

**BUREAU OF LAND MANAGEMENT**



# **Conserving and Restoring Riparian, Fisheries, and Water Resources in a Changing Climate:**

**A 5-Year Strategy for the BLM's Aquatic Resources Program**



January 2022

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# Conserving and Restoring Riparian, Fisheries, and Water Resources in a Changing Climate:

**A 5-Year Strategy for the BLM's Aquatic Resources Program**

**U.S. Department of the Interior  
Bureau of Land Management**

**January 2022**



# BLM's Aquatic Resources Program

## Mission

Conserve and restore riparian, fisheries, and water resources to provide resource values and ecosystem services necessary to achieve the BLM's multiple use and sustained yield mandate.

## Vision statement

Create an interdisciplinary program that is a leader in the conservation and restoration of riparian, fisheries, and water resources for the benefit of all Americans.



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# Executive Summary

The Bureau of Land Management (BLM) Aquatic Resources Program developed this 5-year strategy to address priority public land management issues with a focus on the climate crisis. As the largest land management agency in the U.S., the BLM has a critical role to play in conserving and restoring riparian, fisheries, and water resources to provide resource values and ecosystem services necessary to achieve the agency's multiple use and sustained yield mandate. Unprecedented drought, species loss, and wildfire also require a renewed focus on ensuring ecosystem resistance, resilience, and adaptability to combat the effects of climate change.

This 5-year strategy highlights the following four overarching goals focused on the development and use of the best available science to conserve and restore riparian, fisheries, and water resources for the use and enjoyment of present and future generations. These goals will position the multidisciplinary Aquatic Resources Program to be a leader in the conservation and restoration of riparian, fisheries, and water resources in an era of rapid ecological change.

1. Conserve, restore, and connect riparian, fisheries, and water resources.
2. Protect water supplies and uses.
3. Prevent the establishment and spread of aquatic invasive species.
4. Foster a watershed approach to improve water quality.

The strategy also identifies key elements to successfully achieve these goals, which include an emphasis on process-based approaches to restoration; working collaboratively both within the agency and with partners and communities to implement on-the-ground actions; maintaining and leveraging a diverse workforce of technical experts; and implementing an evidence-based approach to decision making.

