

EXHIBIT A PROPOSAL COVER PAGE

Proposal Type

x Concept Proposal for Demonstration Projects and Processes

Organization Name (Lead Applicant)

Mid Klamath Watershed Council

Organization Type

- Federally recognized Indian Tribe
- California State Indian Tribe
- Public agency
- Local or state agency/special district
- Resource Conservation District
- X Non-profit organization
- Public utility
- Other:_____

Contact Name/Title

 Name:
 Will Harling

 Title:
 Director

 Email:
 will@mkwc.org

 Phone Number (include area code):
 530-517-6051

 Organization Address (City, County, State, Zip Code):
 PO Box 409, Orleans, CA 95556

 Authorized Representative (if different from the contact name)

 Name:
 Luna Latimer

 Title:
 Director

Email: <u>grants@mkwc.org</u>

Phone Number (include area code): <u>530-627-3202 x 1006</u>

Certification of Authority

By signing below, the person executing the certificate on behalf of the proposer affirmatively represents that s/he has the requisite legal authority to do so on behalf of the proposer. Both the person executing this proposal on behalf of the proposer and proposer understand that the NCRP is relying on this representation in receiving and considering this proposal. The person signing below hereby acknowledges that s/he has read the entire Request for Proposals document and has complied with all requirements listed therein.

Official Authorized to Sign for Proposal

anno

Signature

3/13/2020

Date

ORGANIZATION STATEMENT OF QUALIFICATIONS

Project Name: North Coast All Hands All Lands Prescribed Fire Team

MID KLAMATH WATERSHED COUNCIL (MKWC)

Since 2001, the Mid Klamath Watershed Council (MKWC) has been working to restore the threatened Klamath River in Northern California and the upslope habitats upon which the river depends. MKWC is a 501 (c) (3) non-profit organization formed by a diverse group of participants in 2001. Our programs in the Middle Klamath subbasin include Watershed Education, Invasive Weed Management, Roads, Fire and Fuels, Fisheries, Wildlife, Foodsheds and Native Plants. We leverage state, federal, and private grant funding, combined with community volunteerism to accomplish high-value and low-cost restoration actions throughout the Middle Klamath subbasin.

MKWC, through the Orleans/Somes Bar Fire Safe Council (OSBFSC), is facilitating collaborative strategic restoration planning and hazardous fuels reduction throughout our community. Our five-year strategic plan calls for the use of prescribed broadcast burning as a cost-efficient tool for reducing hazardous fuels on pre-treated private lands, and for maintaining these treated areas over time. Returning fire to public land is even more critical, since this comprises 95% of the property in this region. To that end MKWC is a key player in the collaborative Western Klamath Restoration Partnership (WKRP) which seeks to return fire to the wider landscape. WKRP is a community-based partnership working towards building trust and a shared vision to create fire-adapted communities, and to use traditional ecological knowledge and western science to restore fire regimes and re-create resilient biodiverse forests.

KEY PERSONNEL

Will Harling: Director, Fisheries/Fire and Fuels Co-director – Will received a BS in Environmental Biology from Humboldt State University in 1999, with extensive work in fisheries biology, GIS, botany, and forest and fire ecology and management. Will is a federally qualified firefighter working on Single Resource Boss and CA state certified CARX burn boss qualifications. Previous job experience includes work with the US Forest Service, Karuk Tribe, Salmon River Restoration Council, and private consulting and contractual work. Will works closely with partner organizations, scientists, land managers, and landowners, to ensure MKWC plans and implements restoration projects that are supported by science, traditional knowledge and the community. His work as co-director of the Fire and Fuels and Fisheries Program allows him to stay connected with the realities of work on the ground, and he regularly contributes to regional fire and fisheries forums through presentations on lessons learned through work on the ground, and video documentaries on prescribed burning (https://www.youtube.com/watch?v=LWriDpfZnXQ). Will is a co-lead for the Western Klamath Restoration Partnership, on the steering committee of the Northern CA Prescribed Fire Council, on the boards of the Humboldt County Fire Safe Council and the Salmon River Restoration Council, and is a member of the CA Forest Management Task Force, the Humboldt Prescribed Burn Association, the US Fire Learning Network, TREX Coaches Network, and Indigenous People's Burning Network. Recent publications include the 2014 Western Klamath Restoration Partnership Plan.

