



# *Sustainable Rivers Program*

## Sustainable Rivers Program 2021-2024



**US Army Corps  
of Engineers®**

The Nature  
Conservancy 

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Prepared for U.S. Army Corps of Engineers, The Nature Conservancy,  
and other organizations involved with Sustainable Rivers

## Introduction

The Sustainable Rivers Program (SRP) works with water managers, reservoir operators, scientists, and other stakeholders to increase the environmental benefits provided by already built infrastructure. SRP is done in partnership with The Nature Conservancy and numerous other Federal, state, and nongovernmental entities. SRP efforts complement other reservoir-centric water resource projects by demonstrating that a strategic and science-based approach can be used at U.S. Army Corps of Engineers (USACE) projects to maintain or enhance benefits provided to the nation while reducing negative environmental consequences.

Annual funding is used to evaluate environmental strategies for specific USACE reservoirs, apply resulting information to inform project operations, and further hone the implementation process and management practices advanced by SRP. Work is guided by reservoir characteristics including size, level of downstream influence, authorized purposes, operational flexibility, and several other factors.

Funds are used to accomplish programmatic and location-based efforts in accordance with the following SRP principles: 1) Build capacity within the water management community to implement environmental strategies with little or no direct involvement of SRP resources; 2) engage partners to focus on sustainability and avoid conflict; and 3) advance innovative efforts to implement environmental strategies.

This document details Program goals and identifies efforts planned for 2021-2024. Key objectives include: 1) expand SRP geographically with a focus on general reservoirs and environmental flows, 2) broaden the types of environmental actions being used by SRP to achieve sustainable management of water and ecosystems at general reservoirs, and 3) adapt SRP methods to other infrastructure types, especially locks and dams and dry dams. Progress related to these objectives provides a return on investment for the Corps by delivering more benefits from built USACE infrastructure, promoting contemporary operations policy, and steering facility operations away from more contentious, costly, and unsustainable paths.

## Background

The goal and mission of SRP is to improve the health and life of rivers by changing operations of USACE water resources infrastructure to restore and protect ecosystems, while maintaining or enhancing other project benefits.

SRP began in 1998 with an initial collaboration to improve the ecological condition of Green River, Kentucky. The Program was formally established in 2002 and involved 8 river systems. Program funding was first appropriated in 2010 as part of a remaining item entitled National Portfolio for Water Reallocations. Funding 2010-2016 was roughly \$300k per year. In 2017, SRP was spun off into its own remaining item and funding was increased to \$400k per year, 2017-2019. In 2020, funding was increased to \$5M. SRP funding is part of the USACE Operations budget and is provided via the Aquatic Ecosystem Restoration (AER) business line. USACE program management is performed by the Hydrologic Engineering Center with oversight from chain of command and USACE Headquarters staff including representatives of the AER business line, Operations, and Environmental Planning. The number of rivers, structures, and river miles involved in SRP has increased with time (Table 1).

Table 1. Rivers, structures, and river miles engaged in Sustainable Rivers Program at select end of years.

	2002	2009	2019	2020	2021
Rivers	8	8	16	23	40
Structures	13	36	69	79	89
River miles	1,114	2,731	5,083	8,082	10,953

Environmental flows were the founding objective of SRP and remain a key focus. Environmental flows are defined as the quantity, timing, and quality of water flows required to sustain ecosystems. For reservoir operators, environmental flows manifest as management decisions that manipulate water and land-water interactions to achieve ecological or environmental goals.

The SRP process for environmental flows has three phases: “advance, implement, and incorporate”. Advancing e-flows involves engaging stakeholders in a science-based process to define the flow needs of riverine ecosystems. Implementation involves testing the effectiveness and feasibility of the defined flows. Incorporation involves including environmental flow strategies in reservoir operations policy such as water control manuals. Incorporation is largely left to the policy update processes of the involved local USACE Office. SRP is now the largest scale and most comprehensive program for implementing environmental flows below USACE reservoirs.

In recent years, the Program began exploring other reservoir-oriented actions with potential to produce environmental benefits. As with environmental flows, SRP promotes environmental actions via the “advance, implement, and incorporate” process through a combination of capacity building, technologies, methodologies, and experience. Program outcomes follow: 1) modernize strategies for operating purposes related to the environment at USACE infrastructure, 2) deliver more benefits from built USACE infrastructure, and 3) formulate alternative management strategies for rivers and ecosystems associated with USACE infrastructure.