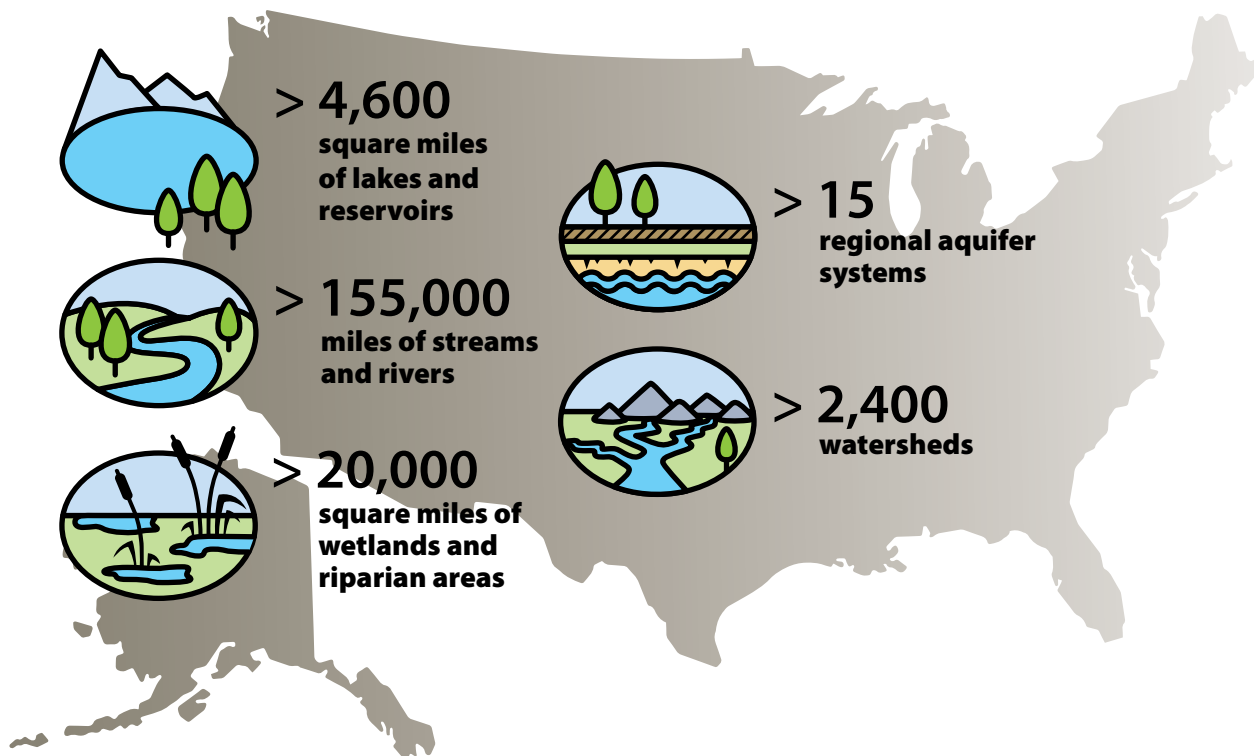


# BLM's Aquatic Resources Program

The Aquatic Resources Program conserves and restores riparian, fisheries, and water resources. Riparian and wetland areas, lakes, streams, and aquifers on public lands managed by the Bureau of Land Management (BLM) are among the most important, productive, and diverse resources in the Nation. They provide habitat for myriad species of plants, fish, and wildlife; provide ecosystem services such as drinking water, pollination, and nutrient cycling; attenuate effects of wildfires, floods, and drought; and are key to the vitality of local economies and communities. Of increasing interest is the ability of riparian and wetland areas such as fens, riparian wetlands, prairie

wetlands, and peatlands to sequester carbon and combat climate change. These resources also support permitted activities on public lands such as livestock grazing, energy and mineral development, timber production, and recreation. Healthy riparian areas, fisheries, and watersheds are essential to achieving the agency's multiple use and sustained yield mandate as directed by the Federal Land Policy and Management Act (FLPMA)<sup>1</sup> and ensure the agency complies with the Clean Water Act, Endangered Species Act, Wild and Scenic Rivers Act, and National Environmental Policy Act (NEPA).

