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REVIEW DRAFT

**USDA FOREST SERVICE
NATIONAL FISH AND AQUATIC STEWARDSHIP STRATEGY**

Note to Reviewers: Please provide your comments by June 30, 2017 to:

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Commented [NFHP1]: It was very nice to see such a strong NFHP presence in this USFS effort – TNC, AFWA, ASA, AFS

I. CHIEF'S STATEMENT

[STATEMENT TO BE INSERTED HERE]

II. EXECUTIVE SUMMARY

The Forest Service is a leading conservation agency and plays a key role in the stewardship of the Nation's water resources and aquatic habitats. The national forests and grasslands contain some of the Nation's healthiest, most intact aquatic ecosystems, providing important strongholds that contribute to sustaining the Nation's fish and aquatic resources. The agency's work extends beyond the national forests and grasslands. The Forest Service works with state fish and wildlife agencies and other partners to protect and sustain ~~aff~~ forested lands nationwide and to safeguard water quality as well as fish and aquatic resources. Forest Service research stations and facilities conduct cutting-edge science on fish and aquatic ecology with broad application and utility across the country and around the world.

The Forest Service's National Fish and Aquatic Stewardship Strategy updates the agency's Rise to the Future Action Plan for the 90s and marks the 30-year anniversary of Rise to the Future, which brought about increased agency and partner awareness and support for the conservation of fish and aquatic resources. This updated strategy was prepared by a large team with representatives across mission areas at all levels of the agency and from several key partner organizations. The updated strategy tiers to the USDA Forest Service Strategic Plan: FY2015–FY2020, helping the agency meet its goals for the conservation, protection, and restoration of fish and aquatic resources and abundant clean water. The Forest Service worked in partnership ~~with others and in cooperation~~ with state fish and wildlife agencies, other Federal agencies, and tribal governments to update the strategy. The success of this strategy will depend largely on working with partners and cooperating with state fish and wildlife agencies, tribal governments, and other Federal agencies that play key roles in the conservation of fish and aquatic resources.

The National Fish and Aquatic Stewardship Strategy contains six goals: (1) to conserve and restore fish and aquatic resources; (2) to connect people to the aquatic world through fishing, boating, and other water-based activities; (3) to strengthen partnerships and work across boundaries; (4) to deliver and apply scientific research; (5) to build capacity through mentoring and training; and (6) to communicate the value of Forest Service fish and aquatic stewardship.

Each goal contains multiple objectives, laying a long-term strategic foundation for rising to current and future challenges, including invasive species; impacts from drought, floods, and other extreme weather events; and limited resources. The goals and objectives will also help the Forest Service take advantage of such opportunities as emerging research technologies and innovative and nontraditional partnerships.

The strategy names eight specific actions as near term priorities to work on with our partners:

1. Develop a coarse-scale national assessment of aquatic biodiversity on National Forests and Grasslands by 2020.

Commented [NFHP2]: Consider adding an action to create a diversity joint venture to increase diversity in aquatic work places (under Goal 5).

2. Cooperate with States, NFHP, and other partners to develop criteria for identifying conservation watersheds for fish and aquatic species on national forests and grasslands. Select conservation watersheds by 2019. Update the list as needed.
3. Collaborate with state fish and wildlife agencies and partners to identify priority locations for recreational fishing access improvements that will yield the greatest increase in fishing participation by 2019.
4. Increase the number of youth connecting to the outdoors through recreational fishing and other water-based activities by 20 percent by 2023.
5. Increase partnerships with States, tribal governments, water providers, corporations, and multi-stakeholder groups that result in meaningful conservation outcomes with multiple benefits by 20 percent by 2023.
6. Conduct and distribute a national fish and aquatic ecology research needs assessment by 2019.
7. Develop business practices and protocols for effective mentoring of fisheries biologists and aquatic ecologists by 2018.
8. Work with communications and marketing experts to develop and implement a communications and outreach plan by 2018.

Commented [NFHP3]: Consider a more aggressive timeline.

Commented [NFHP4]: Suggest increasing to 50%. See specific comments on Page 9

Commented [NFHP5]: How will increase in partnerships be measured?

Commented [NFHP6]: Suggest pushing this date to sometime after 2019 given some of the above referenced action items aren't completed until 2019 or later.

III. INTRODUCTION

BACKGROUND AND HISTORY

The Forest Service, founded more than 100 years ago, is a lead Federal agency in natural resources conservation. We oversee the protection, management, use, and stewardship of natural and cultural resources on over 193 million acres of forests and grasslands. This large area, known as the National Forest System, is composed of 154 national forests and 20 national grasslands from New England to Florida and from Alaska to California.

The Forest Service has a rich history characterized, in part, by the protection of water resources. Congress sought to create, manage, protect, and care for the Nation's forest reserves by passing the Organic Administration Act in 1897, followed by creation of the Forest Service in 1905. Forest reserves were created "to improve and protect the forest within the reservation, or for securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States." In 1905, the forest reserves became the national forests and grasslands. Gifford Pinchot, who served as the first Chief of the Forest Service, stated that "where conflicting interests must be reconciled the question will always be decided from the standpoint of the greatest good of the greatest number in the long run."

The Forest Service seeks to balance the delivery of drinking water from the National Forest System (which about 20 percent of all Americans depend on) with the provision of sustainable timber, fish and wildlife, oil and gas, mining, and grazing activities as well as an immense and growing outdoor recreation industry. The Forest Service is charged with sustainably managing all these resources and uses while also providing for healthy aquatic habitats that support sustainable fish and aquatic resources. The national forests and grasslands contain some of the Nation's healthiest intact aquatic ecosystems, which serve an important role in sustaining the Nation's fish and aquatic resources.

The Forest Service's role extends well beyond the borders of the national forests and grasslands. The work of our State and Private Forestry mission area is vital to ensuring the health of all forested lands and safeguarding water quality as well as fish and aquatic resources. Together with partners, we improve the lives of people in local communities, rural and urban, through our work with State, local, and tribal governments. At our research stations and facilities, we conduct cutting-edge research on fish and aquatic ecology. Our research has broad application and utility across the country and around the world.

The Forest Service's focus on the stewardship of fish and aquatic resources sharpened in 1985 when the American Fisheries Society was invited to evaluate the overall effectiveness of the agency's Fisheries Program in meeting current and projected resource needs and user demands.

