TITLE OF PROJECT:

Reduce Vehicle-Animal Collisions with Installation of Small Animal Exclusion Fencing

PROJECT PROPOSED BY:  Christopher Smith¹ and Peter Leete²

POSITION AND MNDOT OFFICE OR DISTRICT: ¹ Office of Environmental Stewardship, Wildlife Ecologist
                                               ² Office of Environmental Stewardship, MnDNR-MnDOT Liaison

TOTAL BUDGET $150,000

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>AMOUNT</th>
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</thead>
<tbody>
<tr>
<td>MnDOT State Research Funds…</td>
<td>$</td>
</tr>
<tr>
<td>Office or District Funds………</td>
<td>$</td>
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<td>Federal SP&amp;R…………(__ %)</td>
<td>$</td>
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<td>LRRB…………………………</td>
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<td>Other:</td>
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OVERALL PROJECT SCHEDULE

DATE PLAN COMPLETED: March 2017
(allow time for review, approval and contract process)
PROJECT START DATE: July 2017
PROJECT LENGTH (MONTHS): 48

PROJECT OVERVIEW AND GOALS

This proposal will look at reducing access to roadways for small animals including turtles listed as threatened species by the Minnesota Department of Natural Resources. These species, plus several other turtle species that exist elsewhere in the continental US are currently under review for listing under the federal Endangered Species Act, and road mortality threatens their survival.

MnDOT Office of Environmental Stewardship staff, in conjunction with MnDNR, have drafted standard plans and specifications for small animal exclusion fencing, designed with ‘off the shelf’ materials with the intent to redirect turtles and other small animals to existing through road infrastructure (i.e., bridges and culverts). Yet it remains untested.

This research proposal seeks implementation funds to: 1) Identify sites based on target species and input from road authorities; 2) Install a selection of designs from our plan; 3) Monitor effects on target species and other creatures; 4) Evaluate costs; and 5) Generate recommended changes to the plan/spec. This project will complement existing research conducted by MnDNR and leverage work by MnZOO contingent upon its proposal being funded.

MnDOT PROJECT MANAGER OR TECHNICAL LIAISON
Christopher E. Smith
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St. Paul, MN 55155
Christopher.E.Smith@state.mn.us
651-366-3605

APPROVALS

OFFICE DIRECTOR OR DISTRICT ENGINEER
Office or District: Office of Environmental Stewardship
I hereby certify sufficient staff time will be scheduled for the Project Manager and staff to complete the project as outlined in the attached work plan, and commit any Office or District funds as listed above.

Signature of Office Director or District Engineer:
________________________________________
Lynn Clarkowski
Date: ____________

DIRECTOR OF RESEARCH SERVICES SECTION
Approval of work plan and any MnDOT State Research Program funds as listed above.

Signature of the Director of Research Services:
________________________________________
Date: ____________
IMPLEMENTATION PLAN AND PROJECT PROPOSAL

INNOVATION ROADMAP INFORMATION

1) What are the expected benefits to MnDOT from implementing the results of the project? What is the impact on the department?

MnDOT will accrue benefits in the following areas:

- Decrease Engineering / Administrative Costs: One of the overall goals is to evaluate the efficacy of a standard plan / special provision for small animal exclusion fencing. Having a standard plan/spec will allow projects to use an existing accepted plan vs. having to dedicate staff resources to creating project-specific designs. Quantitative benefit could come in the form of average costs associated with developing a custom standard plan / spec.
- Environmental Aspects: Estimating quantitative benefit is challenging, however MnDOT is expected to avoid, minimize, and/or mitigate impacts to endangered and threatened species. A standard plan for fencing to keep small wildlife off roads will become an available best practice. To date, various fencing designs have been implemented across Minnesota by MnDOT and other local road authorities, however, few have attempted to evaluate their efficacy - from both a cost perspective and the fencing's ability to reduce small animal mortality. In addition, resource agencies may assign monetary value to individual wildlife resources. This could be another way to quantify fencing efficacy.
- Safety: Road safety is a cornerstone of all highway planning efforts, however it is difficult to quantify the benefits of reducing small-animal collisions as many go unreported. Driver avoidance or direct collisions with small animals may result in significant damage or even death for motorcyclists and bicyclists.

The proposed project will evaluate the efficacy of the draft standard plans and specifications, and allow staff to adapt it to better meet Dept. goals/standards, as well as environmental objectives. Where DNR/USFWS or general public raise concerns about small animal road mortality, and/or where the Dept. has identified motorist safety or traffic concerns resulting from frequent small animal crossings, the standard plans and specs will provide the Dept. the tools necessary to meet safety and environmental concerns.

2) What transportation problem is this project solving? What has been attempted in the past to solve this problem and what remains to be solved?

To date, various types of fencing have been installed along Minnesota roadways to reduce vehicle-wildlife collisions and wildlife mortality. Very few of these designs have been tested for effectiveness, and designs have been developed on a project-by-project basis. The goal is to develop a standardized set of designs that are both cost effective and that meet both safety/environmental goals using 'off-the-shelf' fencing materials.

