Center Title: Western Center for Native Plant Conservation and Restoration Science

Initial Participating Units: Pacific Northwest Research Station, Pacific Southwest Research Station, and Rocky Mountain Research Station

Director: Dr. Kasten Dumroese
USDA Forest Service
Rocky Mountain Research Station
Moscow Forestry Sciences Laboratory
1221 South Main Street
Moscow, ID 83843

Mission: Provide land managers with science-based solutions for using native plants to restore western ecosystems.

Background and Need for a Center: Many ecosystems, biotic communities, and native species in the western US are at risk from climate change, drought, fire, and invasive species, resulting in accumulating appeals and directives for new knowledge and technology in conservation and restoration. The need for a center focused on native plant conservation has increased greatly in the last decade as unprecedented demands for suitable restoration materials, tools, and monitoring have skyrocketed in response to wildfire, invasions by non-native species, weather events, changing climates, and other disturbances. In some cases, the damaging effects of fire and invasions on plant communities cause harm to ecosystem-dependent species (e.g., Greater Sage-Grouse) by reducing breeding and rearing habitats or disrupting dispersal and travel corridors.

Land managers are requesting more integrated methods and knowledge across the sciences of restoration ecology, climatology, plant genetics, plant conservation, and nursery science. They want to better track and manage ecosystem changes, monitor and manage vulnerable plant and pollinator communities, and improve the quality and quantity of seeds and seedlings necessary for successful deployment. Together, this knowledge leads to restoration that is resilient in the face of long-term drought and climate change and resistant to wildfire and invasions by native plants. In addition, managers are seeking better methods for controlling invasive plants and restoring invaded sites. Population declines of pollinators, especially insect pollinators and including monarch butterflies, have catalyzed increased interest in conserving native plants and understanding plant-pollinator relationships. New research aimed at restoring plant communities to reverse plummeting pollinator populations is needed on public, State, and private lands.

While demands for research and science delivery for conservation and restoration purposes are greater than ever before, financial resources for conducting research and resource management have declined, particularly in the Forest Service. As wild fires have increased in frequency and size, funds have been transferred away from resource programs and research and allocated to

fighting fires, leaving managers and researchers with fewer resources to apply to restoration and putting ecosystems at increased risk of further deterioration. To meet the high demand for knowledge for restoring ecosystems using native plants, Federal scientists are becoming increasingly entrepreneurial in their efforts to obtain funds to conduct research. Therefore, an important goal of a center that supports ecosystem restoration is to become an enterprise for increasing revenue flow for use in developing (research) and delivering (technological transfer) science.

Advantages of a Center: A center offers increased visibility and marketing opportunities for those participating in it, thus enhancing scientist careers through improved collaboration, sponsorship, and product use. Centers improve collaborations with management and can function like a magnet for attracting cooperators and customers, becoming the "go-to" organization for those seeking to sponsor research and science applications that target native plant conservation, restoration, and reforestation. Members of a center typically pursue timely and less diffuse topics than a research work unit or program, creating an atmosphere analogous to a think tank. The benefits of belonging to or collaborating with a center include enhanced opportunities for sharing equipment and resources, improved access to databases, study areas, or cooperator services, compatibility in science goals and direction, better opportunities for synergistic thinking and networking, teamwork, and comprehensive spatial and temporal studies. Administrative costs can be reduced through cost-sharing. Participants can devote time and energy toward common goals, team studies, big projects, and synergistic problem-solving. Given that centers are comprised of scientists with congruent interests, they serve as a central place for funding and finding syntheses and assessments of value to managers. A center broadens the range of customers by not being geographically bound and enhances communication for "connecting the dots" to address needs.

What Can a Center Deliver to Managers? The ***Western Center for Native Plant Conservation and Restoration Science*** (WCNP), whose scope of work includes lands serviced by the Pacific Northwest, Pacific Southwest, and Rocky Mountain research stations, would have the ability to conduct and deliver state-of-the-art science. The focus would be on plant physiology, seed ecology, plant genetics, rare plant conservation, plant-pollinator relationships, monitoring, and small- to large-scale land restoration with native plants (grasses, forbs, shrubs, and commercial and non-commercial trees) across diverse landscapes of the West. The initial complement of scientists representing the Pacific Northwest, Pacific Southwest, and Rocky Mountain research stations collectively have expertise across the entire conservation and restoration process, from plant species selection to identifying appropriate genetic resources to plant propagation to landscape deployment.

