



Promoting Water Reuse through Partnership Programs: National Estuary Program and Urban Waters Partnerships Delivering on EPA's Water Reuse Action Plan



April 2021

EPA -840-R-21-002

Acknowledgements

This document was developed by EPA employee Tara Flint and ORISE Research Participant Daniela Rossi, through their work with the EPA Office of Wetlands, Oceans and Watersheds, and Eric Ruder and Daniel Kaufman of Industrial Economics. Daniela Rossi's role did not include establishing Agency policy, and all final decision-making was made by the Agency. The information presented here would not have been possible without contributions from EPA's Office of Water staff on both the Urban Waters and National Estuary Program teams, Regional Offices, and external partners from the partnership programs.

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Cover Photo Credits (clockwise from top right): Private raingarden planted as part of Homeowner Rewards Program to incentivize green infrastructure (Peconic Estuary Partnership); Rainwater catchment project near Pennington Creek, CA installed in partnership with Morro Bay NEP (Morro Bay NEP); Installed and blooming bioswale in downtown New Haven, CT (Long Island Sound Office); Riverhead Sewage Treatment Plant renovated which supplies reclaimed water for irrigation (Peconic Estuary Partnership)

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1. Introduction

1A. Overview of the Water Reuse Action Plan

The National Water Reuse Action Plan (WRAP) is a coordinated and collaborative effort to advance consideration of water reuse to ensure the security, sustainability, and resilience of our Nation’s water resources.¹ The WRAP reflects nearly four decades of water reuse experience and practice, identifying actions across 11 thematic areas:

- Integrated watershed actions
- Policy coordination
- Science and specifications
- Technology development and validation
- Water information availability
- Financial support
- Integrated research
- Outreach and communication
- Workforce development
- Metrics for success
- International collaboration.

Water Reuse Objectives
Water security: the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socioeconomic development.
Water sustainability: ensuring an adequate, reliable, and continual supply of clean water for human uses and ecosystems.
Water resilience: the ability of a water supply to adapt to or withstand the effects of rapid hydrologic change or a natural disaster.

“Water reuse” is a broad term that generally includes concepts such as “recycled water,” “reclaimed water,” “alternative water supplies,” and “water resource recovery.” Water reuse initiatives can potentially link to municipal wastewater, industry processing or cooling water, stormwater runoff, or agricultural runoff and return water flows (to streams, rivers, etc.). Any of these sources of water are considered “reused” or “recycled” after they have been captured, treated and then tested as acceptable to meet standards for the appropriate end-use application.

The WRAP seeks to promote water reuse consideration by identifying actions that will help communities, policymakers, practitioners, and other stakeholders match potential sources of reused water that can be provided at a quantity and quality needed to meet specific identified applications.

Given the wide breadth of stakeholders involved in water resource management across the country, partnerships are a fundamental delivery mechanism in effectively and sustainably developing and implementing water reuse initiatives. This paper focuses on two successful partnership programs managed by the EPA’s Office of Water in a total of 48 partnership locations nationwide: the National Estuary Program (NEP) and the Urban Waters Federal Partnership (UW).

¹ See [EPA’s National Water Reuse Action Plan](#).

1B. National Estuary Program and Urban Waters Federal Partnerships

The Urban Waters (UW) partnership and National Estuary Program (NEP) leverage strong multi-stakeholder relationships and utilize integrated water resource management strategies to protect and restore the Nation's water resources in addressing issues such as water scarcity, efficient water access and use, improved management of runoff, and riparian ecosystem restoration. Both the UW and NEP take a systems-based approach to water conservation and management in order to maximize economic, social, and environmental welfare in an equitable manner.

Established under the 1987 Clean Water Act Amendments, the NEP protects and restores the ecological integrity of estuaries of national significance. There are 28 local NEPs, each with a Director and staff, working with local stakeholders to improve the health of the waters, habitats, and living resources of their estuaries. Together with their partners, local NEPs develop and implement locally driven plans to improve water quality, habitat, and living resources in and surrounding their estuaries. They use inclusive decision-making and adaptive management processes to deliver on-the-ground action and results.

The UW program began in 2011 and is a cross-federal effort supported by 15 federal agencies and more than 28 non-governmental organization partners working in 20 designated locations. This partnership reconnects urban communities, particularly those that are overburdened or economically distressed, with their waterways by improving coordination among federal agencies and collaborating with community-led revitalization efforts to improve our Nation's water systems and promote their economic, environmental and social benefits.

These two programs are prime examples of partnerships that serve as effective and crucial platforms for delivering on the WRAP priorities with water reuse projects and initiatives in communities across the country.

1C. Scope and Organization

This report provides a snapshot of recent (over the last five years) water reuse projects and initiatives that have been successful across some of the NEP and UW partnership locations. The examples and information provided are by no means exhaustive or comprehensive of all projects in the history of these two programs. We aim to provide a general account of the breadth of water reuse efforts in the NEP and UW locations to illustrate how many areas are currently working towards WRAP objectives through ongoing or recently completed efforts prioritizing water reuse. Management plans and regional priorities evolve given the ever-changing natural and social environments in which the NEP and UW partnership programs are nested; meaning the information provided here will likely shift in the future. This report does not reflect management plans and priorities that are currently being revised or will be in the future. Additionally, and of important note, the projects and activities highlighted in this document focus on larger, landscape-scale efforts at partnership locations, rather than scattered and extremely local-level activities. These water reuse successes concentrate on regional water supply issues and innovative solutions, and therefore do not necessarily include all of the excellent work related to water quality.

Following this introduction, Section 2 provides an overview of the NEP and UW programs, including how they work, where they are located and how their activities support the WRAP. Section 3 describes in

detail how NEPs and UW partnership locations across the country are supporting WRAP themes, and highlights examples from several recent projects. Section 4 summarizes the report's conclusions, which show the power of partnerships to deliver on the WRAP priorities and the potential for expanding water reuse projects across partnership locations. This document includes two appendices. Appendix A presents a series of maps showing the wide geographic distribution of NEP and UW program activities that support different elements of the WRAP. Appendix B provides a full inventory of currently documented NEP and UW water reuse projects that support the WRAP.

2. How the NEP and UW Partnerships Work and How This Supports the WRAP

The NEP was established to protect and restore water quality and ecological integrity in estuaries of national significance and empower local communities to protect, manage and restore estuaries and coastal spaces according to local values and needs. The NEP is a time-tested program that uses a consensus-building process to identify goals, objectives and actions that reflect local environmental and economic priorities with guidance from citizens and intergovernmental management committees.

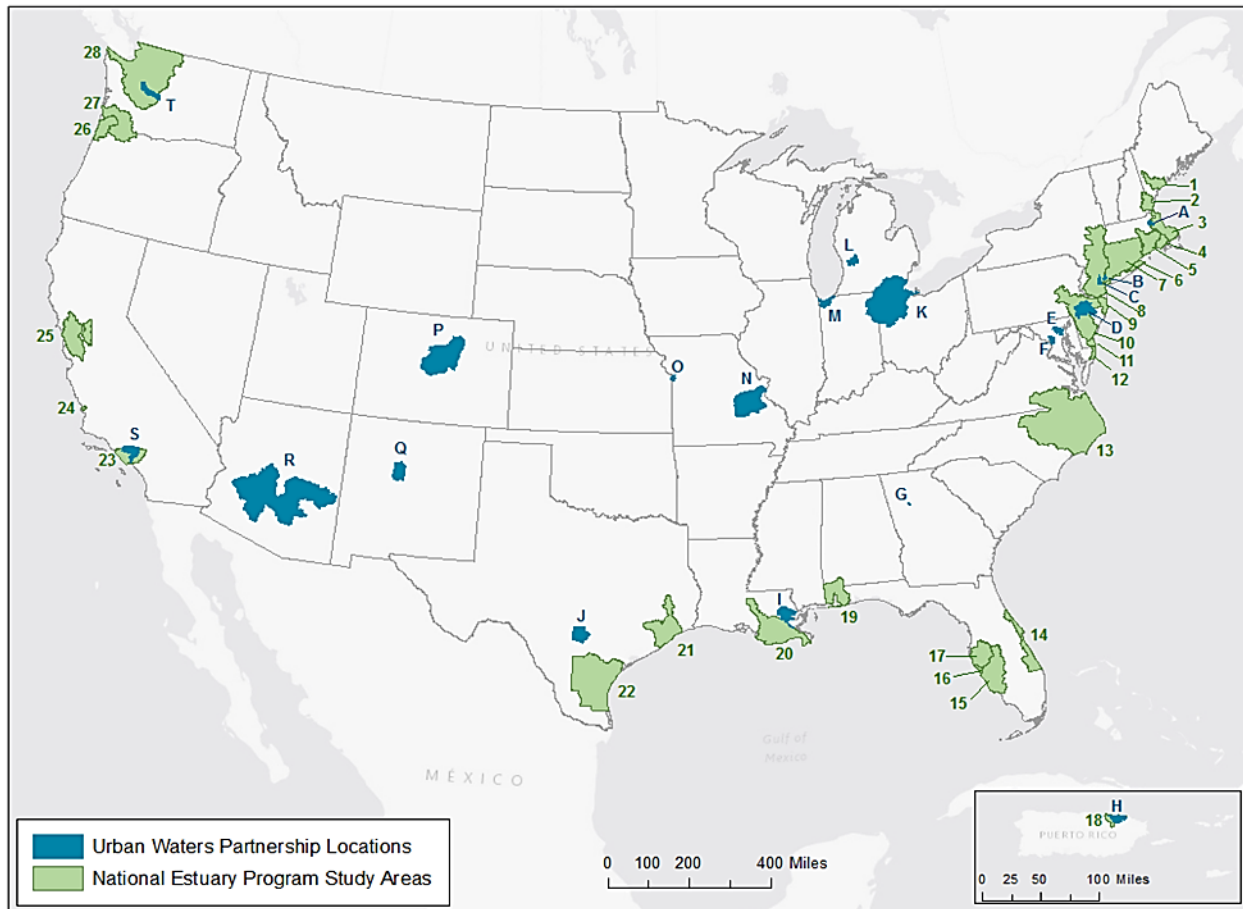
A cornerstone of the NEP is its multiple benefits approach. In water resource management, the term “multiple benefits” represents the deep connection between water and other environmental, economic and community systems. Specifically, strategies to address water challenges can provide other benefits including community resilience, improved habitat and support for local economies. Through providing these multiple benefits, the NEP makes a vital contribution to achieving the WRAP’s vision of ensuring the security, sustainability and resilience of our Nation’s water resources.

The UW program aims to connect communities to their urban waterways to promote healthier human and environmental systems, including the sustainable management of runoff and wastewater. By connecting people — often in the most underserved communities — with their waterways, this program is a catalyst, driving water quality improvements and increased understanding of the role and value of waterways and ensuring equitable access to high-quality local waters. The UW program has the notable distinction of being the Nation’s first multiagency partnership supporting underserved communities and rivers at the watershed level. By catalyzing action and projects that would not otherwise take place and leveraging a wide variety of resources, the program is a highly effective and efficient way to tailor water reuse and conservation initiatives to meet the unique needs of underserved communities.

Through working with utilities, local and state government, and non-governmental organizations, many of the NEP and UW partnership locations have already created safe and reliable water reuse systems while promoting healthy watersheds. The partnerships that exist between these programs and local communities have significant potential to expand integrated water resource management and address issues such as water scarcity in effective and innovative ways. For the purposes of this inventory, the partnership locations and initiatives highlighted in the text have all demonstrated that water reuse and conservation is a top priority in their respective regions. Emphasis was given to larger watershed-level and widespread projects impacting large regions. Projects included in the inventory for specific UW partnerships were selected to magnify ongoing or completed activities collaborated on through the partnership; they did not include those spearheaded and/or funded by partners individually and of their own accord.

The following exhibits show the wide geographic coverage of NEP and UW partnership locations across the country and illustrate the extent to which many of them support the WRAP. Exhibit 2-1 provides a nationwide perspective. It shows all 28 NEPs and 20 UW partnership locations, which illustrates the extensive geographic reach of these partnership programs nationwide. Appendix A provides a series of maps further detailing how NEPs and UW partnership locations across the country address the WRAP themes.

Exhibit 2-1. Geographic Extent of NEP and UW Partnership Locations



National Estuary Program Study Areas

NORTHEAST

- 1 - Casco Bay Estuary Partnership
- 2 - Piscataqua Region Estuaries Partnership
- 3 - Massachusetts Bays National Estuary Program
- 4 - Buzzards Bay National Estuary Program
- 5 - Narragansett Bay Estuary Program
- 6 - Peconic Estuary Partnership
- 7 - Long Island Sound Study
- 8 - New York - New Jersey Harbor Estuary Program
- 9 - Barnegat Bay Partnership

MID-ATLANTIC

- 10 - Partnership for the Delaware Estuary
- 11 - Delaware Center for the Inland Bays
- 12 - Maryland Coastal Bays Program
- 13 - Albemarle-Pamlico National Estuary Partnership

SOUTHEAST, GULF, AND CARIBBEAN

- 14 - Indian River Lagoon National Estuary Program
- 15 - Coastal & Heartland National Estuary Partnership
- 16 - Sarasota Bay Estuary Program
- 17 - Tampa Bay Estuary Program
- 18 - San Juan Bay Estuary Partnership
- 19 - Mobile Bay National Estuary Program
- 20 - Barataria-Terrebonne National Estuary Program
- 21 - Galveston Bay Estuary Program
- 22 - Coastal Bend Bays and Estuaries Program

PACIFIC SOUTHWEST

- 23 - Santa Monica Bay National Estuary Program
- 24 - Morro Bay National Estuary Partnership
- 25 - San Francisco Estuary Partnership

PACIFIC NORTHWEST

- 26 - Tillamook Estuaries Partnership
- 27 - Lower Columbia Estuary Partnership
- 28 - Puget Sound Partnership

Urban Waters Partnerships

NORTHEAST

- A - Mystic River Watershed (MA)
- B - Bronx and Harlem River Watersheds (NY)
- C - Passaic River/Newark (NJ)

MID-ATLANTIC

- D - Delaware River Basin (PA, NJ, DE)
- E - Patapsco Watershed/Baltimore Region (MD)
- F - Anacostia Watershed (DC, MD)

SOUTHEAST, GULF, AND CARIBBEAN

- G - Proctor Creek Watershed/Atlanta (GA)
- H - Martin Peña Canal/San Juan (PR)
- I - Lake Pontchartrain Area/New Orleans (LA)
- J - San Antonio, Bexar County (TX)

GREAT LAKES

- K - Western Lake Erie Basin, near Toledo (OH)
- L - Grand River/Grand Rapids (MI)
- M - Northwest Indiana Area (IN)

MIDWEST

- N - Meramec River and Big River (MO)
- O - Middle Blue River/Kansas City (MO)

WEST

- P - South Platte Watershed, Headwaters to Denver Metropolitan Area (CO)
- Q - Middle Rio Grande/Albuquerque (NM)
- R - Rio Salado/Phoenix (AZ)

PACIFIC SOUTHWEST

- S - Los Angeles River Watershed (CA)

PACIFIC NORTHWEST

- T - Green-Duwamish River/Seattle (WA)

NEP and UW locations across the country are collectively supporting 9 of the 11 WRAP themes. Exhibits 2-2 and 2-3 summarize the range of WRAP themes and the number of NEPs and UW locations supporting each theme.

As shown in Exhibit 2-2, 15 of the 28 NEPs are supporting WRAP themes. Ten NEPs are supporting three WRAP themes, three NEPs are supporting four WRAP themes, and two NEPs are supporting one WRAP theme. Integrated Watershed Action is the most supported WRAP theme (14 of the 15 NEPs), followed by Outreach and Communications and Policy Coordination (both with 11 NEPs). Six NEPs are supporting Technology Development and Validation. One NEP each is supporting Science and Specifications, and Integrated Research.