### Sustainable Rivers Program – Categories – Types of Structures and Types of Tasks

Program work is organized per type of structure and type of task (with all task categories applicable to each structure type). This approach is used to highlight different components of the Sustainable Rivers Program and as a framework for organizing and communicating efforts.

#### *Type of Structure*

The USACE is involved with a diverse portfolio of water resources infrastructure. A national survey completed in 2013 identified 465 reservoirs with federally authorized flood storage. Most (356) are owned and operated by the USACE. The rest (109) are owned and operated by other entities and are often referred to as “Section 7” projects in reference to the section of the Flood Control Act of 1944 which authorized the USACE to prescribe regulations for use of this flood storage.

Flood risk management reservoirs can be separated based on size and use. “Dry dams” are typically smaller and more single-purpose than other surveyed reservoirs. Most were constructed solely for flood risk management and release water passively, storing water only when inflows exceed the physical

capacity of always open outlets. “General” reservoirs are typically larger and multipurpose, with active operations involving flood and conservation pools.

The survey did not consider water control structures without dedicated flood storage, which excluded “lock and dam” reservoirs and “other” water control structures such as bifurcations, diversions, reregulation reservoirs, detention ponds, and pump stations. A report entitled Authorized and Operating Purposes of Corps of Engineers Reservoirs (Hydrologic Engineering Center, Project Report 19, 1992, revised 1994) lists an additional 181 USACE reservoirs, most of which are navigation-oriented locks and dams. The report also references hundreds of “other” structures, most of which are grouped as parts of projects. For example, the Central and South Florida Project includes hundreds of water control structures.

Previous SRP efforts have focused on general USACE owned reservoirs. For example, at the end of 2019, the 69 structures involved in SRP were comprised of 64 of the 312 USACE-owned general reservoirs, 3 of the ~181 USACE locks and dams, and 2 USACE other reservoirs. However, SRP is expanding to include dry dams in 2021. Table 2 lists counts for different types of structures.

Table 2. Classifications and associated characteristics of infrastructure.

Category*	Number of Reservoirs		
	All	USACE Owned	Section 7
All (Flood space)	465	356	109
General	414	312	102
Dry dam	51	44	7
Locks and dams	~181	~181	0
Other structures	~300	~300	0
Total	~946	~837	109

\*Reservoirs with federally authorized flood storage highlighted in green

### Type of Task

SRP uses the following task categories to provide a framework for 1) organizing the types of work and strategies used at SRP sites, 2) communicating successes of those accomplishments, and, ultimately, for 3) making and justifying decisions on how to allocate funds from the national account to river teams.

**Outreach.** Working with partners and spreading the word about SRP is fundamental to advancing its cause. This category encompasses all forms of communications and networking and has connections with each of the other categories in the list. Accomplishments in this category would include exposure through published and broadcast media. Also of importance are organizing and participating in events to promote SRP, including activities to educate senior leaders of organizations involved in SRP.

**Science.** From a purely ecological perspective, success of SRP is a function of improvements in river health, which are therefore of key importance to gage and unfortunately very difficult to measure due to uncertainties in ecological understanding, changing influences of water management, and time required for ecological responses to become measurable. Important efforts in this category include

work to improve the understanding of existing ecological and socio-economic conditions at project sites, define or refine environmental flow needs, and develop monitoring plans for SRP sites.

**Technology.** SRP efforts at several sites have benefitted by decision support tools developed to test and communicate different hydrologic, reservoir operations, hydraulic, and ecologic scenarios. These sites have demonstrated a technical path to support reoperation studies, incorporate scientific understanding, and inform real-time decision making. Work in this category includes preparation of technical data sets to support decision-making and science, development of technologies to improve their applicability to SRP challenges, and application of technologies as components of decision support systems that involve engineering and socio-economic concerns.

**Implementation.** To date, most SRP sites have made some modification to reservoir outflows in accordance with environmental flow strategies. Many of these modifications were undertaken as test implementations and experimental releases. All efforts in this category should contribute to the advancement of environmental flow strategies from experimental implementation to inclusion in formal operating policies of involved structures. Also pertinent to this category are ideas that seek to investigate and affect general water and ecosystem policies of organizations involved in SRP to make future, expanded, and more comprehensive implementation increasingly feasible.

**Innovation.** The first four categories were designed mainly to describe typical efforts and successes of project sites, but the methods and challenges related to SRP are certainly not wholly defined and never will be. This category is included in recognition that SRP must continue to explore new strategies and establishes an official venue where new ideas can be vetted and hopefully funded, tested, and used for the benefit of all SRP sites.

