Oregon Department of Transportation

Research Stage 1 Problem Statement

Number 26-02 – "Identification of Effective, Long-Term, Low-Cost Methods for Mitigating Beaver Dam Culvert Blockage"

1. Concisely describe the **transportation issue** (including problems, improvements, or untested solutions) that Oregon needs to research.

Despite being valuable keystone species that maintain ecosystems, beavers, through their dam building activities, can block culverts and flood highways. Currently, ODOT has an inconsistent approach to conflicts with beavers at or near road culverts. ODOT destroys dams, hires trappers to remove beavers, or rarely, hires outside beaver management experts to install structures for non-lethal management. Current science indicates that, in most cases, adapting site conditions to allow beavers to stay on the landscape is more effective and less costly than trapping and destroying beaver dams (Hood et al. 2017). Retaining beavers on the landscape also provides the societal benefits of raising water tables, retaining more water on the land during drought, providing fire breaks during wildfires, decreasing flooding, and creating habitat for fish and wildlife (Fairfax and Westbrook 2024). Currently, the Bluebook directs maintenance to coordinate with ODFW and NMFS when a problematic beaver dam is located on ODOT right-of-way but fails to identify effective, long-term, low-cost actions that ODOT staff can implement. Consequently, ODOT's current approach to beaver dams at culverts appears to be outdated, costly, and detrimental to Oregon's water resources.

2. What **final product or information** needs to be produced to enable this research to be implemented?

A study revealing the costs and effectiveness of various approaches to beaver dams at culverts is proposed. Currently, ODOT lacks inhouse expertise to assess sites and plan and install non-lethal methods. Therefore, this proposal includes the certification of one to three ODOT wetland specialists as "Beaver Wetland Professionals." The training program is remote and includes four beaver management project implementations. The costs and effectiveness of each non-lethal beaver management project will be compared with an equivalent site where ODOT implements trapping and dam removal.

If the study reveals that non-lethal beaver management is both less costly and more effective than lethal beaver management, the Maintenance Bluebook will be updated.

3. (Optional) Are there any individuals in Oregon who will be instrumental to the success of implementing any solution that is identified by this research? If so, please list them below.

Name	Title	Email	Phone

4. Decision making lenses

Please complete the following three sections. Your answers to these questions will be applied on a programmatic basis to support agency decisions. Answering yes to the questions below is not required. Resolving a narrowly focused technical research problem may meet agency needs without answering yes to any of the following questions. The ODOT Research Section will seek a balanced portfolio some projects will answer yes to one of the three categories below (e.g. climate, equity, and/ or safety) and other projects in a different category.

We are looking for an overall program balance and no one project is expected to balance all categories. Generally, a research problem statement is expected to be able to answer yes with clear and verifiable information in only one of the three categories below, some projects may be able to answer yes in two or even three categories. Some projects (i.e. needs focused on specific elements of infrastructure design), may have no yes answers but may still be high value research need.

Climate

Oregon recognizes the climate crisis and makes systemic changes to reduce emissions caused by travel. Every mile driven in Oregon is powered by a clean source of fuel. We seek research that supports construction and maintenance operations are carbon neutral and investments in mobility that support travel by low and no emission modes. While every research project may not result in a reduction in emissions, transportation investments overall support emission reductions to achieve state goals. Oregon envisions a transportation system that is resilient in the face of seismic and climate events and impacts to the degradation of the natural environment are reduced. Our vision includes a transportation infrastructure is built in a way that avoids impacts on key habitat and results in better environmental conditions for wildlife and native vegetation. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan and Oregon Transportation Plan.

4f. Will addressing the **transportation issue** identified as a need in Question 1 develop, or validate methods for the estimation, measurement, or monitoring of transportation generated greenhouse gasses (GHG)?

☐Yes ☒No ☐Unsure

4g. If climate or GHG is not the focus of this **transportation issue** identified in this problem statement, will the research apply a GHG analysis to transportation infrastructure, planning, operations, maintenance, or materials?

☐Yes ☒No ☐Unsure

4h. Will the addressing the **transportation issue** include development or testing of construction practices, methods, or materials to establish potential reductions in greenhouse gas emissions?

☒Yes ☐No ☐Unsure

4i. Will the solving the **transportation issue** in question 1 study or support the reduction of vehicle miles traveled and single occupancy vehicle travel or support transition to electric vehicles (or other types of zero emission vehicles) or low-carbon alternative fuels?

☐Yes ☒No ☐Unsure

4j. Will the solving the **transportation issue** in question 1 lead to work that will support, measure, monitor, transportation system resilience in response to expected climate events, effects, or natural disasters in general?

☒Yes ☐No ☐Unsure

4k. Will the solving the **transportation issue** in question 1 lead to work that may result in better environmental conditions for wildlife and native vegetation?