Exhibit 2-2. Inventory of NEPs by WRAP Theme

NEP	Integrated Watershed Action	Policy Coordination	Science and Specifications	Technology Development and Validation	Integrated Research	Outreach and Communications
Northeast						
Barneгат Bay NEP	✓	✓		✓		✓
Long Island Sound	✓	✓		✓		✓
Narragansett Bay NEP	✓	✓	✓			
Peconic NEP		✓		✓	✓	✓
Mid-Atlantic						
Maryland Coastal Bays	✓	✓				✓
Partnership for the Delaware Estuary	✓	✓				✓
Southeast, Caribbean & Gulf Coast						
Coastal & Heartland NEP	✓			✓		✓
Sarasota Bay NEP	✓	✓				✓
Indian River Lagoon NEP	✓					
Galveston Bay Estuary Program	✓	✓				✓
Pacific Southwest						
Morro Bay NEP	✓	✓				✓
San Francisco Bay NEP	✓	✓		✓		
Santa Monica Bay	✓	✓				✓
Pacific Northwest						
Lower Columbia Estuary Partnership	✓					
Puget Sound	✓			✓		✓
Total Number of NEP Locations by WRAP Theme	14	11	1	6	1	11

Exhibit 2-3 shows that 11 of the 20 UW partnership locations are supporting one or more WRAP themes. One UW location is supporting three WRAP themes, two UW locations are supporting two WRAP themes, and eight UW locations are supporting one theme. As with the NEPs, Integrated Watershed Action is the most widely-supported theme (five UW locations), followed by Outreach and Communications (four UW locations). Two UW locations are supporting Water Information Availability, and one UW location each is supporting Policy Coordination, Technology Development and Validation, Finance Support, and Workforce Development.

Exhibit 2-3. Inventory of UW Partnerships by WRAP Theme

UW Partnerships	Integrated Watershed Action	Policy Coordination	Technology Development and Validation	Water Information Availability	Finance Support	Outreach and Communications	Workforce Development
Northeast							
Bronx and Harlem River Watersheds (NY)	✓		✓				
Mid-Atlantic							
Anacostia River Watershed (DC/MD)						✓	
Greater Philadelphia/Delaware River Watershed (PA, NJ, DE)							✓
Patapsco Watershed/Baltimore (MD)						✓	
Southeast, Caribbean & Gulf Coast							
Caño Martín Peña (PR)	✓						
Proctor Creek Watershed/Atlanta (GA)		✓			✓		
San Antonio River Basin (TX)				✓			
Great Lakes							
Northwest Indiana Area (IN)	✓						
West							
Middle Rio Grande/Albuquerque (NM)						✓	
South Platte River/Denver (CO)	✓			✓		✓	
Pacific Southwest							
Los Angeles River Watershed/Los Angeles (CA)	✓						
Total Number of UW Partnership Locations by WRAP Theme	5	1	1	2	1	4	1



Photos above show two projects involving planting and landscaping for more effective water management. Left photo is of a Team installing and planting Glasgow Park Rain Garden in 2018 (Sarah Bouboulis, Partnership for the Delaware Estuary). Right photo is of the Westwood Greenway in Los Angeles, where the Santa Monica Bay NEP has partnered with local government to create spaces with native plants and permeable surfaces for a healthier watershed (Source: City of Los Angeles, Shahram Kharaghani).



Photos above from water reuse efforts with Barnegat Bay Partnership. Left photo is imagery from the Jersey-Friendly Yards campaign in which the BBP collaborates (screenshot from jerseyfriendlyyards.org). Right photo is of the Brick Plaza traffic island retrofit as a mini rain garden used in educational campaigns and to improve stormwater runoff in the area (Source: Barnegat Bay Partnership NEP).



Photos above from the Exploration Green project in Texas where the Galveston Bay Estuary Program partnered in converting a former golf course of 178-acres into a large park to help manage stormwater, reduce flooding hazards, and protect regional water supplies. Photo on left of stormwater basin/pond created and photo on right of wetland nursery. (Source: Galveston Bay Estuary Program).

3. NEP and UW Partnerships’ Support of WRAP Themes

This section describes the WRAP themes that the NEP and UW locations are addressing and how the two programs are supporting each theme. Call-out boxes throughout this section highlight examples of how both partnership programs are effectively delivering on the WRAP priorities. An inventory of NEP and UW partnership projects identified as currently supporting WRAP strategic themes is presented in Appendix B.

3A. Integrated Watershed Action

The WRAP defines this strategic theme as integrated and collaborative actions that enable the consideration of water reuse at the watershed scale. Aligned with the concept of integrated water resource management (IWRM), this theme emphasizes that the most successful approaches to managing water are taken at the larger landscape level and incorporate the environmental, social and economic demands on water supplies. Freshwater resources generally have many competing stakeholders vying for water access and rights (including the natural ecosystem itself), making an integrated watershed management approach key for sustainable planning and reducing the risks of overdraft or contamination of water resources.

Integrated Water Resource Management
Integrated Water Resource Management is “a process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment.”
(Source: Global Water Partnership website: https://www.gwp.org/en/GWP-CEE/about/why/what-is-iwrm/)

Both the NEP and UW are grounded in this foundational systems-based approach to water resource management, protection and restoration at the watershed/landscape scale. Given that both partnership programs operate within this IWRM paradigm — utilizing widespread collaboration with diverse stakeholders for holistic and long-term water planning — water reuse and conservation have been organically incorporated into many of their initiatives. These partnership programs exemplify what is possible within this WRAP theme, providing numerous success stories and best management practices on what water reuse looks like at the watershed scale. The range of activities tied to this theme at NEP and UW partnership locations illustrates how much these community-supported programs have already accomplished, as well as how much more is possible in the future by further leveraging existing networks as delivery mechanisms to advance efforts in water reuse at large.

“Integrated watershed actions” as defined in the WRAP constitute the bulk of what the NEP locations focus their efforts and resources on. While not all of these efforts in the NEPs are directly tied to the concept of water reuse, many of the 28 estuaries of national significance have been incorporating water reuse and water conservation into their management plans for decades.

Galveston Bay Estuary Program (NEP) Texas

The Ghirardi Family WaterSmart Park was completed in the spring of 2014 as a collaborative effort between the Texas A&M AgriLife Extension Service, League City, and the Galveston Bay Estuary Program. The 3.75-acre park is the first of its kind in League City and one of the first of its kind in the entire state of Texas. Water conservation strategies used in the park include the following BMPs: rain gardens, bioswales, pervious pavers, rainwater harvesting for irrigation, and a green roof on the pavilion. The park allows developers, city staff, community officials and residents to view functioning BMPs, and learn how they fit into the landscape, can work together to form a treatment train, and truly enhance the area while improving water quality. Texas A&M AgriLife Extension Service is monitoring the effectiveness of the BMPs in this location with unique soils and climate conditions that have not been well studied. These data will help quantify the benefits of BMPs for local decision makers as they consider incorporating use of BMPs into codes and ordinances.

Barnegat Bay Partnership (NEP) New Jersey

The Barnegat Bay NEP takes a holistic, systems-based approach to the conservation of its coastal spaces and natural resources with numerous actions in its management plan that prioritize the maintenance and enhancement of the region's water supplies (both ground and surface water). Barnegat has been an active participant and stakeholder in numerous state-level initiatives sharing the objective of improved watershed health such as stormwater basin restoration efforts and stricter fertilizer laws in the state of New Jersey. At the local level, the Metedeconk River Watershed Protection & Restoration Plan serves as an example of NEP-led green infrastructure initiatives, as the Barnegat Bay Partnership has supported the installation of rain gardens, bioswales and bio-retention parking lots to improve natural water flows and groundwater recharge.

Sarasota Bay Estuary Program (NEP) Florida

Leading the way in Florida, the Sarasota Bay Estuary Program has proven to be a vital player in improving Florida's water resource management and pushing water reuse as an effective option for reducing demands on freshwater supplies. The NEP partnership continues to work with local utilities, such as the Peace Manasota Regional Water Supply Authority to promote reclaimed water usage where possible as an alternative potable water source. Additionally, they played a key role in the Whitaker Bayou Deep-Well Injection Project, which injects highly treated wastewater back into an underground well system in the region, ultimately leading to aquifer recharge and a more balanced watershed. The innovative system has the potential to dispose of 18 million gallons of treated water per day.

Integrated watershed activities with a focus on water reuse in the NEPs range from larger landscape initiatives utilizing green infrastructure for smarter development and natural resource conservation all the way down to household-level upgrades to improve rainwater capture for use in home gardens and landscaping. Fourteen of the NEPs are implementing projects and initiatives tied to the WRAP's Integrated Watershed Action theme. Examples of these efforts include:

- Retrofitting of wastewater and stormwater treatment facilities to improve water reclamation and recycling.
- Utilizing green infrastructure throughout communities to improve surface permeability for water recharge and to reduce runoff.
- Promoting water conservation and water reuse at the household-level through installation of rain gardens and rain barrels.

- Expanding commercial rainwater harvesting and recycled wastewater potential with businesses and agricultural operations to provide alternative water supplies.
- Collaborating to design and establish effective water markets and other innovative environmental economic solutions to promote sustainable water resource consumption.

Bronx and Harlem UW Partnership

The New York area UW partnership in the Bronx & Harlem River Watersheds has been working with their network to push for innovative solutions for the urban runoff problem to create healthier waterways for the highly developed region. One illustration of this is the Pier 5 Pop Up Wetland project along the Harlem River, an innovative design that created floating wetlands and prairie spaces to capture, hold and filter stormwater runoff from the Major Deegan Expressway before draining back into the river system.

Similar concepts and initiatives are being undertaken in five of the UW partnership locations across the country. Urban Waters ambassadors and partners in these locations work with local governments, non-governmental organizations, utility companies, and residents to improve the equitable management of urban water resources with a focus on improving both human and environmental health at the regional watershed level. Some of the efforts of UW partnerships related to the Integrated Watershed Action theme include:

- Designing innovative green infrastructure projects in urban spaces to better capture and treat runoff in order to improve the overall health of the region’s waterways.
- Collaborating on water equity initiatives to improve flood management and stormwater capture for potential reuse post-treatment, especially in low-income or minority communities.
- Partnering with local energy and water utilities to establish sustainable and equitable long-term planning strategies for water resources, including the expansion of water reclamation and recycling.

California NEP and UW Partnership Locations

Water reuse and conservation are high priorities across California’s NEP and UW locations, which cover different geographic spaces within the general areas of Morro Bay, San Francisco and Los Angeles (i.e., the LA UW partnership location is outside of the Santa Monica Bay NEP study area). The San Francisco Estuary Partnership continues to provide support for the Bay Area Integrated Regional Water Management Plan, which is a 9-county effort to coordinate and improve water supply, protect water quality, manage flooding, etc. Projects tied to the Plan are expected to result in 10,000-acre feet per year of potable water offset for the region. In Los Angeles, both the Santa Monica NEP and Los Angeles River Watershed Partnership (UW) are active in building and continuing relationships with local utilities and government to promote watershed-scale planning. The LA Urban Waters ambassador participates on the steering committee for the LA River Masterplan Update and UW partners continue to collaborate on the City’s Water Integrated Resources Plan to better manage water supply through a regional watershed approach. The Santa Monica Bay NEP also furthers these efforts through its work with both the Hyperion Water Reclamation Plant and the Tapia Water Reclamation Facility to expand the use of recycled water and reduce the region’s dependence on water imports.

3B. Policy Coordination

This strategic theme promotes the coordination and integration of federal, state, tribal and local water reuse programs and policies. In the context of the WRAP’s emphasis on integrated water resource management and water reuse planning at the watershed scale, policy coordination among a wide variety of stakeholders becomes vital. Many watersheds in the United States cross not only county lines, but also state borders (and sometimes even international boundaries), thereby requiring cross-jurisdictional cooperation and policy coordination.

Given the magnitude of diverse stakeholders in the NEP and UW partnership networks, policy coordination is key with not only governmental actors as emphasized in the WRAP, but also with non-governmental entities and private businesses. While coordinating policy decisions and water management initiatives across so many partners can present challenges, it also has the potential to lead to the most sustainable outcomes. For example, when local governments work together with water and/or energy utilities, as well as their community members, they create solutions that more effectively address all of the local area’s needs. On the contrary, when messaging and policies are not consistent, water resources are often managed inefficiently or overcommitted due to misinformation, miscommunication or competing interests. The NEP and UW partnership locations have grown increasingly strong networks supported by the public and policymakers alike over the last several decades, which have been the impetus for initiating policy change in support of healthy waterways and sustainable community development. These partnership programs strive to facilitate information exchange and data-sharing across the Nation’s localities, allowing for improved coordination and stronger public policy.

Policy coordination represents a foundational pillar of the NEP program’s success, complementing the focus on integrated watershed actions in the NEP locations. The partnerships established in national estuary regions foster open communication and engagement not only within their own communities, but also with regional players, national policymakers, and autonomous tribal governments. Investments into these

Santa Monica Bay National Estuary Program California

The Santa Monica Bay National Estuary Program continues to be a key partner in the Safe Clean Water LA program which ultimately strives to improve water conservation efforts and support improved water resource management policy in the metropolitan area. In 2018, the NEP supported and collaborated on the placement of Measure W on local ballots, which was passed by the general public, and now allows a 2.5 cent parcel tax per square foot of impermeable surface on private property. The funds collected from this new tax will be applied to improving the local water supply quality and quantity via stormwater management projects.

communication and coordination channels pay off through more efficient leveraging of the limited resources available for watershed conservation and restoration. All 28 NEPs avidly promote policy coordination among stakeholders, and a 11 of them are actively working on policy coordination in the specific arena of water reuse efforts. Some of the more common policy coordination activities include:

- Incorporating specific actions or objectives in their management plans to actively strengthen and sustain coordination efforts with local and state governments.
- Improving local and regional policies for wastewater and stormwater management and permitting.
- Collaborating with water districts and utilities for more sustainable long-term water planning.
- Integrating both land and water resources into development and conservation planning, rather than keeping the two separate.

Maryland Coastal Bays NEP

The Maryland Coastal Bays NEP has ongoing work with the state’s Department of Environment to draft and release new graywater regulations, which would ultimately impact the entire region’s outlook on use of reclaimed and recycled water sources.

The UW program is in large part successful due to its expansive network of organizations across the country, called the Urban Waters Learning Network. Managed through a partnership with Groundwork USA and the River Network, the platform provides a space for stakeholders to share and exchange

Proctor Creek Urban Waters Partnership Atlanta, GA

Atlanta’s Proctor Creek Urban Waters ambassador has been a member of the City’s Water Equity Task Force Initiative (with support from the U.S. Water Alliance) which contributed to Atlanta’s 2050 Metro Water District Integrated Water Management Plan. The plan highlights the necessity and importance of connecting water users, wastewater and stormwater management and overall watershed health across 15 counties and 95 cities in the Atlanta metropolitan area. The release of the initiative was hugely contingent on the coordination of many stakeholders including Atlanta’s water utility, community members, policymakers, and others.

information on lessons learned, best management practices, success stories, collaborative opportunities and more. The partnerships achieved through UW facilitates policy coordination efforts among multiple stakeholders and communities. UW ambassadors in the partnership locations facilitate meetings with multiple types of stakeholders, organizations, and agencies to create actions and projects to ensure that equitable policies and initiatives are implemented for the benefit of the entire community.

