

ATTACHMENT B

B. SUMMARY

Title: Ecological and Economic Benefit-Cost Comparison of Grazed and Ungrazed Prairie Land for Critical Species Protection in Western Washington

Most rangelands west of the Cascades in the Pacific Northwest occur on sites that historically supported native prairie. Over 90% of the prairies in this region have been converted to agriculture or lost to development, making conservation of this rare system a top conservation priority. At the same time, the human population in this region continues to grow, demanding more from regional food production systems. Therefore, agricultural producers are under great pressure from growing needs for food production and habitat conservation. Because of this, it is increasingly recognized that effective prairie conservation can only be achieved by partnering with private landowners to develop incentivized conservation strategies that maintain productive farms.

Through a unique collaboration between agricultural producers, conservation scientists, economists, sociologists, regulators and agricultural researchers, we propose to evaluate if and how agricultural productivity can be maintained or enhanced in working landscapes while simultaneously accruing conservation value for rare native plants and animals. Through replicated on-farm experimental demonstrations, we will quantify the 'ecological lift' generated by conservation tools (altered grazing regimes, spring rest period, seeding native species). Additionally, we will evaluate the costs and benefits associated with conservation actions, to provide guidance on strategies and expenses for agricultural producers. Finally, we will survey producers to identify concerns, questions and needs (financial, technical, other) surrounding habitat conservation on their properties. The combined ecological, economic and social survey data will help guide government incentive programs. We expect this work to identify opportunities for agricultural producers to increase the conservation value of their properties, while maintaining or even enhancing their bottom line.

Study findings and educational materials resulting from the demonstration trials will be communicated through peer-reviewed publications, presentations at academic conferences, a published grazing management guidebook, and a series of collaborative regional workshops for agricultural producers, researchers, extension agents, and land managers.

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C. NARRATIVE - Relevance to sustainable agriculture. Agricultural producers today are faced with the twin pressures of population growth and natural resource degradation. They are being called upon to maintain productive farms for ever-expanding human populations, while managing their lands for sensitive habitat and rare species (Brunson and Huntsinger 2008). These demands require reliable information on both the effects of farming practices on habitat and effects of conservation practices on farm production to help craft sustainable land management guidelines.

In western Washington, farmers and regional decision-makers need data regarding the potential for meeting critical habitat and critical species conservation goals on agricultural land. Two significant pieces of regulatory work driving this need are the Washington State Voluntary Stewardship Program (VSP), and Thurston County's Habitat Conservation Plan (HCP). The VSP seeks voluntary landowner participation in the management of ecologically sensitive areas that occur on farmland, such as wetlands and aquifer recharge zones (Thurston County 2017). The HCP currently being negotiated by partners on this project will establish an agreement between Thurston County and U.S. Fish and Wildlife Service (USFWS) concerning effects of development and other land management on 12 species associated with prairie-oak systems, including three federally listed species: the Mazama pocket gopher, Taylor's checkerspot butterfly, and streaked horned lark. This Plan will identify the conservation value of working lands relative to habitat for these species and incentivize landowner participation based on this value (Thurston County Resource Stewardship Department 2016).

The main challenge facing farmers and county planning project partners regarding the HCP is the absence of region-specific, comprehensive data on both the ecological contributions grazed prairie land can make to protect these species, and the economics of species protection on private grazed lands as compared to using other conservation land options. To provide this information to county planners and decision-makers, this project employs and supports all three aspects of agricultural sustainability: supporting a willing agricultural community in evaluating the environmental potential of working lands, assessing the economics of species conservation in terms of cost-effectiveness and value to farmers and the community, and building a social network across conservation, farming, planning and regulatory communities.

Environmental. The potential of well-managed grazed prairie in western Washington to contribute to species protection is currently unknown. As a result, these lands are underutilized for conservation, with a corresponding opportunity to expand incentive programs and technical training to more widely implement on-farm conservation. Producers involved in this study will receive a free ecological assessment using an evaluation tool developed by USFWS. Combined with evaluation at ungrazed prairie sites, this assessment will indicate current site conditions, as well as potential for ecological lift, or improvement in prairie habitat, with applied conservation actions. Conservation actions based on a free concurrent NRCS site inventory could include a revised sustainable grazing plan, a spring grazing deferment and/or native seeding. Results will provide county planners and landowners with science-based information on the current ecological value of grazed prairie and the potential conservation value when site-specific conservation tools are employed.

