

**NEVADA DEPARTMENT OF TRANSPORTATION  
POOLED FUND RESEARCH PROBLEM STATEMENT**

**I. PROBLEM TITLE**

*The Wildlife Vehicle Collision (WVC) Reduction and Habitat Connectivity*  
Transportation Pooled-Fund Project TPF-5(358)

**II. PROBLEM DESCRIPTION**

**For the purposes of this pooled fund study, the term wildlife includes all terrestrial animal species, large and small, domestic and wild, including livestock.**

The *Wildlife Vehicle Collision (WVC) Reduction and Habitat Connectivity* pooled fund study is a collaborative research project through the Transportation Pooled Fund Program. Partners from both the United States and Canada have come together with a common interest in reducing WVC's for the safety of humans and wildlife, as well as restoring habitat connectivity in landscapes fragmented by roadways. Contributing partners currently include Alaska DOT, Arizona DOT, California DOT, Iowa DOT, Minnesota DOT, Nevada DOT, Ontario Ministry of Transportation, Oregon DOT, and Washington DOT.

WVCs have become an increasingly large component of overall crashes, while at the same time local populations of wildlife, both large and small, have suffered restrictions to their safe movement across roads. While there are several proven mitigation measures that significantly reduce WVCs, provide safe wildlife passage, and maintain habitat connectivity, there are new technologies or improvements to existing or traditional mitigation measures that may reduce overall costs to taxpayers.

How do we cost-effectively make roads safer for motorists while at the same time protect vulnerable wildlife? How do we integrate wildlife mitigation into the early stages of transportation planning to maximize the investment? By comparing new technologies/improvements to traditional measures, corresponding costs, and anticipated needs early in the planning process, transportation and land management agencies can make better investment decisions to reduce WVCs.

This pooled fund study (PFS) will seek to identify cost-effective solutions that integrate highway safety and mobility with wildlife conservation and habitat connectivity. Two main tasks have been identified by the study partners. Each task is unique and can stand alone, but each task has the potential to build upon the other task. Therefore, an applicant can submit a proposal for one task or both, depending on the applicant's experience and knowledge. If an applicant submits a proposal for both tasks, a separate scope, schedule, and budget for each task must be included. Each task may be awarded to separate applicants or together under one applicant as the applicant with the best proposal for each unique task will be awarded that task.

**III. TASKS and ASSOCIATED OBJECTIVES**

1) Cost Effective Solutions:

a. Develop Improvements and Modifications: Develop improvements for

existing methods and modifications that can be used in conjunction with existing or planned transportation infrastructure to facilitate wildlife movements and reduce WVCs with large mammals as well as amphibians and reptiles.

- i. **Literature Review and Comparisons:** Identify and describe current methods used in conjunction with transportation infrastructure to reduce WVCs. Identify and describe current modifications available that can be applied to existing infrastructure. List and compare current methods for modifications to existing infrastructure and describe associated pros and cons, facility requirements, initial costs, operation and maintenance costs, life-cycle costs, etc. Identify and describe the gaps in current science.
  - ii. **Improvements:** Develop improvements to standard engineering designs that assist in the reduction of WVCs. Describe how the improvements can either reduce WVC's or assist terrestrial movements and address facility requirements, initial costs, operation and maintenance costs, life-cycle costs, etc.
  - iii. **Modifications:** Develop modifications that can be applied to existing or planned infrastructure, such as bridges or vehicle underpasses. Describe how these modifications can either reduce WVC's or assist terrestrial movements and address facility requirements, initial costs, operation and maintenance costs, life-cycle costs, etc.
  - iv. **Field Test:** Select the top improvements and modifications that have the highest potential for cost savings. Field test and analyze your selections.
  - v. **Final Report:** Produce a final report with associated findings.
- b. **Investigate New or Emerging Technologies:** Investigate new or emerging technologies, designs, and construction methods that facilitate wildlife movement and reduce WVCs for large mammals as well as amphibians and reptiles.
- i. **Literature Review and Comparisons:** Identify and describe new or emerging technologies, designs, and construction methods and any Best Management Practices associated with each of them. List and compare the new technologies and describe associated pros and cons, facility requirements, initial costs, operation and maintenance costs, life-cycle costs, etc. Identify and describe the gaps in current science.
  - ii. **Field Test:** Select the top new or emerging technologies, designs, and construction methods that have the highest potential for cost savings. Field test and analyze your selections.
  - iii. **Final Report:** Produce a final report with associated findings.
- c. **Investigate Reduction Measures Available for Livestock:** Identify, field test, and analyze mitigation measures to increase driver safety by reducing WVCs with large livestock including horses, burros, and cattle.
- i. **Literature Review and Comparisons:** Identify and describe current methods used to reduce collisions with livestock. List and compare the mitigation methods used for livestock and describe associated pros and cons, facility requirements, initial costs,

