

as it fosters “collaborative relationships for a sustainable water resources future” (USACE, 2010a), including development of a Federal Support Toolbox to provide a common data portal to support IWRM (USACE, 2010b).

B. Watersheds and Wetlands

VISION: Watersheds are protected, maintained and restored to provide climate resilience and to preserve the ecological, social and economic benefits they provide; and the nation’s wetlands are maintained and improved using integrated approaches that recognize their inherent value as well as their role in reducing the impacts of climate change.

Healthy watersheds and wetlands will be critical to climate adaptation and mitigation. This section addresses how EPA intends to protect healthy watersheds, restore impaired watersheds to enhance climate resiliency, and preserve the important functions and ecosystem services provided by the nation’s wetlands, especially in the face of climate change.

Healthy watersheds and wetlands provide a host of ecological services, including water purification, ground water and surface flow regulation, wildlife habitat, flood and surge impact reduction, water temperature moderation, erosion control, and stream bank stabilization. In many cases, they also store carbon and sequester other greenhouse gases. These ecosystems already are threatened with a number of stressors, and climate change will exacerbate existing water quality and ecosystem management issues.

Protecting waters and watersheds inherently involves landscape-scale collaboration involving state, tribal, federal, and local partners. Such collaborations promote a holistic, systems approach, enabling partners to more cost-effectively reach shared goals that increase ecosystem resilience to climate change. In particular, the NWP intends to work to implement the National Fish, Wildlife and Plants Climate Adaptation Strategy (FWP, 2011), which lists seven goals (see Table 1).

Table 1: Draft National Fish, Wildlife and Plants Climate Adaptation Strategy

Goals:

- **Goal 1.** Conserve and Connect Habitat
- **Goal 2.** Manage Species & Habitats
- **Goal 3.** Enhance Management Capacity
- **Goal 4.** Support Adaptive Management
- **Goal 5.** Increase Knowledge & Information
- **Goal 6.** Increase Awareness & Motivate Action
- **Goal 7.** Reduce Non-Climate Stressors

FWP, 2011. Fish, Wildlife and Plants Climate Adaptation Workgroup www.wildlifeadaptationstrategy.gov

“The once seemingly separable types of aquatic ecosystems are, we now know, interrelated and interdependent. We cannot expect to preserve the remaining qualities of our water resources without providing appropriate protection for the entire resource.” *Tennessee Senator Howard Baker on the importance of the Clean Water Act on the Senate floor, 1977*

“I ask that your marvelous natural resources be handed on unimpaired to your posterity.”
Theodore Roosevelt, Sacramento, CA 1903

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The Goals and Strategic Actions in this section in particular reflect EPA's intention to implement the FWP Strategy.

GOAL 3: Identify, protect, and maintain a network of healthy watersheds and supportive habitat corridor networks across the country that provide resilience to climate change.

EPA, in partnership with others, is embarking on the Healthy Watersheds Initiative (HWI) to expand its efforts to protect healthy aquatic ecosystems using a strategic systems-based approach, prevent them from becoming impaired, and accelerate restoration (EPA, 2011g). This Initiative will greatly enhance our ability to meet the full intent and extent of the CWA 101(a) objective, "...to restore and maintain the chemical, physical, and biological integrity of the Nation's waters," and in doing so, will increase the climate resiliency of aquatic ecosystems and their watersheds. This goal would be difficult to achieve without working with our partners and their programs, such as the state-led National Fish Habitat Action Plan, the watershed protection and restoration programs of the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the U.S. Forest Service (USFS), the full suite of conservation programs administered by U.S. Department of Agriculture, the U.S. Geological Survey's (USGS) Water Smart Initiative, the Nature Conservancy's Instream Flow and North America Freshwater Conservation Programs, the U.S. Army Corps of Engineers, and others.

The Healthy Watersheds approach is an important component of IWRM. IWRM offers a more holistic approach to water quality protection by addressing surface water and ground water quality and quantity as one hydrologic system. As implementation of the Healthy Watersheds approach increases our understanding of some of these relationships (e.g., hydrologic requirements of aquatic ecosystems), that knowledge will provide building blocks for the foundation of IWRM.

Strategic Action 8: The NWP intends to develop a national framework for a network of remaining healthy watersheds and aquatic ecosystems, including natural infrastructure for habitat corridors, and intends to support state and tribal efforts.