Dr. Christopher Dunn

Research Associate Wildfire Risk Science & Mgt Oregon State University, College of Forestry 280 Peavy Hall Corvallis, OR 97333

EDUCATION

Ph.D. 2015Oregon State University, Forest Resources, Corvallis, ORM.S. 2010Oregon State University, Forest Resources, Corvallis, OR

Phone: 541-737-1194 E-mail: chris.dunn@oregonstate.edu Weekly rate: \$3,000 (\$75/hour)

POSITION

2015- Research Associate in Wildfire Risk Science and Management, Oregon State University

REFERENCE

Dr. Dave Calkin, Supervisor dave.e.calkin@usda.gov 406-329-2124

RELEVANT PUBLICATIONS

Dunn, CJ, O'Connor, CD, Abrams, J, Thompson, MP, Calkin, DE, Johnston, JD, Stratton, R, Gilbertson-Day, J. 2020. Wildfire risk science facilitates adaptation of fire-prone social-ecological systems to the new fire reality. *Environmental Research Letters*.

Dunn, CJ, Johnston, JD, Reilly, MJ, Bailey, JD, Miller, RA. 2020. Regeneration dynamics offer new insights into fire's functional role in Douglas-fir forests of the Pacific Northwest, USA. *Ecosphere*, 11(1), 1-18.

Eisenberg, C, Anderson, CL, Collingwood, A, **Dunn, CJ**, Meigs, GW, Hibbs, DE, Sissons, R, Murphy, S, Kuiper, SD, Spearchief-Morris, J, Little Bear, L, Edson, CB, Johnston, B. 2019. Out of the Ashes: Effects of Extreme Wildfire, Prescribed Burns, and Indigenous Burning on Ecosystem Structure and Diversity. *Frontiers in Ecology and Evolution*, 7, 436.

Dr. Paul F. Hessburg, Sr.

Research Landscape Ecologist USDA-Forest Service, Pacific NW Research Station 1133 N. Western Ave. Wenatchee, WA 98801 Phone: 509.423.9269 E-mail: paul.hessburg@usda.gov Weekly rate: \$4,080 (\$102/hour)

EDUCATION

Ph.D. 1984	Oregon State University, Corvallis, OR
B.S. 1978	University of Minnesota, St. Paul, MN

POSITION

2008-	Research Landscape Ecologist, US Forest Service, GS-408-15
1995-	Affiliate Full Professor: OSU, UW, UI, WSU, CWU

REFERENCE

Dr. Keith M. Reynolds, Supervisor keith.reynolds2@usda.gov 541-602-9663

RECENT HONORS

2017 Distinguished Scientist, USDA-FS, R & D, Chief's Award.

RECENT PUBLICATIONS

Povak NA, **Hessburg PF**, Moritz MA., Salter RB. 2020. Recent changes in scale-dependent spatiotemporal controls on California wildfires. Global Change Biology.

Hessburg PF et al. 2019. Climate, environment, and fire history govern ecological resilience in fire-prone North American forest landscapes. Frontiers in Ecology and Evolution

Spies T A, Long JW, Charnley S, **Hessburg PF**, et al. 2019. Twenty-five years of the Northwest Forest Plan: what have we learned? Frontiers in Ecology and Environment <u>https://doi.org/10.1002/fee.2101</u>

Susan J. Prichard

Research Scientist College of Forest Resources, Univ. of Washington Box 352100 Seattle, WA 98195-2100 Phone: 509-341-4493 Email: sprich@uw.edu Weekly rate: \$2,576 (\$64/hour)

EDUCATION

Ph.D. 2003 University of Washington, Seattle, Ecosystem Science, College of Forest Resources.

