Sustainably Incorporating a Hemp Biobased Economy into Western U.S. Regional Rural and Tribal Lands

COOPERATING INSTITUTIONS: Oregon State University, Washington State University, University of California Davis, University of Nevada Reno, 7 Generations Development LLC, USDA Agricultural Research Service, USDA Western Rural Development Center, USDOT Volpe National Transportation Systems Center, USDA Abraham Lincoln National Agricultural Library, and USDA National Institute of Food and Agriculture.

RESEARCH PROBLEM. Hemp is an entirely new industry in the United States (U.S.). With the passage of the 2014 and 2018 Farm Bills, hemp was re-established as a legal crop. As a result, with great enthusiasm for the potential promise of this new-old crop, the number of registered acres rapidly increased in the U.S. from 0 acres in 2013 to over 525,000 in 2019, surpassing the largest U.S. hemp acreage in 1943 when 146,200 acres were grown. Regardless of the enthusiasm, there is a general lack of knowledge about where different hemp grain, fiber, and essential oil market classes should be optimally grown and what are the best genetics to use; how to incorporate hemp into existing production systems in ways that complement rather than disrupt current markets; where to process the grown materials that go into the manufacture of value-added products; and what are the likely growth markets to support industry expansion. With great investments already being made and lost in hemp, now is the time to get the science ahead of the market excitement and in an orderly manner help establish a 21st Century industry for this versatile commodity.

OVERALL GOAL. We will determine the feasibility of establishing sustainable supply chains for biobased manufacturing to help hemp reach its potential in the rural western U.S. economic landscape. The outcome from this project will be to provide farmers, financial decision-makers, business developers, policymakers, federal and state service agency providers, and regulators the science-based information they need to make decisions when evaluating the technical, economic, environmental, and social dynamics of incorporating hemp-based industries into the four-state regional economy.

OBJECTIVES:

1. Improve hemp genetics for enhanced production, handling, processing, and materials utilization that meets end-user quality specifications.

2. Identify key production areas in the region for the different market classes and estimate how hemp can complement existing production systems and commodity markets.

3. Assess existing and needed regional infrastructure to determine if and where processing facilities could be located to support biobased products manufacturing.

4. Determine those effects on the capacity to dependably supply hemp materials for value-added products manufacturing.

5. Implement education to train a multicultural workforce that can effectively communicate and work with diverse kinds of participants in all aspects of a hemp-based economy.

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**APPROACH.** As a result of great innovations in science, business, policy, and trade over the last 80 years while hemp was illegal to grow, agricultural productivity in the western states has increased to be among the greatest in the country. We propose to apply this knowledge to all hemp market classes and so increase its competitiveness with other major commodities. We have targeted the rural transportation corridor that traverses Washington, Oregon, Nevada, and California east of the Cascade-Sierra Nevada Mountains from Canada to Mexico (Fig. 1). The region has access to north-south ground and rail transportation as well as established east-west access by water, rail, or ground to major industrial centers and ports in Seattle, Tacoma, Portland, San Francisco Bay, and Southern California. The region is characterized by large irrigated and non-irrigated production areas for growing commodities such as small grains, alfalfa hay, and potatoes and could accommodate another value-added crop such as hemp as a rotation option. With a relatively arid climate, the region is likely better suited for producing grain and fiber hemp market classes than in the marine climate zones west of the Cascade Mountains in Washington and Oregon and Northwest California where specialty feminized hemp and marijuana varieties are exclusively grown. Also, western Washington and Oregon and Central and desert California is where a diversity of high-value specialty vegetable, fruit, and nut crops are grown, so commodity hemp fiber and grain production may have difficulty competing.

Because Native American Indian Tribes are significantly represented in the four-state region, our team has intentionally engaged tribal leaders to initiate partnerships with several nations to better inform the cultural relevance and responsiveness of this project to their economic needs. It is important that Tribes factor significantly in this work, acknowledging the desire of Native Americans in the region to embrace the introduction of hemp farming as well as the manufacture of high-value hemp-based products as a part of their Tribal business development plans for the future.

Using an interdisciplinary systems approach, this project will work to identify and link elements of a globally competitive hemp-based supply chain from border-to-border across the Pacific states, equally integrating American Indian tribes and other rural communities. We have assembled a team of extension specialists, researchers, business developers, and educators to determine the feasibility of establishing hemp grain, essential oil, or fiber market class supply chains within the region. The project draws from the capacities of four land grant universities, two federal research agencies, the Federally Recognized Tribes Extension Program (FRTEP), and a respected tribal-owned private firm that specializes in Indian Country business development. We also have enlisted 30 industry sector advisors to assist with technical details on the different aspects of producing and handling hemp materials and the processing and manufacturing of a range of biobased products. A diverse executive advisory committee is also formed.

We will determine if, where, and how much hemp materials can be produced and where processing facilities could be located to support new manufacturing of biobased products in the region. We will address a wide range of regional ecogeographic effects that impact agricultural production to determine the capacity to dependably supply hemp materials for manufacturing. We consider not only linkages that need to be established between agricultural production and handling; transportation infrastructure; and processing and utilization of materials, but also the chicken-or-egg dilemma of how the needed financing can be raised to build out a new regional bio-based economy focused on hemp. We assume good stewardship can be designed ahead of time into an emergent industry and so will estimate the potential impacts different development strategies have on natural resources quality; wealth; and jobs creation at the farm, rural community, reservation, and regional scales; but also consider approaches to enhance equity for all supply chain participants who want to be a part of this new economy.