Economic. With implementation estimates ranging from \$1.5 to \$6 million per year, the HCP will significantly impact farm economics, the number of farmers involved in conservation efforts, and whether farmer conservation work is supported by incentive programs. Farm profitability as impacted by the HCP could be enhanced for farmers involved in and compensated for species protection work, especially if their farmland remains in production and

county HCP funding and conservation incentives are directed to farms. However, there are potentially significant costs associated with conservation efforts: biological assessments, altered grazing regimes that require additional resources, rest periods, etc. This project supports farm economic sustainability by responding directly to farmer requests to demonstrate and evaluate costs of on-farm conservation so that species/habitat protection can be achieved to the maximum extent possible while maintaining the farmer's bottom line.

Social. The HCP, along with other conservation programs, is perceived as antagonistic to agriculture. This is primarily due to changes in regulatory frameworks (such as zoning) that have historically lacked farmer input and/or costs farmers money. With the requirement to set acreage targets for conservation and direct funding to achieve conservation objectives, the HCP is at a crossroads regarding integration of and support for farmers in protecting listed species. This project addresses this issue by involving farmers in piloting ecological assessment tools, and administering a landowner survey to collaboratively identify how to successfully incentivize conservation work. The project also specifically responds to farmer requests for incentivized conservation and technical support to implement conservation practices (Bramwell et al. 2016).

Innovativeness. Farmers are among the oldest group of natural resource managers, yet predominantly their creative energies have not been employed to protect natural resources. Rather, economic survival paired with incomplete cost accounting has dis-incentivized natural resource conservation. This project will unleash the creative potential of farmers. It will do so by linking ecological, economic, and social evaluations of on-farm conservation. What is the current and potential ecological lift afforded by grazed prairie to protect listed species? What are the associated benefits and costs of achieving desired lift on private and protected lands? What financial or technical support is necessary to more widely implement conservation work on agricultural land? These are the questions this research project will answer. This innovative combination of ecological, economic, and social assessments will provide (1) a practical strategy to document the multiple goods that farms provide, and (2) an opportunity to implement a program that values on-farm conservation in a way that will encourage more of these practices.

Stakeholder involvement. Federal involvement: The Sentinel Landscape Program (SLP) is a national collaboration among the U.S. Departments of Agriculture, Interior and Defense, focused on preserving and protecting working lands, rare species habitat, and military readiness. In 2013, the SLP identified the prairies and agricultural lands of Thurston and Pierce Counties as the first Sentinel Landscape. The south Puget Sound prairie SLP Business Plan has identified ecological and economic assessments of working lands and technical assistance with conservation tools as top priorities. At the state level, the Washington Conservation Commission (which hosts the VSP) is working to develop incentives for private landowners to prioritize the conservation value of their property, and have identified outreach projects such as this one as priority work area. In Thurston County, partners in Long Range Planning co-developed the research goals in this project, with project leads and producers. **Producer Involvement.** Five listening sessions and 19 one-on-one consultations as part of a 2016 Thurston Co. Needs Assessment resulted in 106 (out of 235) regulatory-related needs among producers. Producers sought voluntary and cooperative ways to satisfy natural resource management requirements, and wanted to utilize more cost-share tools, technical support and farmer-farmer networking (Bramwell et al. 2016). This project is explicitly designed around farmer involvement, networking and demonstration, a priority need also identified at the WSARE Subregional Conference (WSARE Subregional Conference Needs

and Issues Section III, 1). The partner producers on this grant are vocal proponents in the community for on-farm conservation; they recently initiated efforts in the Thurston County Agriculture Committee and Thurston Conservation District to expand access to conservation incentive tools for farmers. This project has been conceived with this producer team to estimate the value and potential of on-farm conservation and the need for increased cost-share support for this work. The VSP producer Working Group has also expressed interest in facilitated farmer participation in the VSP (Evan Sheffels, pers. Comm. WA Farm Bureau).