M.S. 1996 University of Washington, Seattle, Ecosystem Science, College of Forest Resources.

POSITION

2003– Research Scientist. School of Environmental and Forest Sciences, University of Washington, Seattle.

RELEVANT PUBLICATIONS

- **Prichard, S.J.** et al. 2020. Fuel treatment effectiveness following the 2014 Carlton Complex Fire in semiarid forests of north-central Washington State. Ecological Applications.
- **Prichard, S.J.** et al. 2017. Predicting forest floor and woody fuel consumption from prescribed burns in southern and western pine ecosystems of the US. Forest Ecology & Management 405: 328-338.
- **Prichard, S.J.** et al. 2017. TAMM Review. Shifting global fire regimes: lessons from reburns and research needs. Forest Ecology and Management.

Frank K. Lake

Research Ecologist, Fire and Fuels USDA-Forest Service, Pacific SW Research Station 1700 Bayview Dr. Arcata, CA 95521

Phone: 707-825-2953 Email: frank.lake@usda.gov Weekly rate: \$2,668 (\$67/hour)

EDUCATION

Ph.D. 2007	Oregon State University, Corvallis, Environmental Sciences Program/Ecology Section.
B.S. 1995	Unveristy of California-Davis, Davis, Integrated Ecology & Culture & Native Am. Studies

POSITION

2008-	Research Ecologist, US Forest Service, GS-13
2008-	Coordinating Scientist, USFS PSWRS and Western Klamath Restoration Partnership

RELEVANT PUBLICATIONS

- Sowerwine, J... Lake, F. K., et al. 2019. Enhancing Indigenous food sovereignty: A five-year collaborative tribal-university research and extension project in California and Oregon. Journal of Agriculture, Food Systems, and Community Development
- Lake, F.K. and Christianson, A. 2019. Indigenous Fire Stewardship In S. L. Manzello (ed.), Encyclopedia of Wildfires and Wildland-Urban Interface (WUI) Fires,
- Marks-Block, T., Lake, F.K., and Curran, L. M. 2019. Effects of understory fire management treatments on California Hazelnut, an ecocultural resource of the Karuk and Yurok Indians in the Pacific Northwest. Forest Ecology and Management

John D. Bailey

Maybelle Clark MacDonald Professor Oregon State University, College of Forestry 280 Peavy Hall Corvallis, OR 97333 Phone: 541-737-1497 Email: john.bailey@oregonstate.edu Weekly rate: \$3,000 (\$75/hour)

EDUCATION

Ph.D. 1997	Oregon State University, Corvallis, Forest Science- Silviculture
M.F. 1985	Virginia Tech, Blacksburg, Forest Biology
M.F. 1985	Virginia Tech, Blacksburg, Forestry and Wildlife Management

POSITION

2007- Associate/Full Professor: Oregon State Univ., Corvallis, OR

REFERENCE

Dr. Jim Johnson Jim.johnson@oregonstate.edu 541-737-8954

RECENT PUBLICATIONS

Dunn, C., J. Johnston, M. Reilly, J. Bailey, and R. Miller. 2020. How does tree regeneration respond to mixed-severity fire in the western Oregon Cascades, USA? IN PRESS: Ecosphere

- Tweedy, P., K.M. Moriarty, J. D. Bailey, and C. Epps. 2019. Using fine scale resolution vegetation data from LiDAR and ground-based sampling to predict Pacific marten resting habitat at multiple spatial scales. Forest Ecology and Management452:117556. https://doi.org/10.1016/j.foreco.2019.117556
- Matosziuk, L., Y. Alleau, B. Kerns, J. Bailey, M. Johnson, and J. Hatten. 2019. Effects of season and interval of prescribed burns on pyrogenic carbon in ponderosa pine stands in the southern Blue Mountains, Oregon, USA. Geoderma348:1-11.

