: Bring stakeholders together to strengthen working relationships, share information, and develop strategies to plan and implement wildlife accommodations; reduce animal-vehicle collisions; and protect wildlife and their movement across state highways.

Outcomes:

• Formation of Montana Wildlife and Transportation Steering Committee.

• Creation of a formal process for identifying shared priorities between MDT, FWP, NGOs and other stakeholders.

• Commitment to meet biennially to discuss highway projects in the Statewide Transportation Improvement Program. Expand the scope of the biennial meetings to include additional topics.
Montana Wildlife & Transportation Summit, Dec. 2018

Outcomes, continued…

• Create a collaborative structure of committees and/or work groups to provide the capacity to plan for and implement wildlife accommodations, as well as define roles and responsibilities.

• Develop a Memorandum of Agreement (MOA) between MDT and FWP that outlines how the agencies will work together on wildlife and transportation issues. This MOA can provide consistency through different agency administrations and build a foundation for a broader partnership, including NGOs and other stakeholders.

• Develop a website that outlines the collaborative structure and provides a clearinghouse for activities during and after the Summit.
Colorado Wildlife and Transportation Summit, June 2017

Purpose: Establish partnerships and share ideas and expertise around improving highway safety, and protecting wildlife populations and movement corridors. The Summit focused on informing and engaging agency staff, decision-makers, and public and private stakeholders on current issues around:

- wildlife concerns;
- highway safety;
- partnership opportunities and case studies related to wildlife populations;
- highway crossings/mitigation features; and
- animal-vehicle collisions.
Outcomes:

• Formation of Colorado Wildlife Transportation Alliance, a collaborative effort to improve human safety while integrating wildlife movements into Colorado’s transportation system. Includes measures that institutionalize wildlife considerations into transportation projects, build partnerships and awareness to protect wildlife movements across the landscape, and reduce wildlife-vehicle collisions while maintaining wildlife populations.

• Establish common mission and staff assignments in CDOT/CPW to allow for close collaboration and work to share information and make incremental progress in communication.

• Revise previous MOU or create a new MOU to set expectations and hold Committee members accountable to action items and agreements.
Purpose: To focus attention on migrating and wintering wildlife, wildlife-vehicle collisions, and motorist safety with the goals of:

1. Strengthen relationships, broaden participation, and enhance communication between WGFD, WYDOT, NGO partners and the public to work together to develop mechanisms to fund and implement priority projects to address the effects of roads on wildlife and minimize wildlife/vehicle collisions; and

2. Identify priority areas around the state and work together to find ways to fund and implement projects that reduce wildlife/vehicle collisions, increase motorist safety, and maintain or reestablish disconnected wildlife migration routes and other critical wildlife seasonal habitat (i.e. crucial winter ranges).
Outcomes:

- Formation of the Wyoming Wildlife and Roadways Initiative and its Implementation Team
- Assessing a liaison position (Initiative Liaison) between WGFD and WYDOT.
- Each WYDOT District’s and WGFD Region’s personnel meet, at minimum, once a year to review the STIP, other highway related projects, and wildlife concerns and data. This may require a memorandum of understanding between the two agencies. The District Engineer and Wildlife Management Coordinator are responsible for coordinating these meetings for each region.
Outcomes, continued…

• Convene a workshop among WYDOT District Engineers and WGFD Wildlife Management Coordinators to identify criteria and develop and implement a decision matrix to prioritize the larger projects/issues mapped statewide during the Summit.

• Release a prioritized list of infrastructure projects and work with stakeholders to identify funding sources.

• Develop a consolidated GIS database of the problem areas and mitigations identified.
State Legislatures

- New Mexico SB 228 (2019)
  - Calls for a state wildlife corridors action plan
  - Calls for a wildlife corridors project list
- Oregon HB 2834 (2019)
  - Calls for a Wildlife Corridor and Safe Road Crossing Action Plan, including priority project list
  - Directs ODOT, when conducting road projects that threaten wildlife connectivity, to identify wildlife corridors that may be threatened and include a mitigation plan in the environmental impact statement for the road project.

More coming....
Governor Polis’ Executive order

- Directs Colorado Division of Parks and Wildlife (CPW) to compile a status report of migration corridors and seasonal habitat that conveys known locations and threats, identifies science/research gaps, makes prioritizations on information needs, identifies funding sources for research, and sets a timeframe for regular updates to the status report.
- Directs Colorado Dept. of Natural Resources to identify policy, regulations, and legislative opportunities to ensure the conservation of migration corridors and seasonal habitat.
- Directs CPW to incorporate migration corridors into the agency’s public outreach and education programs.
Governor Polis’ Executive order

• Directs Colorado Dept of Transportation (CDOT) to enable safe wildlife passage and reduce wildlife-vehicle collisions and to incorporate migration information into “all levels” of the dept’s planning processes.
• Directs CDOT and CPW to enter into an MOU in order to formalize how the two agencies will integrate existing and proposed policies on this issue, identify priority areas for wildlife crossings, and to support the Colorado Transportation Alliance as a forum to raise awareness, partnerships, and funding.
Where it can go wrong

- Fremont County, Idaho
  - A citizen’s group formed to oppose a wildlife friendly transportation project, claiming it would restrict access and weaken private property rights/values
  - A non-binding resolution was put on the November 2018 ballot regarding support or opposition to the project.
  - Agencies and project supporters were caught off-guard and unable to engage and educate local citizens in a way that could compete with the opposition campaign.
Considerations

• Institutionalize your interest
  – Write it in a job description, or dedicate FTE.
  – MOU with sister agency and other relevant stakeholders.
  – Create policy/guidance/memoranda that memorialize your commitment and proposed actions.

• Leave no stone unturned looking for dollars
  – Brief your legislative liaisons or lobbyist(s) on needs and importance
  – Create working groups with NGOs and landowners to seek funds from private, local, state, and federal sources.

• Tell a good story
  – Don’t underestimate the importance of inspiration
Considerations

• Create a body of people that include external stakeholders that will hold you accountable and keep you engaged.
  – Advisory committees, alliances, work groups, steering committees.
  – Can cover multiple needs, e.g. identification/science, funding, public outreach, etc.

• Interact with the public.
  – Host regional or statewide gatherings to share data, solicit input, and build support. Coordinate with counties, cities, NGOs, and landowners.
  – Develop online tools for understanding and visualizing the issue.