Objectives

1. Develop a regional network of three grazed prairie research sites to demonstrate and evaluate effects of conservation tools on prairie habitat. This objective will:
 - a. Implement conservation tools for target species and habitats, with focus on management intensive grazing, exclusion during critical flowering periods and/or native seeding.
 - b. Evaluate impact of conservation installations through a range of habitat and species abundance metrics over 3 years.
2. Utilizing the regional network of grazed and ungrazed prairie sites, quantify the financial benefits and costs associated with managing critical habitat and species on grazed prairie as compared to ungrazed conservation prairie over a 3-year period. This objective will:
 - a. Provide practical financial information to farmers, the conservation community, and the county planners concerning the costs of meeting HCP requirements on grazed and ungrazed prairie both on private and protected sites.
 - b. Develop enterprise budgets and a benefit-cost analysis to inform HCP acreage targets for protecting critical species on grazed land relative to conservation preserve land.
3. Engage private landowners by administering a social survey focused on landowner needs for increased involvement in land conservation programs (conservation easements, HCP, Safe Harbor Agreement). This objective will:
 - a. Engage producers and regulatory entities in a productive discussion on incentives needed for habitat conservation on working lands.
 - b. Provide feedback for regulatory programs on effective strategies to engage private landowners.
4. Present opportunities for technical assistance related to habitat management and discuss economic and landowner incentive opportunities with agricultural producers, regulatory agencies and conservation land managers through several mechanisms:
 - a. Workshop series, with field tours of the agricultural demonstration sites and native prairie preserve sites. Field tours will be sponsored by WSU, CNLM, Thurston County Conservation District and NRCS.
 - b. WSU-Extension technical bulletin providing management guidelines and financial data for conservation tools; and two published manuscripts in peer-reviewed journals.
 - c. Presentation of findings at regional and national conferences.

Materials and methods. *Objective 1: Evaluate effects of conservation tools on rare species habitat.* Three working ranches will be evaluated by NRCS in spring 2018 to determine which conservation tool(s) (management intensive grazing, spring exclusion, native seeding) are needed at each ranch to generate ecological lift and promote habitat for rare prairie species. At each site, we will choose 6 paddocks (3 'treated', 3 'control') for implementation of the recommended conservation tool(s) and evaluation of these practices, relative to the standard practice (control).

We will conduct habitat and species abundance surveys within each of the paddocks in spring 2018 to determine baseline conditions and again in 2019 and 2020 to evaluate effects on rare species and their habitat. In each paddock, we will establish a grid of 25m x 25m 'plots' using ArcGIS and will monitor habitat variables (native species richness, % cover trees, woody shrubs, native herbaceous vegetation, forage grass) in at least 10 randomly selected 25m x 25m plots within each paddock. This approach builds off of protocol used successfully in a landscape-scale habitat evaluation project in the south Puget Sound prairies (Applestein and Hamman 2016), and has been vetted by all participating partners. We will conduct gopher mound surveys within all 25m x 25m plots each fall (height of gopher activity) to determine the area inhabited by Mazama pocket gophers (Olsen 2011). We will conduct butterfly transect surveys twice a month from May to early August (7 surveys) along each gridline 'transect' throughout the paddocks to quantify the butterfly species composition and abundance. These same methods will be employed at three nearby restored prairie preserves.

Objective 2: Development of enterprise budgets. Enterprise budgets will be developed to estimate the economic efficiency of pursuing species protection objectives with and without grazing as a biomass management tool on private and protected prairie land. Budget data will be gathered using the Delphi method utilizing an expert panel of local cattle ranchers and conservation land managers (Hsu and Sanford, 2007). Budgets will illustrate per acre costs and benefits for 'typical' cattle and conservation prairie "enterprises" implementing conservation grazing practices with similar soils, weather and economic conditions. Budget construction will utilize information on cultural practices, operations and all resources utilized including rates of application, for the entire production cycle (Riggs et al, 2005). Enterprise budgets will then be utilized to develop benefit-cost evaluations to assess economic impacts of different utilizing different acreage targets for species protection (Watson et al, 2015).

Objective 3: Development of landowner survey. Private agricultural landowners have a diversity of backgrounds, beliefs, and management goals, which creates challenges for crafting conservation programs that address landowner interests and concerns. To address this challenge, we will use a social marketing approach, defined by Butler et al. (2005) as "the use of commercial marketing techniques to effect positive social change", with the objective of advancing conservation in the working landscape in Thurston County.