Skye M. Greenler

Graduate Research Fellow Oregon State University, College of Forestry 280 Peavy Hall Corvallis, OR 97333 Phone: 608-212-4054 Email: skye.greenler@oregonstate.edu Weekly rate: \$1,129 (\$28/hour)

EDUCATION

M.S 2018	Purdue University, Department of Forestry and Natural Resources
B.A. 2014	Colorado College, Department of Biology

POSITION

2018- Graduate Research Fellow

REFERENCE

Dr. Michael Saunders, Supervisor msaunder@purdue.edu 765-430-1440

RECENT PUBLICATIONS

Greenler S, Saunders M, Swihart R. Prescribed fire promotes acorns survival and seedling emergence from simulated caches. Forest Ecology and Management. (2020).

Greenler S, Estrada L, Kellner K, Saunders M, Swihart R. (2019) Prescribed fire and partial overstory removal alter an acorn-rodent conditional mutualism. Ecological Applications.

Greenler S, Saunders M. (2019) Short-term spatial regeneration patterns following expanding group shelterwood harvests and prescribed fire in the Central Hardwood Region. Forest Ecology and Management. 432, 1053-1063.

NCRP DEMONSTRATION PROJECT AND PROCESSES CONCEPT PROPOSAL BUDGET AND SCHEDULE

Project Name: NCRP Strategic Fire Planning and WKRP State-and-Transition Modelling

Major Tasks	Task Description	NCRP Task Budget	Funding Match *	Total Task Budget	Scaled NCRP Budget **	Start Date	End Date
Project Administration/ Indirect Costs	In cooperation with the County of Humboldt sign a sub-grantee agreement for work to be completed on this project. Develop invoices with support documentation. This work is included in indirect costs at 23.89% (note indirect only charged on first \$25.000 of contracts)	\$20,877	\$0	\$20,877	, \$0	9/1/20	9/30/21
Project Reporting	Data collection, performance measures, and project reporting of outcomes/lessons learned	\$400	\$0	\$400	\$0	9/1/20	9/30/21
SFP/PODS Development	Contractual funds for Oregon State University (Christopher Dunn - PhD, Skye Greenler - PhD Candidate, John Bailey PhD)	\$120,000	\$35,000	\$155,000	\$0) 9/1/20) 9/1/21
STM/REBURN Model Development	Contractual funds for University of Washington (Susan Prichard - PhD), and USFS Pacific Northwest Research Station (Paul Hessburg PhD)	\$100,000	\$30,000	\$130,000	\$0) 9/1/20) 9/1/21
Public Workshops	Contractual funds for Pepperwood Preserve (Lisa Micheli), Oregon State University (Skye Greenler), MKWC (Will Harling), and others to facilitate workshops, secure venues, etc	\$8,000	\$0	\$8,000) \$0) 3/1/21	. 9/1/21
Project Closeout	Write final report, deliver products to funders/partners	\$723	\$0	\$723	\$0) 9/1/21	9/30/21
Total NCRP 2020 [Demonstration Project Request	\$250,000	\$65,000	\$315,000)		
* List the sources an USFS PSW Research Oregon State Unive TNC Fire Learning N ** Is Requested Bud Project scalability in	Id status of matching funds: Station: \$18,400 (cash - secured) for REBURN Model Develo rsity: \$30,000 (in-kind, staff time) for STM PODS Developmen etwork (via MKWC): \$16,600 (cash -secured) for REBURN and get scalable? If yes, indicate scaled totals; if no leave as \$0 nformation for the reviewers (optional):	pment nt d PODS Develo	pment				

1. Project Description [1980 characters]

For over 20 years, the Mid Klamath Watershed Council and its partners have worked to restore fire processes in the Klamath Mountains, addressing social, ecological, cultural and economic factors to create fire management strategies that are now emulated nationally and globally. Since 2013, the Western Klamath Restoration Partnership (WKRP) has created innovative plans, programs, and strategies, bringing together disparate interests to implement meaningful wildfire adaptation measures. This project operationalizes fire planning and project prioritization throughout the entire NCRP area and builds modeling tools to support a dynamic fire-vegetation WKRP landscape.

