Partnering in Research About Land Management With Tribal Nations—Insights From the Pacific West

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Cover: Root digging, May 10, 1953. Internal evidence suggests these roots are Canby's biscuitroot, or "luks" (*Lomatium canbyi*). Negative #825. University of Washington Libraries, Special Collections, David H. and Katherine S. French papers, Accession 5496-001. Box 54.

Abstract

Multiple aspects of forest land management present research partnership opportunities for the USDA Forest Service and tribal nations. These aspects include forests, fuels, and ecocultural resources that often are appropriate to manage at the landscape scale. The impacts of global climate change heighten the timeliness and need for partnerships. Practices that are appropriate for Forest Service-tribal partnerships generally have not been documented in a designated publication. This report responds to this technical knowledge need by presenting field-based insights about effective practices for partnerships in research about land management. The research method was a synthesis of the literature and of insights accrued by the authors in their research with tribes at sites across the Pacific West (California, Oregon, Washington, Alaska). The main topics of this report are partnership benefits and challenges, effective practices, partnership models, and the partnership-building process. Effective practices can be organized into three categories: institutional context-adapted practices—which are attuned to relevant executive orders or other presidential actions, governmental policies, and authorities (e.g., legal foundation, tribal consultation, and tribal governance structure); tribal social context-adapted practices—which pertain to cultural, historical, and community considerations (e.g., the unique culture and history of each tribe, traditional knowledge systems, and culturally and organizationally appropriate methods); and partnership relationship-adapted practices, which are attuned to supporting—and sometimes repairing—the framework for meaningful dialogue and joint efforts (e.g., early and continuous engagement, and obtaining consent). Partnership models include government, collaborative, and community types. Partnership building develops over a multistage life cycle. Through our experiences in working with tribes, we identified seven stages of tribal partnerships: (1) identify shared goals and explore concerns, (2) develop awareness of the tribal governance structure, (3) coordinate natural and social science frameworks, (4) forge partnership instruments, (5) adapt methods to the tribal context, (6) conduct research and implement management action, and (7) give back. Although several of these stages are not unique to tribal partnerships, all require distinct adaptive actions and associated efforts, as discussed in this report. The process is often nonlinear: partners may loop back to preceding stages, leapfrog particular stages, or advance through multiple stages simultaneously. Partnership building is

also characterized by legacy effects. Current partnerships are influenced by the community memory of past experiences regarding aspects of the partnership life cycle. Thus, current partnerships may affect future partnership conditions. These findings may assist scientists and land managers in forging and maintaining effective, productive partnerships with tribal nations.

Preface

This report originated with a presentation by Michelle Steen-Adams to the Goods, Services, and Values program of the USDA Forest Service Pacific Northwest Research Station entitled "Conducting Interdisciplinary Research About Traditional Knowledge With Tribal Partners" in Olympia, Washington, on March 5, 2019.

Contents

Introduction

About This Report

This report offers field-generated insights on effective practices for partnerships with American Indian tribes and Alaska Natives, including Native Hawaiian communities, in research and land management regarding forest landscapes, wildland fire and fuels, climate vulnerability and adaptation, and traditional knowledge systems. Here, the definition of a partnership is based on U.S. Department of Agriculture (USDA) Forest Service administrative code: "a voluntary, mutually beneficial arrangement entered into for the purpose of accomplishing mutually agreed upon objective(s), related to the instruments and authorities listed in Forest Service Handbook 1509.11, chapter 70" (USDA FS 2020). Mutually beneficial means that each partner shares in the benefits the project provides (USDA FS 2014). This report focuses on practices for tribal partnerships with federal government entities, which also may be applicable to universities and nongovernmental organizations. This report presents examples of USDA Forest Service partnerships with tribes. Leveraging partnerships among tribes and USDA Forest Service entities to generate mutual objectives is a principal goal of the USDA "Forest Service Research and Development Tribal Engagement Roadmap" (USDA FS 2015) and an objective of the USDA Forest Service Tribal Relations Strategic Plan (for fiscal years 2019–2022) (USDA FS 2018a). The "Tribal Engagement Roadmap" (USDA FS 2015) calls for building new and enhancing existing partnerships with tribes, Indigenous and Native groups, tribal colleges, tribal communities, and intertribal organizations. To achieve these goals, this report presents a process for building partnerships, and provides a brief background on the federal legal and policy foundation of tribal partnerships. Overall, this report aims to inform effective, productive partnerships with tribes, which can support the attainment of mutual land management goals and uphold federal responsibilities and tribal rights, consistent with previous USDA Forest Service publications (e.g., Long et al. 2018, Lynn et al. 2011, Swanston et al. 2016, Vinyeta and Lynn 2015) and related research (Dockry et al. 2018, 2022; Lake 2021; Lake et al. 2017).

The research method was a synthesis of the literature and field-based insights accrued by the authors during more than a decade of research with tribes across the Pacific West (California, Oregon, Washington, and Alaska). Literature topics examined to develop this synthesis included climatic and environmental change and Indigenous peoples; federal-tribal relationships; forestry and wildland fire; Indians of North America—legal status, laws, etc. in U.S. history; partnerships and partnership building; practices and methodologies of collaborative management and research; and traditional knowledge systems (app. 1).

Tribal Nations and the United States

As of 2020, the U.S. government recognizes 574 tribes, including approximately 229 Alaska Native nations and villages (USDI BIA 2020); in addition, the U.S. government recognizes Native Hawaiians (*Kanaka Maoli*) (hereafter collectively referred to as tribes).[1] Native Americans include all native people of the United States and its trust territories (American Indians and Alaska Natives, Native Hawaiians, Chamorros, and American Samoans), as well as members of Canadian First Nations and Indigenous peoples of Mexico, and Central and South America who are U.S. residents (NCAI 2020). There are also tribes that are recognized by state governments but not by the federal government (NCSL 2019). In addition, there are intertribal and Indigenous coalitions, which operate at local to international levels. These organizations have formed for a variety of purposes. Many organizations focus on the management of specific natural resources, such as forest products and fisheries. Although this report focuses on federally recognized tribes, we also intend for it to be applicable to partnerships with other Indigenous or tribal groups.

Why Partner

Partnerships and collaborations enable participating organizations to generate mutual benefits (Abrams 2019, Dockry et al. 2018, IPC 2013, NFF and USDA FS 2005, Steen-Adams et al. 2021, USDA FS 2014). In the broad scope, partnerships foster relationships between organizations. These relationships can generate several types of benefits: (1) improving the decisionmaking process and outcomes by coalescing entities and individuals with diverse perspectives; (2) building support for projects across organizations and among their stakeholders; and (3) expanding capacity to perform the operational functions in planning and implementation that fulfill each organization's mission yet cannot be accomplished alone, including forest restoration, access to ecocultural resources, research, and education. Many tribes have experience partnering in forest research and management with universities (Matson et al. 2021); nongovernmental organizations (Middleton 2011); the private forest industry (IFMAT 2013); and federal, state, and county agencies (Dockry et al. 2022, Harling and Tripp 2014). Partners may encounter a variety of barriers, however (Dockry et al. 2018), as well as a history of unresolved disputes over governance of traditional homelands (Leland 2015) and underrepresentation of tribal priorities, perspectives, and worldviews in natural resources research (Dockry et al. 2022). Topics that may require attention include legal foundations; appropriate practices for engaging traditional knowledge systems, including Indigenous data sovereignty—the right of Indigenous peoples to govern the collection, ownership, and application

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[1] Senate report 112–151 states that "Native Hawaiians are the only federally recognized Native people barred from self-determination and self-governance…[and] without a government-to-government relationship with the Federal Government" (U.S. Congress 2012). In response, in 2015, the U.S. Department of the Interior established a final rule, "Procedures for Reestablishing a Formal Government-to-Government Relationship With the Native Hawaiian Community" (43 CFR Part 50).

of Indigenous data[2] (Carroll et al. 2020, Lucero et al. 2020, Matson et al. 2021, OSTP and CEQ 2021); and application of governance concepts, such as shared stewardship (USDA FS 2018b) and co-management (Plummer and Armitage 2007, Sams 2022).

Consultation directive based in federal law and trust responsibility

Resource management, especially at landscape level:

- **Forest landscapes**
- **Fire and fuels**
- **Climate vulnerability and adaptation**

Application of traditional knowledge to research products and resource management
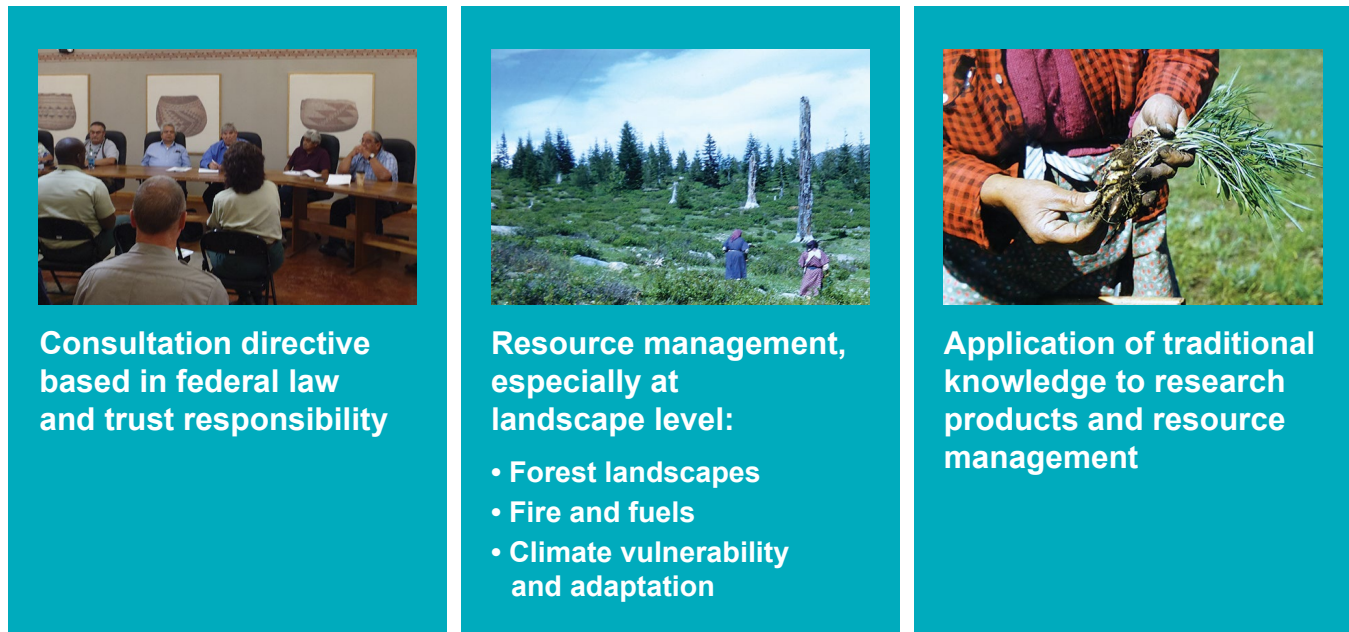
Figure 1—Three main reasons for partnerships with tribes. Photo credits: left, Frank Lake, USDA Forest Service; center and right, University of Washington Libraries, Special Collections, David H. and Katherine S. French papers, Accession 5496-001, Box 54, #589 and #825.

There are several reasons why tribal and nontribal entities may seek partnerships (fig. 1). These motivations are not mutually exclusive; two or more motivating factors may call for a partnership. One reason is tribal consultation—the mandated requirement for federal agencies, including land management agencies, to consult with tribes about federal policies or actions that have tribal implications, as detailed below (Dockry et al. 2018; USDA FS 2014, 2016b; USDI and USDA 2021). A second reason is to fulfill resource management goals, especially for landscape-level management and restoration (Lake et al. 2017). Resource management goals of partnerships may include fulfilling trust responsibilities to American Indian tribes as well as Alaska Native and Native Hawaiian communities (USDI and USDA 2021), climate adaptation (Steen-Adams et al. 2020, Swanston et al. 2016, USDA 2021, Whyte 2017)—particularly in relation to wildfire (USDA FS 2022)—and food sovereignty, such as the Indigenous Food Sovereignty Initiative (USDA, n.d.). Partnerships can improve the management of forests, fuels, and wildland fire by providing essential information that otherwise might be overlooked

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[2] Indigenous data includes data generated by Indigenous peoples and data gathered by governments or other entities about Indigenous Peoples and lands (Carroll et al. 2020).

by the agency. In particular, partnerships may guide the restoration of ecocultural resources—a conceptualization of resources that focuses on the interrelations between the ecological setting and culture of a people—by enabling the application of traditional knowledge and Indigenous values (Matson et al. 2021: 113). We adopted the concept of "ecocultural resources" following Long et al. (2018: 851): "Tribal worldviews in the Pacific Northwest emphasize that humans are an integral part of the natural world and their well-being depends on reciprocal relationships with its inhabitants." The ecocultural resource concept fits well with tribal partnerships: it resolves the incompatibility of tribal worldviews with the dualism-oriented worldview (separating natural resources and cultural resources) that is prevalent in land management agencies.

In November 2021, the White House Office of Science and Technology Policy, and the White House Council on Environmental Quality issued the joint memorandum, "Indigenous Traditional Ecological Knowledge in Federal Decision Making" (OSTM and CEQ 2021). Traditional knowledge often can be integrated with Western science-based knowledge (Bussey et al. 2016; Kimmerer 2000, 2002, 2013).[3] The USDA Forest Service 2012 Planning Rule, 36 CFR 219, recognizes Native knowledge in the agency's planning procedures (USDA FS 2012, 2016b). In addition to agency-specific direction, there is federal agency-wide direction. In November 2021, the White House Office of Science, Technology, and Policy and Council on Environmental Quality issued the joint memorandum, Indigenous Traditional Ecological Knowledge in Federal Decision Making (OSTP and CEQ 2021). This memorandum "recognize[s] Indigenous Traditional Ecological Knowledge as one of the important bodies of knowledge that contributes to the scientific, technical, social, and economic advancements of our nation."

Many partnership guides and tools are available (box 1). The scope of partnership resources ranges from the general to the specific, including guides about partnerships involving the USDA or other federal entities that are not specific to a tribe; guides for research partnerships with indigenous communities; and topic-specific guides. The "Tribal Adaptation Menu" (Tribal Adaptation Menu Team 2019) presents a set of guiding principles for partnering with tribes. This document was designed both as a stand-alone tool and to align with the adaptation workbook and menus published in "Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers" (Swanston et al. 2016). The "Tribal Adaptation Menu," presented in a tiered structure, enables readers to select from

Partnerships can improve the management of forests, fuels, and wildland fire by providing essential information that otherwise might be overlooked by the agency.

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[3] In addition to the term "traditional knowledge," several alternative terms are employed in the natural resources management literature: "traditional ecological knowledge" (Berkes et al. 1995, Charnley et al. 2007, Kimmerer 2000, Turner et al. 2000), "native knowledge" (Boyer 2006), and "Indigenous knowledge" (Barnhardt 2014, Gadgil et al. 1993). The term "Indigenous traditional ecological knowledge" (ITEK) was adopted in the memorandum for the heads of departments and agencies on ITEK and federal decisionmaking by the White House Office of Science and Technology Policy and the Council on Environmental Quality (November 15, 2021) (OSTP and CEQ 2021).