## BLM-Managed Public Lands Include:

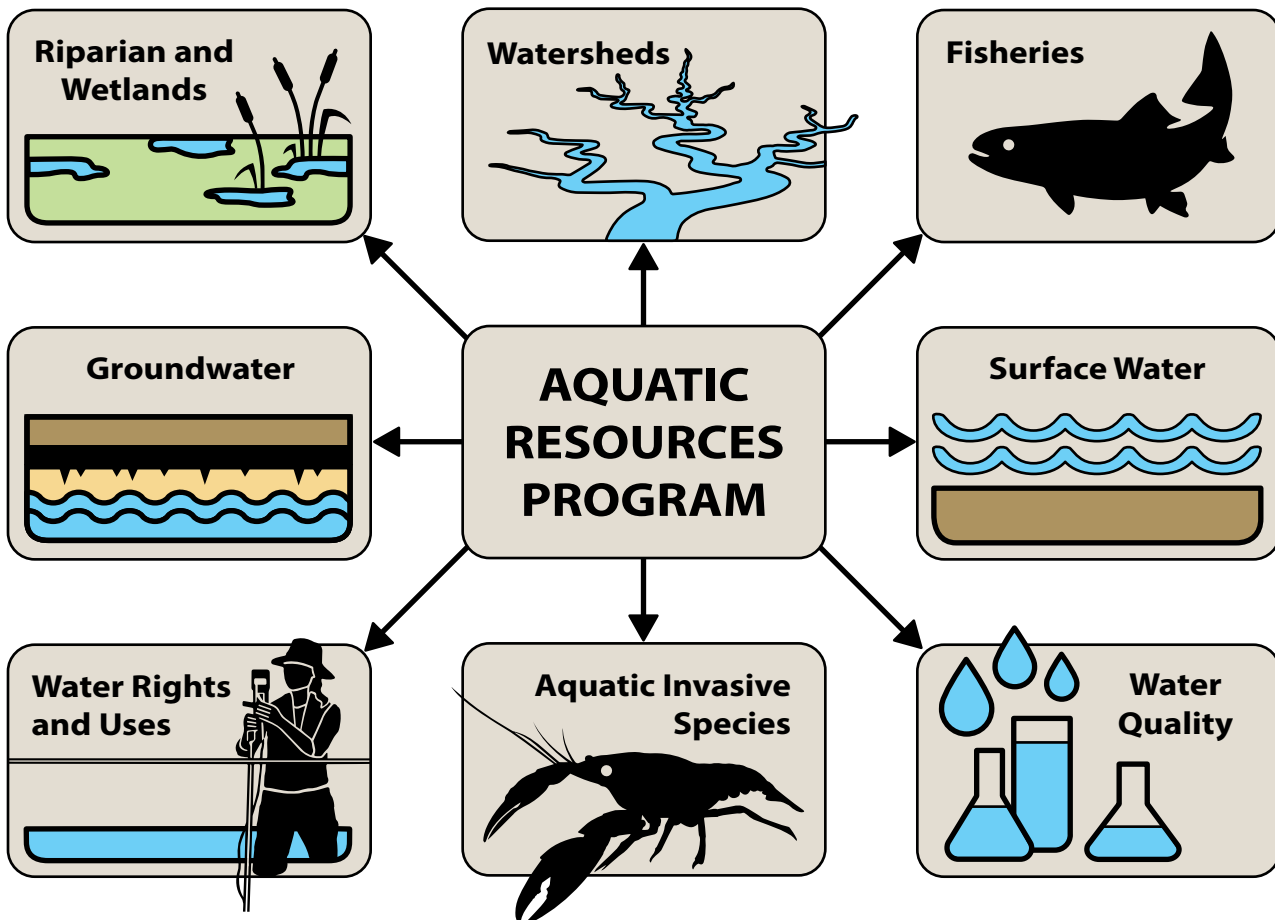


<sup>1</sup> The Aquatic Resources Program implements FLPMA by conducting periodic and systematic resource inventories (Section 102(a)(2)); protecting the quality of ecological, environmental, and water resources (Section 102(a)(8)); providing food and habitat for fish and wildlife (Section 102(a)(8)); supporting outdoor recreation and human use (Section 102(a)(8)); and ensuring compliance with applicable pollution control laws including water pollution standards (Section 202(c)(8)).

To successfully implement this program in an era of rapid ecological change, the Aquatic Resources Program's core functions are:

- **Decision Support:** Inventory, assess, and monitor riparian, fisheries, and water resources to inform our understanding of condition and trend, guide the BLM's management activities, and assess regulatory compliance.
- **Conservation:** Maintain and protect the chemical, physical, and biological integrity of the Nation's lands and waters.
- **Restoration:** Restore riparian, fisheries, and water resources affected by past and present land and water uses, aquatic invasive species, wildfire, drought, and floods; and increase their resistance, resilience, and adaptability to climate change.
- **Sustainability:** Identify the quantity and quality of water required to conserve and restore riparian and fisheries resources, and secure water rights and protections so sufficient water is physically and legally available for all public land management purposes.
- **Environmental Compliance:** Ensure full compliance with applicable federal law, Executive orders, regulations, and policy and with state laws where such compliance does not conflict with federal law mandates.
- **Collaboration:** Coordinate, cooperate, and consult with federal, state, tribal, and local governments and other programs, partners, and communities, to foster adaptive approaches to conservation and restoration and implement education and outreach programs.

## Multidisciplinary Elements of the BLM's Aquatic Resources Program





## Management Challenges and Goals

Informed decision making is paramount given the challenges associated with ever-increasing diversity and intensity of public lands uses, competing societal values for public lands, and rapid ecological change. At risk are countless species, habitats, ecosystem services, and the social and economic well-being of western communities that depend on healthy, functioning riparian, fisheries, and water resources.

Freshwater habitats, resources, and species are declining at unprecedented rates.<sup>2</sup> Chief among the drivers are water development and climate change. Dams, diversions, and groundwater extraction disconnect and degrade riparian and fisheries habitat and deplete water supplies. Climate change affects all aspects of the hydrologic cycle. Hydrologic stress resulting from climate change alters the timing, frequency, duration, and magnitude of events such as drought, floods, and wildfire; alters the thermal regime of freshwater habitats; exacerbates resource use impacts; and threatens to undermine restoration actions. Drought and wildfire exacerbated by climate change have the potential to adversely impact multiple BLM programs by reducing the availability

of water and vegetation. Interacting with these threats are challenges related to invasive species, pollution, and current and past permitted and legacy uses on public lands.