Forest Service Mission: The Forest Service is different from many Federal agencies in that it is guided by a principle of sustainable multiple use and has an eloquent and progressive mission: "To sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations."

Forest Service Motto:
Caring for the Land and
Serving People

The evaluation pinpointed opportunities for improvement. It also led to the formation of a national task force commissioned by the Chief to develop a strategy for improving fisheries habitat on the national forests and grasslands. Led by Alaska Regional Forester Mike Barton, the task force laid the foundations for the Rise to the Future Fisheries Program and Action Plan put in place by Chief Dale Robertson in March 1987, the first nationwide fisheries strategy by a Federal agency. The Forest Service worked with a broad base of partners to improve the quality of aquatic habitat on the national forests and grasslands and increase recreational fishing as well as other use and public enjoyment of fish and aquatic resources.

In 1988, the Forest Service partnered with the Sport Fishing Institute to emphasize recreational fishing. By early 1990, the Bureau of Land Management joined the Forest Service in signing a Recreational Fishing Policy to strengthen programs and partnerships for managing recreational fishing across almost half a billion acres of federally managed lands. In 1991, the Forest Service strengthened protections for threatened, endangered, and sensitive species, putting the agency at the forefront of conserving aquatic resources. In April 1991, the early Rise to the Future program matured into Rise to the Future: Action Plan for the '90s, a comprehensive framework for fish habitat management and fish and aquatic ecology research.

PURPOSE AND PROCESS

The National Fish and Aquatic Stewardship Strategy replaces the Rise to the Future: Action Plan for the '90s as the Forest Service's articulation of its commitment to and role in stewardship of fish and aquatic resources. The National Fish and Aquatic Stewardship Strategy builds on 3 decades of experience with Rise to the Future. The Forest Service needs a new strategy now because there have been important social, economic, ecological, and scientific developments in the past 30 years. This updated strategy seeks to align actions and programs related to fish and aquatic stewardship in all parts of the agency. Revising the strategy is also intended to make it more relevant and useful to the agency's contemporary and future partners and cooperators. Increased alignment and relevancy will allow the Forest Service to take advantage of new opportunities. Opportunities today include a growing emphasis on integrated program delivery and an agency-wide shift to watershed-scale restoration through watershed partnerships.

In 2016, the agency formed a national team with representation across mission and program areas and at every level of the organization. A core team offered oversight and guidance, while an extended core team performed reviews and gave input. Six working groups, one for each of the six strategic goals, fleshed out the goals and accompanying objectives. Key partners offered input and feedback along the way. To respond to the issues, concerns, and needs of state and tribal governments, the Forest Service solicited their input and feedback through meetings and Webinars.

Commented [NFHP7]: On page 14, Objective C.iii, Rise to the Future is specifically mentioned as part of the actions, which is confusing after reading here that Rise to the Future is being replaced. Suggest clarifying.

IV. OVERVIEW OF FISHERIES AND AQUATIC ECOLOGY IN THE FOREST SERVICE

FISHERIES AND AQUATIC RESOURCES ON THE NATIONAL FOREST SYSTEM

The Forest Service manages a large, diverse area that contains a rich array of fish and aquatic resources, including over 220,000 miles of fishable streams and rivers and more than 10 million acres of fishable lakes and reservoirs. Because the National Forest System has some of the highest quality waters and aquatic habitat in America, the Forest Service manages habitat for 60 percent of the fish listed under the Endangered Species Act and 80 percent of the listed freshwater mussels and clams. We manage some of the best—sometimes some of the only—remaining habitat for many fish and other aquatic species with high conservation and cultural value. We strive for multiple use, but certain aquatic resources warrant special recognition, protection, resources, and attention, including research and long-term monitoring, given their scarcity at a landscape scale and increasing threats over time.

The fish and other aquatic species and the habitat where they thrive hold tremendous value. National Forest System lands and waters sustain diverse and growing recreational economies, including activities that depend on clean water, healthy watersheds, and healthy streams, rivers, and lakes. Such activities include fishing, boating, swimming, wildlife watching, camping, photography, and more. In Alaska, the national forests support a world-renowned, billion-dollar commercial salmon industry, as well as culturally important subsistence fisheries for Alaska Native communities.

Recreational fishing, a gateway outdoor recreational activity, introduces many Americans to the outdoors and their public lands. Millions of people go fishing on the National Forest System, a time-honored tradition with a strong constituency. Fishing on public lands connects people to the natural world, fostering current and future generations of citizen stewards. Recreational fishing on the national forests and grasslands supports more than \$2.2 billion of economic activity each year nationwide and contributes revenue to state fish and wildlife agencies through license sales and the excise taxes levied on fishing and boating equipment and fuel. These revenues help sustain state fish and wildlife agency operations, funding their important work on public access, fisheries management, and habitat restoration.

The fish and waters on the national forests and grasslands are important sources of economic value and also of local pride and cultural value. Clean, healthy waters are a natural draw for people, bestowing physical and emotional benefits. These special places and the many rare and important species they support deserve special focus, protection, and sustained commitment to ensure that future generations will enjoy them too.

FISH AND AQUATIC ECOLOGY RESEARCH AND DEVELOPMENT

The Forest Service's Research and Development is the world's largest forest research organization. Its mission is to develop the knowledge and technology needed to improve the health and productivity of the Nation's forests and grasslands and to share science and

technology across the Nation and around the world. We employ more than 500 scientists working in 77 field laboratories in the United States and Puerto Rico. They conduct research on 80 experimental forests and ranges and 370 research natural areas, as well as on sites outside the National Forest System through over 1,000 cooperative research agreements with partners. Forest Service researchers offer scientific information and analysis to help land managers and policymakers make well-informed decisions and to anticipate emerging natural resource issues, both nationally and internationally.

Our Fish and Aquatic Ecology Research Program generates knowledge and tools to improve policy initiatives and management decisions affecting fish and other aquatic species and their habitats. Our scientists in disciplines such as fish biology, genetics, and hydrology conduct basic and applied research on aquatic species and ecosystems. We study the effectiveness of management and restoration actions in achieving conservation outcomes, and we characterize and evaluate emerging threats to aquatic ecosystems, including invasive species and drought. We also develop cost-saving protocols for inventorying and monitoring fish populations and habitats. Our science helps improve strategies for meeting growing demands for water, energy, and other forest-based commodities while ensuring the sustainability and diversity of aquatic species.