Box 1: Partnership Guides and Tools

General guides for federal-tribal partnership:
- Best Practices Guide (IPC 2013); https://www.fs.usda.gov/sites/default/files/building-partnerships-a-best-practices-guide.pdf
- Partnership Guide (USDA FS, n.d.); https://www.fs.usda.gov/detail/prc/tools-techniques/partnership/?cid=stelprdb5438298
- Partnership Guide (NFF and USDA FS 2005); https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5439677.pdf

Research partnerships with Indigenous communities:
- Reciprocal Research: A Guidebook to Centering Community in Partnerships with Indigenous Nations (Poitra et al. 2021); https://www.canr.msu.edu/resources/reciprocal-research-guidebook-partnerships-indigenous-nations
- Partnering with Tribal Nations on Research [Frequently Asked Questions] (NCAI PRC 2021); https://www.ncai.org/policy-research-center/research-data/prc-publications/NCAI_PRC_FAQs_Partnering_with_Tribal_Nations_on_Research_11_12_2021_FINAL.pdf
- CARE Principles for Indigenous Data Governance (GIDA 2019); https://www.gida-global.org/care. See also CARE Principles for Indigenous Data Governance (Carroll et al. 2020) and Transforming Research and Relationships Through Collaborative Tribal-University Partnerships on Manoomin (Wild Rice) (Matson et al. 2021: app. 1)

Place-based research partnerships with Native Hawaiian communities:
- Kūlana Noiʻi [Hawaiian for posture/poise] Version 2.0 [guidelines for equitable research partnerships] (Kūlana Noiʻi Working Group 2021)

Health-related tribal research partnerships:
- Considerations for Meaningful Collaboration with Tribal Populations (Tribal Collaboration Working Group 2018); https://allofus.nih.gov/sites/default/files/tribal_collab_work_group_rept.pdf
- Research Partnerships (NARCH VII), (NCAI PRC, n.d.); https://www.ncai.org/policy-research-center/initiatives/projects/narch. See also: The Holding Space: A Guide for Partners in Tribal Research (Lucero et al. 2020)

Climate change-related tribal partnerships:
- Dibaginjigaadeg Anishinaabe Ezhitwaad: Tribal Climate Adaptation Menu (Tribal Climate Menu Team 2019); https://glifwc.org/ClimateChange/TribalAdaptationMenuV1.pdf
- Best Practices for Collaborative Climate Adaptation [video] (Jones and Marchand 2018); https://vimeo.com/279354118

a menu of tools as appropriate to the management need. The "Tribal Engagement Roadmap" (USDA FS 2015), developed by the USDA Forest Service Research and Development, aims to guide collaboration with tribes for research partnerships, and supports the goals of the 2010–2013 "Tribal Relations Strategic Plan." The "Tribal Engagement Roadmap" (USDA FS 2015) sets forth the goal to leverage partnerships to maximize mutual success (USDA FS 2015).

Consultation—

Partnerships may contribute to fulfillment of federal agency requirements for tribal consultation, as required by the cumulative history of recent presidential actions: Executive Order 13175 (November 6, 2000) (65 FR 67249), "Consultation and Coordination with Indian Tribal Governments" (Executive Office of the President 2000); the presidential memorandum of November 5, 2009, "Tribal Consultation" (74 FR 57879) (Executive Office of the President 2009), and as reaffirmed in the presidential memorandum of January 26, 2021, "Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Relationships," (86 FR 7491) (Executive Office of the President 2021).[4] Consultation is defined in Executive Order 13175[5] as "an accountable process to ensure meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications." Section 1 of this order directs federal agencies to consult and coordinate with tribal governments regarding "policies that have tribal implications," meaning "regulations,…legislation, and other policy statements [e.g., proposed USDA Forest Service regulations, legislative comments, or proposed legislation (USDA FS 2016b)] or actions that have substantial direct effects on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes." Section 2 directs federal agencies to be guided by the fundamental principles of the government-to-government relationship and the trust relationship with tribes. Overall, the executive order on tribal consultation directs federal agencies to adopt these practices: (1) respect the right of tribes to self-government and self-determination; (2) consult with tribal officials and encourage tribes to develop their own policies to achieve program objectives; and (3) uphold an "accountable process" whereby the federal agency documents and reports back to tribal governments how tribal information and

Partnerships may contribute to fulfillment of federal agency requirements for tribal consultation.

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[4]Presidential actions fall into three broad categories: executive orders, proclamations, and memoranda. As directives issued from the U.S. executive branch of government, executive orders are not laws or statutes (of the legislative branch); yet they have the force of law if the topic is "founded on the authority of the President derived from the Constitution or statute." They must be published in the Federal Register and in Title 3 of the Code of Federal Regulations (Library of Congress, n.d.).

[5]EO 13175 is the outgrowth of previous executive actions by President Clinton: a 1994 presidential memorandum as well as the 1998 Executive Order 13084, which followed the advocacy of Professor Gerald Torres and others (Hoss 2022). Hoss' law review article discusses an emerging topic that may be relevant to some collaborative land management projects: tribal health sovereignty.

recommendations were considered and addressed, including explanations about how input was (or was not) incorporated into policy development (Lynn et al. 2011). The presidential memorandum of 2009 directs the heads of federal agencies to submit detailed plans to implement the policies on tribal consultation and coordination of Executive Order 13175. The presidential memorandum of 2021 on tribal consultation and strengthening nation-to-nation relationships affirms the 2009 memorandum. Specific direction to federal agencies to fulfill the directives of the memorandum of 2021 is provided through the "Joint Secretarial Order on Fulfilling the Tribal Trust Responsibility to American Indian tribes in Stewardship of Federal Lands and Waters" (Order 3403) (OSTP and CEQ 2021). Details are reported in the "Co-management and co-stewardship" subsection (p. 11) of this report.

USDA Forest Service Handbook rules align with presidential actions on tribal consultation. The handbook directs agency officials to develop unit-specific agreements that help clarify tribal rights and interests and set forth procedures and protocols for consultation, and to involve tribal representatives in the consultation process, where appropriate (USDA FS 2016a).

Characteristics that constitute meaningful consultation are described in a document about the policy of the Confederated Tribes of the Umatilla Indian Reservation on government-to-government consultation (CTUIR, n.d.; see also Long et al. 2018: 880, Nissley and King 2016). Meaningful consultation involves "bi-lateral decisionmaking among sovereign [governments]" (CTUIR, n.d.: 2). The emphasis is on two-way communication and negotiation that guides the decision outcome, in contrast to perfunctory notification to tribes of a predetermined policy proposal. Meaningful consultation also requires that federal agencies (as well as state agencies, nongovernmental organizations, and academic institutions) and tribes both are cognizant of their respective roles and authorities. Federal agencies recognize the principle of government-to-government relationship, the responsibilities of the federal government under the trust doctrine, and the authorities of tribal government entities. Tribes recognize the decisionmaking authorities of federal agencies. Tribes also may recognize the nontribal politics of a decision, such as resource values held by nontribal stakeholders.

The policy of tribal consultation and coordination (Executive Order 13175) is based on a set of fundamental principles of intergovernmental relations between federally recognized tribes and the federal government (fig. 2): (1) recognition of the right of tribal governments to sovereignty over their members and lands; (2) recognition of the right of tribal governments to self-determination (as established by the Indian Self-Determination and Education Assistance Act of 1975, Public Law 93-638); and (3) enactment of many federal statutes that establish a trust responsibility to protect tribal trust resources (Goschke 2016, Lynn et al. 2011). Underlying these three principles is the government-to-government relationship

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whereby federal entities and tribes negotiate regarding federal decisions that affect the self-governance, rights, resources, and lands of tribes (Dockry et al. 2018, Long et al. 2018).[6]
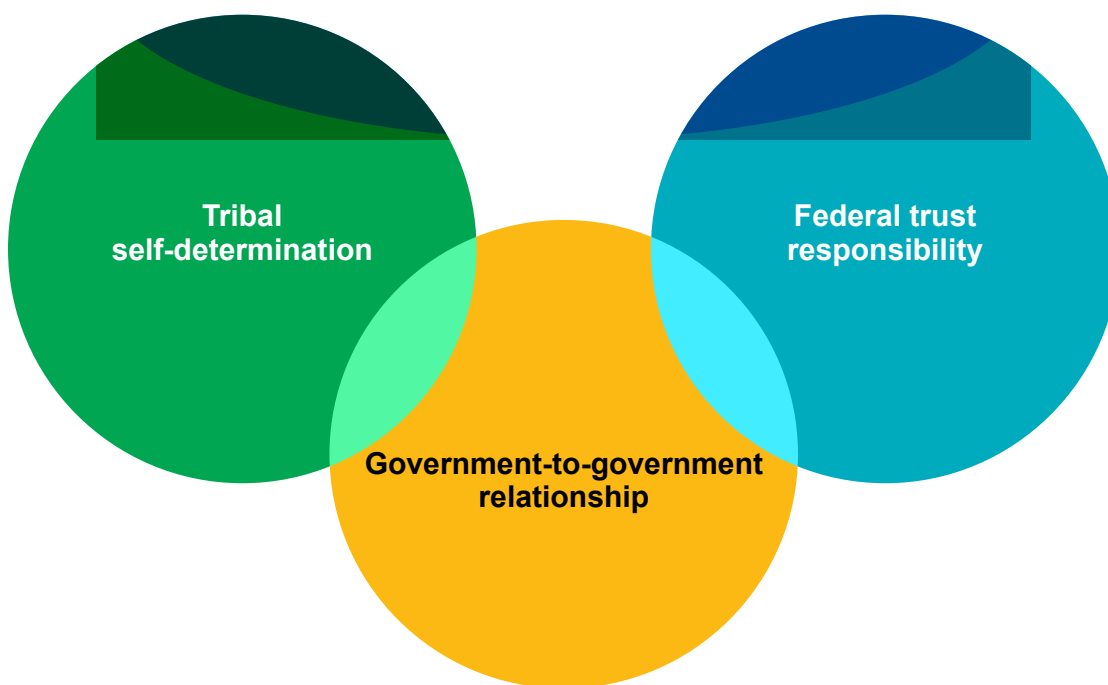
Figure 2—Principles of intergovernmental relations between federally recognized tribes and the United States government. Adapted from Jones and Marchand 2018.

At the state level, Pacific West states have established executive orders and policies that direct state agencies to consult with tribes. In 1996, Oregon was the first state to pass a state-tribal, government-to-government relationship law: Relationship of State Agencies with Indian Tribes of Oregon Revised Statutes (ORS 182.162 to 182.168) (ODLCD, n.d.). This statute established a framework for state-tribal relations. This statute is based on Oregon Executive Order EO-96-30, which defines a process to "assist in resolving potential conflicts, maximize key inter-governmental relations, and enhance an exchange of ideas and resources for the greater good of all of Oregon's citizens." California (CNRA 2012), Washington (WSOAG 2019), and Alaska (ADEC 2002) also have established tribal consultation policies.

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[6] Government-to-government relationship is also known as nation-to–nation relationship, e.g., the "Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Relationships" (86 Fed. Reg. 7491).

Resource management—

Tribal partnerships are also motivated by the shared benefits of restoring socioecological resilience through landscape-level management of forests, fuels and wildland fire, ecocultural resources, and response to climate change (Lake and Long 2014, Long et al. 2018, Norton-Smith et al. 2016, Vinyeta and Lynn 2015). Tribes steward 58.7 million ac of land, including 18 million ac of forest land, as of 2020 (NCAI 2020). Tribal and nontribal lands either intermingle or adjoin in many regions of the United States. These ownership patterns necessitate joint decisionmaking to achieve cross-jurisdictional, landscape-level forest and wildland fire management and restoration (Charnley et al. 2007, Hatcher et al. 2017, Hessburg et al. 2015, Lake et al. 2017, Steen-Adams et al. 2019).

Tribal partnerships can contribute to an effective strategy to restore cross-boundary, landscape-scale ecological processes, structures, and functions—particularly those of ecocultural resources—through the application of traditional knowledge to inform management. Tribal stewardship traditions and worldviews historically maintained important species constituting ecocultural resources, such as acorn-bearing oaks (Long et al. 2016a, Norgaard 2019), basketry grasses (Hummel et al. 2012), and berry-producing shrubs (LeCompte 2018). Indigenous fire stewardship practices to maintain such resources constituted the harvest area's cultural fire regime (described below) (Lake 2021, Lake et al. 2017), and contributed to the area's historical fire regime (Steen-Adams et al. 2019). Many of these ecocultural resources are subject to federal trust obligations for protection (Lake et al. 2017, Long and Lake 2018, USDA FS 2014), and are essential to tribal food security (Sowerwine et al. 2019).

Tribes may form partnerships to improve access to their aboriginal lands.[7] Many tribes contend with barriers to access their aboriginal areas (as ceded lands), which currently are administered by the federal government and other nontribal entities (Dobkins et al. 2016). Also, many tribes lack a designated reservation or trust lands (NCAI 2020, USDI BIA 2014). Tribes contend with barriers to access aboriginal lands, associated timber and nontimber forest products, and sacred

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[7] Aboriginal lands, homelands, territories, or areas refer to the area of occupancy of tribes or bands of Indigenous peoples. "Aboriginal land" consists of federal land that is recognized by a final judgment of the Indian Claims Commission or the United States Court of Claims as the aboriginal land of an American Indian tribe [43 CFR 10.6 (a)(2)(iii)]. "Aboriginal area" is defined by the USDA Forest Service as "the historic and prehistoric lands where a tribe(s) carried out food gathering or seasonal activities or traded with other Indian peoples. These areas may be extensive depending on the geographic terrain" (USDA FS 1997: app. B). Aboriginal land connotes occupancy that spans the past, present, and future, as distinct from the term, ancestral territory—the land area historically inhabited by a tribe or tribes, which may differ from the area of the current reservation or other tribal lands held in trust by the United States.

sites (Adelzadeh, 2006) because of a variety of factors. These factors include satisfying the requirements for resource harvest permits, which can be particularly burdensome for low-income and minority populations (Long et al. 2018); gated and poorly maintained roadways (Dobkins et al. 2016); and overgrown, shrub-encroached trails that impede access to harvest sites (Steen-Adams et al. 2019).

Tribal partnerships align with the USDA Forest Service's shared stewardship strategy for forests, rangelands, climate adaptation, other natural resources, and wildland fire (USDA FS 2018b). This strategy promotes collaborative planning and management across jurisdictions. Shared stewardship is guided by a vision of partnership in making decisions about the appropriate tools, places, and scales of resource investment.

A partnership that exemplifies landscape-level resource management is the Somes Bar Integrated Fire Management Project (Tripp et al. 2017), a demonstration project for the Western Klamath Restoration Partnership (Harling and Tripp 2014, USDA FS 2018c). This project includes about 20 federal, tribal, state, and nongovernmental organization partners in northern California. The partnership has enabled these organizations to develop a joint plan to restore socioecological resilience to wildfire across a 1.2-million-ac landscape (Lake et al. 2018b, Long et al. 2018) based on the traditional knowledges, practices, and concepts outlined in the "National Cohesive Wildland Fire Management Strategy" (National Strategic Committee 2016). This plan incorporates ecological, economic, social, and cultural values to determine where restoration treatments would be most beneficial, yet pose the least impact to ecocultural resources and shared values.