The purpose of this project is to create:

- A strategic fuelbreaks layer for the NCRP area to inform decision-making during fire suppression and increase opportunities for managed wildfire based on a shared understanding of risk. These <u>P</u>otential Wildfire <u>Operational Delineations</u> (PODs) will be based on Potential Control Locations, Suppression Difficulty Index and Quantitative Wildfire Risk Assessments.
- <u>State and Transition Models (STMs)</u> for the WKRP Planning area. STMs show how vegetation and fuels change annually and after fires of varying severity. STMs combine cultural and scientific knowledge to quantify vegetation response to fires, allowing managers to understand how fuel management strategies affect natural and cultural resources, carbon storage, landscape and human adaptation to climate change and wildfires.

Recent wildfires demonstrate the need to shift how we manage fire. Past fire management strategies have increased ecosystem and human community vulnerability to modern wildfires and associated vegetation change by removing fire from fire dependent landscapes until they return with insuppressible effects. To restore this essential process, a shared vision is needed. This project combines proven traditional fire management methods with powerful modelling platforms to create a framework for prioritizing fuels treatments, managing wildfires, restoring cultural resources and fire use, and creating fire resilient forests and communities. The project teams leading fire scientists from across the West Coast with local scientists, cultural specialists, and long-time fire managers.

2. Specific Project Goals/Objectives

Project Goals include:

- Developing a draft PODs layer for the entire NCRP area in coordination with NCRP staff, existing contractors, local experts and project collaborators.
- Modeling the impact of fire-on-fire interactions, fuels management, and reburning on patterns of forest vegetation and fire dynamics under the current climate to inform restoration of landscape and community resilience.
- Engaging in an active co-production model with tribal experts, resource managers, and scientists to develop a shared understanding of historical forest conditions; awareness of current management trade-offs; and a vision for wildfire adapted ecosystems and communities in the WKRP planning area.

Project Objectives include:

- Developing datasets to model Potential Control Locations and Suppression Difficulty across the NCRP Planning area.
- Using Potential Control Locations and Suppression Difficulty along with regional Quantitative Wildfire Risk Assessment datasets to create a draft PODs layer for stakeholder review.
- Hosting six regional planning meetings with local project collaborators, regional experts and key stakeholders to refine the PODs layer based on local feedback.
- Drafting an integrated geospatial map story of place-based historical reference conditions for the WKRP and photointerpretation of historical reference watersheds.
- Synthesizing existing plot, regional ethnographic, and historical non-plot data (i.e., oblique landscape

and stereo aerial photos, fire atlases, maps, fire history studies), and traditional fire knowledge of the region.

- Creating STMs informed by traditional knowledge and western science to demonstrate what forests in the Western Klamath Mountains would look like had indigenous burning practices never ceased.
- Develop the REBURN model to evaluate the role of cultural ignitions on past fire regime dynamics and similar fire and fuels management strategies to guide landscape restoration.
- Develop comparative management scenarios (e.g., full suppression, managed unplanned ignitions, managed unplanned ignitions + cultural burning, managed PODS) to analyze tradeoffs.
- Use scenarios to communicate potential outcomes to community and commodity values and risks.

3. Describe how the project or process addresses the NCRP Goals and Objectives and the intent of the NCRP Regional Forest and Fire Capacity Program Block Grant.

This project addresses the NCRP Goals and Objectives by:

- **Respecting local autonomy and knowledge in plan and project development:** This project engages tribes in development of the PODs layer to ensure protection and enhancement of cultural resources, and the Karuk Tribe in development of the STMs and REBURN model for the WKRP area.
- **Providing an ongoing framework for inclusive, intraregional cooperation**: PODs development will engage regional collaboratives to develop, review and refine products. REBURN model development will be created in close cooperation with the WKRP.
- Integrating Traditional Ecological Knowledge (TEK) in collaboration with Tribes to incorporate these practices into North Coast Projects and Plans: Fire exclusion has greatly impacted both ecosystems and cultural resources. This project identifies networks of fuelbreaks to facilitate conversations about and mitigate shared risk; creates a set of culturally-informed STMs; and simulates outcomes of various management strategies, including cultural fire management.
- Conserving and improving the economic benefits of North Coast Region working landscapes and natural areas: This project develops landscape scale strategies for restoring characteristic fire back to the landscape, yielding benefits of high severity wildfire avoidance and increased habitat, amenity, and commodity benefits from low- to moderate severity wildfires.
- **Conserving, enhancing, and restoring watersheds and aquatic ecosystems:** This project expedites restoration of characteristic fire on the 1.2 MM ac WKRP landscape and the 12.4 MM ac NCRP area.
- Enhancing salmonid populations by restoring essential habitats and hillslope processes: Restoring characteristic fire will concurrently restore wood and sediment recruitment and enhance water quality and quantity by reducing stem densities and maintaining open and closed canopy forests.
- Ensuring water supply and quality while minimizing impacts to sensitive resources: Restoring characteristic fire will increase reliability and quality of water and reduce supply vulnerabilities.
- Addressing climate change impacts and vulnerabilities: This project expedites landscape scale planning to reduce vulnerability to fires, drought, and floods.
- Promoting local energy independence, water/energy use efficiency, GHG emission reduction, carbon sequestration, and jobs creation: This project will enable managers to reduce wildfire related GHG emissions and increase forest carbon storage and jobs over time.
- Improve flood protection and forest and community resiliency to reduce the public safety impacts from floods and wildfires: This project implements pre-fire planning critical to reducing impacts from uncharacteristic wildfires. By identifying the best locations for fuelbreaks and implementing landscape scale fuels treatments, impacts of wildfires and floods will be proactively mitigated.

This project meets the intent of the NCRP RFFC Block grant by creating a tool for prioritizing landscapescale fuels reduction treatments leading to long term forest health, resiliency to wildfire, and cultural resource protection. Over the past two years, we have assembled a talented team that is ready and qualified to create, test, and share these innovative methods and tools with interested parties throughout the NCRP area, the state, and the nation. This project integrates with previous community wildfire adaptation efforts providing a framework for shifting the fire management paradigm of the NCRP area.

4. Describe how the project is scalable, replicable, measurable, innovative and results in outcomes that will increase the scope and scale of multi-benefit forest management in the North Coast.

Previous strategic fire planning efforts and PODs development have been completed by our team throughout Washington and Oregon (USFS Region 6), and in Siskiyou County (Happy Camp Ranger District). Project heads are working directly with national leaders in strategic fire planning and will be applying lessons learned from this work nationally to the NCRP landscape. Collaborative development of both PODs and REBURN models will ensure these products are useful at both the local and the regional scales. The culturally informed STMs that guide the REBURN model will be applicable to areas within NCRP that share WKRP forest types.

5. Describe the need for the project; how it addresses forest health; climate change/extreme event resiliency.

Wildfire conditions in California are perilous throughout the State. Fire exclusion policies established in 1911 have--over the last century--created powder keg conditions in most forests, including those of the NCRP and WKRP. Fire exclusion was easily obtained during a period of cool and moist climate, but it resulted in increased forest area and density. As Carl Skinner said at the 2017 Klamath Fire Ecology Symposium, "never since the last Ice Age has northern California seen so little fire." Now, as we emerge from one of the wettest into potentially one of the driest centuries on record, we are seeing "Perfect Firestorms" nearly every season, with devastating effects on communities and ecosystems. Fire suppression continues to be the primary agency management response even though fire scientists have said for the last half century, and indigenous peoples have said all along--this path ends in folly.

This project provides tools to generate widespread social support for landscape scale fuel break prioritization and construction, increased use of prescribed fire, and managed wildfire where appropriate. Collaboratively developed strategic fire planning layers allow diverse participants to visualize strategies and make shared risk-based decisions. Strategic fire planning connects ongoing suppression with fuels reduction and pre-fire mitigation strategies to add value. This project also expedites development of collaborative strategies for landscape scale fire management that can reduce the occurrence of extreme events and resulting carbon and forest health losses.