The Forest Service has a strong track record of developing and applying innovative methods for studying fisheries and aquatic ecosystems at large geographic scales and over long periods of time. Agency scientists have gained crucial insights into the roles played by watershed integrity, natural disturbance regimes, habitat complexity and connectivity, and gene flow in the long-term viability of aquatic species. In recent years, our researchers have created user-friendly systems to organize and analyze information about native fish habitat and associated watershed characteristics to improve the cost-effectiveness of investments in stewardship of fish and aquatic resources. We share our findings through publications, workshops, Webinars, and decision support tools. We work with partners in Federal, State, and tribal agencies; universities; nongovernmental organizations; and international organizations. This strategy provides the framework needed to ensure we will continue to develop new science and technology for better management decisions and conservation practices affecting aquatic species.

STATE AND PRIVATE FORESTRY AND AQUATIC CONSERVATION

Cooperative Forestry, part of the Forest Service's State and Private Forestry mission area, works through State agencies and other partners to protect and sustain the Nation's forest resources. Programs like Forest Legacy, Forest Stewardship, and Urban and Community Forestry work in partnership with state and local governments and nonprofit organizations to give communities and family woodland owners financial and technical assistance to maintain resilient, healthy forests. Our State and Private Forestry programs and partners collaborate with the national forests and grasslands for seamless conservation, including aquatic conservation, across the country. Working with our partners and private landowners, for example, the Forest Legacy Program has conserved more than 170,000 acres of waterbodies and more than 3,300 miles of streams.

Over 130 million acres of urban and community forests benefit the 83 percent of all Americans who live in cities and towns. Over two-thirds of the Nation's forests are in non-Federal ownership. These 445 million acres of forests are owned and managed by private individuals and businesses, tribal governments, state and local governments, and nonprofit organizations. Urban and other non-Federal forests yield numerous public benefits, including protecting streams and rivers, intercepting stormwater and reducing pollutant runoff, enhancing fish and aquatic habitat, providing clean and abundant water, and furnishing numerous recreational opportunities.

CONSERVATION CHALLENGES AND OPPORTUNITIES

The Nation is undergoing vast ecological and socioeconomic change, partly due to a confluence of stressors, including large wildfires, outbreaks of insects and disease, invasive species, and increased drought and flooding. Despite these challenges and although impacts from historical mining, timber, grazing, and development often require ecosystem restoration across large landscapes, many aquatic habitats on the National Forest System are pristine or of high quality. Meanwhile, demand is growing for the many aquatic resources and services that people get from watersheds on the Nation's forests and grasslands, including water that is clean, abundant, and cold enough to support habitat for native aquatic species. As the country changes and grows, the Forest Service and its state and other partners will continue to sustain and restore fish and wildlife habitat, recreational infrastructure, water supply and quality, and healthy watersheds by using the best available science to integrate aquatic conservation into land management. Restoring watershed health and function is critical to sustaining the clean and reliable water supplies and the fish and aquatic resources that communities value, use, and appreciate.

Accordingly, the Forest Service is accelerating the pace of restoration and creating more jobs on the national forests and grasslands. To do so, we are investing in partnerships with state fish and wildlife agencies and other organizations, bringing people together to achieve shared objectives. We are working with traditional and new partners across landownerships to serve local communities and the American public. Our partners contribute millions of dollars and tens of thousands of volunteer hours annually to ecosystem restoration projects on the National Forest System, and they can play an even larger role into the future. Our focus on restoring fish populations, water quality, and natural processes feeds a growing restoration economy that employs local contractors, workers, engineers, and natural resource professionals from diverse backgrounds.

Commented [NFHP8]: This may be true but it is a reactive, costly alternative to more careful conservation. Consider protecting valued resources in addition to restoring degraded habitats or fish populations. It may be better financially and ecologically for the USFS to "focus on 'conserving' fish . . .to feed a growing 'conservation' economy."

V. STRATEGIC GOALS

GOAL 1: CONSERVE AND RESTORE FISH AND AQUATIC RESOURCES

Sustaining the health and diversity of native fish, other aquatic species, and their habitats is part of the Forest Service's mission. To achieve our goals, we will protect, conserve, and restore watersheds and aquatic ecosystems upon which populations of native fish and other aquatic species depend. Our strategies and actions are designed to help aquatic species and ecosystems adapt to multiple stressors, including drought, floods, invasive species, and disease.

We will work with state fish and wildlife agencies and other partners ~~will to~~ identify watersheds important for the conservation of native fishes and other aquatic species and their habitat. These ~~By ensuring these~~ “conservation watersheds” ~~will be aligned with state plans and policies. this collaborative approach will~~ help managers strategically plan and prioritize activities for the greatest ecological, social, and economic benefits. The designation of conservation watersheds will complement the classification of high-priority watersheds under the Watershed Condition Framework. Through the Watershed Condition Framework, developed in 2011, the Forest Service classified watershed conditions and works with partners to protect and maintain functioning watersheds and to restore degraded watersheds on National Forest System lands. This effort can benefit from similar activities such as the National Fish Habitat Partnership’s (NFHP) assessment program that can help to identify priorities watersheds for protection and restoration. Similarly, listing conservation watersheds is intended to protect and maintain the most intact aquatic systems as well as restore degraded watersheds of high importance. These areas often include or overlap with ecosystems that depend on ground water, and they provide abundant clean water in addition to high aquatic biodiversity.



Many native fish and aquatic species are indicators of excellent water quality and depend on clean, abundant water flowing on and from the national forests and grasslands.

Source: <https://digitalmedia.fws.gov/cdm/singleitem/collection/natdilib/id/7908/rec/75>

Conservation watersheds will protect both common and rare species and habitats as well as natural processes at multiple scales (forestwide, regionwide, and nationwide), helping the Forest Service build a network of healthy, functioning watersheds. Conservation watersheds represent a strategic, long-term approach to working with partners to improve aquatic conditions on and off the National Forest System. In cooperation with States, other Federal agencies, and tribal governments, we will monitor the populations of native fish and other aquatic species, along with their habitats. Knowledge gained from monitoring will help us better understand the complex and ever-changing ecosystems we manage as well as evaluate approaches and formulate new strategies for sustaining and restoring them.

LONG-TERM VISION

Watersheds and aquatic ecosystems across the national forests and grasslands are in a healthy condition characterized by complex, interconnected, and diverse habitats. They contain self-sustaining assemblages of native fish and aquatic species and have a high level of resilience in the face of multiple stressors, including natural disturbances.