- operation and maintenance costs, life-cycle costs, etc. Identify and describe the gaps in current science.
- ii. **Field Test:** Field test and analyze the effectiveness of existing low-cost mitigation measures that have been used traditionally for native wildlife, but have not been tested on livestock, including reflectors, lighting, riprap, and existing warning systems such as stationary and digital signs. Select new wildlife technologies that have potential application for livestock mitigation that have the highest potential for cost savings. Field test and analyze your selections.
  - iii. **Final Report:** Produce a final report with associated findings.
- d. **Develop a Manual for Cost Effective Wildlife Mitigation:** Develop a current manual which combines your findings on cost effective mitigation techniques. Guidance may include best management practices, selection of countermeasures, design criteria, fence elements/treatments such as escape structures, vehicle and pedestrian access, fence ends, product guidance, designs known to be effective by species, the addition of new technologies, animal warning systems, smart-phone detection applications, maintenance concerns, benefit-cost analyses, etc. The manual must incorporate methods that can be implemented across a broad range of environmental conditions (i.e. areas that experience freeze-thaw cycles, temperature extremes, various habitat types, etc.).
  - e. **Develop and Provide a Communication Plan:** Develop and provide a communication plan to share and disseminate the information from this research with transportation agencies. This may include technology transfer, public outreach, education, or training.
  - f. **Annual Partner Meeting:** Coordinate, schedule, and facilitate an annual meeting of representatives of contributing entities.
    - i. Present progress to panel representatives.
    - ii. Outline upcoming tasks and elements.
    - iii. Obtain feedback from panel representatives.
    - iv. Capture meeting notes for project reporting.
    - v. Reimburse representatives for travel.

## 2) Strategic Integration of Wildlife Mitigation into Transportation Procedures

- a. **Investigate Transportation Procedures:** Identify and describe how transportation agencies integrate wildlife mitigation into transportation procedures such as planning, project development, infrastructure design, construction, monitoring, and related processes.
  - i. **Literature Review and Comparisons:** Identify and describe the current state of practice for how transportation agencies integrate wildlife mitigation into transportation procedures. List and compare current methods including the pros and cons as well as opportunities for improvements. Identify and describe the gaps in current science.
  - ii. **Partnerships:** Identify and describe some of the partnerships that have made transportation agencies successful in incorporating

- wildlife mitigation into their transportation procedures. Identify and describe lessons learned through these multi-member partnerships and how transportation agencies can improve partner involvement.
- iii. **Data Requirements:** Identify and describe the data required for integration of wildlife mitigation projects into transportation procedures such as project prioritization, planning, and implementation. Data requirements may include migration patterns, population boundaries and densities, movement data, habitat assessments, crash and carcass data, land use, mitigation costs, available funding, overlap in project locations, etc. Identify and explain new technologies that may assist with data collection and dissemination such as smart-phone detection applications and real-time web-maps.
  - iv. **Final Report:** Produce a final report with associated findings.
- b. Develop a Manual to Integrate Wildlife Mitigation in Transportation Planning: Develop a current manual which provides recommendations to transportation agencies on how to integrate wildlife mitigation into their various transportation processes such as planning, project development, infrastructure design, construction, monitoring, and related processes.
- i. **Prioritization:** Develop a plan for prioritization of wildlife mitigation projects. Describe how these methods can include human safety, wildlife conservation needs, and how the separation of urban and rural conflicts can be considered. Describe why prioritization is important, how it informs management, supports decisions, and can assist with short- and long-term planning efforts.
  - ii. **Planning and Development:** Develop a plan on how to integrate the prioritization of wildlife mitigation into land use, transportation planning, project development, infrastructure design, construction, economic evaluations, and asset management. Describe how early planning can benefit both the short- and long-term transportation projects and goals.
  - iii. **Monitoring Strategies:** Develop a plan to incorporate monitoring strategies to facilitate pre- and post-construction data collection to help determine the effectiveness of wildlife mitigation efforts, aid in asset management, and assess economic strengths and weaknesses.
- c. Develop and Provide a Communication Plan: Develop and provide a communication plan to share and disseminate the information from this research with transportation agencies. This may include technology transfer, public outreach, education, or training.
- d. Annual Partner Meeting: Coordinate, schedule, and facilitate an annual meeting of representatives of contributing entities.
- i. Present progress to panel representatives.
  - ii. Outline upcoming tasks and elements.
  - iii. Obtain feedback from panel representatives.
  - iv. Capture meeting notes for project reporting.
  - v. Reimburse representatives for travel.