Why Now? The WCNP will greatly help the Forest Service address the needs of the American public by supplying, in a cost-effective manner, scientific information to meet goals of the interagency National Seed Strategy for Rehabilitation and Restoration, the White House's National Strategy to Promote the Health of Honey Bees and Other Pollinators, The Pollinator

Research Action Plan, the Department of the Interior (DOI) Secretarial Order 3336 focused on rangeland fire and invasive plants in sagebrush ecosystems, the USDA Climate Adaptation Plan and USDA Climate Hubs, the Endangered Species Act, and several Forest Service programs and strategies: Conservation and Management of Monarch Butterflies: A Strategic Framework; National Strategic Framework for Invasive Species Management; Sage-Grouse Conservation Science Strategy; the Native Plant Materials Policy: A Strategic Framework; the 2012 Planning Rule; the Cooperative Forest Landscape Restoration Program; and the pending National Reforestation Strategy.

Key points are:

- Scientists within the Great Basin Native Plant Project (GBNPP) and National Center for Reforestation, Nurseries, and Genetics Resources (RNGR), as well as individual plant scientists, already have established reputations and partnerships that will enhance the Center.
- The National Forest System (NFS) has significant science needs and monitoring goals and requirements under the new planning rule, several legislative acts, and internal strategic frameworks focused on invasive species, wildlife species, and reforestation.
- Political actions, such as the DOI Secretarial Order 3336 and concerns about the Greater Sage-Grouse, are galvanizing natural resource agencies to meet action plans. To do this, they will need to invest in new science to fill knowledge gaps.
- Forest Service R&D has completed an assessment of Forest Service science on sagebrush ecosystems and sage-grouse conservation and an accompanying science strategy that calls for increased science to support sagebrush ecosystems and sage-grouse management in the National Forest System, and other Federal and State agencies.
- US Department of Agriculture, Forest Service, Interagency, and White House strategies call for more research on seeds, stressors and disturbances, restoration, and pollinator conservation that make native plant conservation science a top priority.
- Forest Service, Bureau of Land Management (BLM), and Natural Resources Conservation Service (NRCS) are signing an MOU in 2016 to use native plants to support sagebrush ecosystem restoration and conservation.
- Partnerships have already been established with NFS, State and Private Forestry (S&PF), Agricultural Research Service, BLM, US Fish and Wildlife Service, NRCS, US Geological Survey, Animal and Plant Health Inspection Service, State agencies, seed and seedling producers, and universities.

Estimated Duration: 5 years, with option for renewal.

Integrated Science – Management Areas. The Center will add value to ongoing research-management efforts on a diverse suite of high priority management issues pertaining to grasses,

forbs, shrubs, and trees. Goals of the WCNP are to: 1) Increase the diversity and resilience of native plants available for restoration in the Western US, 2) improve understanding of the population genetic structure and adaptive genetic variation of native and invasive plants and plant responses to stressors such as drought and climate change and disturbances such as fire and invasive species, 3) develop methods, technology, and equipment for successful restoration of native plant communities, 4) determine the roles and relationships between native plant species and pollinator populations and factors affecting plant-pollinator interactions, 5) determine methods for controlling invasive species that severely impact native plant and animal communities and restoration efforts, 6) develop science applications and transfer science findings to land managers, private sector growers, nurseries, and restoration practitioners, and 7) monitor effectiveness of conservation and restoration practices. More specific research objectives will depend on funding but could include:

Seed and Plant Materials Science

- Increase availability of suitable plant materials, with attention to native grasses, forbs, and shrubs, for restoring plant communities and critical habitats in sites affected by fires, invasive species, and other stressors and disturbances
- Determine factors that inhibit seed germination and seedling growth of native plants and reduce barriers for seedling establishment
- Develop dynamic seed zones and seed transfer guidelines for grass, forb, shrubs, and tree species that are important components of high priority ecosystems

Climate Change

- Identify the climate envelope for native and invasive plant communities and model their current and potential future distributions
- Understand adaptive genetic traits of plants in response to climate change using common garden approaches
- Develop protocols for incorporating climate change analyses into native plant community conservation practices
- Develop protocols for assisted plant migration and evaluate success of assisted migration experiments and projects
- Assess vulnerabilities of species to changes in climate, especially rare and endemic species, and species occupying small, unique habitat types

Pollinators

- Determine responses of native and invasive plants and pollinators to changing climate conditions.
- Evaluate plant-pollinator responses to disturbances and stressors
- Detect threats to pollinators and design methods for reducing threats
- Develop approaches for restoring habitats and native plant species used by pollinators