This 5-year strategy focuses on four overarching goals that position the BLM's Aquatic Resources Program to be a leader in the conservation and restoration of riparian and fisheries resources and the protection of water supplies for the benefit of all Americans, including: (1) Conserve, restore, and connect riparian, fisheries, and water resources; (2) Protect water supplies and uses; (3) Prevent the establishment and spread of aquatic invasive species; and (4) Foster a watershed approach to improve water quality.

A set of metrics will be developed to track progress toward achieving the four main goals, the success of implemented actions, and the need for adjustments. Baseline values and benchmarks for defining success will be established in 2022 and adjusted to allocated funding levels. After the 5-year period, the plan will be assessed in light of changing conditions and needs.

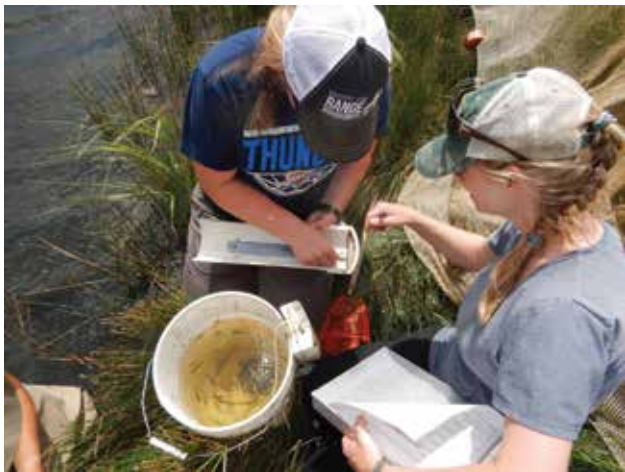


Response of Dixie Creek in Nevada to changes in riparian grazing management

<sup>2</sup> Source: IPBES. 2019. The Global Assessment Report on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany.

## Goal 1: Conserve, restore, and connect riparian, fisheries, and water resources.

As the largest land management agency in the U.S., the BLM has a critical role to play in ensuring the health and sustainability of riparian, fisheries, and water resources and their resistance, resilience, and adaptability to combat climate change. The BLM must focus on policies and management efforts that conserve remaining high-quality lands and waters; restore degraded riparian, fisheries, and water resources; and ensure the connectivity of these systems. Specific objectives to achieve this goal include:



Hutton scholarship interns assisting with field work in Montana

### Objective 1.1: Conserve remaining high-quality lands and waters.

#### Actions:

- a. Ensure policies and procedures are in place to facilitate conservation and attainment of administration goals, such as conserving 30% of the Nation's lands and waters by 2030 in accordance with Executive Order 14008.
- b. Improve implementation of the land use planning process to identify and designate priority lands, waters, and habitats and area-specific use restrictions.
- c. Work collaboratively with federal, state, tribal, and local governments and communities to identify, study, and make recommendations on potential additions to the National Wild and Scenic Rivers System.
- d. Work across BLM Directorates, BLM offices, and with partners to prioritize land and water right acquisitions using the Land and Water Conservation Fund and other authorities to restore and reconnect freshwater systems and to create a well-designed and connected system of conservation areas.
- e. Remove, minimize, or mitigate current threats and stressors to remaining high-quality riparian, fisheries, and water resources.

## Objective 1.2: Restore degraded riparian, fisheries, and water resources.

### Actions:

- a. Restore processes required to improve the health and associated resistance, resilience, and adaptability of riparian, fisheries, and water resources, where applicable. Examples include restoring floodplain connectivity, habitat diversity, instream flows and thermal regimes, and the natural processes supporting surface water and groundwater retention.
- b. Streamline the administrative process for restoration projects by developing new categorical exclusions, programmatic environmental assessments, and improving coordination with permitting agencies.
- c. Develop and implement tools to prioritize watersheds and water bodies for restoration and to assess the efficacy of restoration activities.
- d. Recruit and employ the next generation of resource specialists to conduct restoration efforts.
- e. Create a BLM service team to assist field offices in the planning, design, and implementation of restoration projects.