OBJECTIVES

Objective A: Evaluate the current status and diversity of populations of native fish and other aquatic species and their habitats on National Forest System lands in cooperation with states and other partners.

- i. Develop a coarse-scale national assessment of aquatic biodiversity on the national forests and grasslands by 2020, including identification of important native fish and other aquatic species, their conservation status and trends, and critical information gaps using available data and assessments from state fish and wildlife agencies, tribal governments, Federal agencies, and nongovernmental organizations. Update the assessment every 10 years.
- ii. Encourage development and updates of regional assessments of aquatic ecosystems on the national forests and grasslands that tier to the national assessment and contribute to forest plan revision and subsequent monitoring.
- iii. Encourage development and updates of finer scale assessments of aquatic ecosystems on the national forests and grasslands that contribute to forest plan revision and subsequent monitoring.

Objective B: Identify conservation watersheds to help the Forest Service strategically focus on protecting, conserving, and restoring the populations of native fish and other aquatic species.

- i. Cooperate with States and other partners including NFHP Fish Habitat Partnerships to develop criteria for identifying conservation watersheds on the National Forest System aligned with state plans, priorities, and outcomes. Select conservation watersheds by 2019 ~~and~~ ~~U~~update the list as needed.
- ii. Help ~~partners~~ States as requested identify other important areas off the National Forest System for protection, conservation, and restoration of the populations of native fish and other aquatic species.
- iii. Develop regional assessments of vulnerability of fish and aquatic resources on National Forest System lands to extreme weather events. The assessments should specify high-priority management actions in conservation watersheds.

Commented [NFHP9]: Recommend that the strategy reflect the distinction between the roles and authorities of states (and any other entities with statutory authority) and those of other partners when it comes to identifying conservation watersheds or establishing fishery management policy or actions.

Objective C: Participate in and contribute to developing and updating protection, conservation, and restoration plans.

- i. Participate in the development, updates, and reviews of conservation strategies and recovery plans for at-risk fish and other aquatic species (for example, National Fish Habitat Partnership plans, State-led and tribally led plans).
- ii. Incorporate measures from established protection, conservation, and restoration plans (that is, the Northwest Forest Plan, the Sierra Nevada Framework, PACFISH, and INFISH) into existing or new Forest Service strategies and into forest plan revisions. Refer to established protection, conservation, and restoration plans when selecting conservation watersheds.

Commented [NFHP10]: Agree!

Objective D: Carry out strategic protection, conservation, and restoration actions and demonstrate beneficial outcomes for native fish and aquatic communities.

- i. Perform watershed- and site-specific protection, conservation, and restoration activities based on watershed and threat assessments. Work in an integrated, interdisciplinary manner in collaboration with partners.

- ii. Plan and carry out road-related restoration activities, including best management practices and monitoring, to reduce risks and damage to aquatic resources, protect transportation infrastructure, and ensure safe access for communities.
- iii. Work with the ranching community and encourage new partnerships for working-lands solutions that improve riparian and aquatic habitats and coordinate through the National Fish Habitat Board and Fish Habitat Partnerships to find leverage.
- iv. Limit and reduce the impacts of invasive species on the Nation's fish and aquatic resources by implementing best management practices, including decontamination of boats and gear, and support public outreach and education to prevent the spread of invasive species. Work closely with States and participate in multipartner monitoring and surveillance programs to detect new invasions and to rapidly respond and coordinate through the National Fish Habitat Board and Fish Habitat Partnerships to find leverage.
- v. Track restoration actions and associated performance outcomes using official databases.

Objective E: Monitor populations of native fish and other aquatic species, along with their habitats.

- i. Monitor and assess populations of native fish and other aquatic species at multiple scales as well as habitat conditions over time. Coordinate monitoring and assessment with States, other Federal agencies, tribal governments, and nongovernmental organizations.
- ii. Monitor the effectiveness of management actions and apply the results to adapt and change management practices and strategies where needed (such as forest plans).
- iii. Support and expand a network of long-term monitoring sites, including sentinel and reference watersheds, to track watershed and aquatic habitat conditions over time.

GOAL 2: CONNECT PEOPLE TO THE AQUATIC WORLD THROUGH FISHING, BOATING, AND OTHER WATER-BASED ACTIVITIES

Fishing, boating, and other water-based activities afford economic, social, and cultural benefits. The Forest Service will enhance recreational fishing and water-based recreational activities on National Forest System lands across America through access, facilities, and programs that connect people in urban, rural, and underserved communities with the outdoors. Personal and cultural awareness of and appreciation for the beauty and value of nature build public support for public lands and their stewardship. Through increased public recognition of the value of healthy, sustainable fisheries and aquatic resources, we will engage more people in the conservation of natural resources.

LONG-TERM VISION

Everyone has opportunities to enjoy fishing and other water-based activities on the National Forest System, including youth and others with



Healthy watersheds and clean water on national forests and grasslands improve opportunities for people to explore and enjoy the aquatic world.

Source:
<https://digitalmedia.fws.gov/cdm/singleitem/collection/natdiglib/id/9941/rec/35>

limited access to the outdoors. The next generation of natural resource stewards understands and appreciates the value of public lands and waters and the benefits of clean water, water-based recreation, and healthy aquatic environments.

OBJECTIVES

Objective A: Increase recreational fishing ~~and fishing~~ opportunities on the national forests and grasslands.

- i. Maintain, improve, and expand public access for recreational fishing on the national forests and grasslands. Collaborate with state fish and wildlife agencies and partners to find high-priority locations for improvements that will yield the greatest increase in participation.
- ii. Collaborate with anglers, state fish and wildlife agencies, and partners to identify the social, cultural, and economic barriers to recreational fishing (for example, accessibility, transportation, prior experience, and language) and to seek remedies.
- iii. Support and expand partnerships locally, regionally, and nationally to increase recreational fishing, including coordination with state fish and wildlife agencies, other Federal agencies, tribal governments, and nongovernmental organizations.
- iv. Introduce youth to recreational fishing through activities such as kids' fishing events and educational campaigns in partnership with state fish and wildlife agencies, corporations, and other partners. Host 20 percent more events in each region in 2023 than in 2016. (In fiscal year 2016, a total of 96 youth fishing events reaching 23,200 people were reported by Forest Service units and regions.)
- v. Inform the public about the sustainable use of recreational fisheries, and fishing and boating safety.

