

## ADVANCING ADAPTATION TO CHANGING FIRE REGIMES JFSP SUSTAINED RESEARCH SCIENCE PLAN

*Goal: To strengthen partnerships among scientists, practitioners, managers, and other interested parties, to accelerate the identification and adoption of science-based management strategies that facilitate adaptation to changing fire regimes.*

### Background

Fire regimes are changing from multiple factors, including drought, invasive species, and expanding urban interface, leading to lengthening wildfire seasons, more extreme fire events, and restricting opportunities for conducting prescribed burning (Fill et al. 2019; Kupfer et al. 2020; Parks and Abatzoglou 2020). As fire regimes continue to change, land managers will be increasingly challenged in developing and adopting management strategies that facilitate societal and ecological adaptation to the altered fire regimes. Such strategies may include increasing the pace and scale of actions proven to increase social and ecological resilience to wildfire, such as understory thinning, prescribed burning, cultural burning, community planning, or post-fire restoration. Under some scenarios, climate variability may significantly reduce the relevance of historical conditions or past knowledge to current management strategies, and novel management approaches may be needed. This might include, for example, utilizing prescribed fire outside of traditional burning seasons, investing in more initial attack resources in high-risk areas, or planting drought adapted varieties or species after wildfire. Changing the scale of current management approaches or adopting new strategies is challenging because of high degrees of uncertainty in outcomes, societal expectations, resource constraints, and longstanding organizational culture and norms.

Recognizing the challenges land managers face with adapting management approaches for altered fire regimes, the Joint Fire Science Program (JFSP) Governing Board included this topic for investment in sustained (multi-year) research and directed the JFSP office to develop a long-term strategy in partnership with other organizations working at the nexus of fire and adaptation. The JFSP office initiated this work by partnering with multiple entities to sense the fire and adaptation science needs from the fire science and management community. JFSP held two workshops in partnership with the U.S. Geological Survey (USGS), the USGS Climate Adaptation Science Centers (CASC), the U.S. Forest Service (USFS), and the Fire Science Exchange Network (FSEN). The workshops included open dialogue, break out groups, as well as presentations from managers, practitioners, and scientists engaged in incorporating adaptation

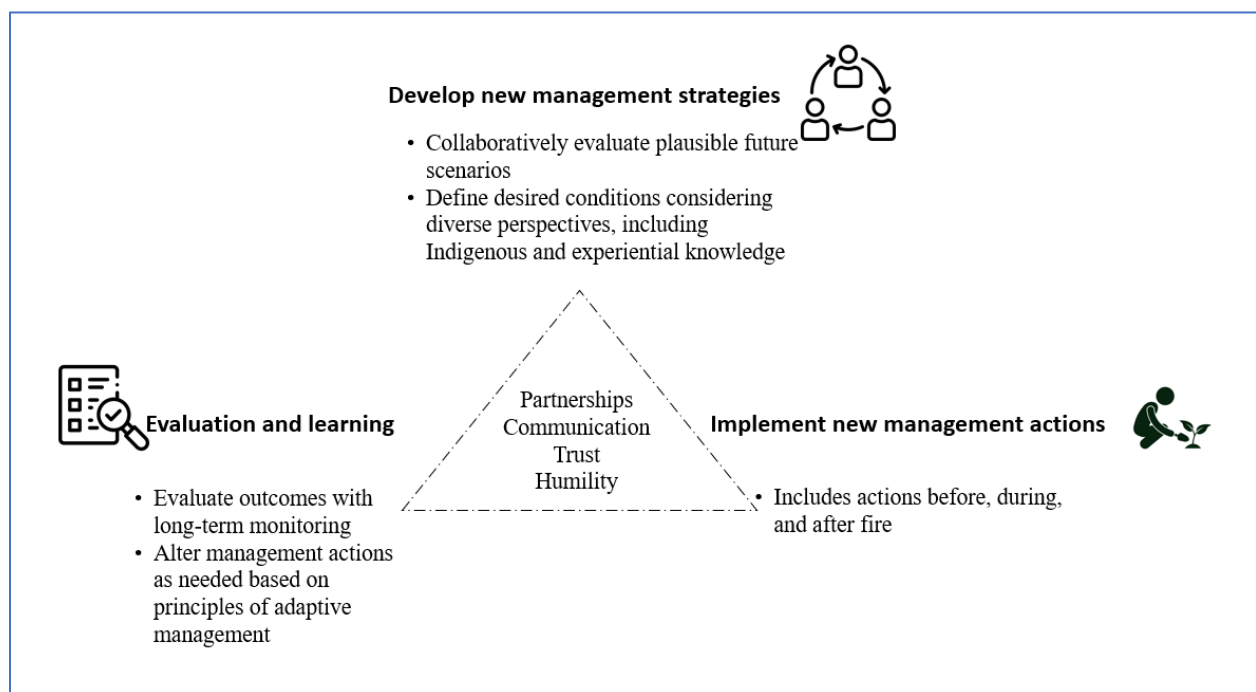
*"If I come up with a vision, it won't be a great one, but if other people join me in creating the vision, it will be better and more widely accepted" Jimmy Fox (scoping workshop participant)*