## Objective 1.3: Connect riparian, fisheries, and water resources.

### Actions:

- a. Reconnect tributaries within mainstem habitat by removing fish passage barriers and maintaining free-flowing and adequate thermal conditions throughout watersheds.
- b. Reconnect systems laterally by ensuring floodplains are connected and rivers are free to traverse valley floors to dissipate energy, recharge aquifers, and create complex habitats.
- c. Maintain groundwater levels and discharge to springs, riparian and wetland systems, streams, and other freshwater resources that provide habitat and ecosystem services.
- d. Implement these strategies in compliance with state water laws, in cooperation with federal, state, tribal, and local governments, and by using the BLM's land use planning and authorization authorities or developing new or supplemental polices where needed.



(Left) Low-tech stream restoration in Utah and (above) wetland restoration in California



## Goal 2: Protect water supplies and uses.

Water resource sustainability is the development and use of water supplies to meet present and future needs without causing unacceptable environmental or socioeconomic consequences. Ensuring water of sufficient quality and quantity is physically and legally available to sustain riparian and fisheries resources requires developing sustainability goals and engaging in federal and state procedures that guide water allocation and administration. Increasing proactive measures to protect instream and groundwater-dependent uses on BLM-managed lands is key to providing reliable water supplies, building long-term wildfire and drought resilience, and improving the ability of the BLM to conserve the economic and resource values of public lands. To achieve this goal, the BLM will emphasize the following objectives:

### Objective 2.1: Ensure water availability to sustain healthy riparian and fisheries resources.

#### Actions:

- a. Quantify ecological water requirements by identifying the rate, volume, timing, and quality of surface water and groundwater required to sustain healthy riparian and fisheries resources on public lands.
- b. Determine limits of acceptable ecological change given the specific values for which riparian and fisheries resources are managed (e.g., biodiversity, drought resilience, subsistence harvest, drinking water supply, grazing, recreation).
- c. Utilize the BLM's land use planning and authorization authorities, and develop new or supplemental policies where needed, to ensure water uses on BLM-managed lands are sustainable.

- d. Participate in state, tribal, and community efforts to identify shared sustainability goals and public trust resources to prevent unsustainable uses of surface water and groundwater supplies.

### Objective 2.2: Secure water rights and uses for public land management purposes.

#### Actions:

- a. Acquire federal reserved and state-based water rights in compliance with state law to ensure water is available for public land management purposes.
- b. Prioritize proactive measures for areas that are likely to be adjudicated, not fully appropriated, or facing emerging threats. Examples include inventorying public water reserves<sup>3</sup> and quantifying instream flows for designated wild and scenic rivers and freshwater systems in other components of National Conservation Lands for which federal reserved water rights have been established.
- c. Collaborate with state and tribal governmental agencies to prioritize the adjudication of federal reserved water rights.



Measuring groundwater levels in Nevada

<sup>3</sup> Springs and waterholes that existed as of April 17, 1926, on vacant, unappropriated, unreserved public lands were reserved by Executive order (Public Water Reserve No. 107) for the primary purposes of stockwatering and human consumption.



## Objective 2.3: Protect water rights and uses in compliance with state law.

### Actions:

- a. Participate in state adjudications, federal negotiations to settle tribal water rights claims, and the negotiation of water right settlement agreements.
- b. Comply with federal and state water use reporting and water rights administration requirements to maintain the validity of BLM-administered water rights.
- c. Determine the extent to which existing and proposed diversions of surface water and groundwater affect the agency's water interests and work with legal counsel to protect those interests.



Measuring streamflow in Milk Creek in Colorado

### Goal 3: Prevent the establishment and spread of aquatic invasive species.

Preventing and controlling the spread of aquatic invasive species (AIS) is critical to conserving riparian and fisheries resources, protecting sensitive species and water supplies, and mitigating economic losses. In partnership with national, regional, and state efforts, the BLM will work to prevent and contain the spread of AIS through outreach, prevention, and control measures. Following the “U.S. Department of the Interior Invasive Species Strategic Plan,” the BLM will pursue two main objectives:

#### Objective 3.1: Work collaboratively to manage AIS.

**Actions:**

- a. Ensure all AIS efforts are coordinated across federal, state, tribal, and local governments.
- b. Identify consistent and annual funding to support interagency AIS efforts, such as outreach and education, early detection and rapid response monitoring, interdiction, and containment.
- c. Use memoranda of understanding, cooperative agreements, and other instruments to strengthen collaboration with our partners to advance efficient management strategies.
- d. Work to improve invasive species data management for decision making across the Department of the Interior (e.g., AIS distribution, watercraft inspection tracking, efficacy of control efforts).