Objective B: Connect people to the outdoors, public lands, and the Forest Service through water-oriented recreation, stewardship, citizen science, and educational activities across America.

- i. Work with partners to support volunteer opportunities for youth and adults to engage in citizen science, aquatic restoration, and educational programs and projects.
- ii. Work with the Forest Service's Conservation Education and NatureWatch programs and agency partners to help people learn about relationships among forests, watersheds, water, fish, and aquatic health (for example, through freshwater snorkeling, educational programs, and youth art contests).
- iii. Educate the public about conservation ethics through programs and workshops with partners.

Objective C: Increase public interest in recreational fishing, boating, and other water-based activities.

- i. Partner with state fish and wildlife agencies, other Federal agencies, and nongovernmental partners to promote recreational fishing and water-based activities on the national forests and grasslands.
- ii. Endorse and contribute to State recreational fishing programs, including those targeting sustainable native fisheries (such as Utah's Cutthroat Trout Slam and Florida's Trophy Catch).

Commented [NFHP11]: What metrics will be used to evaluate progress towards attaining this objective?

Commented [NFHP12]: Will additional resources be allocated to implement the improvements once they've been identified?

Commented [NFHP13]: Commendable, but highly ambitious – suggest providing more specificity for how this will be accomplished and how progress will be measured.

Commented [NFHP14]: Consider adding a statement to reflect support (financial or other) of efforts to evaluate and prioritize recruitment efforts.

Commented [NFHP15]: Suggest increasing to 50% more events over the same time period, bringing the total to 145 events.

Commented [NFHP16]: Recommend identifying metrics to evaluate the effectiveness of actions identified.

- iii. Document and communicate the economic and social value of recreational fishing and water-based recreational activities.
- iv. Use apps and other digital user platforms to share information about fishing access, opportunities, and regulations (for example, through “Discovery Agents” and “Discover the Forests”). Encourage the use of digital tools and platforms during events such as National Fishing and Boating Week, Public Lands Day, and Get Outdoors Day.

GOAL 3: STRENGTHEN PARTNERSHIPS AND WORK ACROSS BOUNDARIES

Tribal and state governments and our Federal and nongovernmental partners are critical to the Forest Service’s ability to achieve our strategic goals. Partners support Forest Service work by lending credibility and sharing resources. Partners help us achieve our objectives for collaborative conservation across multiple landownerships. We will expand and refine our partnership network and work to achieve shared objectives across jurisdictional boundaries and multiple landownerships.

LONG-TERM VISION

Partners support and lend credibility to the Forest Service’s science and management pertaining to fish and aquatic conservation. They play an essential role in achieving desired outcomes across multiple landownerships. Partnerships yield a wide range of benefits and are essential to meeting our strategic goals. We have a large and diverse partnership portfolio and are a partner of choice for large public–private ecosystem restoration and education outreach projects.

OBJECTIVES

Objective A: Work with tribal governments to form stronger and more effective relationships.

- i. Support subsistence use and fulfill treaty obligations, in cooperation with relevant State and Federal partners.
- ii. Incorporate traditional ecological knowledge into planning and design of restoration and management projects, as well as into monitoring and research, and recreational use of fish and aquatic resources, in cooperation with relevant State and Federal partners.
- iii. Improve working relationships, partnerships, and collaboration with tribal governments in areas of mutual interest related to fish and aquatic resources.

Objective B: Work with State governments to form stronger and more effective working relationships.

- i. Improve working relationships, partnerships, and collaborations with State fish and wildlife agencies to discuss and address areas of mutual interest related to fish and aquatic habitat, including continued annual fish enhancement/stocking to bolster fish populations for public recreational use and enjoyment on National forests and grasslands.
- ii. Leverage the expertise and resources of State fish and wildlife agencies and of the Forest Service to achieve mutual goals for the Nation’s forests and grasslands, including sustainable fisheries, increased participation in recreational fishing, and improved boating and fishing access.

Objective C: Expand collaborative efforts to achieve multiple benefits with all of our partners.

- i. Engage in partnerships and initiatives for collaborative conservation of fish and aquatic resources, including the Collaborative Forest Landscape Restoration Program, Watershed Condition Framework, Joint Chiefs' Initiative, and National Fish Habitat Partnership.
- ii. Partner with other Federal agencies, state and tribal governments, and local, regional, and national nongovernmental organizations in areas of shared interest, such as youth education, citizen science, recreational fishing, invasive species management, scientific research, and training.
- iii. Pursue partnerships that integrate objectives for restoring and protecting terrestrial and aquatic natural communities.

Commented [NFHP17]: Agree!

Objective D: Create strong and effective partnerships through durable and long-lasting relationships and improved business practices.

- i. Invest in establishing and maintaining strong relationships with state fish and wildlife agencies and other partners to develop a clear understanding of their unique perspectives as well as of mutual interests, strengths, and assets.
- ii. Establish and update formal agreements that specify mutual benefits, clear expectations, and deliverables for all parties involved.
- iii. Promote the use of multiple authorities for ecosystem and aquatic restoration (such as Stewardship Contracting, Good Neighbor, and Wyden Amendment authorities).

Objective E: Increase partnerships with water providers, corporations, and multistakeholder groups that result in expansive conservation outcomes with multiple benefits.

- i. Recognize and encourage successful partnerships to help keep them going.
- ii. Working with Forest Service researchers and partners, quantify the benefits of and the return on investments in ecosystem restoration projects on the national forests and grasslands.
- iii. Use the best available science to locate the best opportunities for large-scale investments in restoring aquatic and terrestrial communities while also yielding social and cultural benefits.

GOAL 4: DELIVER AND APPLY SCIENTIFIC RESEARCH

Science-based decisionmaking is critical to stewardship of fish and aquatic resources. The Forest Service produces and relies on high-quality science to help formulate strategies and actions to conserve fish and aquatic species. We contribute to and support scientific progress in fisheries and aquatic ecology by ensuring data consistency and quality and by sharing knowledge both internally and externally. Forest Service employees support the conservation of fish and aquatic resources by applying science and technology, building research partnerships, and creating and maintaining reliable databases.