A national framework includes indicators to assess, identify, and track healthy watersheds and the success of protection measures. The NWP intends to support state and tribal efforts to conduct statewide and tribal lands integrated healthy watersheds assessments that include landscape condition (i.e., habitat corridor and floodplain connectivity and headwaters habitat intactness); hydrology; fluvial geomorphologic processes; and aquatic biology, habitat, and chemical condition. The NWP also intends to support state and tribal efforts to implement programs aimed at protecting and maintaining healthy, resilient watersheds and habitat.

Integrated Water Resources Management

Successful adaptation and mitigation of climate change impacts will require a coordinated effort among all levels of government, tribes, communities, nongovernmental groups, scientific entities and the private sector - that is, Integrated Water Resources Management. These voluntary partnerships will be essential to protecting and restoring watersheds, wetlands and coastal areas."

—Nancy Stoner, Acting Assistant Administrator,
EPA Office of Water, 2011

The NWP intends to work with partners to develop and pilot watershed projects and management practices that improve the resilience of healthy watersheds to climate change, including the demonstration of methods that preserve and protect natural hydrology, intact active river areas (TNC, 2008), aquatic habitat corridors, natural transport of sediment, and stream geomorphology. The NWP intends to provide technical decision support to local and regional planning commissions and governments for implementing programs to protect identified watersheds in the face of climate change, consistent with the IWRM objective of the ICCATF.

Strategic Action 9: The NWP intends to collaborate with federal and other partners who focus on terrestrial ecosystems and hydrology to promote consideration of potential effects of climate change on water quality and aquatic ecosystems.

Among the multitude of services derived from intact forests are protection of water resources and sequestration of carbon. The NWP intends to continue collaborating with partner agencies (including the ICCATF Fish, Wildlife and Plants Climate Adaptation Workgroup) to support their management objectives that maximize the adaptive capacity of ecosystems (e.g., through the protection of biodiversity, functional forest groups, and keystone species, and protection against invasive species) resulting in reduced vulnerability to disturbance and associated impacts to aquatic ecosystem integrity. In particular, the NWP intends to actively support and promote appropriate forest protection efforts, afforestation (new plantings) and reforestation (replanting of deforested areas) of non-forest lands, and promote and explore partnerships with working lands, land retirement, and forestry programs within other federal agencies such as those administered by the USFS and USDA's Natural Resources Conservation Service and Farm Service Agency.

For example, to date, EPA has been working directly with USFS staff in the State and Private Forestry program to promote the use of afforestation and reforestation as a component of GI, especially as it pertains to water quality protection and stormwater management. EPA has already co-developed a draft manual describing engineered approaches to afforestation and reforestation for stormwater management and has been working through the National Arbor Day Foundation to disseminate this information to arborists, local and state forestry officials, and tree planting volunteers. EPA intends to continue working with the USFS and partners such as the National Arbor Day Foundation to support these types of outreach efforts and broaden them to address the backlog of one million acres of national forests that the USFS has identified as needing replanting.

EPA has also contributed funds to USFS staff working in the EPA Chesapeake Bay Program Office in order to start up a Web-based forestry stewardship program targeting small landowners. A geo-referenced stewardship planning tool has been developed in partnership with the Pinchot Institute and is operational for three mid-Atlantic States. The tool allows private landowners to enter information characterizing landownership in order to obtain information about available federal and state programs that encourage afforestation and reforestation while providing economic benefits. Efforts are underway to expand the coverage of this tool nationwide.

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Strategic Action 10: The NWP intends to work to integrate protection of healthy watersheds throughout the NWP core programs.

Strategies that build resilience to climate change include incorporating healthy watershed protection priorities into states' continuing planning processes, promoting GI for managing stormwater, implementing the Section 404 wetlands compensatory mitigation rule, incorporating protection of healthy watersheds into funding and technical assistance programs, working with tribes, and strengthening strategic partnerships throughout EPA and the federal government, including smart growth strategies. EPA intends to encourage permitting authorities to use stormwater permits, as appropriate, to increase watershed resilience; for example, where increased use of GI or reductions in impervious cover can both address water quality issues and increase resilience to climate change. EPA intends to work with states to use the continuing planning process to develop and implement healthy watershed protection and restoration priorities.

Strategic Action 11: Increase public awareness of the role and importance of healthy watersheds in reducing the adverse impacts of climate change.

The critical ecological services watersheds and wetlands provide often go unrecognized by the public. Raising public awareness of the importance of protecting healthy watersheds will garner public support for actions needed to sustain these resources in the face of climate change.