☒Yes ☐No ☐Unsure

4l. If you answered yes to any of the climate questions above or can provide alternative details related to climate, please provide additional information:

The proposed research will assess methods that will potentially reduce GHG emissions (4h). Retaining beavers and their dams on the landscape will decreases GHG emissions by preserving wetlands created by beaver dams. Wetlands are widely acknowledged for their ability to sequester carbon and function as "carbon sinks." In contrast, removing beaver dams results in a release of carbon and contributes to GHG emissions.

The proposed research will lead to work that supports transportation system resilience in response to expected climate events and natural disasters (4i). Habitats created by beavers buffer impacts from climate change (Fairfax and Westbrook 2024). Specifically, they decrease flooding by slowing and retaining water, raise water tables that prevents desiccation of vegetation (decreasing wildfire risk), and serve as firebreaks during wildfires. Decreasing both wildfire growth and flooding near state highways will protect the transportation system and boost its resilience.

The proposed research has the potential to dramatically improve environmental conditions for wildlife and native vegetation (4l). Beaver dams dramatically shape and modify ecosystems to benefit a range of native wildlife, fish, and vegetation. In addition to providing a refuge during wildfires, wetlands created by beaver dams provide habitat for migrating birds, aquatic plants, insects, and fish, including many threatened and endangered species. Although wetlands are relatively scarce on the landscape, approximately 40 percent of all plant and animal species live or breed in wetlands. Furthermore, approximately half of all federally-listed threatened or endangered species in the United States are considered "wetland dependent" (https://www.fws.gov/story/2023-04/why-healthy-wetlands-are-vital-protecting-endangered-species). The proposed research project has the potential to preserve a range of wildlife and native vegetation that would be otherwise destroyed.

Equity

Equity can have many dimensions and impacts relating to communities, and transportation. It is important that problem statement proposals clearly explain in what capacities are equity dimensions or impacts being examined within problem statements. It is a goal of the OTP to "Improve access to safe and affordable transportation for all, recognizing the unmet mobility needs of people who have been systemically excluded and underserved. Create an equitable and transparent engagement and communications decision-making structure that builds public trust". Proposed research may have the intent of studying elements of this goal or apply analysis to specific transportation topics to ensure the resulting research recommendations is consistent with our equity goals. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan and Oregon Transportation Plan.

4a Is the **transportation issue** identified as a need in Question 1 specifically focused on transportation equity?

☐Yes ☒No ☐Unsure

4b If the **transportation issue** is not focused on transportation equity, will the primary topic be assessed for equity benefits or impacts within the research project?

☐Yes ☒No ☐Unsure

4c Is the implementation of potential findings from this research likely to directly involve participation from an identified group that would benefit from an equitable process or outcome?

☐Yes ☒No ☐Unsure

4d Is the intended final product or information expected to support ODOT's equity efforts (Including but not limited to supporting one of the equity related objectives of the ODOT's Strategic Action Plan or Oregon Transportation Plan) ?

☐Yes ☒No ☐Unsure

4e If you answered yes to any of the equity questions above or can provide alternative details related to equity, please provide additional information:

Safety

Research outcomes may include interventions and countermeasures to prevent or reduce the frequency of crashes or other causes of transportation-related injury or death; or may include measures to reduce severity of injury (including prevention of death) after a crash or other injurious event. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan, Oregon Transportation Safety Action Plan and Oregon Transportation Plan.

4m. Will solving the **transportation issue** in question 1 support improving **safety culture** for either transportation workers or the traveling public?

☐Yes ☒No ☐Unsure

4n. Will the solving the **transportation issue** support improving safety through **healthy and livable communities**?

☐Yes ☐No ☒Unsure

4o. Will solving the **transportation issue** support improving safety through using **best available technologies**?

☐Yes ☐No ☒Unsure

4p. Will solving the **transportation issue** support improving safety through **communication and collaboration**?

☐Yes ☒No ☐Unsure

4q. Will the solving the **transportation issue** support improving safety through **investing strategically**?

☐Yes ☒No ☐Unsure

4r. If you answered yes to any of the safety questions above or can provide alternative details related to safety, please provide additional information:

Although addressing safety is not the primary goal of the proposed research, the potential for decreased flooding and wildfire expansion will provide the ancillary benefit of preserving the integrity of portions of the transportation system during flooding or wildfire.

5. Other comments:

Hood, G. A., Manaloor, V., and Dzioba, B. 2017. Mitigating infrastructure loss from beaver flooding: A cost–benefit analysis. *Human Dimensions of Wildlife*, *23*(2), 146–159.

Fairfax, E., and C. Westbrook. 2024. The Ecology and Evolution of Beavers: Ecosystem Engineers that Ameliorate Climate Change. *Annual Review of Ecology, Evolution, and Systematics*. 55:323-45.

6. Corresponding Submitter's Contact Information:

Name:	Allison Cowie
Title:	Wetland Specialist
Affiliation:	ODOT
Telephone:	541-410-1696
Email:	Allison.cowie@odot.oregon.gov

This form is not a grant application or contract document.