#### Objective 3.2: Control the introduction and spread of AIS.

**Actions:**

- a. Support and utilize predictive modeling and other decision-support tools to identify high-risk species, pathways, and vulnerable systems.
- b. Educate public land users on invasive species prevention and control measures.
- c. Work collaboratively with BLM programs to prevent the spread of AIS from BLM actions or BLM-permitted actions.
- d. Develop and implement site-specific prevention, containment, and eradication strategies to reduce the invasion risk and spread of AIS.



Boat propeller covered with invasive zebra mussels

## Goal 4: Foster a watershed approach to improve water quality.

Healthy watersheds provide clean, safe water and freshwater habitats. The Aquatic Resources Program estimates that 1 in 10 Americans in the West can tie their source of drinking water to BLM-managed lands and recognizes that interactions with water resources supports the physical and emotional well-being of individuals and communities. The program applies a watershed approach to maintain or restore water quality in shared landscapes. This requires consideration of the full range of ecosystem processes and functions critical to providing clean, safe water during unprecedented drought, species loss, and wildfire. The following objectives place an increased emphasis on collaborating with other programs and partners that share responsibility for preventing water quality degradation:

### Objective 4.1: Enhance education and outreach.

#### Actions:

- a. Develop new water quality monitoring and restoration partnerships with federal, state, tribal, and local governments; nongovernmental organizations; and frontline communities.
- b. Promote and continue to participate in programs such as the American Fisheries Society's Hutton Junior Fisheries Biology Program and the Civilian Climate Corps to provide summer internships and mentoring opportunities for underrepresented communities.
- c. Increase participation in programs such as Project Healing Waters Fly Fishing and the Wounded Warrior Project that seek to rehabilitate the physical and emotional well-being of disabled veterans and underrepresented communities.
- d. Promote BLM engagement in citizen science efforts to improve public understanding of freshwater resource conditions.

### Objective 4.2: Reduce releases of pollutants into public waters.

#### Actions:

- a. Ensure the BLM's land use plans and policies provide for compliance with applicable water pollution standards and incorporate provisions allowing for the suspension or revocation of a lease/grant/permit/authorization for noncompliance with water quality standards.
- b. Continue to implement programs such as the Colorado River Basin Salinity Control Program to control point and nonpoint sources of salt and sediment pollution on public lands to improve the usability of water for freshwater ecosystems, agriculture, and human consumption.
- c. Collaborate with BLM programs to identify wells, well sites, and other uses on public lands that pose a risk to water quality and drinking water supplies to ensure full compliance with applicable water pollution standards.
- d. Develop and implement tools to identify priority watersheds and river segments for water quality improvements and protections.
- e. Update or develop new memoranda of understanding/agreements with the Environmental Protection Agency and state and local agencies to protect water quality and drinking water supplies.



Measuring water quality in Alaska



## Keys to Program Success

Achievement of these four long-term goals requires the BLM to operationalize an integrated Aquatic Resources Program. While there are numerous keys to success, the Aquatic Resources Program highlights four that focus on increased use of process-based restoration, improved partnerships, enhanced human capital, and generating and using the best available science to inform management decisions.

### Increase implementation of process-based approaches to restoration.

A process-based approach to restoration promotes healthy riparian, fisheries, and water resources and their resistance, resilience, and adaptability to droughts, wildfire, and flooding and yields benefits for water supplies, habitats, species, and local economies. Process-based restoration seeks to reestablish normal rates and magnitudes of physical, chemical, and biological processes that create and sustain riparian, fisheries, and water resources.<sup>4</sup> Example practices include reestablishing natural hydrologic or thermal regimes; promoting lateral, longitudinal, and vertical connectivity of riparian and fisheries resources; and managing uplands for natural rates of sediment erosion and transport. Where possible, such approaches are favored over actions that do not address root causes of degradation, that attempt to build habitat conditions that only benefit individual species, and/or that unduly or irreversibly modify systems to support specific land uses. Moreover, process-based approaches are cost effective and efficient, allowing the BLM to implement restoration at scales that match the scope of degradation.