#### **IV. CURRENT PRACTICE and RELATED RESEARCH**

The current practice by transportation agencies varies around the world. Some use inexpensive measures such as signs or reflectors, while others have complicated fencing and crossing structures. These methods are indeed useful, but the low-cost methods tend to be ineffective while the expensive methods can be cost prohibitive. Therefore, what is needed is to determine how to maximize the benefits for the safety of motorists, wildlife, and the cost to taxpayers. There is no single method that will work for all scenarios, but transportation agencies need more options in their toolkit.

#### **V. RESEARCH METHODOLOGY**

It is anticipated that information will be collected from interviews, expert solicitation, publication reviews, field evaluations, and examination of unpublished data.

#### **VI. IMPLEMENTATION POTENTIAL**

WVCs are a serious threat to the safety of the traveling public. Technologies and practices that would reduce these crashes, are reliable and affordable, and could be implemented immediately.

#### **VII. URGENCY and PAYOFF POTENTIAL**

It is extremely important to determine more effective and affordable mitigation techniques in reducing WVCs while helping to increase wildlife connectivity. It is difficult to integrate improvements related to reducing WVCs without strong science to help justify the benefits.

#### **VIII. ESTIMATED BUDGET**

Total \$900,000.00

#### **IX. DATE and SUBMITTED BY**

Nevada Department of Transportation  
1263 S. Stewart Street  
Carson City, Nevada 89712

*For planning purposes, research and final reports must be completed by July 31, 2021.*

#### **X. NDOT CHAMPION, COORDINATION and INVOLVEMENT**

**For consistency, all questions should be emailed to the following NDOT contacts:**

NDOT Administrative Lead

**Ken Chambers**

Research Chief

NDOT Research

Email: [kchambers@dot.nv.gov](mailto:kchambers@dot.nv.gov)

Phone: 775-888-7220

NDOT Technical Lead

**Nova O. Simpson, M.S.**

Northern Nevada Biological Supervisor  
NDOT Environmental Services Division  
Email: nsimpson@dot.nv.gov  
Phone: 775-888-7035

In addition, the following transportation agencies are partners and have made financial contributions to this pool funded study: Ontario, Canada, and Alaska, Arizona, California, Iowa, Oregon, Minnesota, and Washington with the United States. All questions will be distributed by NDOT to the partners for review and comment.

Contributing Partners

**Alaska Department of Transportation**

**Arizona Department of Transportation**

Justin White – Biology Program Manager  
Email: JWhite@azdot.gov

**California Department of Transportation**

James P. Henke - Senior Endangered Species and Wildlife Biologist  
Email: james.henke.jr@dot.ca.gov

**Iowa Department of Transportation**

Steve J. Gent P.E. - Director, Traffic and Safety  
Email: Steve.Gent@iowadot.us

**Minnesota Department of Transportation**

Chris Smith - Protected Species Coordination  
Specializes in small wildlife, including amphibians and reptiles.  
Email: Christopher.E.Smith@state.mn.us

**Ontario Ministry of Transportation**

Brenda Carruthers – Team Lead, Environmental Policy, Policy and Planning Division  
Email: Brenda.Carruthers@ontario.ca

**Oregon Department of Transportation**

Cidney Bowman – Wildlife Passage Program Coordinator  
Email: cidney.n.bowman@odot.state.or.us

**Washington Department of Transportation**

Jon Peterson – Research Manager  
Email: peterjn@wsdot.wa.gov

# Proposal Guidelines

## NEVADA DEPARTMENT OF TRANSPORTATION

### FFY 2018 RESEARCH PROPOSALS

**Proposals should not to exceed 10 pages (font size 12)**

Page limit does NOT include cover page, CVs, resumes and budget

1. **TITLE (Required)**: State the title of the research study that highlights the focus of the proposed research in response to the corresponding problem statement.
2. **PRINCIPAL INVESTIGATOR (Required)**: Provide the name and title of the Principal Investigator (PI). Include an address, email and telephone number for the PI. Additional investigators' details may also be included.
3. **PROBLEM DESCRIPTION (5 Points)**: Define the specific problem the proposed research will address. Describe why the partners need to research the proposed problem (i.e., how the existing research nationally and internationally does not fully solve the problem for the partners).
4. **BACKGROUND SUMMARY(15 Points)**: Include background information on the research topic using the following outline:
  - Summarize the current practice related to the problem described above.
  - Summarize the finding of a preliminary literature search and describe how the proposed study is leveraging and not duplicating prior research.
  - Address why the proposed new research is needed by the partners beyond the existing research.
5. **PROPOSED RESEARCH (20 Points)**: Provide a detailed research plan including the methodologies and the justification for the selected methodology.

The research plan should have a list of specific tasks and provide details on the research activities and should list the deliverables for each task.

- Define the technical objectives.
- Describe the research methodology in detail:
  - Specify a set of tasks and describe how these tasks will directly address the identified problem.
  - **A separate task to produce a final report should be included in all proposals**
- Identify clearly all of staffing and equipment resources that will be needed from all of the partners to accomplish the proposed research.