3C. Technology Development and Validation

This strategic theme focuses on technology development, deployment and validation tied to water reuse efforts. Advances in treatment technologies and corresponding information on technology performance can accelerate water reuse opportunities. These efforts require considerable collaboration and resources to research and develop new equipment and practices to advance water reuse and conservation. Actions within this strategic theme require many levels of coordination, including across multiple federal agencies (DOE, EPA, USDA, DOI, DoD, etc.), non-federal government agencies, and non-governmental and private sector organizations.

NEPs are supporting technology development and validation efforts around wastewater treatment systems, wastewater harvesting, irrigation systems, and innovative approaches to water treatment. For example, the Long Island Sound Study NEP partnered with the local government in East Northport (Suffolk County) to install a wastewater harvesting system at the Matinecock Court affordable housing complex in Huntington. The 10,000-gallon wastewater harvesting system reuses water for irrigation and prevents nitrogen from entering the

Peconic Estuary Partnership New York

The Peconic Estuary Partnership (PEP) has worked with multiple partners to install technologies for treating and reusing water for irrigation. This NEP was influential in supporting the Riverhead wastewater treatment plant upgrade project to use treated wastewater to irrigate the Indian Island Golf Course, which saves an estimated 350,000 gallons of water per day in the summer months for irrigation and reduces fertilizer needs on the golf course given the high nutrient load of wastewater. The PEP was also a partner for a similar golf course irrigation project in Shelter Island Heights. Additionally, in 2019, the PEP awarded grant funding to the Village of Greenport to conduct a feasibility study for a sewage treatment plant to start a water reuse project for irrigation of nearby properties. The PEP and the Long Island Sound Study are helping to facilitate this project.

watershed. The Peconic Estuary Partnership has worked with multiple partners to support projects that treat and reuse water for irrigation, saving hundreds of thousands of gallons per day (see callout box). Several NEPs include actions in their Comprehensive Conservation and Management Plans (CCMPs) that relate to technology development and validation for water reuse technologies. For example, the Puget Sound NEP’s CCMP includes implementing innovative approaches to treating stormwater, and in 2017, the NEP supported the launch of the Aqualyst Accelerator program to promote water technology for improved water treatment.

San Francisco Estuary Partnership California

- The San Francisco Estuary Partnership (SFEP) has been collaborating on an innovative system to inject treated wastewater back into natural habitats. The Oro Loma Living Laboratory is designed to study the concept of using a vegetated gently sloped levee to provide storm surge protection, habitat, and processing of wastewater from treatment plants. Wastewater that has undergone secondary treatment is injected at the top of the levee and dispersed through 12 cells, each one with a different combination of soil and plant habitat. Water quality monitoring at Oro Loma determined that the experimental levee significantly removes wastewater-derived contaminants while providing valuable habitat and flood protection
- SFEP is supporting the San Francisco International Airport Reclaimed Water Facility. This new state-of-the-art facility will produce approximately 1,120 acre-feet per year of disinfected recycled water for unrestricted non-potable uses throughout the airport, including landscape irrigation and urban reuse. The

UW partnership locations are also supporting technology development and validation efforts around water reuse. For example, the Bronx and Harlem River partnership, USGS, and NYC Parks and DEP are working together to assess whether street trees newly planted along the Harlem and Bronx Rivers can help capture stormwater runoff, diverting it from the combined sewer systems.

3D. Outreach and Communication

The ultimate objective of this strategic theme is to improve outreach and communication on water reuse. Any large-scale program or policy such as the WRAP, which focuses on watersheds across the country, requires public acceptance and support to be successful. This is one of the primary reasons that NEP and UW partnerships can be such an effective delivery mechanism of water reuse efforts; both programs have well-established relationships with communities and stakeholders on the ground. Both partnership programs already focus on sustained outreach and communication to their constituents and partners, constantly developing and distributing new educational materials, coordinating workshops and orchestrating community events.

Strong relationships and communication among partners and stakeholders in the NEP and UW partnership programs create opportunities to implement innovative water reuse solutions with strong community buy-in. Both programs use their platforms to reach stakeholders and partners

on a local and national scale to improve access to and the quality of water resources. Outreach and communication are being utilized to support increased water reuse across 11 NEP and 4 UW partnership locations.

The types of activities that involve outreach and communication for the NEPs range from individualized campaigns to larger community-based approaches. For example, projects focused on the household and individual levels aim to promote behavior change in water consumption through the installation of rain barrels, bioswales, and rain gardens

for an overall greener community. Additionally, the NEPs support the dissemination of best practices to reduce contaminants, improve water quality, and protect habitats through professional development trainings and workshops. Environmental education is vital to the NEPs' efforts to help stakeholders understand the value of conserving and protecting water supply. Many NEPs engage in the education of consumers regarding water supply versus demand and tangible ways to conserve or recycle water both indoors and outdoors.

Puget Sound Partnership (NEP)

The Puget Sound NEP collaborated with the WA State Department of Commerce on a [Low-Impact Development Guidebook for Jurisdictions](#). The Guidebook provides tools and resources to local jurisdictions for improved water re-purposing and conservation. It promotes best management practices such as bioretention/rain gardens, pervious surfaces, and rainwater harvesting.

Morro Bay NEP California

The Morro Bay NEP engages in the conservation of water resources through community outreach and engagement in many significant ways. The NEP participates with public and non-profit partners in the purchase of land easements to reduce the use of water resources for intensive agriculture and urban development. Additionally, the NEP supports best management practices with property owners, residents, visitors and businesses to reduce impacts to the estuary from stormwater runoff, water use and spread of invasive species. Morro Bay NEP collaborates on efforts to enhance water conservation and reuse throughout the watershed with all users through activities such as incentive programs to reduce water use, demonstration projects for rainwater harvesting, integrated water management plans, and dialogues with water agencies to advance water recycling.

Many UW partnerships have similar types of localized projects related to behavior change that provide opportunities for the public to attend workshops on community greening, stormwater management, and rain barrel use. Water reuse and conservation is a multi-pronged approach to address a suite of issues beyond protecting the supply, such as improving stormwater management, greening and beautifying a community, and finding a secondary use for water that would otherwise go to waste.

Middle Rio Grande Urban Waters Partnership Albuquerque, NM

The Middle Rio Grande Urban Waters Partnership in Albuquerque, NM focuses its efforts on addressing the challenges of water supply in its arid environment. One of the partnership's significant projects involves hosting a green infrastructure and low-impact development workshop, which bring together a targeted group of stormwater professionals across disciplines to address barriers to green infrastructure implementation. The dissemination of technical resources, education, and the facilitation of collaboration is a key contributor to the expansion of green space and low-impact development in UW partnership locations, and these workshops help facilitate the expansion of knowledge and education for communities across the country.

Patapsco River Watershed UW Partnership Baltimore, MD

Developing [GROW Centers](#) (Green Resources & Outreach for Watersheds) is a project born out of a UW Partnership meeting in Baltimore. These centers are neighborhood greening resource hubs, linking city residents, communities, and faith-based groups to plants, materials, and technical expertise for greening projects. Over the past two years, with help from USDA Forest Service, the Urban Waters Partnership and organizations in Baltimore provided city residents with free and/or low-cost trees, mulch, plants, as well as free workshops on community greening, vacant lot revitalization, and the installation of rain gardens and rain barrels. These pop-ups and workshops were visited by 695 participants, representing over 100 neighborhoods in Baltimore. In total, 376 trees and over 39 cubic yards of mulch were given away, over \$2,000 worth of native plants and 121 recycling bins were sold and 16 workshops on community greening and stormwater management were offered. The GROW Centers were a natural extension of the UW Partnership's [Green Pattern Book](#), a resource that identifies strategies to help green Baltimore's vacant lands, improve water quality and implement stormwater solutions.

3E. Other Themes - Science and Specifications, Water Information Availability, Finance Support, Integrated Research, and Workforce Development

In addition to the four areas highlighted above, NEPs and UW partnership locations support several other WRAP strategic themes, including: Science and Specifications, Water Information Availability, Finance Support, Integrated Research, and Workforce Development.

Science and Specifications

The Science and Specifications theme focuses on compiling and refining fit-for-purpose specifications of water reuse efforts. By compiling and refining science and specifications on managing used water sources and treating for reuse, stakeholders can build a better foundation for developing increasingly efficient approaches and methodologies – an effort that NEPs support. For example, the Narraganset Bay NEP has a CCMP action to implement scientifically based water management to restore and protect streamflow and ensure sustainable yields, including a methodology that accounts for current and future land uses, impacts on aquatic systems and inter-basin transfers.

Water Information Availability

The Water Information Availability theme focuses on sharing data and information on the quality and quantity of available water to improve opportunities for water reuse. The NEPs and UW partnership locations have an important role to play in coordinating and facilitating the dissemination of information. For example, the South Platte River Urban Waters Federal Partnership location funded a critical update to its local [Denver Metro Water Quality Assessment Tool](#), shifting from a static platform to one that will continually update and pull data from the Water Quality Portal. Given the arid nature of the region, water quality data are vital to understanding and managing regional water supply at large. The tool provides both context and direct access to cross-jurisdictional water quality data for the Denver metro area and shows a snapshot of conditions for water quality parameters, including E. coli, contaminants of emerging concern, total dissolved and suspended solids, selenium and nutrients. The assessment tool highlights how seasonal changes to freshwater flows impact water quality and therefore further necessitate the need for water reuse and conservation efforts in the Denver Metropolitan area. The tool makes data easily accessible to the public, including teachers who use the data for classroom learning, and provides storylines that assist the public in taking action to improve water quality. Several partners are collaborating on this project, including water utilities (Denver Water & Metro Wastewater Reclamation District), state, city and county entities, nonprofit organizations, academic partners and three Urban Waters Federal Partnership Agencies.

Finance Support

The Finance Support theme focuses on improving the understanding of water reuse finance options that can enable water reuse projects. The NEP and UW programs, comprised of local, state and federal partners, have knowledge of and access to a wide array of public-facing funding mechanisms to support broader environmental management efforts such as habitat restoration, water quality, and sustainable community development. While many of the grants and funds available are not directly tied to water conservation and reuse, holistic planning and integrated management approaches can easily incorporate the concepts into larger projects and initiatives. As a platform for the sharing of lessons learned and information, the NEP and UW partnerships can showcase funding for innovative water reuse projects, which helps support organizations and partners who are actively working towards water conservation goals.

Proctor Creek Urban Waters Partnership Atlanta, GA

The Proctor Creek Urban Waters Partnership ambassador worked closely with UW partners and the City of Atlanta to address water efficiency and affordability challenges. Through the recognition from the City of Atlanta that customers face difficulty in paying for essential services like water, partners worked to create the Care and Conserve Program. The program offers financial assistance, including assistance with plumbing repairs and the installation of water efficiency devices in homes. Partners from the Proctor Creek Urban Waters Partnership supported efforts in creating the Care and Conserve program, moving the needle in creating equitable solutions to affordability challenges, while providing for at-home water-saving features that meet water conservation goals. This example can be shared among other partnership locations and cities across the country who would like to engage in similar efforts, encouraging financing for this type of work to be a central pillar in water reuse projects.

Integrated Research

The Integrated Research theme is based on the idea that enhanced coordination of past and future water reuse research can optimize its value, better identify critical gaps, and speed delivery to users. The NEPs' role at the intersection of science and information dissemination means they can play an important role in delivering on this theme. For example, as discussed above under the section on Technology Development and Validation, the Peconic Estuary Partnership provided grant funding to the Village of Greenport to conduct a feasibility study for a sewage treatment plant. The research conducted for the feasibility study helped launch a water reuse project for irrigation of nearby properties. This type of funding for research on technology development and retrofitting is not necessarily commonplace among NEP and UW locations at this point in time; however, this example illustrates the possibilities that exist with greater access to resources.

Workforce Development

The Workforce Development theme focuses on helping prepare the water workforce for the increasingly complex and expansive role that water reuse will play in the coming years. The UW program, which helps deliver both environmental and economic benefits, can support these efforts. For example, the Camden County Municipal Utilities Authority, an active partner in the Delaware River Urban Waters Federal Partnership, has committed to revitalize Camden through green jobs programs for youth. This includes PowerCorps Camden, which provides pre-employment training for at-risk young adults to work on Camden's network of storm sewers, rain gardens, vacant lots, and parks.



Photos above from Sitton School depaving in partnership with the Lower Columbia Estuary Partnership. This is one depaving example of many that the NEP has collaborated on in the region to contribute to healthier water supplies and watersheds. (Source: Lower Columbia Estuary Partnership staff).



Photos above from the Oro Loma Living Laboratory in the San Francisco Bay region of California, where horizontal levees have been designed to inject treated wastewater back into the natural environment and better manage flooding (Source: SF Estuary Partnership staff).

4. Conclusions

The WRAP is a coordinated and collaborative effort to advance consideration and implementation of actions to support water reuse. Partnerships are a highly effective delivery mechanism for developing and implementing water reuse initiatives and achieving many of the WRAP's strategic priorities. This paper has demonstrated how two successful partnership programs managed by EPA's Office of Water – NEP and UW – serve as platforms for delivering on the WRAP priorities in communities across the country. Furthermore, the paper illustrates innovative water resource management efforts that have been taken on voluntarily across the NEP and UW programs, many of which have the potential to be replicated in other partnership locations. While “water reuse” was not the sole founding principle of the NEP and UW programs, it has organically become part of many management plans and watershed restoration activities as they take on a more holistic approach to water resource management.

Working with utilities, local and state government, and non-governmental organizations, many NEP and UW partnership locations have already created effective water reuse solutions. Fifteen of the 28 NEPs and 11 of the 20 UW locations collectively are supporting nine of the 11 strategic themes in the WRAP.² To accomplish this, the NEP and UW partnership programs leverage their extensive geographic reach, strong multi-stakeholder networks and an integrated approach to watershed management.

The numerous success stories documented in this paper span multiple topic areas and locations. Some highlights include: working with local utilities on integrated watershed plans and projects that can dramatically reduce demand for freshwater; coordinating with local governments and other stakeholders on plans, regulations, and ballot measures to promote integrated watershed management and improve water quality; demonstrating innovative water treatment and reuse technologies that can save hundreds of thousands of gallons per day; providing outreach, technical assistance, and educational resources to local governments, businesses, and residents to support water conservation and reuse activities; and developing and deploying innovative water quality tools and water reuse finance options.

These successes are the result of the partnership approach that the NEP and UW programs exemplify. Both programs emphasize collaboration with diverse stakeholders for holistic and long-term planning, sometimes including water reuse and conservation planning at the watershed scale. The range of activities tied to this theme at NEP and UW partnership locations illustrates how much these community-supported programs have already accomplished, and the significant potential to further leverage existing networks as delivery mechanisms to continue advancing water reuse at the watershed scale.

The NEP and UW partnership programs' well-established networks and communication channels allow them to serve as effective delivery mechanisms for water reuse initiatives. Both programs focus on sustained outreach and communication to their constituents and partners. Strong relationships and communication in the NEP and UW partnerships create opportunities to implement innovative water management solutions with strong stakeholder support. Moreover, the NEP and UW partnership locations leverage their robust networks to support policies that promote healthy waterways and

² Collectively, this report documents the NEP and UW partnership programs' support of all the WRAP strategic themes with the exception of metrics for success and international collaboration.

community economic development. Both programs facilitate information sharing within and across communities, allowing for improved coordination and stronger public policy.