Restoration

- Determine successful restoration approaches for recovering high priority habitats and encouraging colonization by high priority, obligate, or endangered species
- Design and test seeding and planting methods to restore large landscapes after fire
- Design and test restoration approaches and alternatives for ecosystems that vary in climate and geography
- Develop additional information on treatment effectiveness based on regional data, repeated monitoring over time, and new analytical approaches such as meta-data analyses
- Develop knowledge about and determine appropriateness of establishing novel habitat in areas where newly emerging climate envelopes may allow it to develop
- Test and monitor approaches for controlling invasive species, including secondary invaders, and restoring native plant communities after removal of invasive species

Conservation

- Characterize edaphic and climatic factors that support rare and endemic plant communities to improve restoration success and identify likely new population centers
- Evaluate genetic and demographic factors that could lead to population extirpation of rare species
- Identify locations of unique plant communities and design protection strategies where these communities are threatened

Sharing Information: Decision support tools and assessments will be supplied on demand and can take various forms to help meet native plant management needs. Tools can include field guides and publications that identify models, methods, geographic information systems (GIS) maps, and approaches to address questions about native plant conservation and restoration. Tools can also be instruments, devices, models, methods, maps, databases, and approaches that are available directly to practitioners who access them online, by video, or through consultations, lectures, presentations, and training sessions. Tools are typically developed to meet a management or science application need and are designed so that new techniques do not have to be developed for routine management projects.

Center scientists will use conferences, workshops, training sessions, and special sessions at professional society meetings for communicating new science findings, establishing researcher and manager connections, discovering new techniques, and gaining new knowledge. In addition to traditional methods (presentations, posters, and lectures) for delivering science findings, Center scientists will use vehicles such as webinars, videoconferences, Internet sites, social media, and interactive Internet databases to share information. A web site presence for the Center will be

promptly established to encourage connections with clients and cooperators. Scientists will communicate science and applications results using online newsletters, online publications, peer-reviewed journals, and websites.

An effective way for managers to benefit from engagement with Center scientists is when they are in the early stages of planning management projects, such as a habitat restoration project. To maximize use of science results, WCNP scientists will involve managers on shared goals and activities during the proposal and implementation phases of science studies.

Director's Role: The Center Director's position will periodically rotate at the discretion of the 3 Western Station Directors. The Center Director shall be responsible for providing overall leadership for the WCNP, including:

- Hosting an annual meeting of the Board of Directors
- Hosting at least an annual Technical Steering Committee meeting
- Presenting research findings and applications to the Board of Directors, the Technical Steering Committee, and the scientific and management communities
- Setting a research agenda and guiding, as needed science activities
- Allocating resources that come to the Center rather than to individuals
- Communicating priorities and business processes to WCNP scientists and staff
- Supervising business staff, if any
- Building partnerships with agencies interested in participating in the WCNP

Scientists' Roles: Scientists from the Pacific Northwest, Pacific Southwest, and Rocky Mountain research stations contributed to the development of this charter. Any scientist, including those from other Federal agencies, engaged in conserving and restoring native plants is eligible and welcome to participate. Eligible scientists will need to be nominated and approved by their supervisors. The Center is virtual and scientists will retain their original duty stations. A list of scientists with links to their profiles will be developed and annually updated and posted on the WCNP website. Scientists will contribute information for the annual accomplishments report, communicate with each other and with the director through periodic phone calls or videoconferences, and contribute information to the website.

Customers, Cooperators, and Collaborator: The WCNP will be designed to enhance existing collaborations and encourage new partnerships between Forest Service R&D, NFS, and S&PF, and between the Forest Service and Federal and State agencies, non-government organizations, and universities. Intra- and inter-agency cooperation bolsters individual agency efforts while simultaneously addressing issues across agency boundaries, presents a consistent Federal approach for developing and applying methods and tools for studying and managing native plants, and facilitates program operations without duplication of effort and financial investment.