Tribal stewardship practices (e.g., indigenous fire stewardship [Lake and Christianson 2019]) have been applied across multiple jurisdictions of a tribe's aboriginal territory—including on nontribal public and private lands—as part of a healing process (Middleton 2011). Such practices can generate a variety of ecosystem restoration outcomes: reconciliation with the legacies of land dispossession, disregarded treaties, and settler colonialism, and thereby promote healing; bring about renewed access to ecocultural resources as secured by treaty rights and other government-to-government agreements; and repatriation of tribal knowledge systems and stewardship practices to dispossessed ancestral lands (Long et al. 2020).[8] This healing process may revitalize tribal traditions that have been frayed because of the colonialist ideas embedded in past federal policies that continue to affect tribes today (Long and Lake 2018, Norgaard 2019). Federal

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[8] "Repatriation" in this report is based in part on the Native American Graves and Repatriation Act (Public Law 101-601; 25 U.S.C. 3001-3013). This act recognizes the rights of "Native American lineal descendants, Indian tribes, and Native Hawaiian organizations with respect to the treatment, repatriation, and disposition of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony….The agencies and museums must consult with Indian tribes and Native Hawaiian organizations to attempt to reach agreements on the repatriation or other disposition of these remains and objects." We adopt this term to mean the return and restoration of tribal cultural knowledge systems and stewardship practices to tribal lands.

policies of the allotment, Americanization, and assimilation period (1880s–1920s) (Wilkins and Stark 2017) sought to assimilate tribal peoples into the mainstream society by imposing Anglo-American laws and Western culture on traditional land tenure systems and lifeways (Catton 2016; Greenwald 2002; Loew 2013; Steen-Adams et al. 2010, 2015).[9] These policies disrupted tribal ecological stewardship practices, traditional knowledge systems, and social-political systems. Partnerships may promote reconciliation and revitalize stewardship traditions. For example, in the Pacific Northwest, federal and tribal resource managers have begun to work together to restore culturally important huckleberry fields (USDA FS 2010), although work remains to more completely restore traditional burning and tending practices (LeCompte 2018).

Partnerships also can promote the restoration of socioecological resilience and thereby increase climate adaptation (Johnson et al. 2019, Lake and Long 2014, Vinyeta and Lynn 2013). Tribes experience disproportionate climate impacts on culture, economies, lifeways, and community well-being (Bisbal and Jones 2019, Norton-Smith et al. 2016). Mental health, food security, traditional/first foods, water resources, terrestrial ecosystems, and infrastructure are all affected. Partnerships can help to restore socioecological resilience by generating integrative frameworks for climate science and strategies (Climate and Traditional Knowledges Workgroup 2014, Kruger and Johnson 2017, Norton-Smith et al. 2016, Vinyeta and Lynn 2013). Investigators have found that effective framework elements include traditional knowledges, tribal sovereignty and self-determination, culture, and community health.

Partnerships also can promote the restoration of socioecological resilience and thereby increase climate adaptation.

Co-management and co-stewardship—Co-management, one model of resource management partnership, involves power sharing between government and local resource users. This model integrates centralized, governmental, and decentralized local resource management systems (Berkes et al. 1991, Diver 2016, Plummer and Armitage 2007). Co-management has been defined as "…a partnership in which government agencies, local communities and resource users, NGOs, and other stakeholders share…the authority and responsibility for the management of a

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[9]The General Allotment Act of 1887 (also known as the Dawes Act) exemplifies the federal policy goal of the assimilation, Americanization, and acculturation period (1880s–1920s). This act authorized the president to subdivide reservation land, which had been held in common by tribal members, into private land allotments. The Allotment Act coerced tribes to relinquish traditional systems of land tenure and communal economic land bases (Greenwald 2002, Wilkins and Stark 2017). The disruption of traditional lifeways of the 1880s–1920s drew upon federal policies of the American Indian removal, relocation, and reservation period (1830s–1880s). Key policies included removing American Indians from their ancestral lands, establishing reservations, and assigning Indian agents (USDI Bureau of Indian Affairs administrative personnel) as authorized decisionmakers on reservations.

specific territory or a set of resources" (IUCN 1996, see also Armitage et al. 2007: 3). The principle of tribal sovereignty—the right of tribes to act as governments to protect their lands and peoples—and the doctrine of inherent tribal sovereignty—the right of tribal governments "to protect the economic security, political integrity, and health and well-being of their people"—are important legal bases of co-management (Goodman 2000: 206). Tribal sovereignty is recognized in federal law. A landmark case that has examined the complexities of the implications of tribal sovereignty for co-management is that of tribes with treaty-reserved fishing rights on the Columbia River.

In the United States, tribes advanced the co-management concept as a formal agreement between resource users and government, although forerunners to the concept also can be traced to 19th century Europe and early 20th century Japan (Plummer and Armitage 2007). In the 1970s, tribes holding treaty rights to salmon harvest asserted their right to influence the outcomes of management decisions, such as how, when, where, and by whom fishing would occur. Judge Boldt found in favor of the tribes' argument, rendering the Boldt decision, and laying the groundwork for the co-management concept (initially called "concurrent management"). With this historic decision the tribes' relationship with the government changed to co-decisionmaker for the resource.

Tribes have called for co-management of culturally important resources and ancestral sites on federal lands (e.g., Armitage et al. 2007, Goschke 2016, Vinyeta and Lynn 2015), and have forged co-management agreements. For example, in 1999, the Washoe Tribe of Nevada and California developed an agreement with the USDA Forest Service to co-manage the Lake Tahoe basin to protect and restore access to ancestral sites, including sacred sites, and to restore traditional uses (Adelzadeh 2006). Tribal governments and their associated departments or program staff may serve as co-decisionmakers at various stages of project development, including securing and allocating funding, planning, and implementation. Duties that tribes may assume in co-management include forest inventory; fish, plant, and wildlife monitoring; and fuels treatments, wildland fire management, and restoration.

The "Joint Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters," Order 3403, (USDI and USDA 2021) provides direction regarding co-stewardship, a concept related to co-management. Released on November 15, 2021, this order (section 5) directs USDA and U.S. Department of the Interior (USDI) agencies "to endeavor to engage in co-stewardship where Federal lands and waters, including wildlife and its habitat, are located within or adjacent to a federally recognized American Indian tribes' reservation, where federally recognized tribes have subsistence or other rights or interests in non-adjacent federal lands or waters, or where requested by a federally recognized Indian Tribe." Also, the order (section 6) "recognizes that it is the policy of the United States to restore Tribal homelands to Tribal ownership…" and "supports consolidation of tribal landholdings within reservations, including Tribal

acquisition of Federal lands and private inholdings.…" The authority for this order rests in ratified treaties and other agreements based on the principle of government-to-government relationships, and the federal government's trust obligations to federally recognized tribes. The order recognizes Indigenous knowledge and expertise as valuable capacities to inform management of lands administered by USDA and USDI agencies. The joint secretarial order challenges the USDA Forest Service to "aggressively incorporate Indigenous values and knowledge into… federal stewardship, to fully incorporate shared stewardship (co-management) practices wherever authorized, and to restore lands to tribal stewardship where appropriate" (USDA FS 2021).

A search of the literature indicates that the definition, underlying principles, and practical applications of co-stewardship are emergent, and not yet well developed. Unlike co-management (e.g., Goodman 2000), there have been few published studies on co-stewardship (see Vought 2022, Weaver 2015); and there is a research gap in the legal scholarship literature. The Weaver (2015) co-stewardship study focused on the Badger-Two Medicine area, part of the tribal homelands of the Blackfeet Nation, largely comprised of lands administered by the Lewis and Clark National Forest (now, Helena-Lewis and Clark National Forest) and adjacent to Glacier National Park. Weaver (2015: 8) proposed that co-stewardship "could distinguish this unique relationship of 'protecting and being responsible for something entrusted to one's care' in alignment with the unique legal standing of each party"—that of the USDA Forest Service as administrator of federal lands and a tribe with a unique, sovereign, government-to-government relationship. Co-stewardship has been defined as "equitable sharing of responsibilities and decisions… between a national/state government and Indigenous sovereigns" (Weaver 2015: 128). Elsewhere, co-stewardship refers to a broad range of working relationships between federal agencies and tribes and tribal-led entities, and can be implemented through a variety of mechanisms, including cooperative agreements, memoranda of understanding, self-governance agreements, or other mechanisms (USDI BLM, n.d.).

In a statement on tribal co-management of federal lands and waters before the U.S. Congress House Committee on Natural Resources, National Park Service Director Charles Sams III highlighted the history that underlies Joint Secretarial Order 3403, and the role of acknowledging history in charting a path forward (Sams 2022). The order recognizes that trust lands were previously owned and managed by tribes, and that the cumulative history of tribal stewardship—such as traditional plant gathering by the Nisqually Indian Tribe in the Pacific Northwest and by the Wabanaki Confederacy of tribal nations in the Northeast—generated important cultural and ecological resources. In addition, many federal lands and waters are located in areas where tribes have reserved the right to hunt, fish, gather, and pray. Thus, underpinning ideas of the directive for co-management with tribes include recognition of tribal land ownership history, the legacies embodied in

today's plant and ecocultural resources of past tribal land stewardship, and treaty-authorized reserved rights. As of March 2022, co-management agreements have been established on four national parks. A body of statutory frameworks supplement the co-management and co-stewardship directive of the joint secretarial order. The Timbisha Shoshone Homeland Act (PL 106-423) is one example. As a result of this act, in 2000, the National Park Service transferred lands within Death Valley National Park to the Timbisha Shoshone Tribe, creating the Timbisha Shoshone Natural and Cultural Preservation Area from National Park Service and Bureau of Land Management lands, with provisions for resource access and cooperative management.

The "Memorandum of Understanding Regarding Interagency Coordination for the Protection of Indigenous Sacred Sites" (USDI 2021) also provides direction regarding co-management. Agreed to by eight federal government entities, including the Executive Office, this memorandum of understanding establishes a framework whereby federal entities coordinate with tribes through early consideration to protect and ensure access to tribal sacred sites in agency decisionmaking and implementation. Agencies are directed to take a proactive approach in engaging tribes to explore, identify, and execute co-management agreements.

It is important to recognize challenges of the co-management model. The early research on co-management, which focused on fisheries and nontribal resource users, identified key challenges: (1) distrust of and resistance to management agencies—particularly regarding perceived government desire to control the data; and (2) the absence of broad-based, well-distributed support for co-management among resource users, often owing to inequities among users (Pinkerton 1999).

Tribes are sovereign nations and rights holders, which is distinct from being merely resource user stakeholders; thus there are important distinctions in how these categories of challenges may apply to co-management involving tribes. Regarding distrust and resistance, for tribes the barrier often is rooted in distinct historical factors and the question of authority. The experience of the Washoe Tribe of Nevada and California in developing a co-management agreement for the Lake Tahoe basin with the USDA Forest Service is a good example. The co-management arrangement involved access to sacred lands that were historically held by the tribe. Thus, a source of resistance to co-management lay in the question of the legitimacy of the implied need for the tribe to seek permission for access from the federally authorized land management agency (Adelzadeh 2006). This situation posed a dilemma between the need to access and steward sacred lands on one hand and the perpetuation of perceived paternalism on the other. Historical factors that may compound distrust include past consultation that was not effectively adapted to the tribal context as well as past USDA Forest Service lack of recognition of the tribe's distinct legitimate claim to an administrative area, as distinct from nontribal interests (Adelzadeh 2006). Forging agreement about data sovereignty

protocols—for which there are specific considerations in co-management arrangements involving tribes—may also pose challenges (see "Challenges" below [Carroll et al. 2020, Matson et al. 2021]).

Another barrier is the absence of clear legal authorities that direct a co-management agreement, although co-management projects have been authorized under the Tribal Forest Protection Act of 2004 (Dockry et al. 2018). Federal and state laws and policies for tribal consultation (see "Consultation" above) also may provide a policy foundation for co-management. Another challenge is that it is unclear who benefits from co-management. It is a matter of debate whether co-management operates as an instrument of cooption, particularly in light of the colonial legacies that many tribes encounter, or transformation to mutual recognition of tribal sovereignty (Diver 2016, Norgaard 2019). This disjunction heightens the need for careful, effective planning and attention to meaningful approaches that ensure tribal sovereignty and inclusivity (Diver 2016, Dockry et al. 2018, Goodman 2000, Kenney 2012).

In addition to co-management-specific challenges, prospective co-stewardship challenges—particularly in view of Joint Secretarial Order 3403—should also be recognized. A principal challenge is the apparent absence of applied scientific literature, as well as legal scholarship, that clearly distinguishes these two related concepts. Co-stewardship applies to a comparatively broad variety of arrangements, compared to co-management: "This co-stewardship [of Order 3403] takes many forms, including co-management obligations in law, collaborative and cooperative agreements, and self-governance agreements" (Sams 2022). Still, in some cases, the two terms are presented in language that suggests interchangeability.[10] Thus, scientific and legal scholarship that differentiates the definitions, principles, and applications of these two concepts is a timely, important research need.

Traditional knowledge systems—
Partnerships can guide forestry and environmental research, policy, planning, and management by promoting the integration of traditional knowledge systems and Western scientific knowledge (Bussey et al. 2016; Center for Native Peoples and the Environment, n.d.; Kimmerer 2000, 2002, 2013; Lake et al. 2018b; Vinyeta and Lynn 2013).[11] (Traditional knowledge systems are also called Indigenous traditional ecological knowledges, Native knowledge, and Indigenous knowledge.) Traditional knowledge can be defined as the body of place-specific culture and practices that a society has developed across generations to promote desired ecological conditions,

Partnerships can guide forestry and environmental research, policy, planning, and management by promoting the integration of traditional knowledge systems and Western scientific knowledge.

[10] "The USDA and the Forest Service are being challenged…to fully incorporate shared stewardship (co-management) practices wherever authorized…" (USDA FS 2021).

[11] Traditional knowledges—plural—have been advocated for based on the observation that knowledge systems are deeply embedded in traditional ways of life and in the interdependent relationships that specific peoples have with specific places, resulting in a diversity of traditional knowledges (also known as traditional knowledge systems) (Climate and Traditional Knowledges Workgroup 2014, OSTP and CEQ 2021).

landscape structure, and function (Berkes et al. 1995, Charnley et al. 2007, Steen-Adams et al. 2019, Turner et al. 2000). By contrast, Western scientific knowledge refers to knowledge generated in the academic culture that emerges from the dominant values of Western society and in which nature is viewed objectively (Kimmerer 2002). These two knowledge systems can be successfully integrated, however. Appendix 2 presents a framework for applying traditional knowledge and Western scientific knowledge to wildland fire and fuels management and research (Lake et al. 2017).