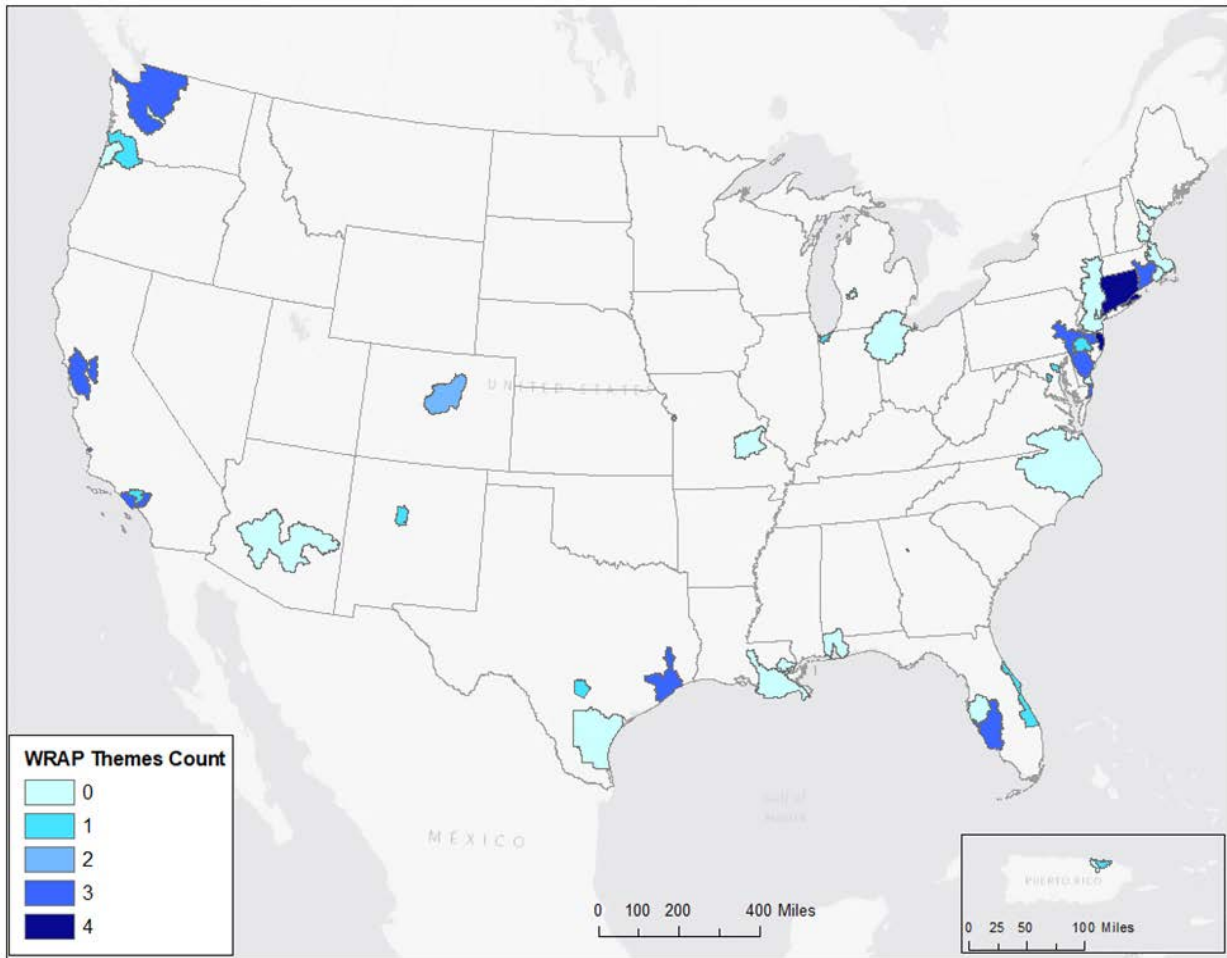
While an impressive number of locations are already delivering on WRAP priorities, it is likely that even more locations are supporting the WRAP in ways that were not documented in this report. It is also true that opportunities to address specific WRAP themes will be more apparent in some locations than others, as freshwater availability varies across the United States. Nonetheless, the experience of partnership locations that are known to be implementing water reuse initiatives makes a compelling case for considering how this approach can be applied more broadly.

The WRAP envisions a collaborative approach to water reuse management with involvement from other federal agencies, state governments and water sector stakeholders. This paper places the partnership model front and center as an effective way to deliver on the WRAP's vision and strategic priorities.

Appendix A: Geographic Coverage of NEP and UW Partnership Programs Supporting WRAP Themes

The following exhibits show the wide geographic coverage of NEP and UW partnership locations across the country and illustrate the extent to which many of them support the WRAP. Exhibit A-1 provides a nationwide perspective, showing the number of WRAP themes addressed in each of the 28 NEPs and 20 UW partnership locations, which illustrates the extensive geographic reach of these partnership programs and that partnership locations in each major region of the U.S. are addressing WRAP priorities.

Exhibit A-1. Number of WRAP Themes Addressed by NEPs and UW Partnerships across the U.S.



Exhibits A-2 to A-8 provide more details on the distribution of specific WRAP priority themes supported by individual NEP and UW partnership locations. For readability, each map in Exhibits A-2 to A-8 focuses on a different part of the country: the Northeast (Exhibit A-2), Mid-Atlantic (Exhibit A-3), Southeast/Gulf and Caribbean (Exhibit A-4), Great Lakes and Midwest (Exhibit A-5), the West (Exhibit A-6), Pacific Southwest (Exhibit A-7), and Pacific Northwest (Exhibit A-8). The shaded areas in each map correspond to NEP and UW locations; and the symbols denote the WRAP themes that the NEP and UW programs are addressing **in each location**.

Exhibit A-2. WRAP Themes Addressed by NEPs and UW Partnerships in the Northeast

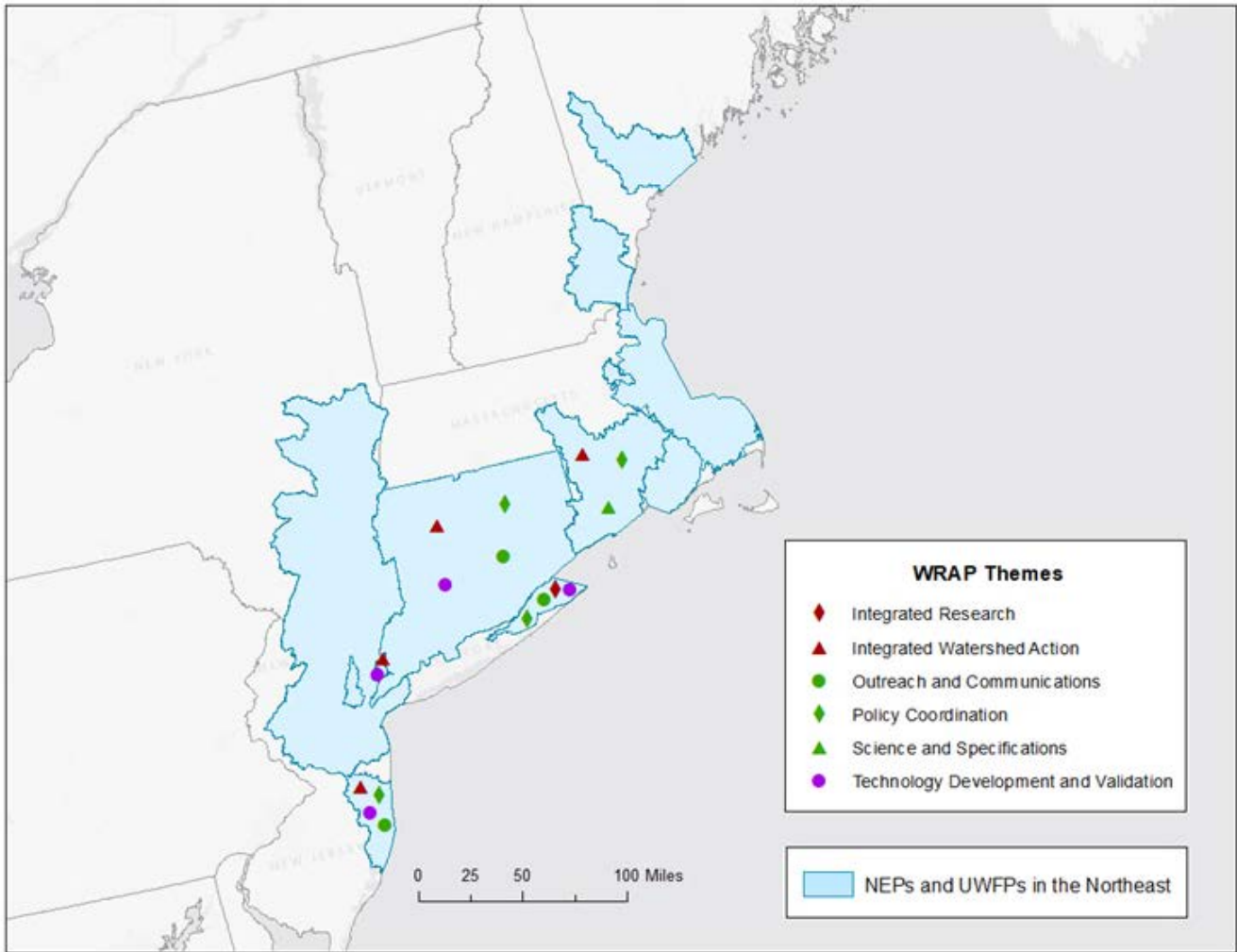


Exhibit A-3. WRAP Themes Addressed by NEPs and UW Partnerships in the Mid-Atlantic

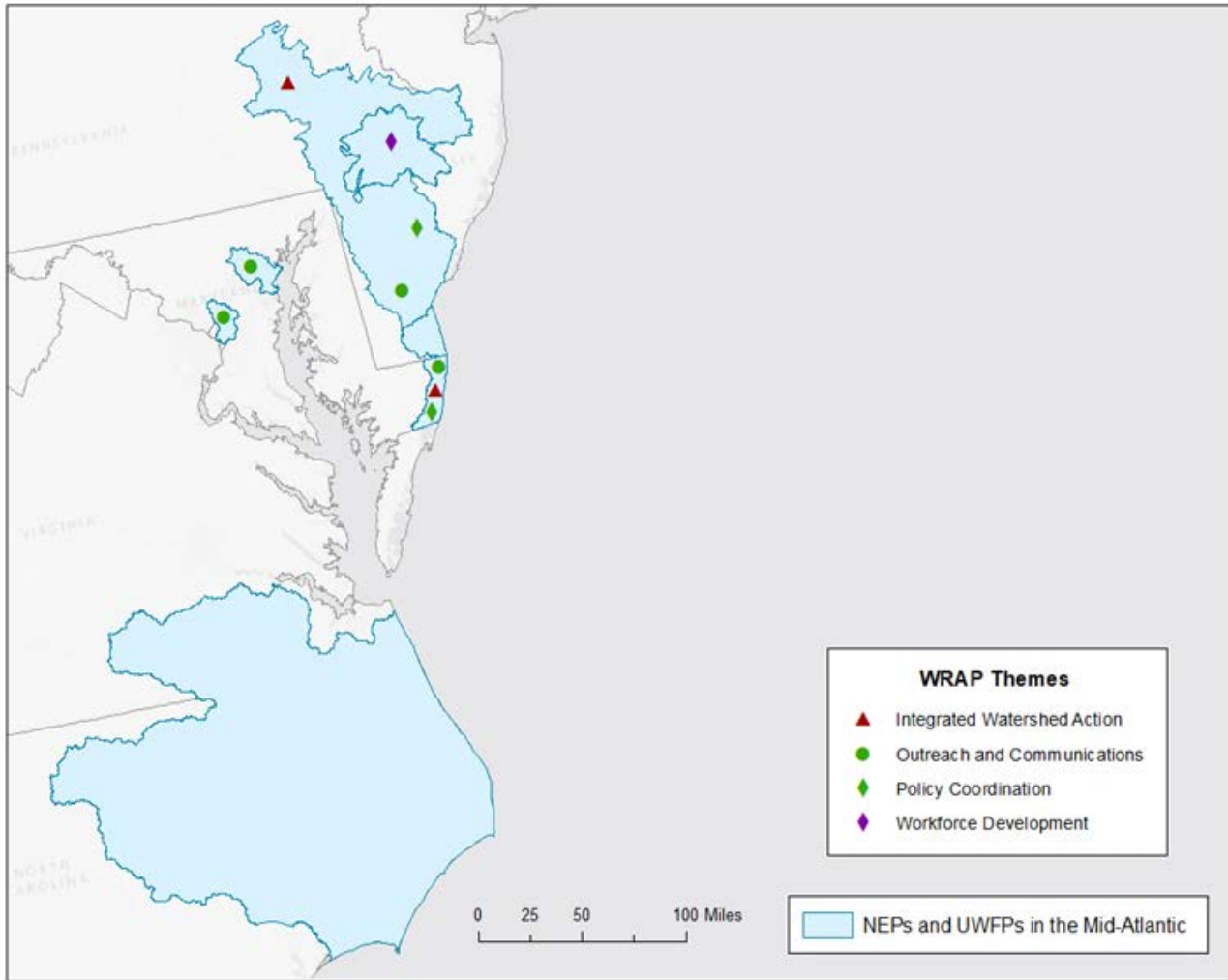


Exhibit A-4. WRAP Themes Addressed by NEPs and UW Partnerships in the Southeast, Gulf and Caribbean

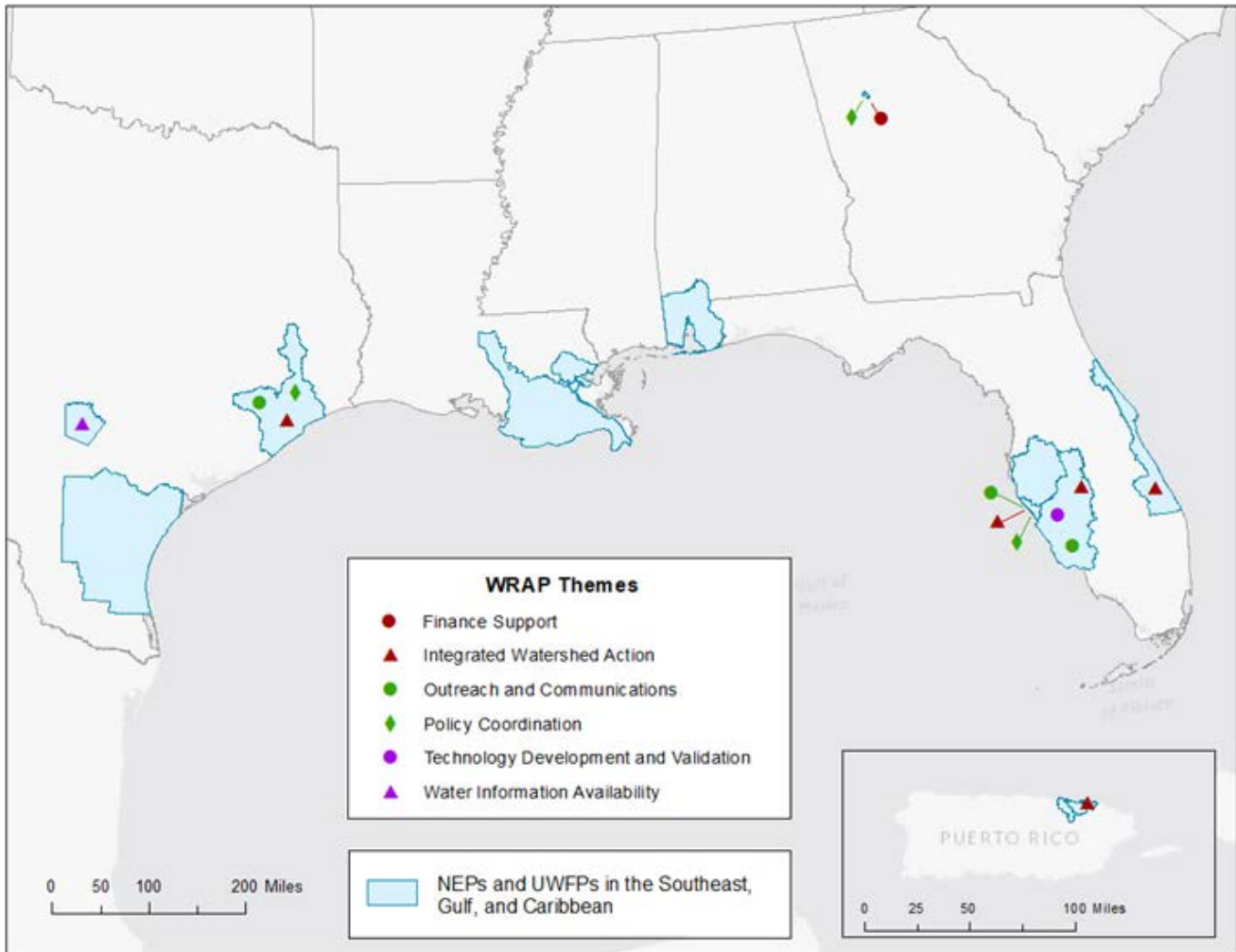


Exhibit A-5. WRAP Themes Addressed by NEPs and UW Partnerships in the Great Lakes and Midwest