This Center builds on a long legacy of science-management partnerships established by the existing Great Basin Native Plant Project, Boise, ID; scientists in the National Center for Reforestation, Nurseries, and Genetics Resources, Moscow, ID; the plant genetics work at the Shrub Sciences Laboratory, Provo, UT, within the Land and Water Management Program, Corvallis, OR, and within the Conservation and Diversity Program, Davis CA; and the chemical ecology and plant-insect science at the Bozeman (MT) Forestry Sciences Laboratory. The National Forest Genetics Laboratory, National Seed Laboratory, and Forest Service nurseries have potential to engage in service-oriented work at the WCNP. Services to customers and partners will be provided by in-house employees and by extending and leveraging partnerships using agreements with universities and other collaborators to obtain additional workforce capacity and expertise. The Center will also offer training and mentoring for students, postdoctoral scientists, interns, temporary employees, and volunteers.

The following are customers, cooperators, and collaborators the Center may partner with:

- PNW, PSW, RMRS
- Forest Service Regions 1, 2, 3, 4, 5, 6, and 10
- National Forest Genetics Laboratory
- Forest Service Nurseries in the Western US (5 facilities)
- National Seed Laboratory
- State and Private Forestry
- Bureau of Land Management
- US Fish and Wildlife Service
- Natural Resources Conservation Service (including Plant Material Centers)
- US Geological Survey
- Climate Science Centers
- USDA Climate Hubs
- State Agencies
- Tribes
- Landscape Conservation Cooperatives
- Plant Conservation Alliance
- Great Basin Native Plant Project
- Colorado Plateau Native Plant Program
- Mojave Native Plant Program
- Society for Ecological Restoration
- Joint Fire Sciences Program and Fire Science Exchanges
- Western Association of Fish and Wildlife Agencies
- Western Universities
- Native Plant Societies
- The Nature Conservancy

- Non-governmental conservation organizations
- State Nurseries
- Seed Producers

Budget and Funding: The Rocky Mountain Research Station will provide funding and space for the Center Director position. Start-up funds for a GS-7 support services specialist to process the Center's administrative work (e.g., PWPs, transaction registers, purchases, communications) would be helpful; this position will be supported in future years by overhead on agreements and through other internal and external allocations. Greenhouses, warehouses, storage space, and other facilities are supplied through appropriated funds at various virtual locations. Laboratory equipment is purchased through internal and external funds, as available. Funding for scientists visiting from other organizations or countries will come from their agency or institution, and administrative and space costs will be negotiated between the host location and the visiting scientists' organization. Students working with the Center will be supported by their university or through grants and agreements between WCNP scientists and universities.

Salaries of scientists and staff will be used to leverage proposals for new incoming funds. Operating funds will be supplied through customers and traditional grant-writing. Business models will be evaluated to determine a solid business approach, within Agency constraints, that will enhance revenue flow, ensure cost effectiveness, satisfy employees, and build partnerships.

Equipment and Access: Scientists and partners at the Center have access, as available, to greenhouses, laboratory equipment, growth chambers, warehouses, nurseries, experimental ranges and forests, research natural areas, and experimental field sites.

How Does the Center Work? (Oversight, operations, governance, coordination, website, marketing). The initial Center Director is a senior scientist in the RMRS Grassland, Shrubland, and Desert Ecosystems Science Program. A Board of Directors representing diverse interests in native plant conservation and restoration will be established to advise the Center. The Board's role will be to guide the Center in its mission, identify emerging research needs, funding opportunities and interagency priorities, support partnerships among State and Federal agencies, and help identify resources for long-term sustainability to ensure management relevance and application of WCNP research. At a minimum, the Board will be comprised of the three Forest Service R&D Station Directors, a representative from the NFS and/or S&PF, and a representative from each participating agency (e.g., the Plant Conservation Alliance, the BLM, the US Fish and Wildlife Service, and others).

A Technical Steering Committee will be established to ensure that the Center is meeting the latest technological and restoration needs of the Forest Service and its partners. The Committee will review new developments in the field of native plant science, periodically assess changes in science priorities, and provide advice and guidance as needed to foster a stable future.

Reporting: The Director will provide briefings to the Board of Directors and Technical Steering Committee at request and deliver an annual accomplishments report. The report will describe publications, presentations, applications, consultations and funding. The WCNP Director will communicate with scientists about emerging issues, funding opportunities, and strategic priorities relevant to center science. The Director will disseminate the annual accomplishment report to the Technical Steering Committee prior to the annual meeting to encourage discussions about future directions and opportunities in native plant science.

Western Center for Native Plant Conservation and Restoration Science

Charter Approval

Robert D. Mangold
Director, Pacific Northwest Research Station

5/13/16
Date

Alexander L. Friend
Director, Pacific Southwest Research Station

13 APR 16
Date

John Phipps
Director, Rocky Mountain Research Station

5/13/16
Date