In the Pacific West, a good example is the traditional knowledge associated with thinleaf huckleberry (*Vaccinium membranaceum* Douglas ex Torr.), a cultural keystone species (Garibaldi and Turner 2004) for certain tribes of the east-side Cascade Range (fig. 3). The knowledge and appreciation of this species has been transmitted across generations and maintained through ceremonies, such as the annual huckleberry feast and the rite of passage of adolescent girls, and through informal communication (Steen-Adams et al. 2019). This knowledge has guided the resource-tending practices that have maintained resource productivity at site to landscape levels.
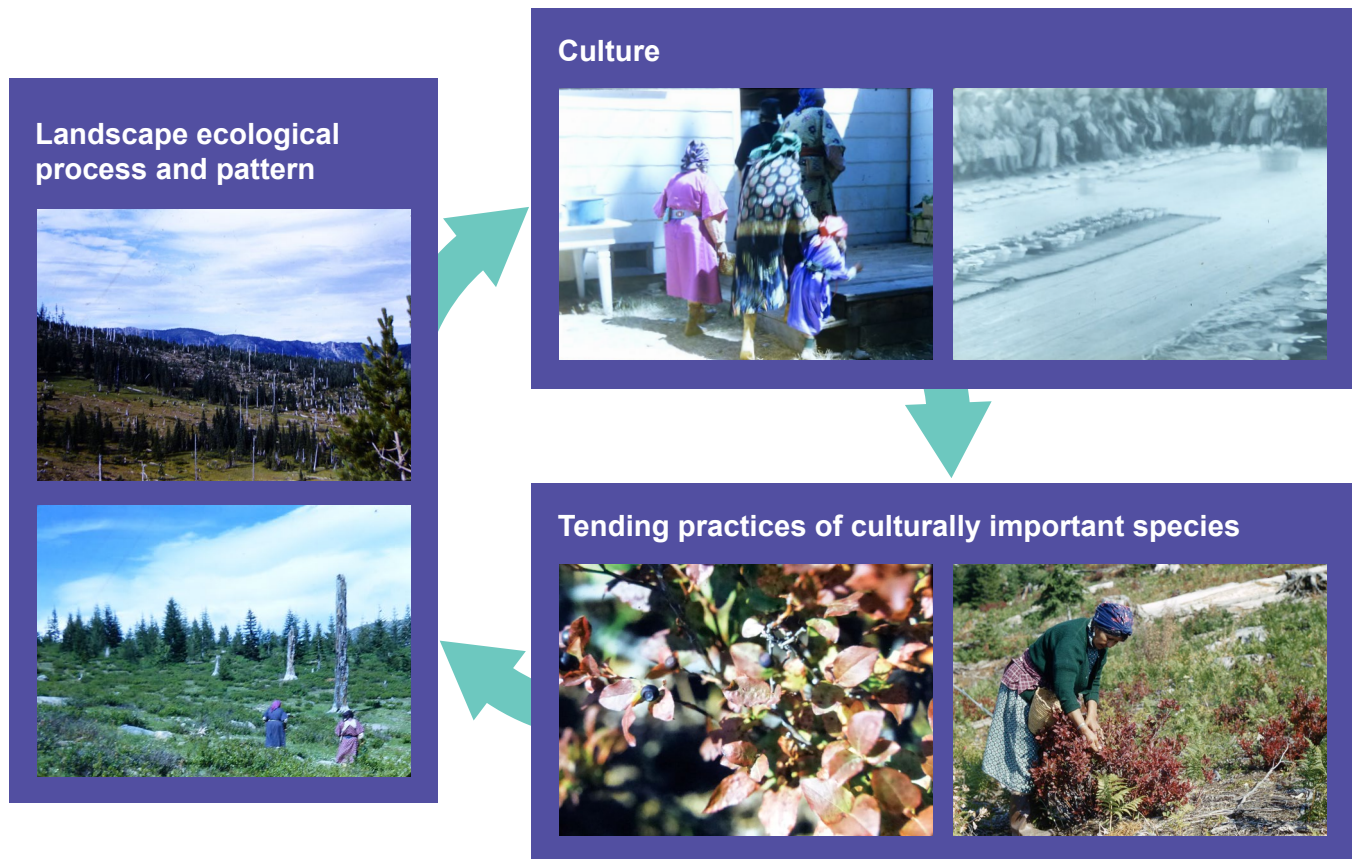
Figure 3—An example traditional knowledge system of certain tribes of the east-side Cascade Range as it applies to thinleaf huckleberry (*Vaccinnium membranaceum*). Culture: berry feast (left) (#575) and berry feast ceremony (#639), August 9–10, 1953. Tending practices (left) (#686), and huckleberries (#582), west slope, Multorpor Mountain, August 10, 1952. Landscape: (#598) Wolf Camp, July 12, 1953 and (#1072) "Wasqupam satas," August 22, 1954. Archival image credit University of Washington Libraries, Special Collections, David H. and Katherine S. French papers, Accession 5496-001, Box 54.

Traditional knowledge systems have several characteristics (fig. 4):

1. Intergenerational transmission and application are essential to preserving and revitalizing traditional knowledge. Oral tradition through storytelling, song, wisdom recollection, and sharing between family and community members remains the primary mode of transmission. Ceremony, ritual, traditional practices, and cultural norms are examples of important social structures that promote knowledge transmission and application across generations.

Intergenerational, experiential transmission

Ceremonies, traditional practices, and cultural norms

Storytelling, song, and sharing of memories

Holistic, cyclical interrelationships

Holistic world view and integrated systems

Relationships between humans and natural world

Informed by observations of place-based relationships

Seasonal cycles of resource tending and harvesting

Traditional cultural wisdom and expressions

Document social and ecological change over time

Cultural traditions passed down through generations

Adapted through history

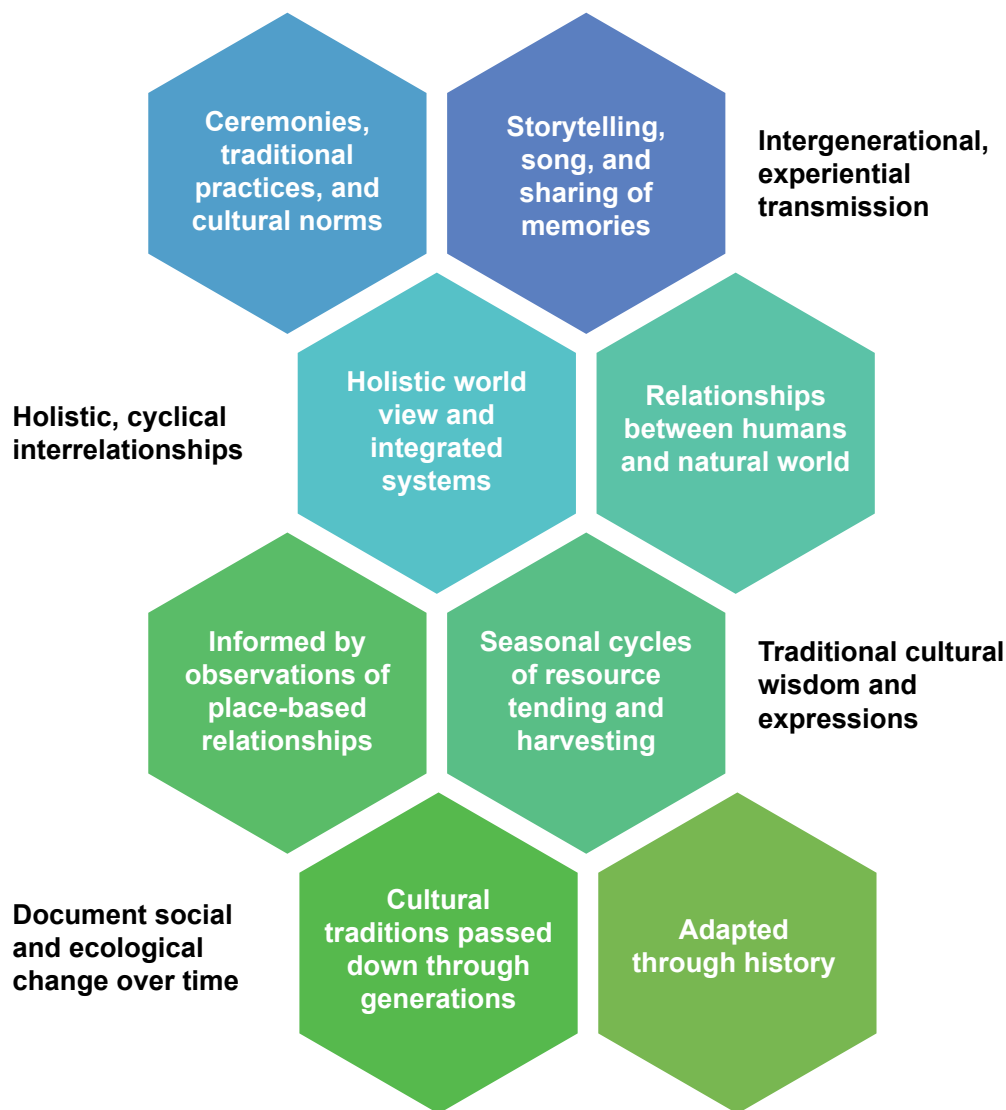Figure 4—Key characteristics of traditional knowledge systems. Adapted from Jones and Marchand 2018.

2. In general, traditional knowledge systems are based on the worldview of holistic, cyclical relationships between humans and the natural world (Bussey et al. 2016). In this worldview, humans are an essential, fully integrated element of the socioecological system whereby traditional practices maintain ecological functions (Lake and Long 2014, Long et al. 2018).

3. Traditional knowledge systems record and memorialize social and ecological changes over time. This memorialization is based on observations of integrated human-nature systems that have accrued over generations, sometimes referred to as "since time immemorial" (e.g., Norgaard et al. 2019), and across tribal homelands. The seasonal round—a migratory pattern followed to fulfill resource needs—as exemplified by that of the Columbia Plateau peoples in figure 5—is a cultural practice that has contributed to the accrual of traditional knowledge.

Figure 5—Seasonal round of Columbia Plateau tribal cultures adapted to Western calendar months. The seasonal round is the pattern of a people's movement around the areas of their homeland to harvest and steward plants and animals in association with seasonal ripening and availability. For many tribes, the traditional knowledge about areas and times to harvest and tend particular plants and animals is embodied in the seasonal round. Also, tending activities are often organized in multigenerational family and community units, and thus, the seasonal round functions as a means of intergenerational maintenance of traditional knowledge (Steen-Adams et al. 2019). Illustration by Lynn Kitagawa©.

4. Traditional knowledge systems are dynamic. Practices have evolved over time in response to observations of social and ecological changes. Traditional knowledge systems integrate observations of change into practices that steward ecological processes and resources.

Traditional knowledge can provide scientists and managers with a valuable record of the ecological legacies of tribal stewardship and resource management on forest landscape ecological structures and processes. For example, in some coniferous forest areas of the Pacific Northwest, cultural fire regimes historically contributed to the forest openings that promoted ecological productivity and resilience (Lake et al. 2017, Senos et al. 2006, Steen-Adams et al. 2019) (fig. 6). "Cultural fire regime" refers to an Indigenous group's practices of managing fuels and ignitions to generate the fire frequency and severity pattern that promotes desired ecocultural resources and environmental conditions. Specifically, cultural fire regimes were generated by indigenous fire stewardship practices, which modified fire regimes "by influencing and diversifying the frequency, seasonality, extent, locality, intensity, and resultant severity of fires" (Lake 2021: 32). The application of traditional knowledge can improve the alignment of management

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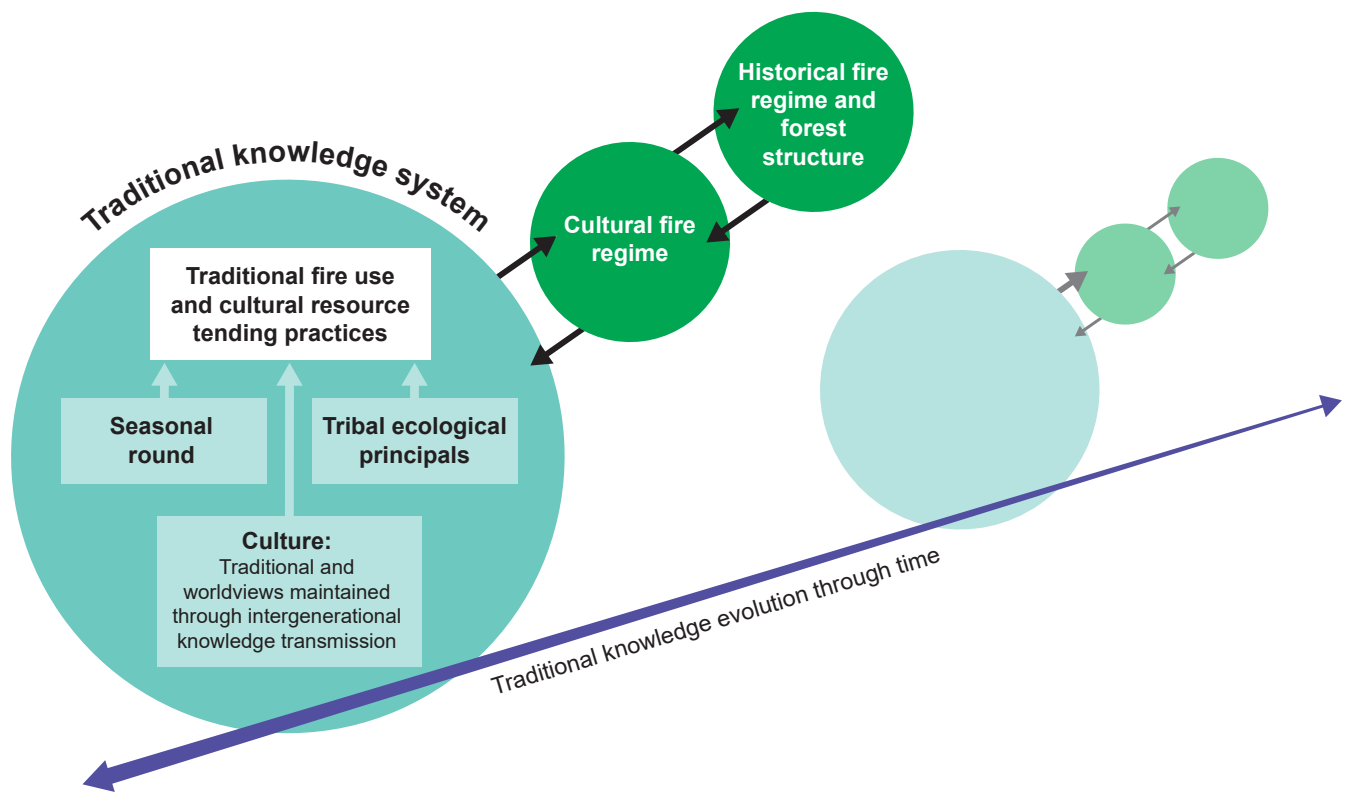
Figure 6—Conceptual model of the cultural fire regime's basis on the traditional knowledge system, and its interaction with the historical fire regime and forest structure. The traditional knowledge system informed the cultural fire use practices that tribes traditionally applied to the landscape (or, cultural fire regime). The cultural fire regime, along with natural ignitions, contributed to the historical fire regime, which influenced forest structure. The cultural and historical fire regimes interacted, as tribes modified cultural burning practices in response to changes in vegetation conditions. Adapted from Steen-Adams et al. 2019.

practices with the place-based landscape values and objectives of tribes and other under-recognized groups (Lake et al. 2018b). Prior to colonization by Euro-Americans, Indigenous peoples tended forest, shrub, and grassland landscapes to promote culturally and economically important species. Efforts to restore such species can be achieved by the preservation, revitalization, and application of traditional knowledge, especially in partnership with tribal communities.