The NWP intends to develop and implement public outreach programs emphasizing the importance of healthy watersheds, including the economic benefits of protecting and restoring watersheds, wetlands, floodplains, and riparian areas. To build support for action, the NWP intends to further articulate the climate-induced risks to aquatic ecosystems, and the associated need to enable ecosystem migration. (See for example EPA, 2011h.)

GOAL 4: Incorporate climate resilience into watershed restoration and floodplain management.

Watershed restoration and a watershed approach to floodplain management focus on re-establishing the composition, structure, pattern, and ecological processes of degraded or altered aquatic and riparian ecosystems necessary to make them sustainable, resilient, and healthy. Incorporating climate change factors into planning efforts will enable watershed strategies to be successful over the long term.

Strategic Action 12: The NWP intends to consider a means of accounting for climate change in EPA funded watershed restoration projects and encourage others funding restoration projects to take climate change and resiliency into consideration.

In partnership with other federal, state, interstate, and local water sector actors, the NWP intends to clarify and encourage implementation of existing investment flexibilities to support investments in climate resiliency in watershed restoration approaches, source water protection, GI, and joint partnerships, consistent with authorizing legislation. For example, CWA Section 319(h) grants can be used to implement nonpoint source management projects to

protect and restore watersheds, including those that are vulnerable to changing land use and/or climate change. The Section 319 grant guidance encourages partnering with other environmental programs with shared goals to leverage funding and strategically target efforts to maximize results. These partnerships are a key element to healthy watersheds protection and have the potential to be effective in meeting common goals of watershed protection across state and federal agencies.

Strategic Action 13: The NWP intends to work with federal, state, interstate, tribal, and local partners to protect and restore the natural resources and functions of riverine and coastal floodplains as a means of building resiliency and protecting water quality.

Floodplains are among the most valuable ecosystems to society, second only to estuaries. Despite representing less than 2% of Earth's terrestrial land surface area, floodplains provide approximately 25% of all terrestrial ecosystem service benefits (Opperman, 2010). Protecting and restoring the natural resources and functions of floodplains will provide numerous environmental as well as economic benefits, such as protecting water quality, enhancing ground water recharge, and ensuring base flow of streams. Buffer areas also provide for flood attenuation, allow potential shoreline and lateral stream movement, modulate water level fluctuations, and minimize impacts on infrastructure. The NWP intends to encourage sound floodplain management, including use of nonstructural measures such as GI and LID, and work with partners to enhance the use of buffers to reduce flood losses, protect riparian ecosystems, improve water quality, and build resilience. The NWP intends to discourage use of structural measures (e.g., stream channelization and levees) whenever possible.

GOAL 5: Watershed protection practices incorporate source water protection, and vice versa, to protect and preserve drinking water supplies from the effects of climate change.

Protecting public health from contaminants in drinking water will require adapting to the impacts of climate change, which poses multiple concerns for public water systems. Warmer waters foster pathogen growth, testing the reliability of drinking water disinfection and potentially increasing costs. Increased precipitation may result in additional pollutant loadings of nutrients, pesticides, and other chemicals, further challenging drinking water treatment. Sea level rise in coastal areas puts freshwater supplies for all uses, particularly drinking water, at increasing risk. Saltwater intrusion into coastal aquifers is a problem in some areas where ground water withdrawals are outstripping recharge; increased pressure head from a higher sea level worsens this problem. As sea level rises, community drinking water intakes may end up in brackish waters as the salt front migrates up coastal rivers and streams.

Strategic Action 14: The NWP intends to encourage states to consider updating their source water delineations, assessments or protection plans to address anticipated climate change impacts.

NWP program staff intend to continue working to assure that states include protecting drinking water supplies (ground water and surface water) in watershed planning and protection programs. States should consider the feasibility and value of periodically updating their source water protection areas and protection plans in concert with state watershed plan updates to address anticipated climate change impacts. EPA and its federal partners intend to

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explore opportunities for providing technical assistance to states as they update their source water delineations, assessments, and protection plans to address anticipated climate change impacts.

Strategic Action 15: The NWP intends to continue to collaborate with stakeholders to increase state and local awareness of source water protection needs and opportunities and encourage inclusion of source water protection areas in local climate change adaptation initiatives.