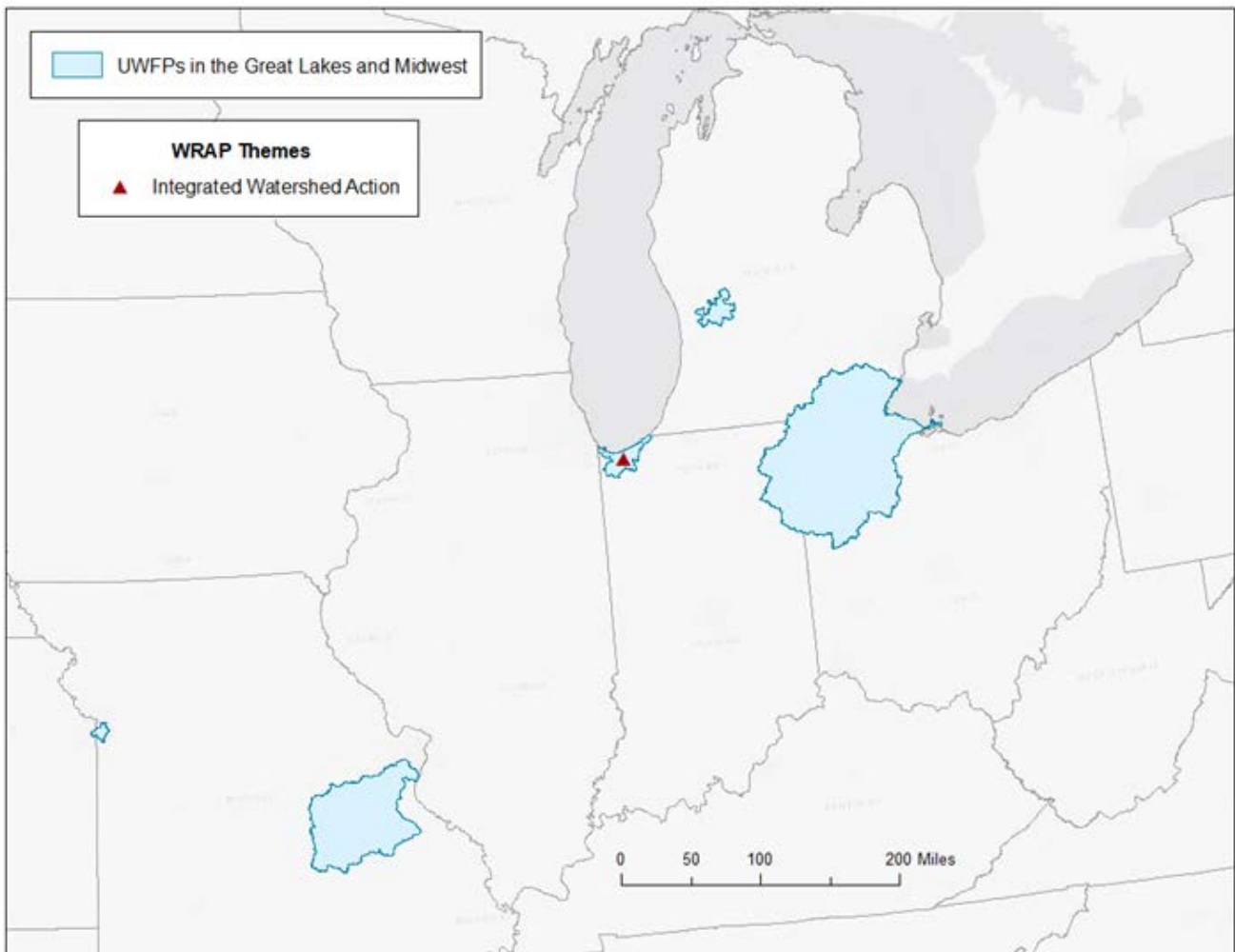


Exhibit A-6. WRAP Themes Addressed by NEPs and UW Partnerships in the West

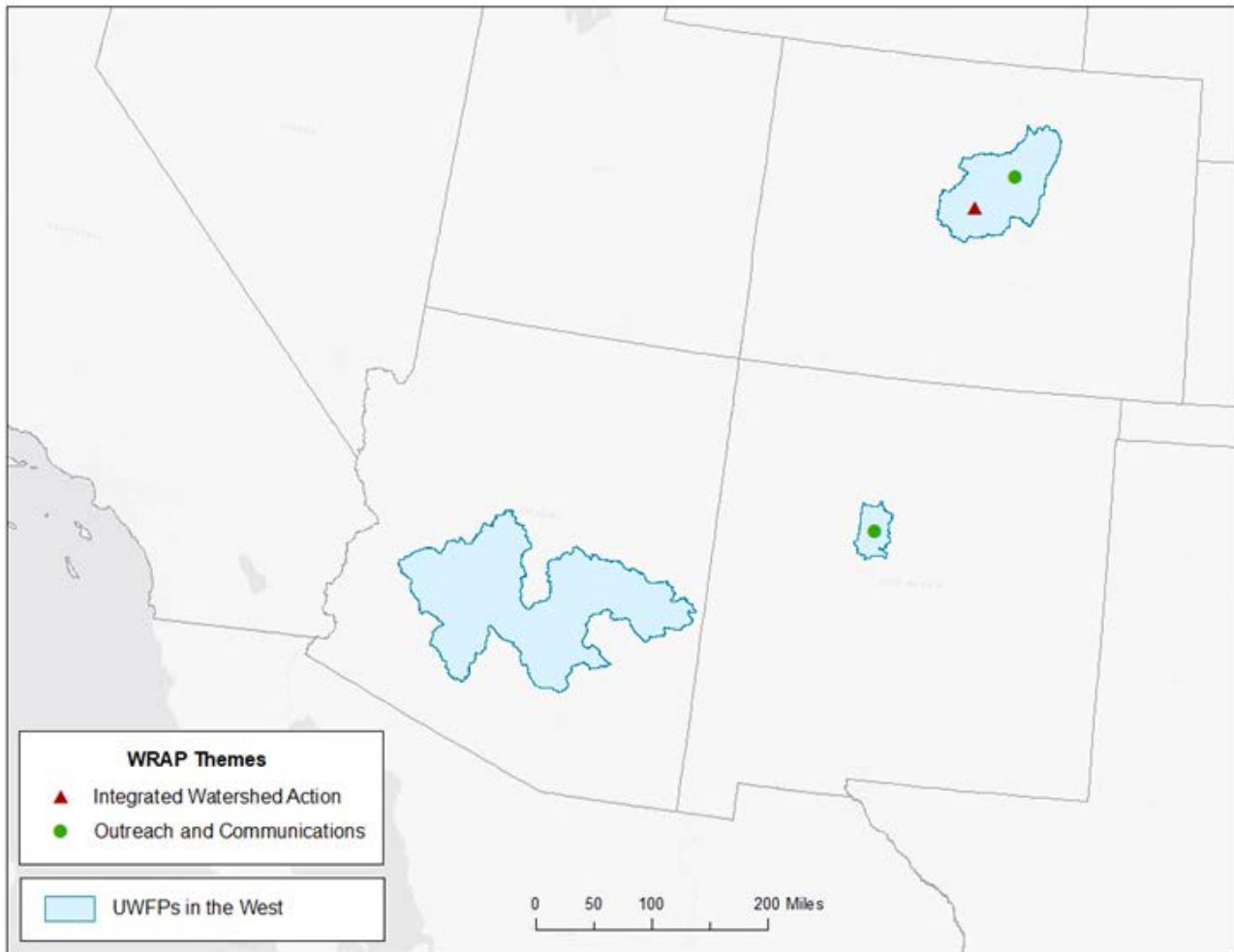


Exhibit A-7. WRAP Themes Addressed by NEPs and UW Partnerships in the Pacific Southwest

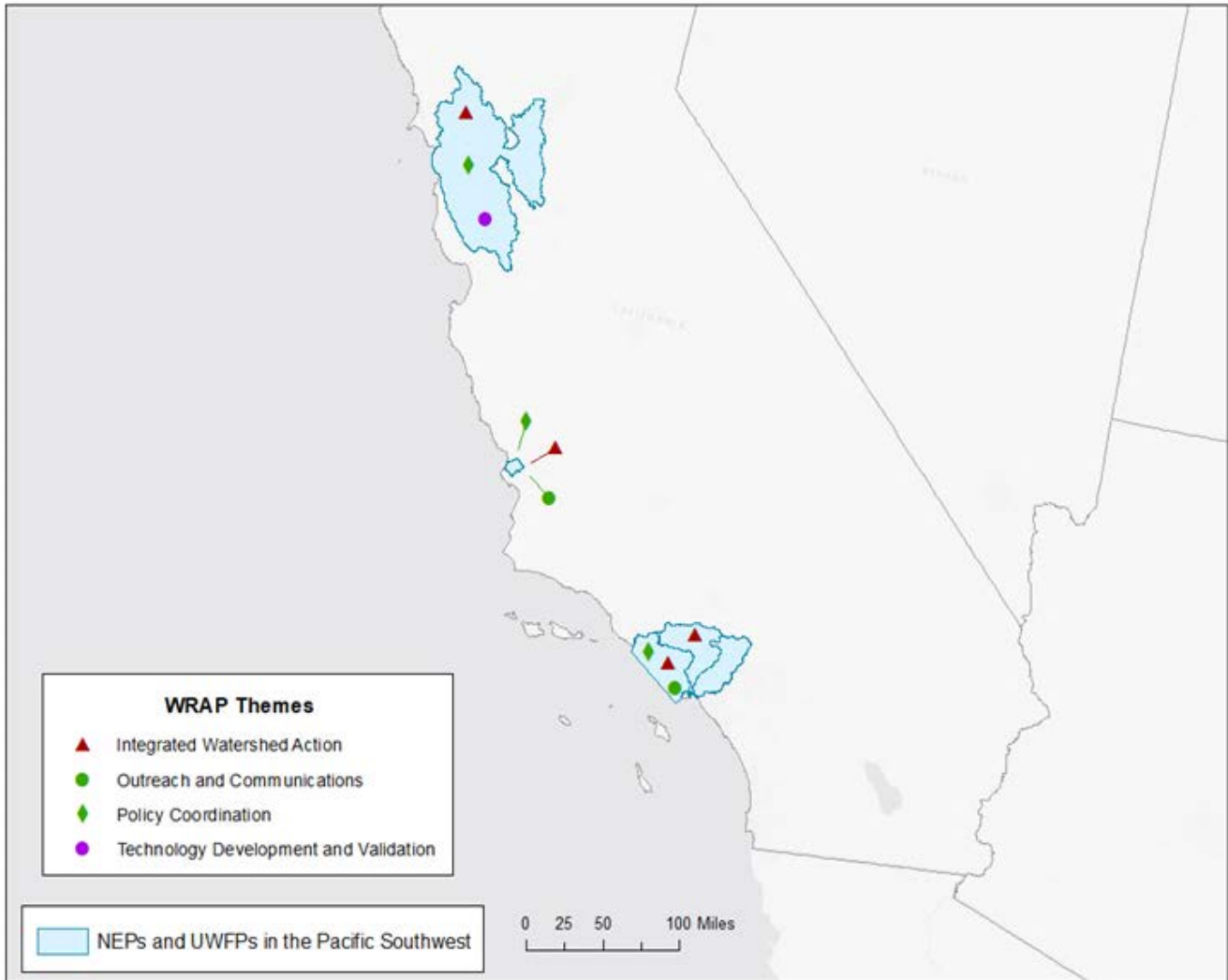
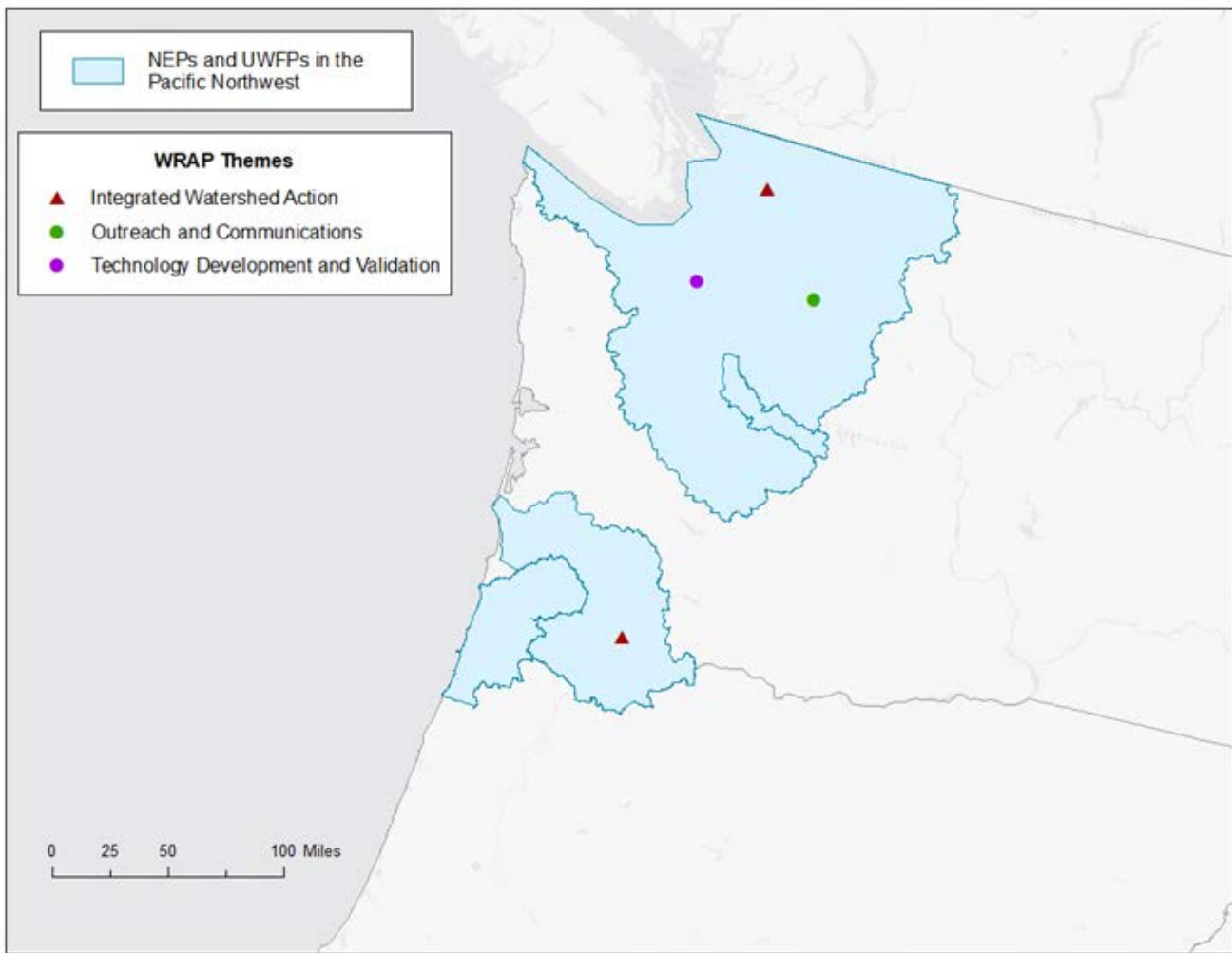


Exhibit A-8. WRAP Themes Addressed by NEPs and UW Partnerships in the Pacific Northwest



Appendix B: Detailed Inventory of NEP and UW Partnership Programs Supporting WRAP Themes

Exhibits B-1 and B-2 provide extensive details on management plan priorities and recent activities tied to water reuse across the UW and NEP partnership locations; however, this information does not contain every single project implemented or planned across the country tied to water reuse. These programs, as well as their mid- and long-term management plans are constantly evolving, therefore causing shifts in restoration and conservation priorities depending on local needs. For example, not every project or activity identified in a NEP’s CCMP is always carried out due to a number of external and internal factors. Additionally, there are likely initiatives just beginning or even well underway related to water reuse that have not been captured here. The focus of this inventory was on partnership locations that place water reuse and conservation at the top of their priorities as illustrated by inclusion throughout management plans and numerous projects and/or activities, rather than scattered, stand-alone initiatives.