In developing partnerships with tribes, it is important to understand the philosophical and spiritual worldviews in which traditional knowledge systems, as well as stewardship practices, are embedded. Many tribes hold a worldview that humans are fully integrated with, and contributors to, ecological processes such as fire (Bussey et al. 2016, Huffman 2013, Lake et al. 2017, Long et al. 2018, Steen-Adams et al. 2019); this worldview has similarities with the concept of coupled human and natural systems (Lake et al. 2018a, 2018b; Steen-Adams et al. 2015, 2017). Attention to tribal worldviews can guide research methods and management strategies that maintain both the productivity of traditional foods, medicines, and basketry materials and the vitality of cultural practices, such as harvesting, ceremonies, stories, and songs (Huffman 2013, Long et al. 2018). Attention to tribal worldviews can also strengthen professional rapports between employees of tribal and nontribal organizations.

Challenges

Although partnerships can promote important shared benefits, they can also encounter significant challenges, which can be grouped into four categories: cross-organizational barriers, bureaucratic barriers of the federal agency or other nontribal organization, tribal organizational (tribal government and community) barriers, and data-related barriers, particularly as pertains to traditional knowledge (table 1). Each of these types of challenge can be understood from a tribal perspective and a nontribal organizational perspective (e.g., of the federal agency), and each has a potential impact.

At the cross-organizational level, unrecognized differences in cultural and organizational structures can undermine partnerships. Tribal cultural norms and appropriate practices generally are unwritten, and failure to respect these norms can inhibit communication and trust building (Grenier 1998). Nontribal entities that have not yet established trust and working relationships with tribal counterparts may encounter a low level of outreach response and partner engagement. Also, prospective partners may be unfamiliar with tribal government and community decisionmaking processes, structures, and authorized representatives. Finally, the history of federal Indian policy, including what has been described as "an ongoing system today" of colonialist policies (Norgaard 2019: 15) may hamper partnership development, such as the level of response to outreach (Long et al. 2016b).

The philosophical and spiritual worldviews in which traditional knowledge systems and stewardship practices are embedded often see humans as fully integrated with, and contributors to, ecological process such as fire.

Table 1—Challenges encountered in research and management partnerships between federal agencies and tribes

Challenge type	Nontribal organization perspective	Tribal perspective	Potential impact
Cross-organizational barriers	Unwritten guidelines of culturally acceptable communication practices and research methods. Unwritten guidelines about tribal governance structure. Required resources to address legacies of past breaches of trust by federal Indian policy and government entities.	Dealing with cultural insensitivities of nontribal entities. Disruptions of working relationships and understandings, due in part to a reportedly high rate of employee turnover among nontribal entities. Inconsistent retention of knowledge about the tribal context.	Low response rate to participation outreach. Higher level of time investment relative to productivity standards (e.g., number of articles published per unit time).
Bureaucratic barriers of federal agency or other nontribal organization	Incongruity between the prevalent prohibition the use of project resources for food and gifts and the cultural norms of food sharing and gifting. Inconsistent practices among researchers regarding level of remuneration for cultural resource services (e.g., by tribal elders).	Dealing with cultural insensitivities and perceived lingering colonialism of certain federal policies and institutions. Incompatibility of certain bureaucratic norms with tribal cultural norms (e.g., failure to allow time for an opening or closing prayer in meeting agendas).	Risk of nonparticipation or lack of data. Perception by tribal community of disrespect or inauthenticity.
Tribal organizational (government and community) barriers	Varied, sometimes competing goals and priorities among tribal governmental entities and community groups. Uneven levels of resources among tribal entities. Potentially fractious relations among tribal political entities. Recognizing and understanding the effects of potential nepotism and political alliances in tribal governance and professional positions.	Jurisdictional overlap challenge: aligning partnership goals among the various entities of a tribe's aboriginal area, given potentially differing missions. Unfamiliarity with tribal histories and cultures by the nontribal partner's leadership and staff. Potential lack of alignment in partnership goals between nontribal and tribal entities.	Risk of not achieving project goals because of competing priorities among various tribal entities or tribal and nontribal entities.
Data-related challenges regarding traditional knowledge systems	Constraints on publishing data derived from traditional knowledge. Potentially imprecise geospatial information (e.g., patch size, spatial extent) of traditional knowledge data.	Cultural norms that may discourage individuals from presenting traditional knowledge (e.g., in an interview), due to its communal or family basis. Evolving and contextual nature of traditional knowledge.	Extended project timeline and resources, due to comparatively long period to learn public disclosure rules and cultural appropriateness about sensitive data. Risk of prohibition on publishing study results (or some aspect thereof) due to unsuitability for public disclosure. Knowledge stewardship responsibility that endures post-partnership: nontribal partners bear responsibility to steward any traditional knowledge shared during the partnership.

One approach for overcoming the prospective differences in interests, values, and goals is to have a neutral third-party facilitator convene the prospective partner groups, whereby each entity can share and contribute in a respectful and inclusive manner. In the case of the Western Klamath Restoration Partnership, The Nature Conservancy facilitated and brought the Open Standards for the Practice of Conservation planning framework to a diverse group of tribes, agencies, organizations, and industries to find alignment in their shared values (Harling and Tripp 2014). This was a critically important foundational process in that it alleviated preexisting historical tensions among some parties. In addition, the Open Standards for the Practice of Conservation framework promoted diversity and inclusion, thereby expanding the array of groups that willingly contributed to the partnership formation process (Lake et al. 2018b).

The bureaucracy of the federal agency or other nontribal entity can also pose partnership challenges. Administrative rules of federal agencies or other nontribal organizations may prohibit the purchase of food or appreciation gifts with project financial resources. In a tribal context, this prohibition is incongruous with many tribes' cultural norms of cross-community gifting and food sharing. Such exchanges are often a foundational component of building trust and establishing relationships. Similarly, nontribal organizations may fail to build time into meeting agendas for an opening or closing prayer; this oversight may offend the norms of many tribal communities. Another challenge is that federal budgetary systems often are not well-aligned with the distinct needs for long-term planning and funding of tribal partnerships (e.g., a 5- to 10-year period) (Dockry et al. 2018). Funds may suddenly become available and must be expended quickly based on annual appropriations. In response to these challenges, nontribal partners can build into the project timeline adequate time to become familiar with tribes' unique cultural and organizational structures, histories, and epistemologies.

Challenges also may emanate from within tribal governments and communities. Differing priorities, uneven resource distribution, and local politics, including fractious interactions, may result in competing goals among tribal entities. For example, the goals of a tribal council and a tribal natural resource agency may be at odds. Tribal councils, which may seek to be recognized as sovereign co-leads in partnerships, may call for an array of economic, cultural, and ecological goals. By contrast, tribal natural resources departments, which may seek the same sovereign co-leadership role as tribal councils, may prioritize ecological outcomes, such as increased resilience to wildfire or increased productivity of an ecocultural resource. The priority level and willingness to engage with nontribal entities also may vary among tribal councils, committees, departments, programs, families, and individuals. Consequently, the multiple demands on tribal government and staff may require a relatively large time investment compared to the time needed to meet the predetermined productivity targets of some partner agencies.

Norms and protocols regarding research products and data also may pose challenges to partnerships. Indigenous data sovereignty is the authority of indigenous peoples over data derived from their own communities, and the right to determine the rules and standards that govern data security and sharing (Carroll et al. 2020, Lucero et al. 2020). Upholding the safeguards on data sovereignty is important to tribes; thus, respect for this authority is essential to effective tribal partnerships (Dockry et al. 2022). Partners are advised to be prepared to alter the work plan if protections on data sovereignty cannot be guaranteed; and to defend the requirements for data sovereignty to funders (Matson et al. 2021). In general, scientists of federal agencies, universities, and nongovernmental organizations are expected to report a study's results to expand knowledge about a research topic. However, it is not appropriate to report certain data derived from tribal partnerships beyond the tribal community, and those data may be subject to a prohibition on disclosure (USDA FS 2019). Traditional knowledge systems are structured into nested spheres of sensitivity. Some traditional knowledge is considered sacred, protected, or sensitive (Berkes 2017) and is limited to specific cultural or spiritual leaders in the community. In a partnership context, the prospective arrangement for sharing traditional knowledge-derived data requires a time investment by all parties to build understanding and trust. Agreement considerations may include each party's intellectual contributions and safeguards to protect sensitive knowledge and data. In the case of publications, from management technical reports to research articles, tribes may desire co-authorship and attribution of their intellectual property and partnership contributions.

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Forging and Maintaining Tribal Partnerships for Forestry, Wildland Fire, and Climate Research: Implications for Management

Effective Practices

Effective practices can be organized in three categories: institutional context-adapted practices, tribal social context-adapted practices, and partnership relationship-adapted practices (fig. 7). Institutional context-adapted practices are attuned to relevant executive orders or other presidential actions, governmental policies, and authorities: the federal legal foundation of U.S. government-tribal relationships, including Executive Order 13175 (65 FR 67249) for "Consultation and Coordination with Indian Tribal Governments" and the federal trust responsibility (USDA FS 2015); each tribe's governance and organizational framework; and instruments that structure partnerships, such as memoranda of understanding (Donoghue et al. 2010, Vinyeta and Lynn 2015). Tribal social context-adapted practices pertain to cultural, historical, and community considerations: recognition of each tribe's unique culture and history, traditional knowledge, culturally important species, culturally adapted research methods, meeting practices,

and communication practices (Lake et al. 2018a). Partnership relationship-adapted practices are attuned to supporting—and sometimes repairing—the framework for meaningful dialogue and joint efforts: shared goals, timing and continuity of engagement, and trust and respect (Dockry et al. 2018, USDA FS 2015). In this section, we present these three categories of practices to promote effective, productive, inclusive, and respectful partnerships.
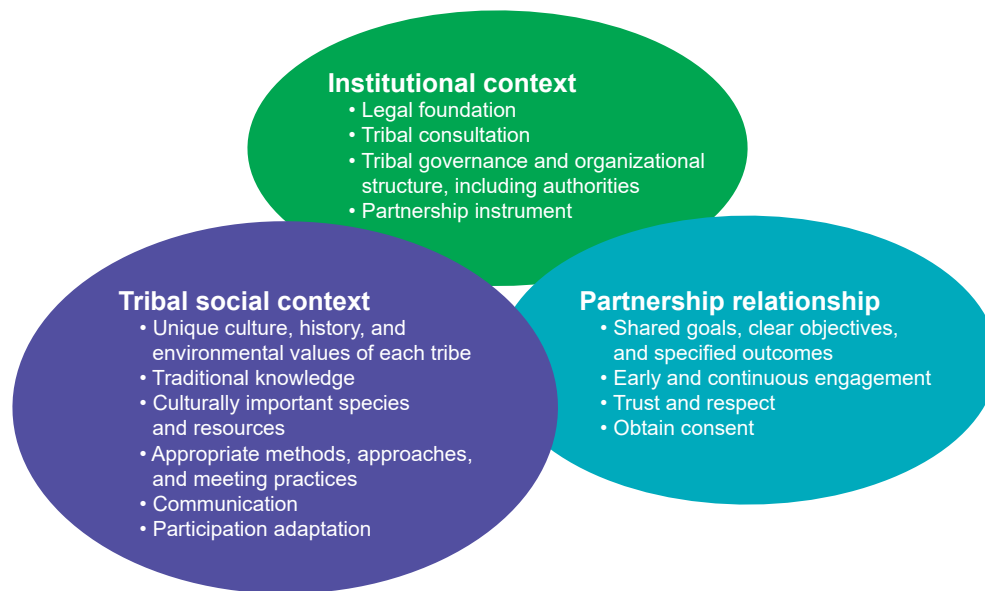
Institutional context
• Legal foundation
• Tribal consultation
• Tribal governance and organizational
  structure, including authorities
• Partnership instrument

Tribal social context
• Unique culture, history, and
  environmental values of each tribe
• Traditional knowledge
• Culturally important species
  and resources
• Appropriate methods, approaches,
  and meeting practices
• Communication
• Participation adaptation

Partnership relationship
• Shared goals, clear objectives,
  and specified outcomes
• Early and continuous engagement
• Trust and respect
• Obtain consent

Figure 7—Three categories of effective practices for tribal partnerships.

Institutional context-adapted practices—

Legal foundation—Partners recognize the federal legal foundation of the relationship between the U.S. government and federally recognized tribes—tribal sovereignty, tribal self-determination, federal trust responsibility of protected resources, and the government-to-government relationship (see fig. 2).

Tribal consultation—Partnerships are more effective when they recognize the obligation of the federal government, as well as many state governments, to initiate the formal tribal consultation process with federally and state-recognized tribes. Consultation pertains to federal/state decisions that affect tribes. Although the partnership may not be the arrangement that fulfills consultation requirements, the partnership is likely to be more effective when the requirements are mutually recognized and function as a layer of partnership interactions. Nongovernmental organization entities also can consult with tribes regarding proposed actions in their administrative jurisdiction that lie within or adjacent to tribal aboriginal territories.

Co-management and co-stewardship—Partnerships are more effective when partners familiarize themselves with executive actions and statutes regarding

directives on co-management and co-stewardship and track updates in the literature and practices, particularly those in response to Joint Secretarial Order 3403 (USDI and USDA 2021) on co-stewardship of federal lands and waters. Examples of existing agreements may serve as a valuable reference point in clarifying agreements under discussion (Aldezadeh 2006).

Tribal governance and organizational structure, including authorities—Partners familiarize themselves with each tribe's governance and organizational structures, including relevant authorities. Partners become aware of tribal decisionmaking entities, including the distinct roles played by tribal government agencies, tribal councils, elected and appointed committees, departments, ceremonial and religious leaders, and other community groups. As appropriate, partners may engage and coordinate with these various tribal entities.

Partnership instruments—Partnerships will benefit when each party understands and adheres to mutually agreed upon partnership instruments. Two customary instrument types are memoranda of understanding and nondisclosure agreements regarding sensitive data. Such instruments define the partnership purpose, respective roles and resource contributions, guidelines (e.g., data collection, storage, access, and use), and products.

In developing the budget for a project that involves tribes, partners can facilitate effectiveness if they recognize the tight constraints on tribal government resources (e.g., staff time), relative to work scope, that are often in effect. One meaningful action is to build line items that offset tribal resource allocation into the project budget. Another constraint to recognize is the fit between the funding transfer mechanism, such as an interagency agreement, and the administrative structure of the tribal partner.