Program efforts for 2020 are detailed in the 2020 Program Management Plan (SRP Management 2020 Report - 2020-01-07.docx) and the 2020-2021 In Progress Review (Sustainable Rivers - In Progress Review - 2021-01-26.docx).

### **Sustainable Rivers – Program Management – 2021-2024**

As in previous years, SRP funds will be used to accomplish a combination of programmatic and site work in accordance with the following principles: 1) build capacity within the water management community to implement environmental strategies with little or no direct involvement of SRP resources; 2) engage partners to focus on sustainability and avoid conflict; and 3) advance innovative efforts to implement environmental strategies.

In broad terms, programmatic work focuses on how best to generate more environmental benefits from water resources infrastructure and location-based work focuses on advancing, implementing, and incorporating environmental strategies at specific facilities. The two are complementary with each generating new ideas, honing SRP methods, and demonstrating the benefits of environmental actions. Individual pieces of programmatic and location-based work are characterized by the leads for those efforts per the task categories described above for organizational and communications purposes.

Ideas for programmatic work originate from and are shaped by several influences. Regional and national SRP meetings, other USACE programs, strategic directions of SRP's governmental and non-

governmental partners, and especially interactions with and commonalities amongst location-based teams are important sources. Ideas are refined by staff involved with SRP programmatic support and initiated as Program capacity allows.

Ideas for location-based work are invited via requests for proposals (RFP). Between 2010-2019, SRP did one RFP per year. In 2020, there were two RFPs, one before and one after the budget increase. In 2021-2024, three requests for location-based work proposals are planned per year, one of which invites ideas especially but not exclusively about general reservoirs, another that focuses on opportunities at locks and dams, and the last being about environmental actions at dry dams.

SRP identifies and executes location-based work via the following process: 1) revisit program objectives and topics of interest, 2) highlight objectives and topics as part of a RFP, 3) compile and prioritize proposals submitted, 4) scope priority tasks, 5) arrange funding and other logistics, and 6) perform work. Proposals are prioritized based on the following criteria: 1) assist site advancement, 2) expand geographically, 3) broaden types of environmental actions, 4) adapt methods to other infrastructure, 5) express benefits of implementation, 6) transferability, 7) special topics, and 8) past performance. Leveraged funds are also considered. Proposal review is led and managed by SRP program representatives with input from and USACE Headquarters staff, including representatives of the AER business line, Operations, and Environmental Planning.

As 2021 marks the first year SRP is employing three RFPs and new location-based efforts (structure and action) typically take more than one year to complete the “advance, implement, and incorporate” process, plans detailed in this section are for 2021-2024, which is anticipated as sufficient time to understand the efficacy of new management strategies. SRP budgets for future years are unknown. For planning purposes, anticipated funding levels are assumed to be equal to 2020 and constant over the period of the management plan. However, two safeties are in place to mitigate impacts if future year funding is reduced: location-based work is funded annually with no promise of future year support and tasks are scoped such that each year produces deliverables with stand-alone value, even when part of multi-year efforts.

An overview of programmatic and location-based work is provided in this section.

### *Programmatic*

Programmatic work planned for 2021-2024 is comprised mainly of program support, technologies, and validation of environmental strategies. Program support includes costs to administer the Program, engage partners, capacity building, and assistance for location-based efforts (outreach, implementation, and innovation). Technologies includes investments in ecological and water resource software applied broadly within Sustainable Rivers as well as technical support for software applications led by location-based teams (technology and innovation). Validation of environmental strategies includes science-based efforts designed to justify and communicate benefits of infrastructure reoperations (science and innovation). Between 4 and 5 new or continuations of ongoing programmatic efforts per year are expected, 2021-2024 (e.g., national informational resources, regional meetings, national meetings, technologies, and validation).

Programmatic work, especially the program support component, also aligns with structure categories. In this role, programmatic work is key to understanding and communicating the portfolio of structures

involved (distribution and relevant characteristics of structures) and the spectrum of possible environmental actions (enabling setting and other considerations). Programmatic work undertaken in support of the different types of structures, includes organizing regional Operations and Water Management Meetings as well as the following type-specific activities.

General. Per number of facilities, “general” is the largest structure type SRP is involved with. Management of these 414 reservoirs directly involves 33 USACE offices. Since 2015, SRP has invested in geographic information system (GIS) resources related to reservoirs with federally authorized flood space. Results from these efforts now underpin the fundamental metrics SRP uses to communicate Program status and growth and are routinely used during presentations about Sustainable Rivers. In 2021-2024, SRP - General work continues with emphasis on executing pertinent RFPs and transitioning GIS resources to parallel data sets for USACE-owned and Section 7 reservoirs and general and dry dam reservoirs.