There are many players who influence the effectiveness of source water protection at the national, state, interstate, tribal, and local levels, such as water science and regulatory agencies, water sector utility operators, local decision-makers, and nongovernmental and private sector stakeholders. Acting individually, they may affect aspects of source water protection and preservation, but collaborating on the same watersheds and aquifers increases the potential to protect and preserve those resources. The NWP intends to work to foster increased collaboration to develop decision support tools to inform deliberations at the local and watershed or aquifer scale.

GOAL 6: EPA incorporates climate change considerations into its wetlands programs, including the CWA 404 program, as appropriate.

Since 1989, the federal government as a whole has embraced a policy goal of no net loss of wetlands under the CWA Section 404 regulatory program. In addition, the program operates under a goal of a net increase in the quality and quantity of the nation's wetlands. EPA's Wetlands Program fosters effective wetlands management through strategic partnerships with states, tribes, local governments, and other partners. Key to accomplishing these goals and actions is a watershed approach to aquatic resource protection.

Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Activities in waters of the United States typically regulated under this program include fill for development, water resource projects (e.g., dams and levees), infrastructure development (e.g., highways and airports), and mining projects. Section 404 requires either a permit from the U.S. Army Corps of Engineers (USACE) or an EPA-approved state program before dredged or fill material may be discharged into waters of the United States.

One basic requirement of the CWA Section 404 permitting program, as implemented by 404(b)(1) Guidelines, is that no discharge of dredged or fill material into wetlands may be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. Significant degradation is broadly defined in the 404(b)(1) Guidelines to include individual or cumulative impacts to human health and welfare; fish and wildlife; ecosystem diversity, productivity, and stability; and recreational, aesthetic, or economic values.

Strategic Action 16: The NWP intends to consider the effects of climate change as appropriate when making significant degradation determinations in the CWA Section 404 Wetlands Permitting and Enforcement Programs.

In light of the growing concerns regarding the adverse effects of climate change and the recognition that protecting the nation's wetlands and other aquatic resources can help mitigate these effects, EPA intends to coordinate with USACE to better understand how climate change may impact Section 404 sites and if/how the systematic consideration of climate change impacts could be incorporated into decision processes (including minimization and compensatory mitigation practices) in a scientifically and legally defensible way. EPA's Section 404 permit review process also includes determining if there would be a "substantial and unacceptable" impact to Aquatic Resources of National Importance (ARNI), as provided in Part IV of the 1992 CWA Section 404(q) Memorandum of Agreement between EPA and the Department of the Army, often called the elevation procedures. Criteria used for identifying an ARNI could potentially consider the chemical, physical, and biological importance, in light of climate change, of an aquatic resource proposed to be impacted. In partnership with USACE, the NWP also intends to consider how to incorporate the anticipated effects of climate change, as appropriate, when determining whether impacts are "unacceptable" (e.g., where discharges would result in harm to wetlands critical to storm surge reduction).

Strategic Action 17: The NWP intends to evaluate, in conjunction with relevant Federal Agencies when applicable, including USDA, USFWS, and the USACE, how wetland and stream compensation projects could be selected, designed, and sited to aid in reducing the effects of climate change.

Consistent with established regulatory policy, impacts must be compensated for "to the extent appropriate and practicable" after they are avoided and minimized to the greatest extent practicable. As an example, in order to offset permitted impacts, the Corps typically requires between 40,000 and 50,000 acres of compensatory mitigation annually. This compensation takes the form of restored, created, enhanced, and/or preserved complexes of wetlands and streams. EPA, in conjunction with the Corps, intends to consider how these wetland and stream compensation projects could be selected, designed, and sited to aid in reducing the impacts of climate change, with a focus on analyzing climate change and associated relative sea level change for coastal mitigation projects. For example, certain types of wetland mitigation projects might be encouraged in the future because of their scientifically assessed relative carbon sequestration benefits or because siting mitigation projects in coastal zones would facilitate wetland migration as sea level rises while also enhancing the natural lines of defense ("resilience") of the coastline and community and creating public green space that enhances the livability and sense of place of the community.

GOAL 7: EPA improves baseline information on wetland extent, condition, and performance to inform effective adaptation to climate change.

Baseline information on the location, extent, and quality of wetlands and aquatic resources will help to measure changes caused by climate change and other stressors. Ongoing monitoring will inform the development of predictive models and management strategies, including for climate change adaptation.

Strategic Action 18: The NWP intends to expand wetland mapping by supporting wetland mapping coalitions and training on use of the new Federal Wetland Mapping Standard.