Our work will proceed in 5 steps: (1) We will work with Thurston County staff and our Western SARE team to develop a list of social, environmental and economic landowner incentives; (2) we will design a survey to both provide information to landowners on incentive programs and gather information on the types of incentives that might motivate landowner participation in those programs. Survey methodology will be based on the Tailored Design Method (Dillman 2007), a standard method of survey design updated for modern technology. The survey will use a combination of email and direct mail approaches to reach landowners and reduce bias in survey results. Sample size will be determined by number of landowners with at least 10 acres of actively grazed land in Thurston County (expect appx. 50 landowners). A comparable survey in which the authors surveyed family forest owners using a social marketing approach had a 49% participation rate (Butler et al. 2005); (3) we will analyze survey results and develop a set of realistic landowner incentives; (4) we will craft an email follow up to invite respondents and others to a landowner workshop; (5) the Western SARE project team will run a landowner workshop on the value of conservation, and opportunities and incentives available to encourage this work (see below).

Objective 4: Provide technical assistance and networking opportunities. To effectively communicate opportunities for conservation to producers in western Washington, we will host a workshop series in summer 2019. This three-workshop series will provide information on conservation tools, incentive programs, and initial findings from field and social surveys. We will include field tours of the experimental demonstration sites and native prairies as part of each workshop to exhibit and discuss opportunities for implementation of conservation tools and examples of potential outcomes. WSU-Extension will produce and distribute a technical bulletin that summarizes site-specific management guidelines and economic analyses for conservation tools. We will produce two published manuscripts on the ecological outcomes and the socio-economic evaluations, and results will be presented at scientific conferences.

Roles

Stephen Bramwell, (WSU Extension, principle investigator) will coordinate the project team, lead economic data collection and assessment in collaboration with Phil Watson, and coordinate demonstration sites, field days and development of written project products. Stephen is the primary point of contact with the producers and Thurston County (Objectives 1, 2, 4).

Sarah Hamman, (Center for Natural Lands Management) Co-Principle Investigator will lead ecological assessments using adapted USFWS performance standards. Sarah will help plan and participate in field days and workshops, present at regional and national conferences, and lead manuscript preparation for one scientific journal publication (Objectives 1, 2 and 4).

Riverbend Ranch is a multi-generation cattle operation. Farm financial data from the Riverbend will be utilized to develop enterprise budgets documenting costs and benefits of managing conservation land with and without grazing. This site represents a middle range of ecological lift expected from grazed prairie, and provides opportunity for habitat augmentation to increase lift.

Colvin Ranch is a 150 year grazing operation on high quality prairie landscape type. Farm financial data from the Colvin Ranch will be utilized to develop enterprise budgets documenting costs and benefits of managing conservation land with and without grazing. This site represents an upper bound of ecological lift expected from grazed prairie.

Fisher Ranch is a family grazing operation on a 40-acre ranch of moderate quality prairie. This site represents a middle range of ecological lift and provides unique opportunity for habitat augmentation, as it is adjacent to a recently protected prairie preserve.

Marty Chaney (Natural Resource Conservation Service) will conduct initial inventory of site resources, development of management alternatives, documentation of farmer objectives, and development of implementation plans. She will provide cost estimations of conservation practice alternatives, and estimated cost-share potential (Objectives 1 & 2).

Christina Chaput (Thurston County) will review research objectives, expected outcomes, and implementation to ensure results address county needs regarding evaluation of grazing impacts on species, suitability of the ecological assessments, and economic evaluation.

Phillip Watson, (University of Idaho, project partner) will advise farm economic assessments (Objective 2) for development of generalized enterprise budgets for grazed private and non-grazed conservation prairie land. Phillip will advise a graduate student on data collection and guide aggregation of enterprise budget data to develop a benefit-cost analysis.

Cheryl Schultz (Washington State University) will advise her graduate student on the development and implementation of a landowner survey. Cheryl will also coordinate butterfly habitat monitoring efforts, present at regional and national conferences and lead manuscript preparation for one scientific journal publication (Objectives 1,3, & 4).

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