Locks and Dams. The next largest structure category is locks and dams with approximate 181 locks and dams in the systems around the country. In 2020, work began on a SRP locks and dams database. Initial counts indicate 235 structures in the USACE portfolio, which is higher than the 181 USACE reservoirs without a flood risk management function listed in the Authorized and Operating Purposes of USACE of Engineers Reservoirs report, though several structures are locks without a dam structure and are not likely to be promising candidates for environmental actions. Information being compiled in the database includes basic pertinent characteristics (location, purposes, target pools, gate structure, etc.), basic traffic metrics, and environmental considerations. Much of this information is being imported from existing sources. St. Louis District staff are supporting development of the GIS database for USACE locks and dams and continue to compile attribute data.

Management practices for locks and dams varies across USACE Divisions and Districts. Many factors go into lock and dam operations, such as physical location and the desire to minimize federal land purchase or flood easements. Flows are generally managed in accordance with target water elevations needed for a nine-foot navigation channel (Inland Navigation) that are specified at a single geographic location or at a series of locations as a function of flow. Target elevations are important factors when considering the operational flexibility at a lock and dam structure and are often communicated as an operable band (i.e., a range of pool elevations that support navigation). Since these dams do not provide flood risk management, gates are generally open during high flow events creating a semi-connected river system. This allows occasional improved fish passage for some species though the timing of gate openings amongst different structures in the same system does not necessarily coincide, which limits environmental benefits. Management of pool elevations within the operable band has been done for environmental purposes, especially to promote desired ecosystem responses in areas associated with shorelines, shallow water habitats, and exposed substrates.

To date, there has been limited implementation of environmental strategies at locks and dams. Most of the work relates to conservation locking of migratory fish species and managing water levels in the pools behind the dams to create improved conditions for wetland and other floodplain vegetation. The goal of SRP - Locks and Dams is to increase the locations where ecological flows and pool management actions are implemented using existing flexibility of lock and dam operations and to investigate new opportunities to improve ecological outcomes through lock and dam operations. In 2021-2024, SRP – Locks and Dams work continues with emphasis on executing pertinent RFPs, developing informational

resources about the USACE portfolio of locks and dams, and rendering of this information in GIS as support for ongoing planning and communication activities.

Dry Dams. There are 51 USACE-affiliated dry dams across the nation, including 44 that are owned and operated by the USACE (Table 2). Dry dams are reservoirs that typically do not have a water conservation pool and release water passively, storing water only when inflows exceed the physical capacity of always open outlets. Most USACE dry dams are single-purpose flood risk management reservoirs, although some are also authorized for other purposes, including recreation, fish and wildlife, sediment management, and water conservation.

While SRP's traditional focus on downstream environmental flows may not be possible at dry dams, other management actions that affect land-water interactions may be implemented to improve environmental conditions. Potential actions include wetland improvements, stream restoration and habitat diversification, management of invasive vegetation, creation of ponds, creation of vernal pools, planting and seeding native vegetation, and others.

In 2020, work began on a SRP dry dams database. Information being compiled includes basic pertinent characteristics (location, purposes, age, storage, condition, etc.), land use and status, regulatory considerations, and environmental lift potential. Much of this information is being imported from existing sources.

In 2021-2024, SRP - Dry Dams work continues with emphasis on executing pertinent RFPs, developing informational resources about the USACE portfolio of dry dams, and rendering of this information in GIS as support for ongoing planning and communication activities.

### *Location-based*

SRP identifies and executes location-based work via the following process: 1) revisit program objectives and topics of interest, 2) highlight objectives and topics as part of a RFP, 3) compile and prioritize proposals submitted, 4) scope priority tasks, 5) arrange funding and other logistics, and 6) perform work.

Proposals are prioritized based on the following criteria: 1) site advancement, 2) expand geographically, 3) broaden types of environmental actions, 4) adapt methods to other infrastructure, 5) express benefits of implementation, 6) transferability, 7) special topics, and 8) past performance. Leveraged funds are also considered.