Our scientists and natural resource managers will work together and with partners to formulate and investigate the highest priority research questions related to fisheries and aquatic ecology. Our researchers will advance the science of aquatic ecology and produce impartial and reliable data, analyses, and syntheses that managers and decisionmakers can use at local, state, regional, national, and international levels. We will communicate the value of research, align research

priorities in fish and aquatic ecology with management needs, and apply the best available science to guide policy and management decisions. The agency will work with partners such as the American Fisheries Society to use peer-reviewed scientific journals to share research results with the broader fisheries community.

LONG-TERM VISION

The Forest Service excels in science and science-based management of aquatic resources. Forest Service scientists collaborate with managers across the agency, as well as with State and other Federal agencies, academia, and other stakeholders. Our research is reliable, advances scientific understanding of aquatic ecosystems, and helps decisionmakers. Our national, publicly accessible databases document the status and trends of aquatic species and habitats across the national forests and grasslands. The public, other agencies, and Congress are well informed about the status of fish and aquatic resources and the importance of public lands for their conservation.

OBJECTIVES

Objective A: Prioritize research projects on fish and aquatic ecology needed to sustain the health and diversity of aquatic life on the Nation's forests and grasslands.

- i. Conduct and distribute a national fish and aquatic ecology research needs assessment every 5 years. Include fish and watershed professionals and stakeholders from both inside and outside the agency (e.g. members of the NFHP Science and Data Committee) in the assessment.
- ii. Develop and apply methods and protocols to meet inventory and monitoring requirements related to fish and aquatic resources at multiple levels.

Objective B: Produce, support, and synthesize the science related to the conservation of fish and aquatic resources needed to sustain the health and diversity of aquatic life in the Nation's forests and grasslands.

- i. Encourage partnerships and secure resources to meet the needs in the national assessment of science needs related to conserving fish and aquatic resources.
- ii. Encourage the formation of high-performance groups of researchers, managers, and partners with complementary expertise and supported by professional staff with necessary technical skills (that is, in relational databases, geospatial databases, Web design, and technology transfer).
- iii. Motivate researchers and managers to work together on high-priority research projects related to the conservation of fish and aquatic resources.

Objective C: Use Forest Service science to help managers achieve desired outcomes related to fish and other aquatic resources.

- i. Link research activities to management needs. Establish mechanisms for staff on the national forests and grasslands and for other management partners to engage our scientists in meeting their research needs.
- ii. To encourage collaboration, hold regular meetings across mission areas (National Forest System, Research and Development, and State and Private Forestry) and program areas (such as fisheries, watersheds, soils, range ecology, and forest management). Establish other regular channels of communication among scientists and managers. Consider using

regular meetings of groups like the American Fisheries Society to maximize communication efforts.

iii. Maintain and expand the Forest Service's ability to share knowledge internally and externally through innovative approaches to technology transfer.

iii-iv. Work with partners, including NFHP and FHPs, to deliver science and results such as through journals and mailing lists.

Objective D: Improve practices for data collection and stewardship to increase transparency and opportunities for partnerships inside and outside the Forest Service.

- i. In cooperation with state fish and wildlife agencies, tribal governments, and Federal agencies, develop and use nationally standardized protocols to collect, report, manage, and share data about fish and aquatic resources on the national forests and grasslands. Build on the Forest Service's capacity to collect and analyze large datasets from various partners and across diverse landscapes
- ii. Streamline and improve monitoring programs and databases to increase the knowledge gained from monitoring data and to improve the usage, interoperability, stewardship, and accessibility of data.
- iii. Create database task force teams to work with the national forests and grasslands and partners to compile, organize, and integrate large legacy datasets and new datasets to address issues related to the protection and conservation of fish and aquatic resources at broad scales.

GOAL 5: BUILD CAPACITY THROUGH MENTORING AND TRAINING

Competent, motivated, and well-networked professionals and technicians are essential to successful aquatic resource management. The Forest Service gives employees training and opportunities to effectively manage aquatic resources on the national forests and grasslands and to advance science to improve aquatic resource management. We will improve the skills, capabilities, and professionalism of our workforce in support of the conservation of fish and aquatic resources. We will recruit and maintain a diverse workforce with opportunities, training, technologies, and toolsets to increase its effectiveness. We will foster an inclusive work environment, recognizing and valuing the diverse perspectives and contributions of all employees. Formal and informal networking with peers and mentors will accelerate capacity building and adaptability, transferring institutional knowledge throughout the workforce. We will create opportunities for professionals and technicians to grow and develop throughout their careers.

LONG-TERM VISION

The Forest Service's well-trained, effective professionals consistently perform at a high level and are recognized for their contributions. They demonstrate leadership, working in an interdisciplinary manner in support of fish and aquatic resource conservation by planning and executing integrated resource management projects and scientific investigations. They are part of an active network of professionals who support and advise one another. They work well together and with others, and they are sensitive to the concerns of others, both internally and among external constituencies. Resources are available for training and professional development. Peers,

supervisors, program leaders, and mentors encourage staff to participate in developmental opportunities, raise their visibility, and showcase their technical skills and professional achievements. The diversity of Forest Service fisheries biologists and aquatic ecologists reflects the public we serve.

OBJECTIVES

Objective A: Recruit and maintain employees from diverse backgrounds to meet current and future needs for fish and aquatic resource research and management.

- i. Assess staffing needs for current and future workloads. Develop coordinated plans to meet needs nationally, regionally, and locally.
- ii. Adopt efficient and effective consolidated hiring practices for positions related to fisheries biology and aquatic ecology.
- iii. Support entry-level and career-ladder positions throughout the agency.
- iv. Recruit from underrepresented groups to diversify workforce perspectives.
- v. Reach out to students at all levels by offering workshops and distributing information at professional conferences.
- vi. Develop and support career opportunities for youth and young adults through internships, summer work programs, and seasonal jobs.

Objective B: Offer training and mentoring for technical and professional development.

- i. Assess technical and professional training needs and opportunities. Encourage employees to complete training in aquatic ecosystem management. Work with professional societies and other agencies to coordinate training schedules and opportunities for continuing education.
 - ii. Expand mentoring opportunities across mission and program areas at all agency levels.
 - iii. Expand opportunities for fisheries biologists and aquatic ecologists to take communications training to help them network and tell their stories.
 - iv. Offer leadership development through formal leadership programs (such as the Forest Service Middle Leader and Senior Leader Programs), training, detail assignments, and job shadowing.
 - v. Emphasize the importance of individual development plans.
 - vi. Incorporate IPA's (Inter-personnel Agreements) and staff details with AFS, state fish and wildlife agencies to cross-train staff.
 - vii. Develop internship opportunities.
- ✖:

Objective C: Foster an environment of professional excellence.