Exhibit B-1. Inventory of NEP Projects Supporting WRAP Themes

NEP	Project
Integrated Watershed Action	
Narragansett Bay NEP (2012 CCMP)	<p>CCMP Actions: Section 1 – Protect & Restore Clean Water</p> <ul style="list-style-type: none"> • 2.2 Prioritize retrofitting of BMPs to areas most affected by stormwater impacts, using Low Impact Development (LID) and including physical and habitat restoration where feasible to achieve water quality goals. <p>Section 3 – Protect and Restore Fish, Wildlife and Habitat</p> <ul style="list-style-type: none"> • 5.6: Identify compatibility issues related to hydroelectric power generation and river ecosystems; incorporate into hydropower development strategies. <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Stormwater Management—Suburban Parkway (Warwick, RI) – finished in 2018 with purpose to improve water infiltration and filtration of stormwater runoff along roadway medians
Long Island Sound (2015 CCMP)	<p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • “Peecycling” nutrient reuse—Brattleboro WWT (VT) recycles nitrogen from wastewater to reuse as fertilizer (actual project by Rich Earth) • Norwalk Harbor GI Improvements (2019—depaving for better recharge of water sources and cleaner runoff into harbor for shellfish harvests) • NYC Green Playgrounds—partner with schools and trust for public land to depave schools, install more permeable surfaces and green space for improved stormwater capture and infiltration
Barnegat Bay NEP (Draft July 2019)	<p>CCMP Actions: Water Supply Objective 1: Protect, maintain and enhance existing water supply and surface and ground water flow.</p> <ul style="list-style-type: none"> • WS 1-1: Assess/implement existing shallow groundwater protection programs, including wellhead protection, rainwater and treated wastewater recharge, and new septic designs that may better address release of nutrients and anthropogenic compounds to groundwater. • WS 1-3: Assess HUC 11s for water supply capability related to streamflow, surface and shallow groundwater withdrawal capacity. • WS 1-5: Promote/support land use activities that enhance water supply protection and minimize water withdrawals and usage, especially in the most water stressed planning areas as identified in the State Water Supply Master Plan. <p>Water Supply Objective 2: Prevent degradation of water supplies.</p>

NEP	Project
	<ul style="list-style-type: none"> • WS 2-2: Identify, implement and support voluntary and mandated conservation and infiltration practices and regulation to maintain and restore base stream flows and natural hydrology. <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Brick Plaza project completed in 2019—permeable surfaces, water capture and outreach on runoff/water management (improved water infiltration) • Metedeconk River Watershed Protection/Restoration Plan: GI for stormwater control/management & NPS education/outreach for water reuse/conservation → rain gardens, catch basins/bioswales, bio-retention parking lot spaces • Role in larger landscape/state level initiatives for overall improved groundwater recharge and runoff management with potential ties to water reuse: <ul style="list-style-type: none"> ○ NJ Fertilizer Law ○ NJ “Soil health/ restoration” Law ○ Stormwater basin restoration efforts across NJ
<p>Partnership for the Delaware Estuary (2019 CCMP)</p>	<p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Ongoing efforts in region to plant/install stormwater/runoff management infrastructure such as rain gardens <ul style="list-style-type: none"> ○ 2018 installment of Glasgow Park rain garden in Newark, DE ○ Save the Source Landscape Makeover Program: leverage green stormwater infrastructure and ag BMPs to provide rain garden rebates, assessments for municipal and public properties, incentives to farmers using BMPs (18 acre minimum of green stormwater infrastructure) • School depaving campaigns to replace asphalt with permeable surfaces <ul style="list-style-type: none"> ○ Jenkintown School District Water Harvest program (rainwater harvesting system with facilities for re-use)
<p>Maryland Coastal Bays (2015-2025 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • Water Quality Goal 1.2: Improve the understanding and protection of groundwater resources. <ul style="list-style-type: none"> ○ WQ 1.2.6: Work with local gov and other state departments to advance use of gray water for irrigation. • Water Quality Goal 1.6: Promote the use of treated wastewater as a resource rather than a waste product. <ul style="list-style-type: none"> ○ WQ 1.6.1: Maintain policy of no new wastewater treatment plant discharge and continue to support spray irrigation and other tech instead. ○ WQ 1.6.2: Facilitate point source removals at Church Branch and Marshall Creek by connecting landowners with funding sources for spray irrigation or wastewater treatment plant hook ups.
<p>Galveston Bay Estuary Program (2018 draft CCMP)</p>	<p>CCMP Actions:</p> <p>Nonpoint Source Pollution Action 1: Support watershed-based plan development and implementation.</p> <p>Water Reuse Updates/Activities:</p> <ul style="list-style-type: none"> • Exploration Green is a 178-acre park located at the former Clear Lake Golf Course that was turned into a stormwater wetland. Exploration Green provides stormwater detention for 500 million gallons of water, protecting over 2,000 nearby homes and businesses. This area is an integrated, natural solution for catastrophic seasonal flooding, while also serving as a nature preserve and recreation area with six-miles of trails and two athletic fields for community use. The first phase of Exploration Green was about 80% completed when Hurricane Harvey hit and the detention area held enough stormwater runoff that even houses that habitually flooded with just 5 to 10 inches of water from storms, didn’t flood with the 45+ inches that came with Harvey. The park saved over 150 homes from flooding during Hurricane Harvey and completely mitigated flooding during 2019 Tropical Storm Imelda. In addition to stormwater relief, the conservation area improves water quality, provides carbon sequestration, and has increased wildlife and plant diversity fivefold. Exploration

NEP	Project
	<p>Green’s 39 acres of wetland habitat and 38 acres of permanent lakes support 890 native plant and wildlife species as well as the 150,000 wetland plants that have been planted in the conservation area. Exploration Green also encourages area residents, from all walks of life, to utilize trails and attend weekly community events. All phases of the project are expected to be complete in 2021.</p> <ul style="list-style-type: none"> • The Ghirardi Family WaterSmart Park was completed in the spring of 2014 as a collaborative effort between the Texas A&M AgriLife Extension Service, League City, and the GBEP. The Ghirardi WaterSmart Park is a 3.75-acre space and is the first of its kind in League City and one of the first of its kind in the entire state of Texas. Water conservation strategies used in the park are: rain gardens, bioswales, pervious pavers, rainwater harvesting for irrigation, and a green roof on the pavilion. The BMPs in the park serve both education and demonstration purposes. The park allows developers, city staff, community officials and residents to view functioning BMPs, learn how BMPs fit into the landscape, how BMPs can work together to form a treatment train, and how BMPs truly enhance the area while improving water quality. Texas A&M AgriLife Extension Service is monitoring the effectiveness of the local stormwater BMPs, which have the unique soils and climate conditions that have not been well studied here. These data will help quantify the benefits of features like rain gardens and swales for local decision makers as they consider incorporating the use of these practices into their codes and ordinances.
<p>Coastal/Heartland NEP (2019 CCMP)</p>	<p>CCMP Actions: Water Quality Improvement Action 4: Reduce wastewater pollution.</p> <ul style="list-style-type: none"> • Activity 4.1: Support WWT improvements, encourage proactive inspection, maintenance and replacement of failing or underperforming sanitary sewer infrastructure. Encourage, expand and incentivize water reuse, especially wastewater, which is protective of water quality and the natural hydrology in nearby waterways. Support additional WWT capacity to prevent overflows and other impacts to infrastructure and performance due to climate stressors. <ul style="list-style-type: none"> ○ Water reuse actions stated to be collaboration with municipal and county governments and other local stakeholders. <p>Hydrologic Restoration Action 2: Increase fresh surface water and groundwater availability to support healthy ecosystems:</p> <ul style="list-style-type: none"> • Activity 2.2: Increase aquifer recharge by supporting local plans/codes to decrease impervious surfaces, incorporate GI, protect recharge areas and protect/restore wetlands. • Activity 2.3: Encourage conservation and efficient water use and promote aquifer recharge through GI projects, adoption of ag irrigation BMPs, and promotion of alternative water supply sources (including increased reuse of treated wastewater). <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Polk County is restoring 120-acre lakebed to receive/treat water from farm canals before release into Peace River. • City of North Port is installing GI such as pervious parking lots, bioswales, stormwater pond aerators, stormwater harvesting for irrigation and acquiring waterfront land for blueway buffers.
<p>Sarasota Bay NEP (2014 CCMP)</p>	<p>CCMP Actions: Wastewater Treatment & Reclamation:</p> <ul style="list-style-type: none"> • Objective 4: Develop a wastewater reclamation program to eliminate discharge to Sarasota Bay. <ul style="list-style-type: none"> ○ Action 4.1: Reconsider regional program to reclaim treated wastewater. ○ Action 4.2: Explore options for alternative water supply, including use of treated wastewater or potable water, aquifer recharge and protection, and other uses in the Southern Water Use Caution Area. <p>Stormwater Treatment & Prevention:</p> <ul style="list-style-type: none"> • Objective 1: Improve stormwater quality.

NEP	Project
	<ul style="list-style-type: none"> ○ Action 1.1: Implement Florida-Friendly Landscaping (FFL) which emphasizes reductions in use of pesticides and water and encourages broad use of slow-release nitrogen fertilizers. ● Objective 3: Manage quantity/quality of stormwater to Sarasota Bay. <ul style="list-style-type: none"> ○ Action 3.2: Explore options to treat and reclaim stormwater. <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> ● Continued use of reclaimed wastewater as alternative supply-work with Peace Manasota Regional Water Supply Authority ● Collaboration and support of Whitaker Bayou deep-well injection project: <ul style="list-style-type: none"> ○ This project takes wastewater that would normally flow into bay/creeks and treats before injecting into underground well system back into aquifers ○ Potential to dispose of 18 million gallons treated water/day (as of 2016) ● Hudson Bayou In-Stream Restoration and Water Quality Improvements Project: <ul style="list-style-type: none"> ○ Design, permitting and construction of upstream and channel shoreline improvements to increase infiltration and other habitat characteristics for better water quality flowing into Bayou (routes untreated stormwater through designed areas prior to discharge to Sarasota Bay)
<p>Indian River Lagoon NEP (2019 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> ● Wastewater Action 2: Reduce or remove all wastewater discharges to the IRL; directly and indirectly through water reuse. ● Wastewater Strategy: Reduce excess use of reclaimed water that supersaturates soils and pollutes groundwater within the IRL watershed. <p>Water reuse Updates/Activities:</p> <ul style="list-style-type: none"> ● Brevard County has undertaken many changes to management and use of reclaimed water with 88% of water being reclaimed in public access areas and for landscape irrigation. Around 18.5 million gallons/day are applied to over 7340 acres of land. This year an additional \$15.5 million will be put towards wastewater treatment plant upgrades and water reuse customers will continue to receive educational and communications materials on water reclamation and conservation.
<p>Santa Monica Bay (2018 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> ● Action #17: Infiltrate, capture, and reuse stormwater and dry-weather runoff through green infrastructure, LID and other multi-benefit projects and improve understanding of ecosystem services provided. <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> ● With Proposition 84 Grant money from state (originally allocated \$18 million for coastal watershed contamination prevention, coastal/marine habitat restoration): <ul style="list-style-type: none"> ○ Westwood Neighborhood Greenway Project—City of LA divert/capture flow from storm drains from 2400 acres into two large bioswales to improve water quality in the receiving waters (Sepulveda Channel, Ballona Estuary and SM Bay Beaches) → expected to capture 67-340K gallons/day or urban runoff ○ Ladera Park Water Quality Enhancement Project—LA County Public Works is storing, treating, and helping infiltrate 85th percentile 24-hour storm volume of 5.1 acre-feet of stormwater runoff and ALL non-stormwater runoff from 110-acre tributary area through combo of facilities ○ Culver Boulevard Realignment and Stormwater Infiltration/Retention Regional Project (in planning phase) ● Work with Hyperion Water Reclamation Plant: partner with city, county and other stakeholders in improving water reuse in region
<p>Morro Bay NEP (2012 CCMP)</p>	<p>CCMP Actions:</p> <p>Best Management Practices Actions:</p> <ul style="list-style-type: none"> ● BMP-5: Support BMPs with property owners, residents, visitors and businesses to reduce impacts to the estuary from stormwater runoff, water use and spread of invasive species. <p>Freshwater Resources Actions:</p>

NEP	Project
	<ul style="list-style-type: none"> • FWR-6: Encourage well-managed groundwater recharge through increase of permeable surfaces, stormwater controls and floodplain restoration <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Upcoming—State Park Marine Stormwater Management Project: Work with CA Marine Sanctuary Foundation & CA State Parks to install stormwater BMPs and redesign parking lot to reduce polluted runoff and increase groundwater recharge • Chorro Creek Ecological Reserve Floodplain Restoration Project: (continuing through FY20) Enhance floodplain connectivity via land easements and habitat restoration → increase groundwater flows/recharges and reduce erosion to improve quality of water.
<p>San Francisco Bay NEP (2016 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • Action 21: Reduce water use for landscaping around the estuary (more efficient use of water and increase recycling of water for landscaping—work with municipalities, land use and water supply agencies to reduce consumption) <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Transforming Urban Water initiative—partnership with WWT facilities in region to promote nature-based solutions and green infrastructure • Urban Greening Bay Area (with funding from EPA)—partnership to use green infrastructure in treating urban and stormwater runoff + reduce local flooding • Sustainable Streets projects—Chynoweth Avenue in San Jose created as demo site in 2018 (drastic remodel of thoroughfare to include bioretention/pervious surfaces along sides—created 5600 sq feet of bioretention area with 19,500 sq feet of porous asphalt) <ul style="list-style-type: none"> ○ Ongoing multi-year project for San Pablo Avenue with similar goals—construction tentatively began in Fall 2019 • Stakeholder/participant in “Bay Area Integrated Regional Water Management Plan” (9-county effort to coordinate/improve water supply, protect quality, manage flooding, protect habitat, etc. of SF Bay) --http://bayareairwmp.org/ <ul style="list-style-type: none"> ○ Tied to North Bay Water Reuse Program (effort between 11 agencies) ○ Projects expected in totality to result in 10,000 AFY potable water offset • Widespread planning and implementation of landscape trainings on water-wise and water efficient designs (part of larger efforts across state)
<p>Lower Columbia Estuary Partnership (2011 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • Action 4: Establish and maintain Columbia River flows to meet ecological needs of the lower CR and estuary <ul style="list-style-type: none"> ○ Initiate water conservation, water markets and acquisition of water rights to improve flows where needed ○ Encourage rainwater harvesting, water reuse, and other water saving actions to lessen water demand • Action 8: Reduce/improve water quality of stormwater runoff and other NPS pollution <ul style="list-style-type: none"> ○ Promote practices through various means (outreach) to reduce volume and velocity of runoff from developed sites by such means as disconnecting downspouts, using onsite infiltration, installing green roofs, promoting natural buffers, building narrower sidewalks, removing impervious surface, and other Low Impact Development techniques on new/redevelopment ○ (For transportation infrastructure) use techniques such as green streets, narrower streets, street side infiltration, porous concrete and pavement, and gravel parking to reduce runoff <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Sitton School Stormwater project: <ul style="list-style-type: none"> ○ In 2019 worked with school in Northern Portland to remove 3000 square feet of asphalt from schoolyard and replace with native vegetation and other permeable surface to help with stormwater runoff/infiltration ○ Worked with school, Portland Bureau of Enviro Services and a community watershed stewardship program