The second focus of this project, to develop and run a REBURN fire/vegetation simulation model for the WKRP landscape, both provides a powerful tool for validating the PODs layer and allows diverse WKRP partners to visualize forest structure and composition before fire exclusion homogenized our vegetative landscape. It will allow us to better understand and conceptualize the variability of historical forest conditions and create a shared vision for desired future conditions. Lack of a shared vision continues to be the biggest source of disagreement within WKRP, limiting forward progress. This lack of shared vision afflicts forest collaboratives throughout California and the West. The power of the REBURN model to understand what our forests looked 1 or 2 centuries ago is matched by its ability to show how proposed fire and fuels management strategies can assist landscape management into the future. For example, the REBURN model will show which treatment scenarios might hold the most promise for protecting communities, enhancing and restoring wildlife habitats and cultural resources, sequestering carbon, and reducing smoke emissions. Once built for the WKRP landscape, our model can be expanded to adjacent landscapes with less effort to support other efforts to re-imagine fire management on their landscapes.

6. Describe the location and size of the project and the communities served by this project.

This project proposes to work with NCRP staff to develop PODs for the entire 12.4 million acre NCRP landscape, as well as develop a draft REBURN model for a representative portion of the WKRP landscape. The NCRP area contains large tracts of public and private lands, with two large tribal reserves and ancestral territories of several of the largest tribes in California. This project will facilitate collaborative input,

validation and review of existing PODs layers on national forest lands, as well as develop them for private lands and tribal reserves in conjunction with local partners. Until they are validated on the ground, PODs locations will be considered draft control locations, as significant archaeological and cultural resources occur along these features. PODs locations will be refined and ground-truthed before work is accomplished on the ground. The seven rural communities within the WKRP landscape will be greatly served by the REBURN model, as it visualizes the effects of proposed fire and fuels management strategies in a way that most people can understand. This tool is critical for creating the social support needed to engage in managed wildfire and large scale prescribed burns in the Wildland Urban Interface (WUI).

7. List and describe the partnerships involved in the project and local and/or political support.

This project originated from the Western Klamath Restoration Partnership, which has built a strong foundation for restoring more characteristic natural and cultural fire to our landscape by actively and openly engaging communities, tribes, local NGO's, academia, industry, environmental groups, foundations, and state and federal agencies. WKRP has been highlighted as one partnership that addresses all components of the National Cohesive Wildland Fire Management Strategy by the Western Region Cohesive Strategy committee, and key members have recently received awards from CALFIRE and the USFS Washington Office. The WKRP has built strong working relationships with local and regional academic institutions, and our work is supported by local and regional state and federal politicians. A large percentage of our population supports progressive fire management as evidenced by support for in season prescribed burning and managed wildfires. This is due in large part to the influence of native peoples whose cultural resources have been greatly impacted by fire exclusion policies. WKRP strongly supports leadership by native tribes in this effort to re-learn how to live with fire. This proposal is vetted with partners at the Humboldt County FSC, Humboldt PBA, Watershed Center, Tukman Geospatial, Pepperwood Preserve and others.

8. List the estimated quantifiable, measurable benefits expected to result from the proposed project. Quantifiable benefits from this project include:

- Strategic Fire Planning for the entire NCRP area: Potential Control Locations, Suppression Difficulty mapping, and Quantitative Wildfire Risk Assessment modeling to create a draft PODS layer.
- Six regional meetings to inform and refine the draft PODS layer.
- Draft State and Transition models (STMs)for a representative portion of the WKRP area that are informed by extensive plot data from matching funds and past projects, as well as indigenous fire knowledge, that are an input to run a draft REBURN model. We anticipate submitting a proposal to further develop, calibrate, and validate the REBURN model in the May NCRP RFP cycle.
- Facilitate two workshops to gather information and refine STMs in the WKRP area.