Comprehensive details should also be provided regarding data collection plans, data sample sizes, statistical analysis methods, use of existing models or development of new models, expected survey techniques, etc.

List all of the deliverables for each task of the proposed research project including the following:

- a. Interim reports, synthesis documents and final report.
- b. Any programming codes, databases, and other tools to be developed.
- c. Models to be developed using proprietary and other programs

6. **ANTICIPATED BENEFITS (10 Points):** Quantify the potential payoff if the project objectives are achieved successfully and the research results are implemented.

- Provide a preliminary analysis of specific benefits anticipated because of this research:
- Provide the cost of implementation of the research results and the operations and maintenance when implemented.
- Include an estimate of the savings in terms of time, money, increased safety, improved service, or improved processes for the partners.

7. **IMPLEMENTATION PLAN (15 Points):** Identify at what stage of the research deployment the proposed research is and clearly identify if the proposed research will result in deliverables that are ready for implementation. Any institutional, political, or socio-economic barriers to implementation of the anticipated research results/products should also be identified.

Address the following in this section:

- a. Identify all of the tasks and stages (include an estimate of costs beyond the proposed research) needed for full implementation of research results.
- b. Include an accurate estimate of the cost of research for implementation.
- c. If the proposed research will result in deliverables that are ready for implementation, **please include a task to develop a detailed implementation plan for the partners.**

8. **PROJECT SCHEDULE (5 Points):** Provide a detailed project schedule. Please consider the seasonal effects on data collection and other tasks in determining the overall schedule. Please suggest a starting date between October 1, 2018 and December 31, 2018. Please identify proposed timelines for completing the deliverables.

9. **FACILITIES AND EXPERTISE (15 Points):** Describe the research team's expertise and the facilities available to accomplish the research.



Indicate whether the equipment which is necessary for completion of the research is already available for the proposing entity. Specify any equipment which is necessary but not currently on-hand. Below is a definition of equipment according to the Nevada State Administrative Manual.

**“Equipment” is defined as any item that must have an anticipated useful life extending beyond one year, must not be consumed in use, must not be attached permanently as a non-movable fixture, and must cost \$5000 or more.**

Explain how the expertise of the proposers will aid the proposed research and include CVs and resumes as needed.

10. **BUDGET (10 Points):** Include an estimate of the budget for each phase proposed (if more than one). The budget for the proposed research should be in the attached format (page 4 of this document, **the format has changed recently**).

**An estimated budget for delivering a final report should be included as a separate line item in the budget.**

11. **PARTNER COORDINATION AND INVOLVEMENT (5 Points):** Briefly describe the efforts made in seeking and utilizing the partners input. **Identify all stakeholders and their needs including the requirements of individual partners**

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**STANDARD BUDGET ITEMIZATION FOR DEPARTMENT RESEARCH PROJECTS**

Project Title:  
Project Duration:

Name	Position / Title	% Fringe Benefit	Total Fringe Benefit	Salary or Wage	Monthly % Salary or Hours	Total Monthly Wage	Total Year 1
			\$	\$		\$	\$
			\$	\$		\$	\$
			\$	\$		\$	\$
<b>Year 1 Total</b>			\$	\$		\$	\$

Name	Position / Title	% Fringe Benefit	Total Fringe Benefit	Salary or Wage	Monthly % Salary or Hours	Total Monthly Wage	Total Year 2
			\$	\$		\$	\$
			\$	\$		\$	\$
			\$	\$		\$	\$
<b>Year 2 Total</b>			\$	\$		\$	\$

Name	Position / Title	% Fringe Benefit	Total Fringe Benefit	Salary or Wage	Monthly % Salary or Hours	Total Monthly Wage	Total Year 3
			\$	\$		\$	\$
			\$	\$		\$	\$
			\$	\$		\$	\$
<b>Year 3 Total</b>			\$	\$		\$	\$

	Year 1	Year 2	Year 3
A. Personnel	\$	\$	\$
B. Travel	\$	\$	\$
C. Operating Costs	\$	\$	\$
<b>D. Final Report Preparation and Submission</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
E. Other Costs	\$	\$	\$
F. Subtotal of Direct Costs (sum of A thru E)	\$	\$	\$
G. Total Indirect Cost (% of F at corresponding rate of indirect costs)	\$	\$	\$
H. Student Tuition and Fees	\$	\$	\$
I. Contractor >\$1,000.00	\$	\$	\$
K. TOTAL PROJECT COSTS PER YEAR (sum of F thru I)	\$	\$	\$
<b>TOTAL PROJECT COST</b>			<b>\$</b>

**Notes:**

- 1) DEPARTMENT only pays for travel that is essential for the completion of the project and cost are per state rates. Travel costs to professional and other meetings are not allowed. **Out-of-state travel requires approval in advance**