NEP	Project
	<ul style="list-style-type: none"> • Boise-Eliot/Humboldt School stormwater project: <ul style="list-style-type: none"> ○ In 2018 removed 6700 square feet of asphalt to replace with pervious surfaces and stormwater gardens • Vernon School stormwater project: <ul style="list-style-type: none"> ○ Similar efforts to above, in 2016 completed • PE Report for FY15-19 summarizes depaving efforts: removal of 9000+ square feet pavement, leading to prevention of 200,000 gallons/year stormwater runoff
Puget Sound (2018 CCMP)	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • CHIN2.3/2.4: Increase stream flows and increase storage capacity in watershed for groundwater and summer low flows <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Overarching focus on improved water cycle in entire watershed—improving flows, groundwater recharge, etc. at large • 2018 School "Depave" Projects (similar to Lower Columbia efforts) • Kingston Recycled Water Feasibility Study—CHIN2.1 (treated water for improved summer flows impacting salmon recovery)
Policy Coordination	
Narragansett Bay NEP (2012 CCMP)	<p>CCMP Actions:</p> <p>Section 1 – Protect & Restore Clean Water</p> <ul style="list-style-type: none"> • 4.2: Fully utilize watershed-based plans such as stakeholder-based plans, NPS plans, TMDLs, and special area management plans to coordinate prioritized actions to protect, restore and manage the land and water (including groundwater) resources within watersheds. • 4.5: Update and implement state management plans to protect ground water and surface water resources from priority pollutant risks <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Role in Massachusetts state-level reclaimed water permitting program
Long Island Sound (2015 CCMP)	<p>CCMP Actions:</p> <p>Theme 1: Clean Waters and Healthy Watersheds</p> <ul style="list-style-type: none"> • Strategy 1-1a7: Improve comprehensive management and performance of decentralized WWT systems and residential, on-site WWT systems. <ul style="list-style-type: none"> ○ WW-11: Improve understanding, management and design of denitrifying decentralized and residential, on-site WWT systems <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Building Clean Water Project: Matinecock Court HDFC in Huntington installing a wastewater harvesting system at affordable housing complex—reused water for irrigation and prevention of nitrogen entering watershed—10,000 gallon WW harvest system; stormwater pretreatment system through enhanced gravity separation of pollutants; upgraded irrigation systems; case study for lessons learned.
Peconic NEP (Sept 2019 draft)	<p>CCMP Actions:</p> <p>Action 12: Plan science-based approaches for monitoring and reducing nitrogen pollution.</p> <ul style="list-style-type: none"> • Includes performance measures to: Work with water districts and municipalities to manage water use, conserve water and maintain existing/protect future buffers to prevent saltwater intrusion into groundwater (such as irrigation BMPs that guide amount/frequency of irrigation).
Barnegat Bay NEP (Draft July 2019)	<p>CCMP Actions:</p> <p>Water Supply Objective 1: Protect, maintain and enhance existing water supply and surface and ground water flow.</p> <ul style="list-style-type: none"> • WS 1-4: Support comprehensive planning that will guide sustainable water supply management, and to the maximum extent possible, maintain natural hydrology. <p>Water Supply Objective 2: Prevent degradation of water supplies.</p> <ul style="list-style-type: none"> • WS 2-3: Inventory and evaluate municipal ordinances, rate structures, and other available information for opportunities to better ensure judicious water usage and incentivize water conservation at the household/ community level.

NEP	Project
	Water Reuse Updates/ Activities: <ul style="list-style-type: none"> • New Jersey statewide water supply planning (NEP activity in Save the Source)
Partnership for the Delaware Estuary (2019 CCMP)	CCMP Actions: <ul style="list-style-type: none"> • Strategy W1-3: Promote land use planning by local municipalities that prevents, reduces and/or more efficiently manages stormwater runoff.
Maryland Coastal Bays (2015-2025 CCMP)	Water Reuse Updates/ Activities: Working with MD Department of Environment for drafting of graywater regulations (2019-2020)
Galveston Bay Estuary Program (2018 draft CCMP)	CCMP Actions: Freshwater Inflow Action 1: Regional planning for freshwater inflows. <ul style="list-style-type: none"> • Encourage public and GBEP stakeholder participation in regional water planning groups and the development of priority policies that ensure adequate quantities of freshwater reach Galveston Bay.
Coastal/Heartland NEP (2019 CCMP)	CCMP Actions: Water Quality Improvement Action 3: Reduce urban stormwater and agricultural runoff pollution. <ul style="list-style-type: none"> • Activity 3.1: Support urban BMPs that return freshwater inputs to receiving water to a more natural pattern of quantity, timing and distribution. <ul style="list-style-type: none"> ○ Install new stormwater treatment areas to increase retention and storage ○ Increase pervious and decrease impervious surfaces and implement other GI practices • Activity 3.2: Support agricultural BMPs that return freshwater to receiving water to a more natural pattern of quantity, timing and distribution. <ul style="list-style-type: none"> ○ Increase retention of ag runoff to reduce pollutant loadings and treat water.
Sarasota Bay NEP (2014 CCMP)	Water Reuse Updates/ Activities: <ul style="list-style-type: none"> • Continued partnerships with local utilities (i.e. Central County Utility, Sarasota County Bee Ridge Utility and others) to form Water Quality Consortium in improving water quality conditions and improve impaired waters • NEP participation in Sarasota County Sewer and Water Advisory Committee— recommendations and guidance for policies relating to water/sewage issues and wastewater treatment
Santa Monica Bay (2018 CCMP)	CCMP Actions: <ul style="list-style-type: none"> • Action #21: Support policies to reduce reliance on imported water. <ul style="list-style-type: none"> ○ Support policies that promote reuse, recycling, and advanced WWT to reduce reliance on imported water sources. • Action #43: Support and implement Safe Clean Water Program. <ul style="list-style-type: none"> ○ County-wide program to support control of stormwater pollution via projects— went up for vote in 2018 and passed (allows 2.5 cents tax per square foot of impermeable surface on private property— revenue would fund stormwater projects to improve local water supply and quality.) Water Reuse Updates/ Activities: <ul style="list-style-type: none"> • Progress/work with Hyperion Treatment Plant for expanded use of recycled water with advanced purification. • Support recycled wastewater efforts by Tapia Water Reclamation Facility. • Santa Monica and Los Angeles at large have very ambitious water reuse/recycling plans to reduce dependence on water imports—NEP plays a supporting role in many of these endeavors • Assisting/partnering in “Safe, Clean Water Program” for LA <ul style="list-style-type: none"> ○ 2018 Measure W passed by LA County Voters for special parcel tax to fund efforts for more efficient water use/ supply/ management (this initiative mentioned in CCMP) ○ https://safecleanwaterla.org/ (numerous specific projects tied to SM Bay)
Morro Bay NEP (2012 CCMP)	CCMP Actions: Freshwater Resources Actions:

NEP	Project
	<ul style="list-style-type: none"> • FWR-1: Support efforts by state, local gov and users to manage freshwater resources and protect public trust resources
Science and Specifications	
Narraganset Bay NEP	<p>CCMP Action: Section 1 – Protect & Restore Clean Water, 4.1: Implement scientifically-based water management to restore and protect streamflow and ensure sustainable yields including methodology that accounts for current and future land uses, impacts on aquatic systems and inter-basin transfers.</p>
Technology Development and Validation	
Long Island Sound (2015 CCMP)	<p>CCMP Actions: Theme 1: Clean Waters and Healthy Watersheds</p> <ul style="list-style-type: none"> • Strategy 1-1a7: Improve comprehensive management and performance of decentralized WWT systems and residential, on-site WWT systems. <ul style="list-style-type: none"> ○ WW-11: Improve understanding, management and design of denitrifying decentralized and residential, on-site WWT systems <p>Water Reuse Updates/ Activities: Building Clean Water Project: Matinecock Court HDFC in Huntington installing a wastewater harvesting system at affordable housing complex—reused water for irrigation and prevention of nitrogen entering watershed 10,000 gallon WW harvest system; stormwater pretreatment system through enhanced gravity separation of pollutants; upgraded irrigation systems; case study for lessons learned.</p>
Peconic NEP (Sept 2019 draft)	<p>CCMP Actions: Action 13: Implement science-based approaches for monitoring and reducing nitrogen pollution.</p> <ul style="list-style-type: none"> • Includes performance measures to: Use existing legal framework and county/ town grant and loan opportunities to assist homeowners in upgrading to “innovative and alternative on-site wastewater treatment systems” (I/A OWTS) <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Currently developing project with Suffolk County to replace outdated septic systems with “Innovative Alternative Onsite WWT Systems” • Riverhead Sewage Treatment Plant Upgrade (and water reuse project): PEP was influential in getting 2016 upgrade and reuse project up and running to use treated wastewater to irrigate golf courses in area. Saves estimated 350,000 gallons of water/day in summer months for irrigation Also reduces fertilizer needs on golf course given high nutrient load of wastewater. 2016 Riverhead Sewage Treatment Plant upgrade and reuse project
Barnegat Bay NEP (Draft July 2019)	<p>CCMP Actions: Water Supply Objective 4: Review existing literature and successful pilots, and conduct studies to improve scientific understanding of new and emerging issues pertaining to water conservation, advanced potable treatment options, and reuse.</p> <ul style="list-style-type: none"> • WS 4-1: Identify and explore infrastructure, research and piloting options for the use of advanced treatment at wastewater treatment plants and water reuse, including wastewater and gray water, within the watershed.
Coastal/Heartland NEP (2019 CCMP)	<p>CCMP Actions: Water Quality Improvement Action 3: Reduce urban stormwater and agricultural runoff pollution.</p> <ul style="list-style-type: none"> • Activity 3.1: Support urban BMPs that return freshwater inputs to receiving water to a more natural pattern of quantity, timing and distribution. <ul style="list-style-type: none"> ○ Install new stormwater treatment areas to increase retention and storage ○ Increase pervious and decrease impervious surfaces and implement other GI practices • Activity 3.2: Support agricultural BMPs that return freshwater to receiving water to a more natural pattern of quantity, timing and distribution.

NEP	Project
	<ul style="list-style-type: none"> o Increase retention of ag runoff to reduce pollutant loadings and treat water.
<p>San Francisco Bay NEP (2016 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • Action 20: Increase regional ag water use efficiency (promote modifications of water storage methods, reduce instream diversions, promote groundwater recharge and provide greater water supply reliability for farmers)
<p>Puget Sound (2018 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • CHIN 2.6: Incentivize/accelerate stormwater management <ul style="list-style-type: none"> o TIF2.1: Address stormwater treatment (desire to implement innovative treatment approaches) <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Aqualyst Accelerator program (launched 2017)—water technology support/promotion for improved water treatment • Brawne Ave Basin Water Quality Retrofit & Fones Road Bioretention Retrofit (supposed to begin 2020)—TIF2.1 action
<p>Integrated Research</p>	
<p>Peconic NEP</p>	<p>(1) Village of Greenport water reuse efforts: Awarded grant money in 2019 to conduct feasibility study for sewage treatment plant to start water reuse project for irrigation of nearby properties. PEP and Long Island Sound Study helping to facilitate project where needed.</p> <p>(2) Shelter Island Heights water reuse: Similar efforts to above—water reuse for golf course irrigation—PEP is partner in this.</p>
<p>Outreach and Communications</p>	
<p>Long Island Sound (2015 CCMP)</p>	<p>CCMP Actions:</p> <p>Theme 3: Sustainable and Resilient Communities:</p> <ul style="list-style-type: none"> • Strategy 3-3a1: Support dissemination of the best practices to reduce contaminants, improve water quality, and protect habitats through professional development trainings and workshops. <ul style="list-style-type: none"> o SC-20: Develop/implement regional outreach and training programs on innovative and sustainable flood and erosion control for municipalities <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Numerous green infrastructure projects for improved infiltration and increase of permeable surfaces (rain gardens, bioswales, etc.)
<p>Peconic NEP (Sept 2019 draft)</p>	<p>CCMP Actions:</p> <p>Action 13: Implement science-based approaches for monitoring and reducing nitrogen pollution. Includes performance measures to:</p> <ul style="list-style-type: none"> • Increase funding/ outreach for Homeowner Rewards Program which provides financial incentives for homeowners to install raingardens, native plants, and/or rain barrels to benefit environment • Implement wastewater re-use initiatives with municipalities <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Homeowner Rewards Program: PEP has started program which has reached 71 property owners since 2014 in completing green infrastructure upgrades to yards through planting of native plants, rain gardens, rain barrels. 3300 square feet of rain garden installed and 67 rain barrels. Homeowner Rewards Program
<p>Barnegat Bay NEP (Draft July 2019)</p>	<p>CCMP Actions:</p> <p>Water Supply Objective 5: Educate consumers regarding water supply issues and indoor/outdoor water conservation and reuse.</p> <ul style="list-style-type: none"> • WS 5-1: Promote water reuse demonstration projects for stormwater, graywater and wastewater. • WS 5-2: Disseminate educational materials for best practices on water conservation activities. • WS 5-3: Develop program to educate stakeholders on sources and value of their water. <p>Water Reuse Updates/ Activities:</p>

