Healthy Watersheds Initiative

National Framework and Action Plan

2011

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Agency

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This Healthy Watersheds Initiative National Framework and Action Plan is a collaborative product of EPA and our state and Federal partners. The following Association of State and Interstate Water Pollution Control Administrators agencies and the Association of Fish and Wildlife Agencies were primarily involved in developing this document:

New Hampshire Department of Environmental Services
New Hampshire Fish and Game
Connecticut Department of Environmental Protection
Vermont Department of Environmental Conservation
Massachusetts Department of Fish and Game
Massachusetts Executive Office of Energy and Environmental Affairs
New York Department of Environmental Conservation
Pennsylvania Department of Environmental Protection
Virginia Department of Environmental Quality
Virginia Department of Conservation and Recreation
Maryland Department of Natural Resources
North Carolina Department of Environment and Natural Resources
Mississippi Department of Environmental Quality
Tennessee Wildlife Resources Agency
Michigan Department of Environmental Quality
Wisconsin Department of Natural Resources
Minnesota Pollution Control Agency
Ohio Environmental Protection Agency
Oklahoma Conservation Commission
Louisiana Department of Environmental Quality
Texas Commission on Environmental Quality
Iowa Department of Natural Resources
Kansas Water Office
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Alaska Department of Environmental Conservation

U.S. Forest Service
U.S. Fish and Wildlife Service
U.S. Geological Survey

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The Conservation Fund
The Green Infrastructure Center
The Nature Conservancy
The Trust for Public Land

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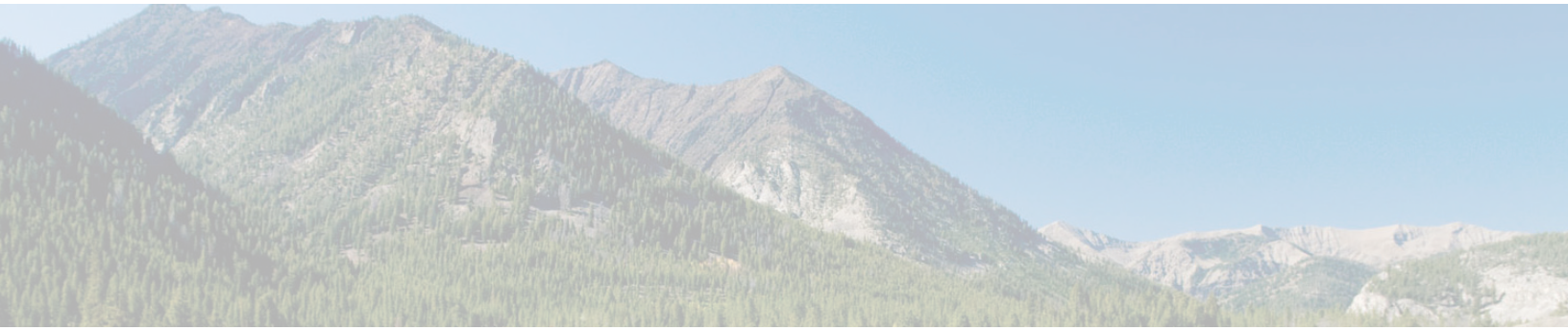

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Preface

On March 29, 2011, EPA released the ***Coming Together for Clean Water*** strategy as the framework for guiding the Agency's implementation efforts and actions to meet the 2011–2015 Strategic Plan objectives for protecting and restoring our waters.

One of the key areas of the Agency's strategy is to ***Increase Protection of Healthy Waters,*** including healthy watersheds. This Healthy Watersheds Initiative (HWI) National Framework and Action Plan outlines a new approach for how EPA will meet this objective. The approach provided in this document is a recommendation that does not replace existing laws or regulations or impose binding requirements on EPA or the states in implementing partnerships to protect healthy watersheds.

What is different with the HWI?

- The HWI represents a new construct for how EPA promotes the protection of chemical, physical and biological integrity of our waters and aquatic ecosystems. This construct acknowledges that **our waters and aquatic ecosystems are dynamic systems that are interconnected in the landscape.** We recognize that while we may protect their parts (e.g., water chemistry) or stream segments independently, it is also important to protect them as whole, interconnected systems that include all integral hydrologic, geomorphic and other processes.
- The HWI represents a cost-effective, non-regulatory approach to protecting our aquatic ecosystems at the state scale that is based on the **implementation of strategic watershed protection priorities** established by partnerships comprised of states and Federal agencies. Protecting an integrated ecological network or infrastructure of healthy watersheds, in addition to removing and reducing the causes of degradation, is important to sustaining healthy watershed processes and ensuring successful restoration.
- EPA will promote and support the national **implementation of state healthy watersheds strategies** by coordinating across state water quality and aquatic resource protection agencies, and with Federal and non-Federal partners, to leverage programs and resources for protecting and restoring the highest priority watersheds.