As described above, ideas for location-based work are invited via requests for proposals (RFP). In 2021-2024, three requests for location-based work proposals (general, locks and dams, and dry dams) are planned per year. Each RFP includes an articulation of strategic objectives and special topics. RFPs are distributed to structure type-specific mailing lists comprised of USACE staff that are active in Sustainable Rivers, have expressed interest in the Program, or were identified as being strategically important to one or more structure categories. Recipients are encouraged to further distribute RFP announcement to other USACE staff at their discretion. There is typically a roughly two-month open period to allow for formulation, coordination, and submission of proposals. Proposals submitted are reviewed and prioritized (generally 1 month post-submission) by USACE staff involved with Sustainable River programmatic efforts and the AER Business Line Manager, USACE Headquarters Program Manager for Land Use and Natural Resources - Operations, and Senior Policy Advisor - Environmental Planning.

Sustainable Rivers Program representatives then work with the field offices to scope the priority tasks (generally 1-2 months post-submission) and once the priority tasks are fully scoped, reviewed, and approved (generally 2-4 months post-submission), the field offices receive funding as funding allows (generally 2-5 months post-submission). Between 40 and 50 new or continuations of ongoing location-based efforts per year are expected 2021-2024, with an anticipated trend towards multi-year projects with larger overall budgets. This trend was aided in the 2021 RFPs through inclusion of guidance to consider tasks up to \$150-200k and split bigger efforts into separate tasks.

General. Strategic objectives for the general RFP include: 1) expand SRP geographically with a focus on general reservoirs and environmental flows, 2) broaden the types of environmental actions being used by SRP to achieve sustainable management of water and ecosystems at general reservoirs, and 3) adapt SRP methods to other infrastructure types, especially locks and dams, dry dams, Section 7, and other structures (e.g., control structures, pump stations, etc.).

Special topics for the general RFP include: 1) preparation of scientific narratives about ecosystem responses to operational changes --- videography and photography components of ongoing location-based work are good examples, 2) organization of regional environmental flow meetings --- many opportunities and challenges are consistent regionally, perhaps at a USACE Division-scale. A starting point here would be for an existing SRP site to convene a regional meeting and share their experiences with staff from other offices that have similar hydrology-ecology-infrastructure and less experience with Sustainable Rivers, and 3) management of water temperatures for environmental benefits.

The general RFP is typically announced in October with responses due in December.

Locks and Dams. To generate interest in environmental activities at locks and dams and stage the first locks and dams RFP, a series of virtual meetings was held in 2020 to explore status of locks and dams and learn more about potential environmental outcomes. Group expertise spanned water management, environmental restoration, and river ecology.

Participants identified existing ecological actions associated with using the operational flexibility at USACE lock and dam facilities. Two actions were noted at multiple locks and dams: 1) conservation locking of endangered and migratory fishes and 2) management of pool levels to create improved conditions for wetland and floodplain vegetation. Lessons learned provide a foundation for engaging interest in similar actions at other facilities and for stimulating ideas about other environmental actions.

At the conclusion of the series, a nationwide USACE meeting was held for staff who work on lock and dam water management and river ecology for all USACE Divisions and Districts to introduce SRP and present case studies of ecological outcomes related to operational changes at locks and dams. Forty-six attendees participated in the call from across the country with representation from most Divisions and Districts involved with locks and dams.

Information and meeting dialogue were used to shape the locks and dams RFP. Strategic objectives for the locks and dams RFP include: 1) expand SRP activities at USACE locks and dams geographically and 2) expand the types of environmental actions pursued at locks and dams. These objectives were reinforced through mention of the following special topics: 1) promote established practices such as conservation locking and in pool vegetation and 2) explore environmental innovations.

The locks and dams RFP is typically announced in November with responses due in January.

[Dry Dams](#). To generate interest in environmental activities at dry dams and stage the first dry dams RFP, two national meetings and a South Pacific Division regional dry dams meeting were held in 2020-2021 to explore environmental opportunities at dry dams and learn more about pertinent environmental actions and related considerations.

The strategic objective for the dry dams RFP is simply expressed as: 1) expand geographically by inviting ideas for a variety of environmental actions identified by the formative 2020-2021 meetings as well as Upper Midwest (2019), South (2020), and Northwest (2020) Operations and Water Management meetings.

The dry dams RFP is typically announced in December with responses due in February.

*Budget Summary*

Programmatic and location-based work is managed at HEC. Deliverables and milestones are tracked in the Enterprise Management Tool. Activities, expenditures, and obligations are tracked in the USACE P2 fiscal accounting system and in the Enterprise Management Tool. Table 3 provides past (2020) and planned (2021-2024) program allocations. SRP budgets for future years are unknown. For planning purposes, anticipated funding levels are assumed to be equal to 2020 and constant over the period of the management plan.