Tribal social context-adapted practices—
Unique and distinct cultures and histories—Each tribe has a unique culture, community history, and legal history with the federal or a state government; relationship history with other tribal and nontribal entities; and set of sociocultural and environmental values. Nontribal partners should recognize the unique culture, histories, and values of each tribe—including distinctions among the individual tribes that compose an association of confederated tribes. Consequently, partnership instruments and project methods should not be generalized across multiple tribes. Rather, each tribal government partnership agreement should be developed anew.

Acknowledgment of past harms experienced by tribal partners often is an important foundational step. These harms can have a variety of origins. Federal agencies administer a land base that includes lands that tribes were coerced to cede. In addition, there are many unanswered calls by tribes for the return of their traditional lands, such as the Dakota Sioux tribe's call for its homelands in the

Nontribal partners should recognize the unique culture, histories, and values of each tribe— including distinctions among the individual tribes that compose an association of confederated tribes.

Black Hills (Lenane 2015). Another type of harm may emerge in a research context. The benefits of products generated with the contributions of tribal knowledge—including ecocultural resources such as "manoomin" (wild rice) have sometimes gone to entities other than the knowledge bearers, causing tensions (Matson et al., 2021). Even if the harm has not been remediated—sometimes because an act of Congress is required—recognizing the harm is important.

Traditional knowledges (or traditional knowledge systems)—Forestry-, fire-, and climate-related research and management present opportunities to apply traditional knowledges. At the same time, partners should be mindful that, for many tribes, traditional knowledge is sacred, closely held, and communal in nature. In addition, viewpoints about these characteristics may differ within a community; some community members may hold a viewpoint that strongly favors guarding traditional knowledge, while others may do so to a lesser degree. Consequently, some content is not appropriate to share with partners, owing to the life-long responsibility for stewarding such knowledge. Moreover, there may be limitations on reporting traditional knowledge-derived data, which should be formalized through a partnership instrument (e.g., nondisclosure agreement). In addition, appropriate applications of traditional knowledges should be respectfully discussed with tribal partners if encountered outside of a formalized agreement.

Ecocultural resources—Consideration of resources from the perspective of ecocultural resources—resources with characteristics that are generated through the interaction of ecological and cultural realms—is an effective practice. This idea is based in the worldview that humans are integral to the functioning of the natural world. Ecocultural resources are valued by tribes for the significance of their use economically and ecologically as foods, materials, and medicines; culturally as elements of spiritual or ceremonial practices and in maintaining traditional knowledge systems; and socially as contributors to community cohesion and physical and mental health. Tribal governments and communities often value research and management of such species or resources because of these values. If desired by tribal partners, the partnership may emphasize ecocultural resources (e.g., in contrast to U.S. Endangered Species Act-listed species that are agency conservation priorities).

Identify culturally appropriate approaches for the community and tribal government—Nontribal partners can facilitate effectiveness if they build into the project timeline an interactive phase to identify approaches that are appropriate to both the community and the resource constraints of the tribal government. Approaches that may be appropriate include intergenerational format (youth-elder interactions), workshops (community interaction and capacity building), field-based activities, and engagement with archival materials (Lake et al. 2017). For example, archival photographs, historical maps, documents, or artifacts may be integrated

into research instruments (Steen-Adams et al. 2019). This approach may serve as the springboard for interactive interviews and workshops as well as pose an opportunity for intergenerational, interdisciplinary learning. Potentially appropriate methods may include interviews (individual interviews or focus groups) and field trips. Participatory geographic information system use may also be appropriate, particularly if care is exercised to identify landmarks that are recognizable to tribal participants (see McBride et al. 2017, Steen-Adams et al. 2019).

Refine research methods, including protocols—After identifying appropriate prospective methods, partners tailor the methods to the tribal social setting. Partners interactively evaluate proposed research methods and formalize protocols. Potential methods are presented, discussed, and evaluated with tribal counterparts and community members for cultural and organizational appropriateness. A period to test, evaluate, and refine protocols may be useful.

Culturally appropriate meeting and event practices and formats—Adapting meetings and events to the community cultural context tends to promote effective partnerships. Practices may include offering an opportunity for opening and closing prayers, sharing food, giving appreciation gifts, or providing honoraria. Meeting planners might build in time for informal conversations and maintain flexible agendas. Adaptive and flexible scheduling is necessary and respectful.

Communication—Culturally sensitive, respectful, and appropriate communication plays an important role in tribal and nontribal partnerships. It is important to be mindful of speaking tone, pace, pauses or interruptions, distractions, body language, deference, and appropriate use of humor. Appropriate use of media and communication materials is also recommended. For example, partners may provide printed handouts to accompany presentations for later reference. This practice may accommodate potential constraints on access to electronic documents or internet access for some demographic groups within the tribal community.

Participation adapted to community context—Mindfulness of the community context when scheduling meetings and events is another important partnership practice (e.g., providing honoraria, covering travel expenses). Partners also can build in scheduling flexibility to accommodate emergent community priorities. For example, a project meeting or event may require rescheduling because of the passing of a tribal elder or other significant tribal, community, or natural events (e.g., wildfires, severe storms, health pandemic).

Partnership relationship-adapted practices—
Shared goals, clear objectives, and specified outcomes or deliverables—Partners identify mutually beneficial goals, set clear objectives, determine an appropriate project scope, and identify specific outcomes or deliverables. Revisiting these goals, objectives, and outcomes on a periodic basis, and as appropriate, making adjustments, may be beneficial.

Early and continuous engagement through the project life cycle—Many funders of competitive grant programs seek proposals that demonstrate tribal engagement; yet proposals that involve tribes primarily to make the grant proposal more competitive can undermine effective partnerships. Effective partnerships avoid delaying the initiation of tribal engagement until after the project's main research questions and objectives have been identified. Tribal input is sought during the foundational stages of a project (e.g., project scoping, initial statements of interest, seeking funding), thereby promoting the collaborative identification of goals, objectives, and outcomes (USDA FS 2015). Thereafter, tribal partner input is sought on an ongoing basis (e.g., during initial, mid-point, and final drafts of publications or other end products).

Trust and respect—Mutual trust and respect are foundational elements of partnerships. A useful practice is allowing adequate time to explore shared goals and emergent concerns, preferably via in-person interactions. In addition, awareness of the community and governance context may be beneficial. Also, recognition of the historical context of federal-tribal interactions is important. Some tribal communities have reported that the rates of employee turnover (which some have perceived as high) of many agencies has resulted in perceived inconsistencies in management priorities and an erosion of mutual understanding and trust. Such events tend to persist in the community memory and may hinder partnership effectiveness. Demonstration of respect includes recognition of the distinct missions and goals, resource availability and constraints, and authorities under which each entity operates. It may be helpful for partners to proactively develop guidelines with tribal leadership for conflict resolution and mediation should disagreement or legal issues arise.

Obtain consent and recognize knowledge sovereignty—Partners should approach the appropriate authorities to obtain prior and informed consent for proposed actions and use of traditional knowledges in the development of data products or management applications. An understanding of knowledge sovereignty, as distinct from intellectual property, is important to effectiveness in obtaining consent. Intellectual property generally deals with protecting legal rights, such as is designated by a copyright. Knowledge sovereignty resides with the individual, family, tribe, or other entity that holds authority over their knowledge (Karuk Tribe 2016; Norgaard 2014a, 2014b), and generally is based in Indigenous ethics of care and stewardship of the natural world. This concept recognizes the autonomy of entities to apply their knowledge to research methods, stewardship of resources, or management practices (see Norgaard 2014a, 2014b). An individual's or family's perspective regarding their knowledge sovereignty, as applied to environmental stewardship or related cultural practices, may differ from that of the tribe to which they belong or from which they have descended (Norgaard 2014a, Sowerwine et al. 2019, Tobin 2015). Finally, there are various levels of responsibility associated with

Knowledge sovereignty resides with the individual, family, tribe, or other entity that holds authority over their knowledge.

knowledge sovereignty: specific individuals, compared to the family unit or community, may bear higher responsibility to steward knowledge to maintain culturally, ecologically, and spiritually appropriate relationships with ecocultural resources such as plants, wildlife, land, and water (Norgaard 2014a, Sowerwine et al. 2019).

Partnership Models

Partnership models for tribal and nontribal entities can be grouped into three broad categories based on variation in the primary decisionmaking entities and degree of power sharing (table 2): (1) the government model in which decisions are made within one or more government agencies that have legal jurisdiction over public or tribal lands and their management, and outside (e.g., local community) opinions may or may not be sought, depending on the situation and availability of options for public or tribal input; (2) the collaborative model in which decisionmaking is shared across formally identified partners; and (3) the community model in which decisionmaking resides with community members who own specific lands (i.e., hold land title), own lands across jurisdictions, or have formal or informal traditional and customary rights among specific territories (Lake et al. 2018b). These three partnership models differ in several important respects: (1) the extent to which different knowledge systems are—or could be—used in research and resource management; (2) distribution of authority for research practices, methods, and resource use and management; (3) distribution of expected benefits (e.g., ecosystem services) primarily to the broader society as compared with local communities; (4) productive capacity of an economy as affected by governance stability and local to global market economies; and (5) jurisdictional control or tenure ownership of specific landscapes and resources. Understanding which partnership model is operative (or viable) on a given landscape increases the effectiveness with which traditional knowledge can be integrated into the visioning, planning, participatory decisionmaking, and implementation of partnerships, such as forest landscape restoration approaches (Lake et al. 2018b).

Partners can facilitate successful outcomes if they are aware of the various entities and their respective jurisdictions of decisionmaking authority for research and management activities on a particular area or landscape. This consideration entails awareness of the various jurisdictional scales specified by relevant laws, including customary laws or belief systems, authorities, regulations, or policies. For example, the degrees of authority over aboriginal territories, which may include federal, tribal, state, county, or private lands, may differ between a tribe and a confederation of tribes. In addition, the degrees of authority over ancestral lands as aboriginal territories, compared to a reservation or tribal trust lands, may differ. If the landscape area of interest crosses jurisdictions, partners need to understand which governance model or variation of the models is most applicable or is currently being applied.

Partners can facilitate successful outcomes if they are aware of the various entities and their respective jurisdictions of decisionmaking authority for research and management activities on a particular area or landscape.

Table 2—Forest landscape restoration partnership models[a]

Model type:	Knowledge system application to forest landscape restoration and resource management	Decision authority for resource use and management	Scope of expected landscape benefits [e.g., ecosystem services] to broader society vs. local communities	Economic capacity affected by governance stability and global to local market economies	Rights to the management of specific geography, jurisdictional control, or tenure ownership of resources
Government	Western strongly favored over local/traditional	Centralized: government agency representatives often not living on the land	Broad: to address national scale economic interest serving society, with some local resource interests	Higher to moderate: based on global to national capital market interest, (e.g., carbon cap and trade revenue)	Federal-state controlled: national scale policies and authorities affect local community scale rights
Collaborative	Both Western and local/traditional, with the former often more prominent	Semi-centralized: mixed partner representation, some live on the land, others do not	Broad to local to regional: to support national economic goals while serving some local water, food, and forest products interests	Moderate: based on national to regional market factors affecting resource natural and national capital values	Federal-state/regional controlled: national scale with allowances for local stewardship and engagement
Community	Local/traditional, generally more prominent than Western	Decentralized: local/traditional leadership living on the land, often hereditary or with elder councils	Regional to local: to support mostly local needs, serving some regional and fewer national resource interest	Lower to moderate: based on reduced dependency on national capital markets and greater reliance on local resources for security and livelihoods	Local/regional controlled: usufruct (non-ownership use) and hereditary rights with traditional area or resource stewardship claims

[a] Adapted and modified from Lake et al. 2018b.

Similarly, where a tribe has aboriginal territory that is administered by the USDA Forest Service or another federal agency, the agency has a trust responsibility and legal obligation to consult on management actions that affect tribes (Nissley and King 2016). Legal obligation by federal agencies for consultation stems from executive actions (executive orders, presidential memoranda), which are legally binding for federal agencies (Hoss 2022). Also, the principle of tribal sovereignty—"the authority of tribes to exercise jurisdiction over their land and govern their people" (Hoss 2022: 161, see also Goodman 2000)—is recognized by federal law and governs tribal, state, and federal government relationships. Yet, in most circumstances, the decisionmaking authority for actions on federal land resides with a federal official, not a tribal council (Dockry et al. 2018).

Consultation is not as restrictive as a co-management agreement, wherein both the tribe and agency are signatories to a binding project plan. Nevertheless, Executive Order 13175 (65 FR 67249) for Consultation and Coordination with Indian Tribal Governments and related presidential memoranda requires federal agencies to carry out an accountable process with the appropriate tribal governance entity regarding "policies that have tribal implications." For example, academic researchers working on a national forest within a tribe's aboriginal territory generally need a research permit for plots or destructive sampling. The research team also may need to gain approval from the tribal cultural resource committee to conduct research that pertains to culturally sensitive information or is not covered by federal laws regarding heritage or cultural resources. There are different mechanisms for formalizing partnerships that tier to each entity's authorities, policies, laws and ordinances, and guidance initiatives. Particular groups may use an agreement, memorandum of understanding, or contract in working together with tribes. Such partnership instruments can clarify each party's scope of work, roles, and responsibilities. For example, partnership instruments often specify the tasks of each entity to promote accomplishment of shared goals and achievement of objectives.