- i. Encourage employees to participate in and contribute to professional societies (such as the American Fisheries Society and the Society for Freshwater Science) at national, regional, and local levels, including serving in leadership positions.
- ii. Hold agency meetings among researchers and managers in fisheries biology and aquatic ecology in conjunction with external professional meetings to encourage internal and external coordination and networking.

Commented [NFHP18]: The details under this objective are described in more general terms than those in earlier objectives. More description will help to explain intent. One option is to connect with the state-private Diversity Joint Venture effort now underway.

Commented [NFHP19]: Consider a diversity joint venture to increase diversity in aquatic work places.

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- iii. Recognize and reward exceptional contributions to fish and aquatic conservation and science and to an integrated fish and aquatic conservation community through the annual Rise to the Future awards program.

GOAL 6: COMMUNICATE THE VALUE OF OUR WORK

Sharing what the Forest Service does and why we do it demonstrates the value of our work and enhances our ability to support the conservation of fish and aquatic resources. We are committed to awakening and strengthening the connection of all people to aquatic ecosystems. Accordingly, we will tell our stories locally, nationally, and globally. We will listen and respond to the needs and values of the public. We will be accountable for the resources we manage, and we will effectively communicate our accomplishments and explain the value of conserving fish and aquatic resources and its connection to abundant clean water for the American public. We will showcase our conservation successes and the recreational and other opportunities we offer.

LONG-TERM VISION

A wide range of local, national, and global audiences understand the value of our work in fish and aquatic conservation. The public, our agency, and our partners appreciate the value of fish and aquatic resources, recognizing our role in conserving them and in delivering abundant clean water. We listen and respond to the public and our partners.

OBJECTIVES

Objective A: Develop and share media and information to increase public awareness of and engagement with fish and aquatic resources on the national forests and grasslands.

- i. Work with state and tribal governments, Federal agencies, and nongovernmental partners to develop and share coordinated messages that underscore the connection between healthy fish and aquatic resources and abundant clean water.
- ii. Work with communications and marketing experts to develop and carry out a communications and outreach plan to deliver key messages through film, social media, and other formats (such as fish cams) to tell our story to various audiences.
- iii. Update our Websites regularly and use social media to communicate the benefits of our work to the American public.
- iv. Encourage upward reporting of conservation success stories related to fish and aquatic resources (such as Show-and-Shine reports) at the forest, region, station, and Washington Office levels.
- v. Highlight stories about staff and partners who work across disciplines and geographies in support of fish and aquatic resource conservation in urban locations and other nontraditional arenas (such as grazing, engineering, and wildland fire management).
- vi. Motivate Forest Service researchers to share their findings through social media and networks in both scientific and nontechnical language.

Objective B: Communicate the value of partnerships in achieving the Forest Service's mission.

- i. Track partner support and diversity and communicate the corresponding benefits to stakeholders, the public, and Congress.

- ii. Work with partners such as the communications committees of the National Fish and Aquatic Stewardship Strategy and individual Fish and Aquatic Stewardship Strategy Partnerships to Promote effective partnerships and collaboration through awards, outreach material, and media, illustrating models and components for success.

Objective C: Listen and respond to partners and the public.

- i. Find opportunities to interact with various audiences, including in urban communities, to get people's perspectives about fish and aquatic resources and our stewardship activities.
- ii. Invite individuals and communities to use social media and other interactive communication platforms to tell their stories and express their values with respect to fish and aquatic resources.
- iii. Incorporate partner and public feedback into our program direction, public outreach and education activities, conservation projects, and youth programs.

VI. ALIGNMENT OF THE NATIONAL FISH AND AQUATIC STEWARDSHIP STRATEGY WITH THE FOREST SERVICE STRATEGIC PLAN

The National Fish and Aquatic Stewardship Strategy's six goals, along with their supporting objectives and action items, will help the agency to carry out the Forest Service Strategic Plan. As regional offices, research stations, and national forests and grasslands tier their respective fish and aquatic conservation plans and activities to this national strategy, the Forest Service will make progress locally, regionally, and nationally in achieving the goals of this strategy. We will meet the ecological, social, and economic goals of the National Fish and Aquatic Stewardship Strategy by working together across mission and program areas to achieve multiple benefits at all levels. Equally important is collaborating with and aligning priorities with tribal governments, state fish and wildlife agencies, other federal agencies, adjacent private landowners, and the many and diverse stakeholders and partner organizations who use and value the National Forest System. It is crucial not only to align our priorities with those of our partners and to meet their expectations but also to complement each other's strengths, skills, and assets.

Appendix A describes the alignment of the six goals outlined in this strategy with the four strategic goals in the Forest Service's Strategic Plan. In some cases, the goals in this strategy align with more than one agencywide strategic goal.

Long-Term Vision for the Results of Alignment: Protection, conservation, and restoration of abundant clean water and fish and aquatic resources are widely recognized and embraced as an important part of who the Forest Service is and what the agency does. The agency actively engages with government and non-government partners at local, regional, and national levels to ensure our efforts support the conservation, recovery, and public use and enjoyment of fish and other aquatic resources.

VII. HIGH-PRIORITY ACTIONS AND PROGRESS MEASURES

To begin carrying out the National Fish and Aquatic Stewardship Strategy, the Forest Service will focus on implementing the eight high-priority actions listed below. The actions are from the list of goals and objectives above, as indicated in parentheses after each action. Each action is associated with a clear deliverable (that is, a plan or assessment) or numerical accomplishment (for example, a 20-percent increase in partnerships) and an associated timeframe.

Accomplishing the actions in coordination with our partners within the specified timeframes will demonstrate that the strategy is producing results and contributing to the desired outcomes set forth in the Forest Service Strategic Plan.