9. List any scientific studies, plans, designs or reports completed for the project or process.

This process will draw upon the following scientific research papers:

- Dunn, C.J., Connor, C.D.O., Abrams, J., Thompson, M.P., Calkin, D.E., Johnston, J.D., Stratton, R., Gilbertson-day, J., 2020. Wildfire risk science facilitates adaptation of fire-prone social-ecological systems to the new fire reality. *Environ. Res. Lett.* 15.
- Hessburg, P.F., Miller, C.L., Povak, N.A., Taylor, A.H., Higuera, P.E., Prichard, S.J., North, M.P., Collins, B.M., Hurteau, M.D., Larson, A.J., 2019. Climate, Environment, and Disturbance History Govern Resilience of Western North American Forests. *Front. Ecol. Evol.* 7, 239.
- Kachergis, E.J., Knapp, C.N., Fernandez-Gimenez, M.E., Ritten, J.P., Pritchett, J.G., Parsons, J., Hibbs, W., Roath, R., 2013. Tools for resilience management: Multidisciplinary development of state-andtransition models for northwest Colorado. *Ecol. Soc.* 18.
- Lake, F.K., 2013. Trails, trials and tribulations: Tribal resource management and research issues in northern California. Occas. *Interdiscip. Stud. Humanit.* v. 5, 1–22.
- Lake, F.K., Long, J.W., 2014. Fire and Tribal Cultural Resources, *General Technical Report PSW-GTR-247*.

- Long, J.W., Lake, F.K., 2018. Escaping social-ecological traps through tribal stewardship on national forest lands in the Pacific Northwest, United States of America. *Ecol. Soc.* 23.
- Prichard, S. J., P.F. Hessburg, R. Gray, N. Povak, B. Salter, C. Stevens-Rumann, and P. Morgan. 2018. Final Report: evaluating the influence of prior burn mosaics on subsequent wildfire behavior, severity, and fire management options. Joint Fire Science Project 14_1_02_30.
- Prichard, S.J., Stevens-Rumann, C.S., Hessburg, P.F., 2017. Tamm Review: Shifting global fire regimes: Lessons from reburns and research needs. *For. Ecol. Manage.* 396, 217–233.
- Ray, L.A., Kolden, C.A., Chapin, F.S., 2012. A case for developing place-based fire management strategies from traditional ecological knowledge. *Ecol. Soc.* 17.
- Sarna-Wojcicki, D., Sowerwine, J., Hillman, Lisa, Hillman, Leaf, Tripp, B., 2019. Decentering watersheds and decolonizing watershed governance: Towards an ecocultural politics of scale in the Klamath Basin. *Water Altern.* 12, 241–266.

10. Describe the approach to data collection, performance measures, and project reporting of outcomes/lessons learned.

Potential Control Location, Suppression Difficulty Index, and Quantitative Wildfire Risk Assessment models are produced using place-based fire histories, operational fire-fighting constraints, predicted fire behavior, and equations describing wildfire effects on many different values using the quantitative process described in Dunn et al. 2020. To delineate POD boundaries, these three models are employed to produce predictive maps of wildfire risk, control opportunities, and operational constrains across a landscape, and unit boundaries are collaboratively developed based on quantitative products and local knowledge. POD boundaries often end up connecting roads, trails, drainages, fuel treatments, and other features, and represent a user-defined box for containing a wildfire. These analytical tools will be developed by NCRP consultants and will help evaluate landscape conditions, determine areas of high suppression difficulty, and identify potential control locations.

State and Transition models will be created by summarizing existing plot data (ecology plots/LiDAR validation plots) and resampling select plots to assess temporal change. This work will also include: 1) reconstructing cultural burning practices and historical reference conditions to inform landscape modeling and restoration goals, 2) creating culturally-informed state-transition models (STMs) to inform vegetation succession and fire dynamics as influenced by coupled natural and cultural ignitions and burning, 3) simulating historical fire-climate and vegetation dynamics and evaluate varying adaptation strategies, and 4) quantifying wildfire risk to communities, carbon storage, and wildfire emissions for management scenarios.