Table 3. Sustainable Rivers Program allocations, 2020-2024.

Component	Year(s)	<i>Past and Planned Program Allocations (\$M)</i>	
		<i>2020</i>	<i>2021-2024/year</i>
Programmatic		2.9	2.0
- Program support		0.8	0.8
- Technologies		1.3	0.7
- Validation		0.8	0.5
Location-based		2.1	3.0
- General		1.9	2.0
- Locks and dams		0.16	0.5
- Dry dams		0.04	0.5
Total		5.0	5.0

Historically, SRP carryover funds have been comprised almost entirely of unexpended labor for location-based work and unexpended funds that support non-labor actions, including contracts, Intergovernmental Personnel Act agreements, MIPRs for federal partners, and other repositioned funds. Importantly, these funds, though unexpended, are committed to a specific purpose. Generally, SRP works with receiving entities to assure that funds are executed per planned expenditure schedules or as efficiently as possible for any unplanned carryover.

[Program Administration](#). Program administration is performed by a team of SRP representatives from the Hydrologic Engineering Center, the Institute for Water Resources, and a variety of other USACE Offices. The team is responsible for advancing programmatic work such as development of national

informational resources, organization of regional and national meetings, and support for location-based work, including management of RFPs and associated prioritizations, PWS development, and initiation and assistance of location-based efforts. Intergovernmental Personnel Act agreements have also been used to extend team capacity and involve partners such as The Nature Conservancy in programmatic work.

*Efficiency Metric*

Funds for SRP are provided through the USACE Operations budget via the AER business line. A significant portion, historically more than half, of the budget is used to support location-based teams of operators, water managers, planners, and scientists working to advance, implement, and incorporate environmental strategies at specific USACE facilities.

In the interests of efficiency, the time from completion of a draft Performance Work Statement (PWS) to provision of funding is tracked (see “Sustainable Rivers – Program Management – 2021-2024 --- Location-based”, step 5 - arrange funding and other logistics). Time includes PWS review and resourcing of funds. Table 4 provides times per fiscal year and type of resource. Resources are individual labor codes or non-labor actions such as a repositioning or MIPR transfer.

Table 4. Time from draft scope to provision of funds per fiscal year and per resource.

	2019	2020	2021*
Count – All	18	172	189
Time (mean, days)	8.1	14.0	32.7
Count – Labor	15	144	140
Time (mean, days)	7.9	10.9	30.9
Count – Non-labor	3	28	49
Time (mean, days)	8.7	29.7	37.7

\*Codes for meeting support omitted to avoid skewing of statistics as described in text.

This metric is useful, but coarse and skewed by efforts with high numbers of resources per task. For instance, support for the South and South Pacific regional meetings held in 2020 was provided as labor codes for individual USACE participants. If those codes are omitted, the count of labor resources would decrease from 144 to 115 and time would increase from 10.9 days to 13.1. In terms of year to year change, 2019 to 2020, this would shift the percent increase in time from +38% to +66%.

**Conclusion**

Sustainable Rivers Program is expanding. Recent expansion is catalyzed by interest in the Program and the 2020 budget increase. Additional funds have allowed SRP to more openly pursue and support engagement with new rivers, accelerate development of technologies used by location-based teams for

environmental decision support, and begin efforts to validate the effectiveness of environmental strategies implemented at USACE water infrastructure projects. Prior to receiving the extra funds, SRP was constrained such that expansion was systematically limited (in terms of number of rivers engaged, environmental actions pursued, and types of infrastructure considered) and program support for technology development and strategy validation was minimal.

This management plan details Program strategies for 2021-2024. Key objectives include: 1) expand SRP geographically with a focus on general reservoirs and environmental flows, 2) broaden the types of environmental actions being used by SRP to achieve sustainable management of water and ecosystems at general reservoirs, and 3) adapt SRP methods to other infrastructure types, especially locks and dams and dry dams. Progress related to these objectives provide a return on investment for the Corps by delivering more benefits from built USACE infrastructure, promoting contemporary operations policy, and steering facility operations away from more contentious, costly, and unsustainable paths. With expansion, comes a need to build information resources about portfolios of structures per type. This work will rely heavily on existing USACE resources and Sustainable Rivers experience with general reservoirs.

Even with recent Program expansion, most of SRP's potential remains available. The 10,953 river miles engaged with Sustainable Rivers (Table 1) is both notable and a modest fraction of the more than 52,860 river miles the USACE is involved with.