HIGH-PRIORITY ACTIONS

1. Develop a coarse-scale national assessment of aquatic biodiversity on the national forests and grasslands by 2020 (goal 1, objective Ai).
2. Cooperate with States and other partners to develop criteria for identifying conservation watersheds for fish and aquatic species on national forests and grasslands. Select conservation watersheds by 2019. Update the list as needed (goal 1, objective Bi).
3. Collaborate with state fish and wildlife agencies and partners to identify the best locations for improving access to recreational fishing by 2019—locations that will increase fishing the most (goal 2, objective Ai).
4. Increase the number of youth who connect to the outdoors through recreational fishing and other water-based activities by 20 percent by 2023 (goal 2, objectives Aiv and Bii).
5. Increase partnerships with States, tribal governments, water providers, corporations, and multistakeholder groups that result in meaningful conservation outcomes with multiple benefits by 20 percent by 2023 (goal 3, objectives A, B, and D).
6. Conduct and distribute a national fish and aquatic ecology research needs assessment by 2019 (goal 4, objective Ai).
7. Develop business practices and protocols for effective mentoring of fisheries biologists and aquatic ecologists by 2018 (goal 5, objective Bii).

Commented [NFHP20]: Please see comments in the Executive Summary.

8. Work with communications and marketing experts to develop and implement a communications and outreach plan by 2018 (goal 6, objective Aii).

STEERING COMMITTEE

A strategy implementation steering committee will give guidance and ensure accountability in achieving results. The purpose of the steering committee is to evaluate the effectiveness of the National Fish and Aquatic Stewardship Strategy and its alignment with, and contributions to meeting, the broader goals of the Forest Service and the fish and aquatic conservation community. The steering committee will include Washington Office directors, regional office directors, forest supervisors, research station assistant directors or program managers, and representatives from partner organizations. The national fisheries program leader and the national program leader for fish and aquatic ecology research will meet with the steering committee every 2 years, beginning in the first quarter of fiscal year 2020, to report on strategy implementation. The steering committee will receive written progress reports at the meetings, and the reports will be shared widely, internally and externally.

IX. ACKNOWLEDGMENTS

Numerous participants across the agency at all levels contributed to the development of this strategy, including participants from all three mission areas (National Forest System, Research and Development, and State and Private Forestry). Several key partner organizations also contributed and many tribal governments provided input. Appendix B lists the names and affiliations of all who contributed.

KEY MESSAGES

Note to Reviewers: In the final version of the strategy, the following key messages will not appear in this location or in this format. Instead, the key messages will be placed throughout the strategy in the sections of the document indicated in brackets after each message. The purpose of these messages is to convey in a condensed manner the major themes of the strategy. Each key message will be set off from the main body of the text and will be illustrated with a high-quality photo related to the message. The placement of the messages and accompanying photos will occur as the strategy is prepared for final production. Comments on the key messages are welcome.

Americans benefit from nature and healthy headwaters on the national forests and grasslands. [couple with photo and put next to Sec. III.]

Fish your national forests. [couple with photo and put next to Goal 2.]

Explore waters on your national forests. [couple with photo and put next to Goal 2.]

The Forest Service is a premier fish and aquatic habitat conservation agency. [couple with photo and put next to either the Chief's Statement or Sec. IV or Sec. V – tbd]

Science is the foundation for collaborative fish and aquatic conservation. [couple with photo and put next to Goal 4]

Partnerships are key to our success. [couple with photo and put next to Goal 3.]

The Forest Service manages some of the best remaining fish and aquatic habitat in the country. [couple with photo and put next to Goal 1.]

Fish and aquatic resources on the national forests and grasslands are an irreplaceable part of America's cultural legacy. [couple with photo and put next to Goal 6.]

Fish and aquatic resources on the national forests and grasslands have tremendous economic value. [couple with photo and put next to Goal 6.]

People are our most valuable asset. [couple with photo and put next to Goal 5.]

APPENDIX A. CORRELATION OF NATIONAL FISH AND AQUATIC STEWARDSHIP STRATEGY GOALS WITH AGENCY GOALS

The goals of the Forest Service's National Fish and Aquatic Stewardship Strategy are correlated with the goals of the USDA Forest Service Strategic Plan: FY2015 – 2020.

The four goals of USDA Forest Service Strategic Plan are:

Sustain our Nation's forests and grasslands

Deliver benefits to the public

Apply knowledge globally

Excel as a high-performing agency

The descriptions below specify how each of the six goals of the National Fish and Aquatic Stewardship Strategy align with one or more of the four Forest Service strategic goals.

Goal 1. Conserve and restore fish and aquatic resources.

Fish and aquatic resources are integral parts of the Nation's forests and grasslands. As we conserve healthy native fish populations and restore aquatic resources on national forests and grasslands, we contribute to *sustaining our Nation's forests and grasslands*.

Goal 2. Connecting people to the aquatic world through fishing, boating, and other water-based activities.

Fishing, boating, and other water-based activities that connect people to the aquatic world are enjoyable and valued experiences that offer a wide range of personal and social benefits from relaxation to exhilaration to education to making positive memories with friends and family. As people participate in these activities on national forests and grasslands, we *deliver benefits to the public* and we foster a caring, engaged public with a sense of stewardship to ensure we collectively *sustain our Nation's forests and grasslands*.

Goal 3. Strengthen partnerships and work across boundaries.

No single agency or organization can do all that needs to be done to conserve the Nation's fish and aquatic resources. Partnering with other Federal agencies, States, tribal governments, nongovernmental organizations, and private landowners is vital to fish and aquatic conservation, and is essential to *sustaining our Nation's forests and grasslands*. With rich and diverse partnerships, we are able to accomplish more than we would be able to do alone, increasing our ability to *deliver benefits to the public* and to *excel as a high-performing agency*.

Goal 4. Deliver and apply scientific research.

The fish and aquatic ecology research we conduct serves as the foundation for fish and aquatic conservation at multiple scales. This scientific foundation is necessary to *apply knowledge globally* and to manage aquatic resources effectively so that we *excel as a high-performing agency*.

Goal 5. Build capacity through mentoring and training.

A well-trained, highly-motivated diverse workforce is a critical component of our organizational capacity to *excel as a high-performing agency* which allows us to *sustain our Nation's forests and grasslands, deliver benefits to the public, and apply knowledge globally*.

Goal 6. Communicate the value of our work.

Communication is key in all that we do. Effectively communicating the value of our work lends relevance and credibility to our efforts to *sustain our Nation's forests and grasslands, deliver benefits to the public, apply knowledge globally, and excel as a high-performing agency*.

APPENDIX B. CONTRIBUTORS

Numerous participants across the agency at all levels contributed to the development of this strategy, including participants from all three mission areas (National Forest System, Research and Development, and State and Private Forestry). Several key partner organizations also contributed and many tribal governments provided input. The names and affiliations of all who contributed follow below.

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