Partnership-Building Process

Tribal-nontribal partnership building develops over a multistage process and life cycle. Through our experiences in working with tribes, we identified seven stages in the tribal-nontribal partnership life cycle: (1) identify shared goals and explore concerns; (2) develop awareness of the tribal governance structure; (3) coordinate natural and social science frameworks; (4) forge and operationalize partnership instruments; (5) adapt methods to the tribal governance and community context; (6) conduct research and implement management action(s); and (7) give back: provide deliverables relevant to the partners' shared goals (fig. 8). This series of stages may develop based on either individual projects or sustained working relationships spanning multiple projects.
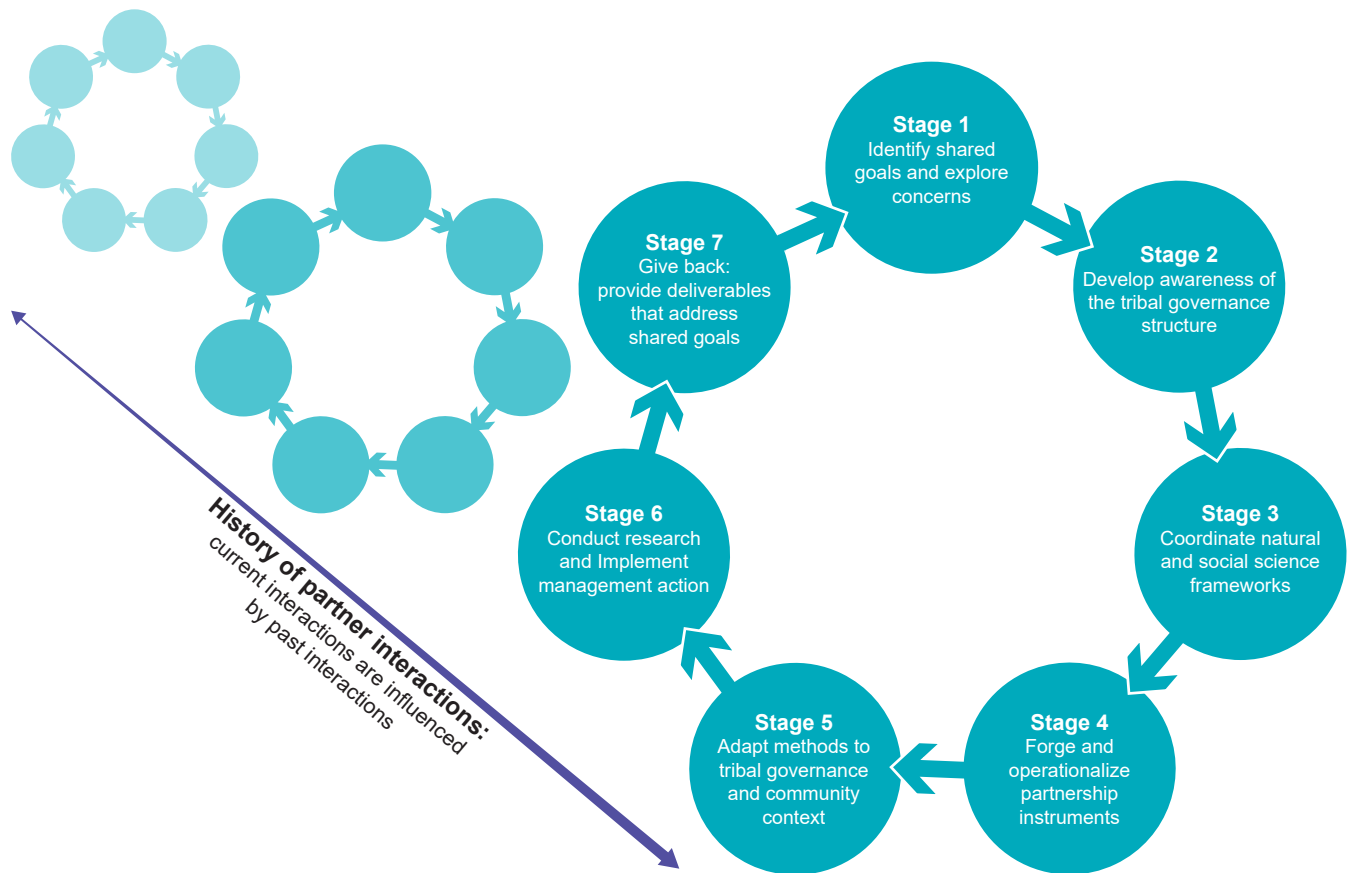
Figure 8—Process of tribal-nontribal partnership building for research and management.

The life cycle of the tribal partnership model roughly corresponds with the generalized model of USDA Forest Service partnerships, which consists of four phases—start-up, initial high-growth phase, slower growth phase, and maturity (USDA FS 2014). However, important distinctions for partnerships with tribes should be noted. The tribal partnership stages (stages 2–5) that correspond with the two growth phases of the generalized model are comparatively numerous and complex, suggesting that (1) a comparatively long period of work (often multiple years) is required to advance through the growth phases, and (2) developing tribal partnerships requires substantial technical and sociocultural knowledge. Much of this knowledge will need to be accrued during project development owing to the specifics of the tribal partner and project. Another distinction of tribal partnerships is the critical importance of the give-back stage (stage 7) in view of tribes' unique historical, cultural, and legal contexts. This stage reflects the heightened need for USDA Forest Service or other nontribal entities to build in time and resources to the partnership life cycle to return a multitude of benefits to tribal partners.

Partners may find it useful to recognize the historical dimension and cumulative nature of the partnership-building process (fig. 8). Current partnerships are impacted by the legacies of past interactions on the community memory, while present-day interactions lay the groundwork for future partnerships. Legacy effects can be

Box 2: Stages of the Partnership-Building Process

Identification of shared goals and exploration of concerns (stage 1): Partners identify shared resource values and goals; seek and secure project funding to promote fulfillment of these goals; invite and listen to feedback, including concerns, from all partners; and adapt the project specifics accordingly. Partners identify shared and differing resource needs and desired products. This stage may involve the identification of the management areas for ecocultural resources; the locations of pilot sites for project implementation; and guidelines for sensitive topics, such as traditional knowledge content, in project reports, articles, or other partnership products.

Awareness of tribal governance structure (stage 2): Nontribal partners seek guidance from tribal counterparts to identify the array of tribal entities that are relevant to the project and the roles of these entities in the tribal governance structure. Governance involves the decisionmaking entities, generally including the formal government and the community (Abrams 2019, Armitage et al. 2007,

Long et al. 2018). For many tribes, the formal government is organized into three types of bodies: an executive branch; administrative branches, such as a department of natural resources; and a services branch (fig. 9). Other tribes have a governance structure that blends traditional spiritual leaders into a secular government structure (i.e., an elected chairperson and a hereditary chief as co-leaders). In addition, there is the tribal community, which includes on- and off-reservation tribal citizens and descendants. The various entities may play distinct roles in project governance, research, and management, such as in formal and informal agreements and community engagement.

Coordination of natural and social science frameworks (stage 3): Interdisciplinary projects often require a focused effort to coordinate natural and social science frameworks into a unified framework. Ecologists, social scientists, natural resource managers, and cultural and heritage specialists may need to resolve discrepancies between respective
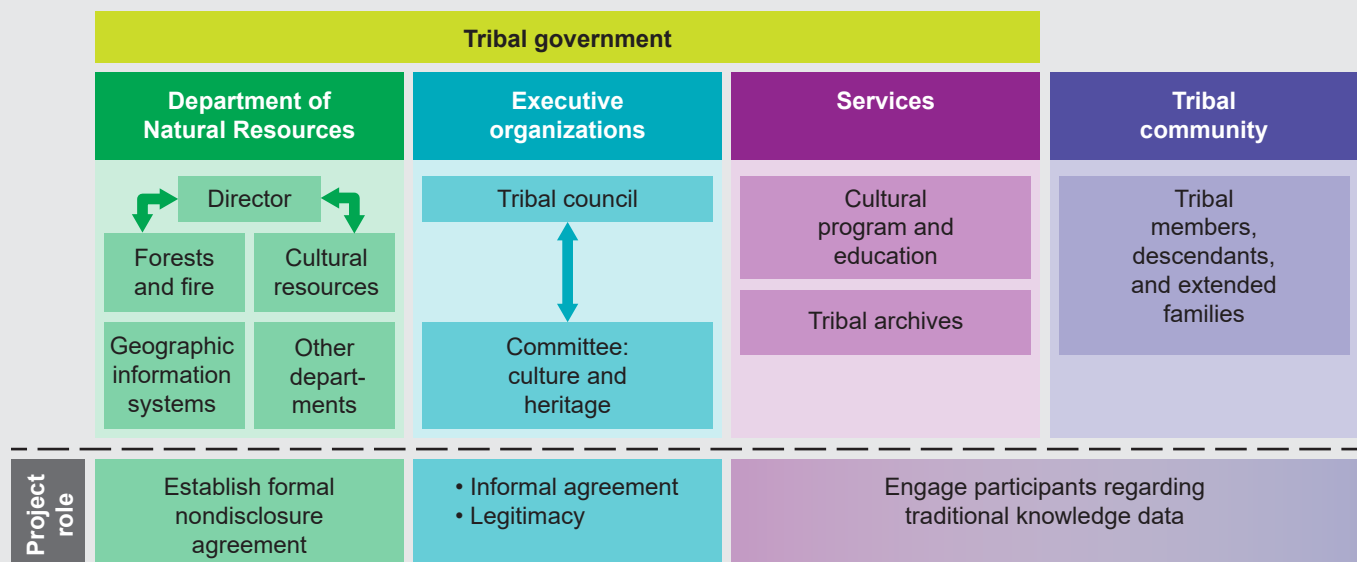

Figure 9—Generalized tribal governance structure and respective roles in a research partnership that involves integrating traditional and Western scientific knowledges.

research frameworks. Design considerations may include delineation of the study area; coordination of the spatial scale (geographical extent, acceptable spatial resolution), and if relevant, temporal scale and historical period of analysis. In addition, crosswalks between natural and social science datasets also may be developed. Investigators can benefit from collaboratively developing research questions and science support needs. It may also be helpful to identify concepts, models, or theories that span both the natural and social science components of the project.

During this third stage, partners may select and define the project framework, including holistic, ecosystem, single-species or single-resource variants. Many federal land management agencies have adopted an ecosystem management framework, in accordance with federal policies of the early 1990s (Grumbine 1994, Kohm and Franklin 1997, USDA FS 1992). However, compliance with the Endangered Species Act, which prioritizes single-species conservation, tends to hamper the adoption of a holistic framework (emphasizing ecological, cultural, and spiritual values), as advocated by many tribes. Other characteristics of a holistic framework are stewardship practices such as harvesting, pruning, removing debris, and burning to maintain ecocultural resource productivity (Long et al. 2018)—as contrasted with excluding humans, ostensibly to protect nature—and adoption of a coupled human and natural systems approach to maintaining or restoring ecosystem services. In the Pacific Northwest, for example, many federal management activities are constrained by Endangered Species Act regulatory compliance for the northern spotted owl (*Strix occidentalis caurina*), which has limited the active stewardship and management practices desired and proposed by various tribes.

Conservation of spotted owl habitat is prioritized by several legal and regulatory factors. For many tribal entities, single-species-based regulatory compliance, particularly for the owl—which many tribal members consider a messenger of sickness, death, danger, and sorcery (Gerdts 2012, Kroeber and Gifford 1949)—is incongruous with goals for active holistic management of cultural keystone species that provide food, spiritual benefit, or broader values (Long and Lake 2018, Long et al. 2018).

Forging and operationalizing partnership instruments (stage 4): Partners first recognize the decisionmaking authorities of the relevant tribal and nontribal government agencies, then develop partnership instruments (e.g., agreements, memoranda of understanding, contracts), and finally operationalize the instruments. An iterative process characterizes this stage. Partners discuss the application of partnership ground rules or other instruments to specific examples of proposed methods, data resource generation, or management actions. Then, feedback on the proposed examples informs the mutual understanding of appropriate application of the agreement in a tribal setting. Partners also may tailor sharing agreements and protocols for data sharing to the applicable scales of knowledge sovereignty (Norgaard 2014b, 2019). Such protocols also should address intellectual property rights.

Partnerships that involve traditional knowledge and tribal intellectual property may include nondisclosure agreements that prohibit the reporting of confidential, legally protected, or sensitive information. There are certain levels of specificity that are not appropriate to share with the public. For instance, agreements may prohibit the public reporting of fine-scale project site maps or

photographs that reveal specific locations or details of tribal artifacts and associated resources and certain traditional knowledges. Data derived from traditional knowledge systems may fall midway along the spectrum of acceptable and nonacceptable reporting. Considerable context dependence and subjectivity require discussing specific examples to determine how the agreement applies in practice. For example, partners may identify and assess the sensitivity of the heritage or cultural resources of proposed treatment units or research study areas. Partnership agreements also should accommodate the variability in appropriate levels of access to sensitive data by project participants. Not all partnership entities need to know the same degree of traditional knowledge about particular places, resources, or species and associated cultural uses.

Adapting methods to the tribal governance and community context (stage 5): Proposed project methods are presented, evaluated, and piloted for appropriateness to the community. Significant revision of proposed methods in response to feedback from tribal resource managers or the community may be needed. Community-adapted methods may include capacity-building investments (e.g., apprenticeships, internships, workforce development); intergenerational interactions (e.g., elder-youth interviews or traditional practices); and protocols that engage with the community's sense of place, history, and desired future conditions. Protocols that invite conversation about ancestors, for instance via photographs, text, or audio recordings, and about culturally important places may also be appropriate.

Conduct research and implement management action (stage 6): USDA Forest Service or other nontribal investigators and managers coordinate with tribal counterparts to identify appropriate participants, sites, or venues for project activities; develop suitable mechanisms to recruit and engage participants (newsletter and radio announcements, community bulletin boards); and secure permission from relevant authorities. Partners also may clarify the preferred and alternate courses of action based on the applicable scales of knowledge sovereignty (Norgaard 2014b, 2019).

Give back: provide relevant deliverables (stage 7): Partners present or submit deliverables that are relevant to tribal goals for the partnership. In many instances, an interactive format, such as a workshop, meeting, or field trip, can significantly enhance the deliverable's impact. Developing a variety of modes of media access, such as a webpage, story map, or film, also may be effective. Attention to strategies to make the public aware of the deliverable's availability, such as a public services announcement or media report, is also important.

Investigators and managers may consider developing an array of deliverables tailored to various tribal entities. For tribal natural resource agencies, a scientific publication, report, or research brief may be useful. Field notes and geographic information system layers may also be relevant; however, applicability depends on compatibility with the tribal agency's standards, such as ecocultural resource inventory system or management unit organization. The tribal community may find products developed through data collection, such as interview transcripts and archival photographs and texts useful. A booklet that highlights appropriately recognizable places, people, or events, also may be meaningful. Also, maintaining ongoing communication after the project has formally ended can strengthen the durability of the project's impact.

positive, negative, or mixed. The layered nature of tribal partnerships may promote opportunities to develop emergent projects with the tribal government and community. On the other hand, partnership cycles that are characterized by a failure to recognize tribal history, culture, and legal context—or impart other negative effects—may hinder opportunities for prospective future partners.

Partnership building can be understood as a cyclical, adaptive process in that the interactions of one project often lay the foundation for future partnerships. Moreover, present-day partnerships often encounter the layers of past partnerships in the form of community memories and evolved understandings. Thus, partners are advised to consider their interactions as a single phase of a multidecadal continuum of forest and grassland governance and management interactions. The prospective benefits of enduring partnerships with tribes, such as increased effectiveness of forest landscape restoration projects, increased resilience to climate change, and rejuvenation of tribal traditions based in ecocultural resource stewardship, could be promoted by building formal institutional support for partnerships that endure beyond individual projects.

In practice, partnership building is generally nonlinear in two respects. (1) Partners may loop back to preceding stages or leapfrog individual stages during the partnership's life cycle, rather than developing in a predictable, stepwise pattern. For instance, new understandings of shared goals, as well as concerns, may emerge as additional partners are consulted and engaged. Likewise, the goal-setting stage may be revisited as participants become familiar with proposed methods or management actions. (2) Partners may develop activities of multiple stages simultaneously, resulting in an overlap of stages. Consequently, ongoing developments in one stage of the partnership-building process may generate ongoing developments in others. For instance, the evolution of stage 1, "identification of shared goals and exploration of concerns," may occur in tandem with stage 2, "awareness of tribal governance structure" (fig. 10). Several factors may account for the nonlinear nature of the partnership-building process: for many tribes, insufficient staff and other constraints on capacity to fulfill essential government functions; for both tribes and agencies, the reciprocal challenges of navigating each entities' complex bureaucracies and organizational structures; and the incremental engagement of participants.

