



FY 2015 Research Problem Statement

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I. TITLE

15-011 Development of Native Seeding Mixtures for Erosion Control on Construction Grades in Western Oregon.

II. PROBLEM

Seed mixes containing aggressive, non-native grasses and herbaceous species have been in use for decades as a means for erosion control within the Oregon state highway system. Despite their utility and low cost as erosion control these aggressive, non-native plants have spread throughout Oregon Department of Transportation's (ODOT) right-of-ways and require greater and more costly roadside maintenance than native species do. Further, invasive, non-native species significantly degrade sensitive wildlife habitat and plants communities that support state and federally listed species; species which FHWA/ODOT are mandated to protect under federal and state law. Tall, fast growing non-native species found in ODOT erosion control mixes have increased ODOT maintenance costs and have hindered FHWA/ODOT environmental compliance. For example, ODOT Region II's per/acre costs for roadside mowing ranges between \$68-\$245/acre. District 4 spent approximately \$95,000 for mowing and D5 about \$88,000 for fiscal year 2013. Because native plant communities are short and require less or no mowing district mowing costs in aggregate would trend lower via these reduced mowing requirements of native species. It is not unreasonable to assume that ODOT could safely 'skip a year' of mowing in areas occupied by native plant communities due to their shorter stature and still maintain highway clear zone and public safety. Reduced labor required for mowing would free-up crews for deferred maintenance activities and/or safety-related projects. Similarly, by developing effective native seed mixes erosion control costs for construction would also trend lower by reducing the need to apply temporary seeding on construction grades. Other benefits, which reliable native seed erosion control would provide may include increased environmental permit compliance, improved habitat conditions on highway grades, and increased public satisfaction of roadsides in western Oregon.

The conventional treatment along Oregon's highway rights-of-way has been to re-vegetate with aggressive, low cost seed mixes for their fast growth. Unfortunately, this practice leads to higher long-term maintenance via the constant need to mow. The incompatibility of non-native erosion control mixtures with native habitats is well documented in the literature. Unfortunately, native seed mixes alone generally cannot reliably stabilize slopes or control erosion on construction grades. In 1999, the Presidential Executive Order 13112 (*Invasive Species*) instructed federal agencies to provide leadership on preventing the introduction and spread of invasive species at government facilities and on federally funded (FHWA) projects. Despite this presidential mandate, as well as the federal and state Endangered Species Acts, ODOT routinely uses invasive, non-native grasses as its primary source of erosion control, which negatively affects native plant communities in western Oregon. Without funding to explore and develop cost effective native alternatives to our current erosion control practices the use of native seed mixes along ODOT's roadsides will not materialize in any meaningful way. Consequently, exotic species will continue to degrade native habitats and regulatory issues associated with habitat loss will continue to be in the forefront for our agency.

Why dwarf cereal grains? Because native vegetation often takes longer to establish than non-native vegetation use of native seed alone does not appear to be an effective method to control erosion, even in areas where native species are required. However, a technique that may significantly aid the establishment of native vegetation is to combine native seed with appropriate dwarf, cereal grain seeds (varieties) that are quick to germinate, short, able to stabilize soil, and do not persist in the landscape. Many annual, dwarf cereal grain varieties have these important characteristics. This problem statement seeks to explore the effectiveness of such varieties to serve as an effective soil-holding component for native seed mixes on construction grades. Native vegetation is adapted to survive in almost any soil condition and requires no fertilizer or irrigation after establishment. Consequently, over the long-term native vegetation can reduce maintenance costs, especially on new highway grades.

III. PROPOSED RESEARCH, DEVELOPMENT, OR TECHNICAL TRANSFER ACTIVITY

We propose experimental field trials (*i.e.*, paired control and experimental plots) to study the effectiveness of using annual (non-persistent) dwarf, cereal grain varieties (*e.g.*, short wheat and/or barley, etc.) in conjunction with native grass/forb seed mixtures to control erosion and successfully establish native vegetation on ODOT construction grades. The efficacy of dwarf, cereal grain varieties as an erosion control component and the success of native vegetation establishment will be quantified by comparing plant characteristics in control and experimental plots. Appropriate plant characteristics (parameters) to measure and relationships to examine include, but are not limited to

germination dates, root growth, cover, vigor (speed of establishment), plant height, relative soil-holding capacity, inter-specific competition, senescence date, drought resistance, and bio-mass persistent in plots.

The proposed scope of this study is realistic and would substantially revise or extend ODOT's existing knowledge base. Consequently, a very reasonable objective of this study is to develop native seed mix designs and protocols that will provide rapid cover and soil stabilization, and increase the success of native vegetation establishment on construction grades in western Oregon. Similarly, we believe effective native erosion control seed mix designs would establish a trend that will likely minimize maintenance costs over the long-term.

IV. POTENTIAL BENEFITS

Successful development of native seed mix designs that provide effective erosion control would benefit the agency by controlling erosion, reducing future maintenance costs, increase regulatory compliance and habitat quality, use less fossil fuels and reduce ODOT's carbon output. Research findings would provide useful best practices and protocols for native seeding on construction grades that would offer viable and cost effective options to transportation managers for vegetating ODOT future roadsides. Similarly, if research does not explore and develop effective native seed mixtures regulatory compliance issues and elevated maintenance costs will likely continue to persist.

Additional benefits include:

- Downward pressure on roadside mowing means reduced disturbance of ODOT roadsides thereby reducing the potential for weed infestation.
- Native species are short
- Crews that are not mowing have time available for other important things.
- Native species will reduce fuel loads retained on the roadsides reducing the risk of fire.
- Native grasses and forbs benefit native fauna thereby increasing biodiversity.
- Helps address storm water, vegetation establishment, and bank protection and scour research priorities for Geotechnical, Hydraulics, and Environmental.
- Enhance migratory bird habitat and compliance with the Migratory Bird Treaty Act.
- Offer additional erosion control options for ODOT construction and maintenance to use in environmentally sensitive areas containing native and/or rare plant communities.
- Increase FHWA/ODOT compliance with Presidential Executive Order 13112.
- Native vegetation is more drought tolerant and will retain its green look for most of the year.
- Native seed use supports economic diversification opportunities for the local agricultural industry.
- Serve as valuable baseline data from which to develop statewide native mix designs.

V. IMPLEMENTATION

The primary product/result of this research effort would be proven native seed mix designs that produce fast, effective growth, control erosion, require low maintenance, are cost effective, and can be reliably used on ODOT construction grades.

Environmental regulations are requiring the establishment of native vegetation on most ODOT activities that involve sensitive species or areas. These days this means every time ODOT touched a waterway or stream native species are required. Currently, there are no native seed mix designs that adequately control erosion on construction grades. ODOT's office of d construction and maintenance are firmly in support of native mix designs that work as erosion control, they have shown disinterest in native mix designs that fail on project grades. Functional native seed mix designs would help ensure compliance of construction and maintenance activities and environmental permit conditions when they are present. Similarly, effective native mix designs would greatly assist ODOT's habitat restoration and mitigation efforts.

VI. LIST OF REFERENCES (optional)

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