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While Agency conclusions should be informed by detailed, accurate data sources, the existing National Wetland Inventory (NWI) mapping, managed by the USFWS, is a good initial guide about potential wetlands in an area/watershed and is used extensively, including to address the effects of climate change (e.g., modeling relative sea level rise). The NWI maps were innovative when first produced, but additional work is now needed to update these maps to make them current and to better satisfy the demands for sophisticated analysis that supports effective environmental planning. Hardcopy maps are available for approximately 4/5 of the nation, and approximately half of the NWI is available online for use in geographic information system (GIS) applications. However, a significant portion of the arid Western United States has not yet been mapped.

The modernized Wetlands Mapping Standard was developed by the interagency Federal Geographic Data Committee (FGDC), in collaboration with representatives of federal agencies, states, tribes, environmental organizations, and management associations, as well as local government associations from both the wetlands and geospatial communities. The Wetland Mapping Standard was developed to improve and standardize mapping data quality in order to accelerate the rate at which the national wetlands mapping is completed and to enable real-time updates of the national wetlands data layer in the future. Using the new Standard, other groups, such as states, tribes, local governments, and nongovernmental organizations, are able to collect and upload digitally mapped data to the NWI. EPA and other federal agencies intend to train and support a range of organizations to complete the national map.

Strategic Action 19: The NWP intends to produce a statistically valid, ecological condition assessment of the nation's wetlands.

The National Wetland Condition Assessment (NWCA) will be an integrated gauge of wetland condition nationwide, summarizing the cumulative effects of federal, state, interstate, tribal, and local government and private-party actions that either degrade wetlands or protect and restore their ecological condition. The NWCA will be repeated at the national scale every five years and will incorporate those indicators that EPA identifies as most meaningful to detecting and predicting the impacts of climate change on the condition of the nation's wetlands.

EPA worked closely with the USFWS Wetlands Status and Trends program to utilize its network of analysis plots as the sampling frame for the NWCA. When these efforts are paired, we will for the first time be able to measure progress toward the national goal to increase the quantity and quality of the nation's wetlands (Figure 8).

Figure 8: National Wetland Condition Assessment Site Locations



Approx. 1,000 randomly selected wetland sites sampled in 2011. National Wetland Condition Assessment, EPA, 2011n.

Wetland quality or condition speaks to how wetlands differ from their “natural” state, providing an assessment of the overall ecological integrity of the resource and the relative status of wetland processes, such as the ability of a wetland to absorb nutrients. In addition, the NWCA will identify the stressors most associated with degraded wetland condition because they provide insights into the causes of declining wetland quality.

“Wetlands are inextricably tied to water levels and changes in climatic conditions affecting water availability will greatly influence the nature and function of specific wetlands, including the type of plant and animal species within them.”

Secretary of the Interior Ken Salazar, announcing availability of the new wetland mapping standard.
August 18, 2009

Strategic Action 20: The NWP intends to work with partners and stakeholders to develop information and tools to support long term planning and priority setting for wetland restoration projects.

Wetlands have the potential to provide added benefits for climate change adaptation as well the potential to store and sequester carbon. The NWP intends to work with partners and stakeholders to share evolving

information and tools to encourage consideration of climate change in long term planning and priority setting for wetlands management strategies and sustainable restoration projects.

C. Coastal and Ocean Waters

VISION: Adverse effects of climate change along with collective stressors and unintended adverse consequences of responses to climate change have been successfully prevented or reduced in the ocean and coastal environment. Federal, tribal, state, and local agencies, organizations, and institutions are working cooperatively; and information necessary to integrate climate change considerations into ocean and coastal management is produced, readily available, and used.

Coastal and ocean environments are inextricably linked, both spatially and ecologically. This section borrows the concept of the “baseline” (a legal demarcation of ordinary low tide levels that also crosses river mouths, the opening of bays, and along the outer points of complex coastlines) to facilitate the discussion of strategies that may be more applicable to coastal environments (which we loosely define as being on the landward side of the baseline) or ocean environments (seaward of the baseline). The baseline may affect climate change strategies because of its jurisdictional implications relevant to governmental authority. However, although the terms “coastal” and “ocean” are used primarily to organize this discussion, we recognize that those domains grade into each other and that some strategies may be appropriate on both sides of the baseline.

As in other regions, coastal areas will face challenges to wetlands, watersheds, infrastructure, water quality, and drinking water. Some coastal problems, such as nonpoint source pollution and changing precipitation patterns, have the same causes and effects that are found in inland places.