*"We need a fundamental different vision of what the next 50 years will look like" Kelly Martin (scoping workshop participant)*

into fire management. Information gathered from these events, as well as relevant literature, was used to develop a framework to guide future funding opportunities related to incorporating adaptation strategies into fire management (see Hunter et al. 2022). This framework entails utilizing best available science, partnerships among practitioners and scientists, and diverse perspectives to identify new fire management approaches that are

adaptive to changing fire regimes. Those new management approaches are then implemented, tested, and monitored in the context of adaptive management (see Figure below).

*Figure: Framework to guide future funding opportunities, from Hunter et al. 2022.*



The first step of this framework, which is the identification of new management strategies based on best available science, is meant to accelerate adaptation to changing fire regimes and is arguably the most challenging. These management strategies must be based on an articulation of desired future conditions that incorporate diverse perspectives. Critically, these perspectives should include those with experiential knowledge and Indigenous cultures, who have a deep history and knowledge of land stewardship under changing conditions. The desired future conditions also need to be feasible, given how we expect ecosystems and fire regimes to change in the future. Syntheses of science as well as landscape and ecosystem models are important tools in this respect, for evaluating a range of plausible future scenarios. This initial step of identifying new management approaches is not trivial, as there may be a great deal of uncertainty in the outcomes, risk of unintended consequences, or tradeoffs in different approaches for protecting different social or ecological values. Thus, it is critical that the process of identifying new approaches to management be done with partnerships among scientists, managers,

practitioners, community representatives and leaders, and others who have a deep interest in the outcomes of management interventions.

This science plan focuses primarily on the first phase of this framework for guiding future funding opportunities, which is identifying new management approaches and strategies meant to accelerate adaptation to changing fire regimes. Focusing on this critical first phase is designed to set practitioners and managers up for success as they implement and monitor these new management strategies and approaches. Critical elements of this phase include scientist and practitioner partnerships, inclusion of diverse perspectives and best available science, and identification of additional science gaps. The plan also includes new research to address science gaps identified by these partnerships. This science plan articulates distinct phases: (1) a pilot project where existing science-practitioner partnerships are supported, (2) an expansion of the concept to additional regions, and (3) development of research funding opportunities based on articulated science gaps. The plan will also include external evaluation of the outcomes of these activities and investments in terms of meeting overall goals and objectives.

## PHASE 1: PILOT PROJECT

**Title:** Accelerating science to action in fire-prone ecosystems: Spurring innovation in adaptation through knowledge exchange and place-based partnerships

**Purpose:** The purpose of the pilot project is to test a new model for funding actionable science, whereby multiple science funding organizations work together to focus on science-management partnerships to explore available science and tools, diverse perspectives on desired conditions, and science gaps related to altered fire regimes.

**Participants:** JFSP and the Southwest Climate Adaptation Science Center s(SW CASC) are the managing partners of the pilot project, which includes providing funding to support place-based, science-manager partnerships and related activities, and recruiting additional partners (e.g., USGS, USFS, Department of Defense) to participate in pilot project *activities*.

**Goals:**

- To strengthen existing partnerships among scientists, practitioners, managers, and other interested parties in the southwestern U.S. (Arizona, New Mexico, and Southern California) for the purpose of identifying and accelerating the adoption of management strategies that facilitate adaptation to altered fire regimes.
- To strengthen partnerships among science funding organizations (e.g., National Science Foundation, National Oceanic and Atmospheric Administration) so that investments in science and partnerships are not duplicative and expertise related to fire science, adaptation, and other disciplines is leveraged.
- To gather and summarize lessons learned and science needs from the pilot project to inform future investments in actionable science and partnerships in additional regions.

**Process:**



**Competitive funding opportunity** - The pilot project initiates with a competitive funding opportunity to support place-based partnerships among scientists, practitioners, managers, and other interested parties in the southwestern U.S. (Arizona, New Mexico, and Southern California), jointly funded by the JFSP and the SW CASC. Proposals will be expected to articulate a process whereby diverse partnerships utilize available science, experiential knowledge, and diverse perspectives to identify desired future conditions, new adaptive management strategies, monitoring strategies, and science gaps needed to inform adaptation strategies for changing fire regimes. In addition to the place-based partnership, successful projects will be expected to participate in two larger convening events, an Innovation Accelerator and a Closeout Workshop, designed to share relevant science resources and tools, build networks, and share lessons learned and science needs. To the extent possible, it is preferable that these convening events can be held in conjunction with already planned conferences or workshops. See the [JFSP funding tab](#) for previous task statements focused on this science plan.