MnDOT, local road authorities, and MNDNR have installed both temporary and permanent fencing at various locations across the state with the specific aim of reducing small wildlife road crossings. Many of these implemented fencing projects have not been evaluated for efficacy, and none have attempted to standardize the fencing designs. MnDOT and DNR have worked together to draft a standard plan / spec for use on future projects, but the designs need to be implemented and to be evaluated for efficacy. Researchers at MNDNR / MNZOO have expressed interest in this project.

3) Additional information about the project and goals:

Road safety is a cornerstone of all highway planning efforts. Vehicle-animal collisions account for thousands of crashes per year with untold dollar amounts of damage. Most records of these incidents involve large animals such as Deer-Vehicle collisions. However, this proposal will look at reducing small animal access to roadways. The target species are turtles which commonly move on to or across roads during spring nesting season.

Road mortality is also a key contributor to turtle declines throughout much of the United States, and is particularly suspected in declines of two turtle species that occur in Minnesota: the wood turtle (Glyptemys insculpta) and Blanding’s turtle (Emydoidea blandingii) are both listed as threatened species by the Minnesota Department of Natural Resources. These species, plus several other turtle species that exist elsewhere in the continental US are currently under review for listing under the federal Endangered Species Act.

In response to the possibility of a win-win situation for both protection of existing turtle species and increase road safety,
MnDOT Office of Environmental Stewardship staff, in conjunction with MnDNR, have drafted standard plans and specifications for small animal exclusion fencing. This fencing has been designed with ‘off the shelf’ materials with the intent to redirect turtles and other small animals to existing through road infrastructure (i.e., bridges and culverts). Yet it remains untested.

4) **How does the proposed project build upon previous research? If further research is proposed, why does similar previous research not solve the Minnesota transportation problem being addressed and why is further research needed?**

This project builds upon previous research by developing standard plans/specs using the a compilation of the most successful attributes taken from previously installed fencing, as well as consultation with wildlife and transportation experts. After testing and refinement, these plans would meet the unmet need of a standard and effective design to be used by road authorities to reduce vehicle-wildlife collisions.

Select previous research:

5) **How will the results of the completed project be put into practice and deployed by MnDOT? Who needs to make a formal decision to implement and deploy, and who would be responsible for implementation and deployment?**

Fencing should be implemented / deployed in coordination with MnDOT Office of Environmental Stewardship.

The project will develop the following end-user products:
- Best practices guidance
- Develop a new specification or modify existing specification
- Develop a new design process or method
- Improve or modify an existing design method
- Construction method or materials

MnDOT’s current fencing spec does not adequately address the need to keep wildlife from reaching the roadway. The goal is to refine the existing spec/design, or possibly create a new spec/design, to develop a product that will reduce vehicle-animal collisions via the installation of small animal exclusion fencing. The goal is to generate a standard spec and a standard plan, resulting in a best practice that project designers and engineers can use on projects where reducing small animal vs. vehicle collisions is desirable from a safety and/or environmental perspective.

Technical advisory panel or project steering committee:
- Peter Leete (MnDOT-DNR Liaison)
- Beth Brown (MnDOT - Environmental Stewardship)
- Scott Bradley (MnDOT - Environmental Stewardship)
- TBD (MnDOT - Maintenance)
- TBD (MnDOT - Safety)
- TBD (Fencing Contractor)
- Gaea Crozer (MNDNR) or Krista Larson (MNDNR)
- Lisa Gelvin-Innvaer (MNDNR) or Luke Groff (MNDNR)
- Seth Staphleton (MNZOO)

MnDOT specialty offices:
- Environmental Stewardship,
- Maintenance
MnDOT Districts and District functional groups:
- All Districts

Additional key practitioners or management champions:
- DNR staff

Management group:
Practitioner committee:
Other cooperating program or agency:
Other stakeholders:
Others who may be interested, not listed above:
- USFWS
- FHWA

MnIT involvement (software, data management, or technology devices): N/A
Items for State contract or Approved Products list: N/A
Intellectual Property or licensing: N/A

6) **What future efforts or steps will be needed to derive full benefits from the expected results of this project?**

MnDOT is committed to the following future steps:
- Revise / develop a finalized standard plan / spec for approval as a Special Provision
- Develop protocol for when/where fencing should be used.

7) **Communication Plan**

- Catch phrase for marketing: Why Did the Turtle Cross the Road? Or Fencing for Motorist and Wildlife Safety Or Ecological Approach to Roadway Fencing

Target audience for early communication (in addition to those named above):
- District Engineers
- Maintenance Local Road Authorities
- External Stakeholders (Snowmobile clubs, environmental groups, etc.)

Early Communication plan:
- Small group discussions
- Online survey
- MnDOT 'Newsline' article
- Web Blog (for example, Research Services blog posting)

These should be performed as early as practicable: during the site-selection phase of the project.

Target audience for rolling out the innovation:
- Road authorities.
- End user is fencing contractors.