NEP	Project
	<ul style="list-style-type: none"> • Greening Your Landscape While Protecting the Watershed (2017 grant project)—rain gardens through Brick Township Municipal Utilities • Water Conservation/Re-Use Campaign: <ul style="list-style-type: none"> ○ public outreach via blogs, newsletters, social media for water conservation programs ○ promote/assist/collaborate on water reuse projects (follow up here) ○ Groundwater protection/recharge through healthier soils, permeable surfaces ○ Partner/promoter of “Jersey Friendly Yards” program for water conservation/reuse
<p>Partnership for the Delaware Estuary (2019 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • Strategy W1-4: Provide outreach/information to property owners to assist in reducing NPS of nutrients <ul style="list-style-type: none"> ○ Promote good stormwater management at home, work and in neighborhood—rain barrels, gardens, etc. for collection/infiltration • Strategy W3-3: Promote water conservation and efficiency by utilities and industrial water users: <ul style="list-style-type: none"> ○ Apply advanced methods and programs (WaterSense & Energy STAR programs for increased efficiency) ○ Update plumbing standards ○ Conduct water loss audits ○ Research/disseminate information related to conservation rate structures to promote less water consumption by utility clients ○ Infrastructure improvements to drinking water systems ○ Advance water conservation outreach programs • Strategy W3-4: Provide outreach/tech assistance to promote water conservation and infiltration by residential/commercial users and communities: <ul style="list-style-type: none"> ○ Provide outreach on water reuse (rain barrels, large scale cisterns) ○ Stormwater infiltration BMPs (rain garden systems in communities, permeable pavements, etc.)² implement BMPs and support their implementation in ag/irrigation
<p>Maryland Coastal Bays (2015-2025 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • Water Quality Goal 1.2: Improve the understanding and protection of groundwater resources. <ul style="list-style-type: none"> ○ WQ 1.2.7: Educate public about water conservation practices—target high volume water users and gray water reuse systems <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Working with Berlin and Ocean Pines for public integration on stormwater management—recent focus on submerged gravel wetland project
<p>Galveston Bay Estuary Program (2018 CCMP draft)</p>	<p>CCMP Action:</p> <p>Freshwater Inflow Action 3: Develop or support outreach initiatives that promote water conservation and educate the public on the value and importance of freshwater inflows.</p>
<p>Coastal/Heartland NEP (2019 CCMP)</p>	<p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • City of Winter Haven construction of small stormwater green infrastructure like rain gardens in public park areas • City of Cape Coral is upgrading catch basins and installing bioswales as part of utilities upgrade project
<p>Sarasota Bay NEP (2014 CCMP)</p>	<p>CCMP Actions:</p> <p>Wastewater Treatment & Reclamation:</p> <ul style="list-style-type: none"> • Objective 1: Wastewater treatment and reclamation policies should be consistent throughout region. <ul style="list-style-type: none"> ○ Action 1.2: Educate public about need for consistent policies on WWT and reclamation. <p>Citizen Participation:</p>

NEP	Project
	<ul style="list-style-type: none"> • Objective 1: Encourage Florida Friendly Landscaping (means native plants, less water, less pesticides, etc.) • Objective 3: Encourage water and energy conservation <ul style="list-style-type: none"> ○ Action 3.1: Encourage rainwater collection systems for reuse, including rain barrels and cisterns. ○ Action 3.2: Educate households and businesses about smart water-use choices, including pervious surfaces, outdoor water use and energy-efficient appliances. ○ Action 3.3: Participate in, and actively promote, area conferences and public events which highlight water conservation, energy efficiency and watershed health. <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Florida Yards & Neighborhood Program (Be Floridian campaign)—widespread promotion of fertilizer ordinances and sustainable landscaping efforts
<p>Santa Monica Bay (2018 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • Action #30: Engage community in water conservation and reuse. <ul style="list-style-type: none"> ○ Conduct community engagement, outreach, education and inform policies related to water conservation and reuse to reduce water demand. • Action #31: Engage business in water quality improvements <ul style="list-style-type: none"> ○ Clean Bay Certified program works with restaurants to improve compliance with urban runoff management <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Partner in the Culver City Rainwater Harvesting Program (2012 completed)—396 rain barrels installed with private property owners capture total of 174,240-392,040 gallons that would normally flow into SM Bay • Partner with Metropolitan Water District of Southern CA in 2015 to install residential rain gardens
<p>Morro Bay NEP (2012 CCMP)</p>	<p>CCMP Actions:</p> <p>Land Protection Actions:</p> <ul style="list-style-type: none"> • LP-4: Conservation of Water Resources—Participate with public and non-profit partners in the purchase of land/easements to reduce the use of water resources for intensive agriculture or urban development. <p>Freshwater Resources Actions:</p> <ul style="list-style-type: none"> • FWR-5: Support efforts to enhance water conservation and reuse throughout watershed with all users. <ul style="list-style-type: none"> ○ Includes activities such as incentive programs for water users to reduce use, demonstration projects for rainwater reuse, integrated water management plans, dialogues with water management agencies to advance water recycling. <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Rainwater Harvesting for Water Preservation/ Reuse: Working with Cal Poly SLO to implement largescale project to collect rainwater from rooftops/stores for cattle during the summer months (thereby reducing reliance on groundwater wells). This has since inspired more small-scale household level movement in improving local rainwater storage capacity.
<p>Puget Sound (2018 CCMP)</p>	<p>CCMP Actions:</p> <ul style="list-style-type: none"> • CHIN 2.6: Incentivize/accelerate stormwater management <ul style="list-style-type: none"> ○ BIB1.1: Increase local capacity to manage stormwater programs. “Near term actions”→ outreach/ education on stormwater <p>Water Reuse Updates/ Activities:</p> <ul style="list-style-type: none"> • Collaboration on “Low-Impact Development Guidebook” with WA State Department of Commerce <ul style="list-style-type: none"> ○ Provide tools/resources to local jurisdictions for improved water re-purposing/conservation (promotes BMPs like bioretention/rain gardens, pervious surfaces, rainwater harvesting, etc.)

Exhibit B-2. Inventory of UW Partnership Projects Supporting WRAP Themes

Urban Waters Partnership	Project
Integrated Watershed Action	
Bronx and Harlem River Watersheds (NY)	Pier 5 Pop Up Wetland and Plants: This creative “best management practice” captures stormwater runoff from the elevated Major Deegan Expressway with a “pop-up wetland.” Using a \$200,000 grant in 2013 from NOAA, the Bronx Council on Environmental Quality (BCEQ) created a floating wetland and prairie, two mini ecosystems designed to capture, hold and filter water allowing clean water to drain to the river. Rain passes through a large pipe into a first flush basin, then to the wetland with overflow into the prairie meadow. (more)
Caño Martín Peña (PR)	Water supply is a big challenge in Puerto Rico currently, and authorities are looking to find ways to engage in integrative actions and solutions for water conservation and reuse. The Martín Peña Channel Urban Waters Federal Partnership seeks to make significant contributions to the health and welfare of the eight communities that surround the Martín Peña Channel in San Juan. To improve water quality, restore the watershed’s ecosystem, and address public safety issues, the Urban Waters Federal Partnership is currently engaged in several initiatives with their local partner, the Corporación del Proyecto ENLACE del Caño Martín Peña (ENLACE). Multiple State Revolving Fund grants allowed ENLACE to issue a request for proposals for the design of a baseball field using green infrastructure to serve as water detention during community flooding events. The grants also funded the development of a stormwater management plan for the Caño Martin Peña District using green infrastructure in combination with grey infrastructure.
Northwest Indiana Area (IN)	Michigan City, Gary, East Chicago, and Holbart in Lake County come to quarterly meetings and are heavily engaged. Members of local watershed groups, and many are members of their septic coordination workgroup. The Michigan City Sanitary District and Alliance for the Great Lakes began convening a StormWater Advisory Group (SWAG) to better inform stormwater management efforts; several Urban Waters partners participated in the group. The SWAG worked to recommend a green stormwater streets policy for Michigan City. Michigan City Sanitary District also worked with the Alliance for the Great Lakes to plan for the Cheney Run Wetland project to infiltrate and treat water before it enters Trail Creek and develop a land acquisition strategy to acquire land for stormwater management, conservation, and recreation.
South Platte River/Denver (CO)	The South Platte River Urban Waters Federal Partnership (SPRUWP) funded a critical update to its local Water Quality Assessment Tool, shifting from a static platform to one that continually updates. The tool provides context and direct access to cross-jurisdictional water quality data for the Denver metro area and shows a snapshot of conditions for water quality parameters. The tool makes water quality data easily accessible to the public, including teachers who use this data for classroom learning, and provides storylines that assist the public in taking action to improve water quality. Several partners are collaborating on the project, including water utilities (Denver Water & Metro Wastewater Reclamation District), state, city and county entities, nonprofit organizations, academic partners, and three UW Federal Partnership Agencies.
Los Angeles River Watershed/Los Angeles (CA)	The City of LA prepared a Water Integrated Resources Plan (IRP) which manages water supply, reuse, conservation, stormwater management, and wastewater facility planning through a regional watershed approach. Urban Waters ambassador participates on the steering committee of the LA River Masterplan Update ran by LA County. Most of the water flow from the LA River is discharged by LA Sanitation.
Policy Coordination	

Urban Waters Partnership	Project
Proctor Creek Watershed/Atlanta (GA)	The Urban Waters Ambassador, Darryl Haddock, was a steering committee member in Atlanta’s Water Equity Task Force Initiative from the U.S Water Alliance. The task force’s work contributed to Atlanta’s 2050 Metro Water District Integrated Water Management Plan . This plan highlights the connections between water supply and conservation, wastewater management and stormwater and watershed management across 15 counties and 95 cities in the metropolitan Atlanta area. This initiative also highlights the involvement of several stakeholders across the state, including the water utility in Atlanta, to tackle water management issues.
Technology Development and Validation	
Bronx and Harlem River Watersheds (NY)	The New York City Department of Parks and Recreation (NYC Parks) is committed to implementing green infrastructure to keep contaminants out of the Bronx and Harlem Rivers. The USGS is partnering with NYC Parks to evaluate the effectiveness of different green infrastructure systems in removing stormwater-related contaminants in areas of existing and proposed parks. Together, USGS, NYC Parks, and NYC DEP, all of whom are partners in the Urban Waters Partnership, are assessing whether street trees newly planted along the Harlem and Bronx Rivers can help capture stormwater runoff, diverting it away from the combined sewer systems.
Water Information Availability	
San Antonio River Basin (TX)	Increased aquifer recharge (Edwards Aquifer) for drinking water: Edwards Aquifer is the primary source of drinking water in San Antonio. The aquifer balances municipal and agricultural demands, and groundwater contamination is of concern due to urbanization. How much does stormwater runoff from urban areas affect the water quality of the aquifer system? The U.S Geological Survey (USGS) in cooperation with San Antonio Water Systems (SAWS), the City of San Antonio (CoSA), and the San Antonio River Authority (SARA) have established a network of surface water and groundwater sites in areas with various degrees of urbanization to provide long-term monitoring and water-quality data needed to answer this question. Goals of this effort are to assess if water quality in the Edwards Aquifer is changing as a result of development. Data from this project also could be used to model potential groundwater contamination and provide better understating of the dynamic hydrologic processes involved in controlling water quality, a vital resource for this urban center. More info .
South Platte River/Denver (CO)	The South Platte River Urban Waters Federal Partnership (SPRUWP) funded a critical update to its local Water Quality Assessment Tool, shifting from a static platform to one that continually updates. The tool provides context and direct access to cross-jurisdictional water quality data for the Denver metro area and shows a snapshot of conditions for water quality parameters. The tool makes water quality data easily accessible to the public, including teachers who use this data for classroom learning, and provides storylines that assist the public in taking action to improve water quality. Several partners are collaborating on the project, including water utilities (Denver Water & Metro Wastewater Reclamation District), state, city and county entities, nonprofit organizations, academic partners, and three UW Federal Partnership Agencies.
Finance Support	
Proctor Creek Watershed/Atlanta (GA)	The City of Atlanta recognizes that customers may face difficulty in paying for essential services like water. Thus, financial assistance is offered by the Care and Conserve program, which provides assistance with plumbing repairs and the installation of water efficiency devices. Partners from the Urban Waters Federal Partnership supported efforts in creating the Care and Conserve program.
Outreach and Communications	
Anacostia River Watershed (DC/MD)	The DC Department of Energy and Environment, which manages the Ambassador position for the Anacostia Urban Waters Partnership, runs a successful program called "RiverSmart," which includes sub-programs such as RiverSmart Homes, RiverSmart Schools, RiverSmart Communities, etc. The program provides free rain barrels and rain gardens (or rebates on them) to property owners in the District of Columbia, and the program is implemented through a partnership with the Alliance for the Chesapeake

Urban Waters Partnership	Project
	<p>Bay. Through the capture and storage of rooftop rainwater runoff, the collected water can be used for a multitude of purposes including irrigation, landscaping, car washing, and even fountains. The simple act of collecting rainwater helps residents take part in decreasing stormwater runoff, recharging the groundwater, conserving freshwater, and improving local waterways.</p>
<p>Patapsco Watershed/Baltimore (MD)</p>	<p>A project born out of an Urban Waters Federal Partnership meeting in Baltimore are GROW Centers (Green Resources & Outreach for Watersheds). GROW centers are neighborhood greening resource hubs, linking city residents, communities, and faith-based groups to plants, materials, and technical expertise for greening projects. the USDA Forest Service, a federal lead in this Urban Waters Partnership location, has provided free and/or low cost trees, mulch, plants, as well as free workshops on community greening, vacant lot revitalization, and the installation of rain gardens and rain barrels to city residents. These pop-ups and workshops were visited by 695 participants, representing over 100 neighborhoods in Baltimore. In total, 376 trees and over 39 cubic yards of mulch were given away, over \$2,000 worth of native plants and 121 recycling bins were sold and 16 workshops on community greening and stormwater management were offered. The GROW Centers were a natural outgrowth of the Urban Waters Partnership’s Green Pattern Book. The Green Pattern Book is a resource of strategies to help green Baltimore’s vacant lands, improve water quality and implement stormwater solutions.</p>
<p>Middle Rio Grande/Albuquerque (NM)</p>	<p>UW Project: UW hosted a Green Infrastructure (GI) and Low-Impact Development (LID) workshop on expanding GI in Albuquerque -- The first workshop brought together a targeted group of stormwater professionals from across disciplines including landscape architects, engineers, developers, design-build companies, architects and plan reviewers of large projects. While addressing some perceived barriers to GSI/LID implementation as well as some known gaps in knowledge, policy, and practice, the workshop provided technical resources and education to the participants specific to facilitating collaboration across disciplines in our arid environment.</p> <p>Valle de Oro National Wildlife Refuge, Backyard Refuge Project Middle Rio: As the first Urban Wildlife Refuge established under the USFWS Urban Wildlife Conservation Program, Valle de Oro National Wildlife Refuge (NWR) and its nonprofit Friends group work to ensure conservation and stewardship of natural resources through meaningful engagement of residents in the Middle Rio Grande watershed. These groups have been core participants in the Middle Rio Grande Urban Waters Partnership since its inception. To foster their conservation strategy, the Friends of Valle de Oro NWR and 40 partners are implementing The ABQ Backyard Refuge Program (ABQ BYRP). The completed sites would demonstrate passive and active stormwater harvesting features such as rain gardens, swales, basins and rain barrels, as well as simple designs for the creation of pollinator and wildlife habitat. The sites will also include interpretive signage to educate the public about water conservation and stormwater reuse, creating successful urban habitat areas, and the ecological function of each of the site components.</p>
<p>South Platte River/Denver (CO)</p>	<p>In building on a previous stormwater messaging <u>project</u> regarding topics such as scooping the poop, phosphorus free fertilizer, algal blooms, and drinking water supply both in English and Spanish, the UW partnership will add messaging related to water conservation. This effort was led by the Barr-Milton Watershed Association and involved multiple partners.</p> <p>Aurora Water and Denver Water, and over 30 other Urban Waters partners were key stakeholders in the development of the Natural Capital Resource Assessment Tool, a large-scale green infrastructure mapping tool for the watershed that assigns an ecosystem services value looking at three distinct geographic sections: headwaters (drinking water), Denver metro area, and the plains area.</p>

Urban Waters Partnership	Project
Workforce Development	
Greater Philadelphia/Delaware River Watershed (PA, NJ, DE)	Camden County Municipal Utilities Authority (CCMUA): PowerCorps Program CCMUA, an active partner in the Delaware River Urban Waters Federal Partnership, commits to revitalize Camden further through green jobs programs for youth, including PowerCorps Camden. This program provides pre-employment training for at-risk young adults, working on Camden’s network of storm sewers, rain gardens, vacant lots, and parks.