**Innovation Accelerator** – Following the funding opportunity and initiation of funded projects, the JFSP, SW CASC, and the FSEN (Southwest and California regions) will host an Innovation Accelerator, whereby practitioners, scientists, and other interested parties in the Southwest will convene to build and strengthen partnerships that advance identification and testing of management strategies that facilitate adaptation to altered fire regimes. The Accelerator will include team members from partnerships funded in the competitive funding opportunity, where they will further build their network, present their proposal, and be introduced to those with resources and expertise in climate and fire sciences, climate adaptation, co-production, and science exchange. To that end, the Accelerator will include presentations from those who can provide scientific, technical, and logistical support to the awarded partnerships as they work to identify adaptation strategies as well as case studies of successful fire adaptation partnerships.

**Closeout Workshop** – As funded projects near completion, JFSP, the SW CASC, and the FSEN (Southwest and California regions) will convene scientists and practitioners from funded projects to report on lessons learned during the project and additional science needs identified. Following the closeout workshop, JFSP and the SW CASC will consolidate lessons learned and science needs and use them to inform future funding opportunities. Identified lessons learned and science needs will be communicated to multiple audiences via multiple formats (e.g., journal article, fact sheet, presentations) to encourage targeted partnership and science investments that address the identified needs.

**Funding mechanisms:** Additional funding may be provided to FSEN (Southwest and California regions) to collaboratively plan and host the Innovation Accelerator and the Closeout Workshop in FY24 (\$15,000 per exchange over two years). In FY24, the SW CASC will provide up to \$250,000 and JFSP will provide up to \$500,000 to support projects with successful proposals (pending peer review and recommendations by JFSP board advisors and the JFSP Science Committee). Throughout the pilot project period, JFSP and the SW CASC will communicate project goals, progress, and lessons learned to multiple audiences for the purpose of recruiting additional partners to engage in future funding opportunities.

## PHASE 2: EXPANSION OF PLACE-BASED PARTNERSHIPS TO ADDITIONAL REGIONS

JFSP will extend funding of place-based partnership opportunities, similar to the pilot project, to additional regions. The goal is not necessarily to cover every region of the country, but to focus on regions where impacts of changing fire regimes are expected to be most significant and to cover a diversity of regions and vegetation types. JFSP would target funding of two proposals for each region, totaling \$1 million to \$1.5 million per year. Additional proposals may be funded by partners. To facilitate the engagement of the Fire Science Exchange Network in the funded partnerships, future funding opportunities will coincide with years in which regional members of the network will develop new proposals for funding (see schedule below). This will allow exchanges to incorporate partnership activities into their proposal budgets and plans of work.

## PHASE 3: RESEARCH FUNDING OPPORTUNITIES BASED ON IDENTIFIED SCIENCE GAPS

In the process of exploring existing science and desired future conditions, the funded regional partnerships are expected to identify key uncertainties and science gaps that would inform future management actions in response to altered fire regimes. The FSEN has already identified science gaps related to the management of changing fire regimes. These include better understanding of historical, current, and future relationships between climate and fire regimes; strategies for managing landscapes that have been impacted by large, high severity wildfires; and the effectiveness of fuel treatments under current and future climate conditions. A subset of these topics or additional topics identified by the funded partnerships will be developed into research task statements in FY27 and FY29 (see schedule below). The target will be one task topic in each year with a total investment of \$1.5 to \$2 million per task statement. These and other topics related to climate and fire are also of interest to many research funding organizations (e.g., CASC, National Science Foundation). To that end, it will be imperative that JFSP coordinate with other science funding agencies to reduce duplication of effort and to leverage opportunities when possible. JFSP will work to communicate the goals and outcomes of this science plan to multiple entities.

### *Schedule of funding opportunities<sup>1</sup>*

- FY 25 regional partnership funding opportunity: Northern Rockies, Northwest, Great Basin (budget estimate - \$1.5 million)
- FY 26 regional partnership funding opportunity: Appalachian, Southeast, Southern Rockies (budget estimate - \$1.5 million)

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<sup>1</sup> All future funding opportunities are contingent on JFSP and partner annual budget appropriations.



- FY 27 Science task statement based on identified needs. Potential topics: post-fire management, fuel treatment effectiveness under variable climate, fire-climate relationships (budget estimate - \$1.5 to \$2 million)
- FY 28 regional partnership funding opportunity: Alaska, Pacific (budget estimate - \$1 million)
- FY 29 Science task statement based on identified needs. Potential topics: post-fire management, fuel treatment effectiveness under variable climate, fire-climate relationships (budget estimate - \$1.5 to \$2 million)

### *References*

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