James Turowsky, Colorado Natural Heritage Program

Resilience of riparian areas to wildfire in Colorado

<sup>4</sup> Source: Beechie, T.J., D.A. Sear, J.D. Olden, G.R. Pess, J.M. Buffington, H. Moir, P. Roni, and M.M. Pollock. 2010. Process-Based Principles for Restoring River Ecosystems. *BioScience* 60 (3): 209-222.



## Improve partnerships to further the science and management of public lands and waters and to implement on-the-ground actions.

Successful implementation of conservation and process-based restoration projects requires partnerships in:

- **Education and outreach** to inform communities about the benefits of riparian, fisheries, and water resource conservation and restoration for drought resiliency, clean water supplies, the control of aquatic invasive species, and the recruitment of the next generation of resource managers.
- **Implementation** of conservation, restoration, and connectivity efforts beyond the BLM's footprint by bringing together diverse interest groups representing different perspectives.
- **Research** involving federal partners, tribes, universities, and other stakeholders, to ensure the best available science and data inform the decision-making process. Example focal areas include new species monitoring tools such as environmental DNA, planning and monitoring approaches for implementing and assessing the efficacy of process-based restoration, mapping of flow permanence and hydrologic regimes, quantifying ecological water requirements, and responding to a changing climate.

## Enhance and maintain the BLM's human capital and technical expertise.

To successfully carry out the mission and core functions of the Aquatic Resources Program, the BLM requires significant breadth and depth of professional skills. For example, subject matter experts in fluvial geomorphology, aqueous geochemistry, hydrogeology, fish/aquatic ecology, riparian and wetland ecology, water rights, and limnology are needed to accomplish the core functions of this program. The BLM should employ a diverse array of technical specialists, strive for functional redundancy in such skills, and invest in continuing education under this program to successfully meet mission requirements. This includes continuing to develop water rights training and new curricula with the National Training Center, providing resources for staff to participate in or assist with trainings, exploring shared services approaches to hiring scarce skill positions among states, and cultivating a diverse applicant pool. The program must also reestablish early career positions and career ladders to ensure long-term program development and momentum.



## Increase utilization of the best available science and data to inform decision making.

The Aquatic Resources Program's efforts to support the BLM's decision-making process must be evidence-based and informed by the best available science. The program must work across directorates to integrate science into the BLM's decision-making processes. A cornerstone of the Aquatic Resources Program and the BLM's decision making is inventory, assessment, and monitoring information. These data are required by FLPMA to characterize what resources exist, where they are located, what condition they are in, how they are used by people and wildlife, and how they are changing over time in response to natural and anthropogenic drivers. Furthermore, such information is needed to inform actions required to conserve or restore riparian, fisheries, and water resources. The BLM should further implement the Assessment, Inventory, and Monitoring (AIM) Program. This includes multiscale applications from national-scale reporting, field data to improve remotely sensed products, and local-scale applications that integrate AIM with other assessment and monitoring tools such as Multiple Indicator Monitoring and assessments of riverscape health. These data, and all other information sources, must be current and of known quality, stored in enterprise data systems, and readily available to the BLM's decision makers. All information used to inform decisions shall be robust, repeatable, transparent, and adhere to the Department of the Interior's scientific integrity standards.



Training staff to implement riparian and wetland Assessment, Inventory, and Monitoring protocols in Wyoming

## Conclusion

Implementation of the Aquatic Resource Program's 5-year strategy will create an interdisciplinary BLM program that is a leader in the conservation and restoration of riparian, fisheries, and water resources for the benefit of all Americans. It will ensure that healthy, sustainable riparian, fisheries, and water resources are available to combat climate change and achieve the BLM's multiple

use and sustained yield mandate. Attaining these goals during a time of rapid ecological change and increasing demands for public lands will require collaboration with federal, state, tribal, and local governments and other programs, partners, and communities, to foster flexible and adaptive approaches to conservation and restoration.