A process that underlies tribal partnership building is cross-organizational acculturation—the process whereby each respective partner develops an understanding of the beliefs, values, norms, customs, and practices of one another (Koontz 2007, McCurdy 1992). Regarding tribal partnerships, cross-organizational acculturation pertains to gaining the capacity to evaluate whether a proposed method or action is appropriate to the tribal community and governance context, and if not, whether adaptation is viable. For instance, community validation—a social sciences method of assessing and refining interview data derived from focus groups (Besser et al. 2014, Burnette et al. 2014, Fisher and Ball 2003)—may require

Present-day partnerships often encounter the layers of past partnerships in the form of community memories and evolved understandings.

adaptation to fit the tribal context. When the data pertain to traditional knowledge derived from interviews with tribal elders, large-group validation may be perceived as incongruous with the social norm of respect for elders due to perceived scrutiny of these data. An alternative protocol, such as open-ended follow-up questions with tribal elders, may be a better fit with the community's norms. Cross-organizational acculturation practices that can contribute to the development of culturally adapted protocols include: inviting conversation regarding partnership goals in light of tribal history, culture, and current conditions; listening to and exploring concerns about proposed methods in light of tribal values and norms; and building into the project work plan and budget adequate time to collaboratively develop adaptive responses.

Evolution of partnership-building stage 1, identification of shared goals

Evolution of partnership-building stage 2, awareness of tribal governance structure

Training and skill-building for interns

Intergenerational transmission of traditional knowledge

Restore culturally important resources

Document and apply traditional knowledge to forest management

Restore forest landscape resilience

Community participants

Culture and heritage committee, tribal government

Culture program, government services

Department of Forestry, Branch of Natural Resources

| 1 | 2 | 3 | 4 | 5 |

Project year timeline
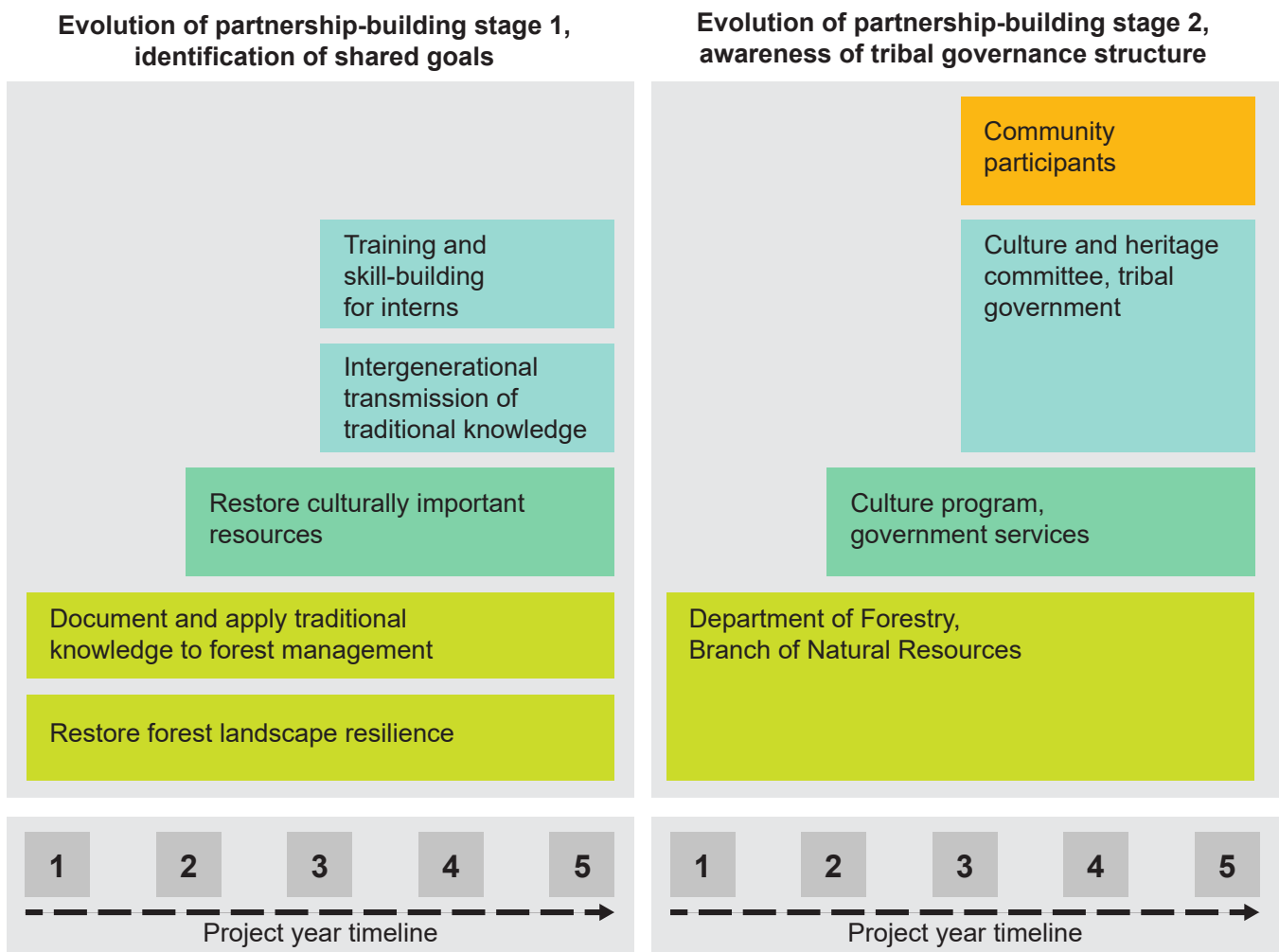
| 1 | 2 | 3 | 4 | 5 |

Project year timeline

Figure 10—Illustration of the nonlinear nature of the partnership building process, based on the experience of one interdisciplinary forest science team. The activities of two partnership-building stages occurred during overlapping project years, rather than sequentially. In this example, the team's identification of shared goals and exploration of concerns (stage 1) overlapped with the development of awareness of the tribal governance structure (stage 2).

Considerations for Tribal Engagement in the Process of Conducting Research

There are many considerations for tribal engagement in the process of conducting research. Figure 11 presents some steps in the research process that researchers would benefit from considering. The rounded boxes in figure 11 show steps in which researchers engage with tribes and Indigenous communities in the research effort—often integrating Indigenous and Western scientific knowledges—or ways in which working with Indigenous traditional ecological knowledge call for a range of considerations. The lighter rectangle in figure 11 show suggestions for specific steps in the research process for engagement with tribal research entities that support the stages of partnership building (fig. 8). Lastly, the ovals in figure 11 show guidance considerations for the respective step in the research process that have or can have important implications for inclusion, respectful application, and protection of Indigenous traditional ecological knowledge when working with tribes and Indigenous communities. The considerations include many, but not all, aspects of conducting research among governmental, academic, tribal, and other partnership entities.
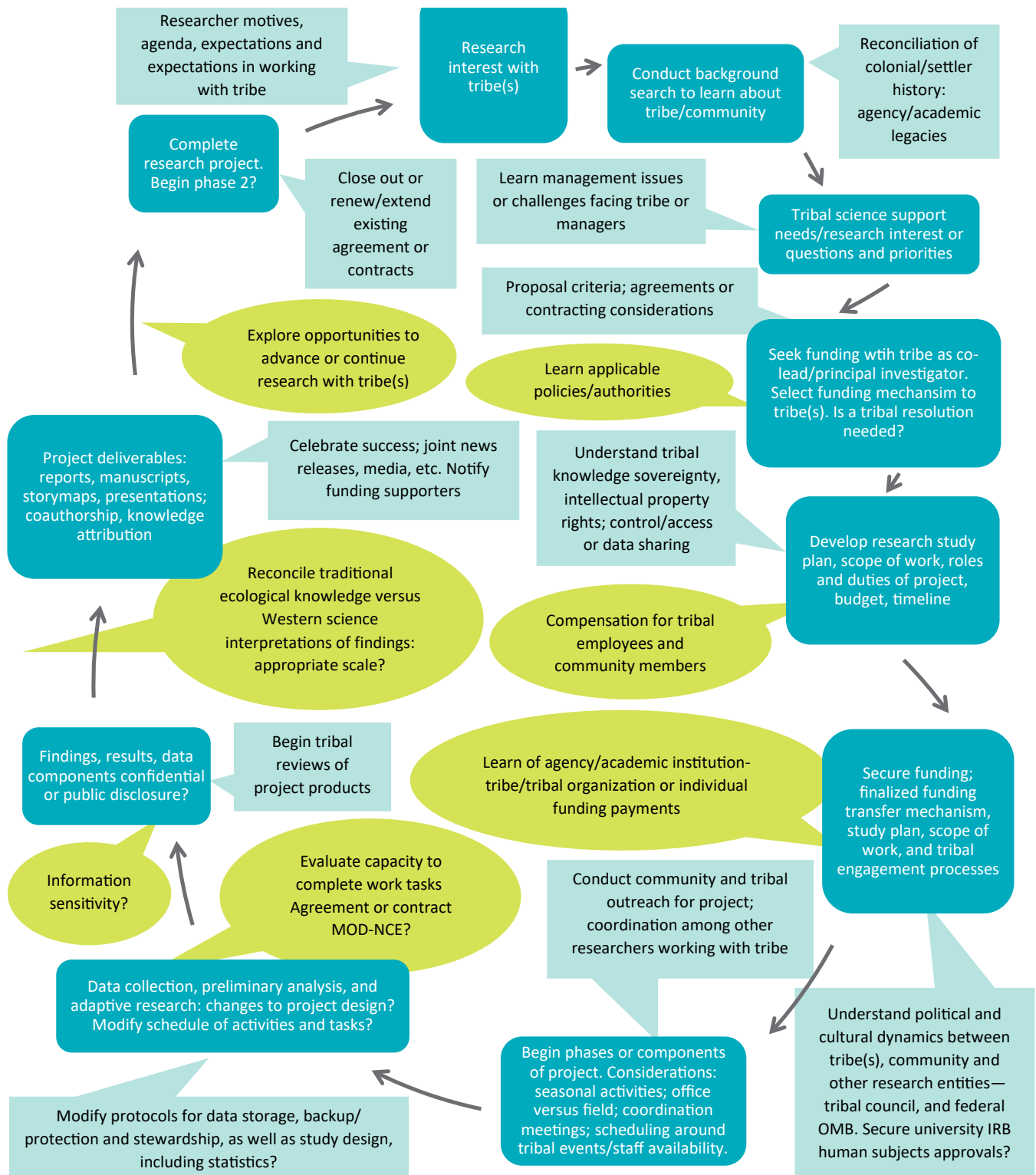
Figure 11—Checklist diagram of considerations for tribal engagement in the process of conducting research. Boxes with rounded corners represent steps for consideration during the research process; lighter rectangle represent suggestions for considerations in a specific step; ovals represent guidance for considerations in steps. Contract MOD-NCE = Modification-No Cost Extension, OMB = Office of Management and Budget, IRB = Institutional Review Board.

Conclusion

Tribal-nontribal partnerships can play an important role in promoting participatory decisionmaking and building capacity in research and management of forests, rangelands, fuels and wildland fire, and climate vulnerability and adaptation. Also, a body of executive orders and other executive actions, as well as statutes and judicial decisions, have established legal requirements involving the three branches of the federal government for consultation, co-management, and co-stewardship. Partnerships can support these requirements. At the same time, partnerships may encounter significant challenges because of multiple factors, including the need to learn about and adhere to legal requirements and other tribal protocols, historical animosity or conflict between partner entities, and the requirement for Indigenous data sovereignty. These and other challenges—such as generally unwritten guidelines, capacity constraints, and complexities that are inherent in cross-organizational interactions between nontribal and tribal organizations—are important to recognize.

Application of effective practices, including selection of the most appropriate partnership model and recognition of the partnership-building process, can help federal, tribal, state, and nongovernmental organization entities to resolve partnership challenges. There is no prescribed formula to structure effective and enduring partnerships. This report offers general guidance for promoting more respectful working relationships, expanding the inclusivity of traditional/native knowledges, and recognizing cultural practices and tribal values in research and management. Readers may draw upon the menu of concepts in this report to guide partnership development.

A body of executive orders and other executive actions, have established legal requirements involving the three branches of the federal government for consultation, co-management, and co-stewardship.

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Appendix 2: Framework for Applying Traditional Knowledge and Western Knowledge in Wildland Fire and Fuels Management and Research

Key elements	Wildland fire and fuels	
	Management	Research
Sources of traditional knowledge: Literature or communication with tribes and tribal organizations.	Publications and presentations of fire effects on cultural resources, traditional fire knowledge and practices.	Conduct literature review. Ethnographic materials at universities, agencies, or tribal archives.
Tribal outreach: Request of tribal government, cultural committee, or members for incorporation of applicable traditional knowledge.	Contact tribes about planning and management strategies, short- and long-term project objectives.	Contact tribes and tribal organizations for researchable questions of interest and science support needs.
Tribal consultation: Government to government: identify management or research issues and actions of interest.	Consult with tribal government, departments, or committees for proposed actions (emergency or NEPA).	Request input from tribal councils, departments, and committees to develop preliminary research questions and methods.
Building trust: Tribal identification, transfer, and authorization of traditional knowledge use.	Develop or renew agency-tribe fire management agreement. Identify designated tribal representatives and heritage advisors.	Obtain formal agreements, permission or authorization of traditional knowledge use: IRB, OMB, and tribal approval.
Actively learn traditional knowledge and Western knowledge: Cross-cultural appreciation of traditional knowledge used with management actions and research methods.	Workforce education of management effects on heritage/cultural resources and tribal values. traditional knowledge informs NEPA and WFDSS planning.	Researcher and student education on tribal traditional knowledge, fire use, and fire effects through academic courses, workshops, and field trips.
Tribal oversight: Coordination and communication with tribes on planning and implementation of projects.	Tribes review proposed management treatments or incident objectives and identify missing values or issues.	Tribes approve research methods, metrics used, and analysis planned, identifying specific values or addressing issues of concern.
Active listening and sharing: traditional knowledge informs workforce, treatment implementation, mitigation activities, or research practices.	Interdisciplinary or incident command team works with tribal staff to identify values at risk and develop mitigation actions.	Tribal members/youth assist researchers. Collect data with tribal members. Conduct new interviews if needed.
Applying traditional knowledge with Western knowledge: Tribal participation and stewardship activities.	Tribal partnerships using traditional knowledge to guide fuels treatments, fire operations, and mitigation strategies.	Traditional knowledge collaboratively guides experimental methods, study sites, treatments, indicators, or variables of research interest developed.
Tribal review: Tribal approval and oversight of project implementation and results.	Tribes review project implementation or fire management and modify actions for adaptive management.	Tribes review analysis results, discussion, and recommendations for management or additional research. Clarify traditional knowledge and data ownership.
Reporting: Share and celebrate accomplishments and lessons learned from traditional knowledge and Western knowledge.	Identify postfire actions: BAER practices, share/reflect on lessons learned from after action review.	Best available science is developed. Publications and presentations co-authored with tribes and tribal organizations.

BAER = Burned area emergency response; IRB = Institutional Review Board; NEPA = National Environmental Policy Act; OMB = Office of Management and Budget; WFDSS = Wildland fire decision support system.

Source: Lake et al. 2017.

This publication is available online at www.fs.usda.gov/research/psw.