Roll-out message, methods and activities:
The overall message should be that MnDOT is attempting to create a safe traveling experience for motorists, while also minimizing impacts to wildlife. The goal is a standardize design so that outcomes are effective (both cost and environmental).
- Presentation to a technical group
• Internal office meeting
• Include in other scheduled training
• MnDOT 'Newsline' article
• Demonstrations
• DOT standard plan / spec.

Roll-out timing and responsibilities:

• Revise / develop a finalized standard plan / spec for approval.
• Develop protocol for when/where fencing should be used.

Address future funding needs for implementation on project. Study long-term maintenance issues.

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**PROJECT WORK PLAN INFORMATION**

**BACKGROUND:** Include any background information or history pertinent to the project that has not been provided above.

**SCOPE:** Briefly summarize the scope of work of this project. This includes an overall description of how the project will be conducted. Please summarize coordination with other projects or other work that is necessary for completion of this project, such as specialized help or input including data, materials, equipment, facilities, etc.

Scope of work includes the identification of study sites, fencing installation (multiple types) at multiple sites, effectiveness monitoring (repeated surveys for wildlife mortality - focus on turtles), evaluation of fencing cost vs. effectiveness, and adaptive changes to draft standard plan/spec to improve fencing efficacy. Study sites likely to occur in Districts 1, Metro, 6, and/or 7. Effectiveness monitoring will require University PI / graduate student(s).

Budget: $150,000 to $270,000 (rough estimate)

Schedule: 4 years

Contractor/researcher: We have a few potential PIs in mind, but we will want to put out a public RFP.

**TASKS:** List the major tasks in the sequence necessary to complete the project, including the elements listed below.

Scope: For each task, give a task title, describe the work that will be included the in task and who will perform the work (consultants, contractors, university researchers, MnDOT personnel, or others). Purchase orders for equipment can be included here as a task to be completed by MnDOT. For each task there should be at least one deliverable, such as a report, test results, equipment, software, etc.

Schedule: Indicate a realistic duration for each task, and proposed start and end dates. The contract execution date will be unknown at the time this work plan is prepared, so it is important to note any “hard schedule” requirements for task start or ending dates, such as for seasonally-dependent work.

Budget: For each task, provide the total cost to complete the task. Tasks performed by MnDOT personnel may have zero-dollar budgets for the purpose of this work plan.

**TASK 1:** Identify Sites
- Completed by MnDOT/DNR
- Completed by Dec. 2017
- No Cost (labor)
- $5,000 for MnDOT Equipment
- Outcome - Identify multiple sites based on target species and input from road authorities

**TASK 2:** Install selection of fencing designs
- Install fencing using fencing contractor(s).
- Completed by Oct. 2018
- Cost, $30,000 to $150,000
- Outcome - Fencing installed per plan/special provision
TASK 3: Monitor Fence Effectiveness / Evaluate Costs
- University PI - Conducted in calendar year 2019/2020.
- Cost $120,000
- Outcome - Evaluation of fencing design efficacy for reducing small animal road crossing (focus on turtles).

TASK 4: Generate Recommend changes to plan/spec - MnDOT and MnDNR
- By June 2021
- No Cost
- Outcome – Finalized and approved Standard Plan and Specification and/or Special Provision.

SCHEDULE SUMMARY: List each task, start and end dates, or attach a Gantt chart.

Task 1: July 2017-June 2018
Task 2: June 2018-Oct 2018
Task 3: Jan. 2019-April 2021
Task 4: Jan. 2020-June 2021

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<thead>
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<th>DETAILED BUDGET FOR ENTIRE PROJECT</th>
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<tbody>
<tr>
<td>DOLLAR AMOUNT (OMIT CENTS)</td>
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<tr>
<th>DIRECT COSTS</th>
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<tr>
<td>CONSULTANT, CONTRACTOR AND TESTING COSTS (list each contract and its expected cost)</td>
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<tr>
<td>Fencing Contractor (TBD)</td>
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<td>Research Contract (TBD)</td>
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<tr>
<th>EQUIPMENT (itemize by vendor)</th>
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<tbody>
<tr>
<td>Fencing materials, GPS units, and tablets for digital data collection. This is largely unknown.</td>
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<tr>
<th>TOTAL PROJECT COSTS</th>
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<td>$10,000</td>
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BUDGET BY SUMMARY TASK AND CONSULTANT/VENDOR:

(List task number and dollar value for each task in the work plan. If the project includes consultant contract or vendor P.O., provide breakdown of task budget. Insert additional rows as necessary.)

<table>
<thead>
<tr>
<th>Task Number</th>
<th>Task Description</th>
<th>Consultant, Vendor or Contractor Name</th>
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<tbody>
<tr>
<td>Task 1</td>
<td>Identify Sites</td>
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<td>Task 2</td>
<td>Install Fencing</td>
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<td>Task 3</td>
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<td>Task 4</td>
<td>Best practices guidance, plans, specification</td>
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<td><strong>TOTAL PROJECT COSTS</strong></td>
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COMMENTS/JUSTIFICATION