Protecting healthy watersheds has many benefits:

- Strategies that prioritize the protection and restoration of healthy watersheds are cost-effective. Budgets are tight, and we can no longer afford not to have a strategy.
- Healthy watersheds provide sufficient amounts of clean water required for healthy aquatic ecosystems, habitat for fish and wildlife, safe drinking water, and recreational opportunities as well as mental and physical health benefits, and help reduce vulnerability to climate change impacts and costs for adaptation.
- Healthy watersheds provide many economic benefits such as reduced costs for supplying and treating drinking water, restoring watersheds, and mitigating flood, hazard and climate change damage; expenditures on fishing, boating, swimming recreation and eco-tourism; and increased property values.

Healthy Watersheds Initiative Tenets

1. Partnerships are established to identify and protect healthy watersheds.
2. Healthy watersheds are identified state-wide using professional, scientifically sound, strategic, integrated assessments.
3. Healthy watersheds are listed, tracked, maintained and increased in number over time.
4. Healthy watersheds are protected and, if applicable, enhanced using the best regulatory and non-regulatory tools.
5. Progress on protecting healthy watersheds is measured and tied to securing and raising the overall goals of EPA's Water Program, including direct support of the public health and environmental goals established in EPA's Strategic Plan.

Healthy Watersheds Initiative:

National Framework and Action Plan

Table of Contents

Preface v

Healthy Watershed Initiative Tenets vi

Part 1 – Introduction 1
- What Are the Benefits of Healthy Watersheds? 1
- Why a Healthy Watersheds Initiative? 4
- What Is a Healthy Watershed? 6
- What Is the Healthy Watersheds Initiative? 8
- How Does the Healthy Watersheds Initiative Enhance and Supplement Existing EPA Water Quality Programs? 8
- Purpose of the National Framework and Action Plan 8

Part 2 – Healthy Watersheds Initiative Vision 9
- Guiding Principles 9
- Goals and Objectives 9

Part 3 – Healthy Watersheds Initiative Action Plan 11
- Priority Actions: EPA Headquarters, Regions, States 11
- EPA Headquarters Actions 12
- EPA Regions Actions 15
- States Actions 16

Part 4 – Implementation Framework 17
- Coordination and Communication 17
- Tracking Progress 17
- Determining Success 17
- Specific Examples of Success 17
- Summary of Actions for the HWI National Framework and Action Plan 20

Part 1

Introduction

Recently, a large focus of EPA's water quality protection program has been based on the remediation of impaired waterbodies and, to a significant extent, on the reduction of specific pollutant levels in waterbodies. Although EPA and our state and other partners have made and are continuing to make considerable progress in this important work, we recognize the need at the same time to protect and maintain the full chemical, physical and biological quality of our Nation's waters. The Healthy Watersheds Initiative (HWI) explicitly addresses this need by expanding our focus to include protection of intact aquatic ecosystems and integrated processes as they naturally occur within a watershed context: linked surface and subsurface waters and habitats comprised of continuous rivers with natural flowing water and sediment regimes; lakes and wetlands with natural water volumes and level variation; and springs and groundwater connected by hydrology. EPA acknowledged the need to increase protection of healthy waters in the *Coming Together for Clean Water: EPA's Strategy to Protect America's Waters*.[1] The strategy increased the focus on the protection of source waters and healthy watersheds as one of five areas guiding the implementation efforts and actions to meet the Strategic Plan objectives in the next 2 years and beyond.

Many states, Federal agencies and other EPA partners have begun in recent years to implement broader, aquatic ecosystem-based approaches that identify and protect their healthy watersheds. They recognize the benefits of protecting and maintaining high-quality waters, which include reducing the number of future impaired waters and resulting cost savings of not having to restore those waters; ensuring successful and holistic restoration and maintenance of restored waters; and the overall socio-economic benefits of healthy watersheds.

What Are the Benefits of Healthy Watersheds?

The benefits of healthy watersheds are numerous. Healthy watersheds provide sufficient amounts of clean water required for healthy aquatic ecosystems; habitat for fish and wildlife; safe drinking water; and recreation as well as mental and physical health benefits; and help reduce vulnerability to climate and land use change impacts and costs for adaptation. Healthy watersheds provide many economic benefits such as reduced costs for supplying and treating water for human consumption and industrial uses, restoring watersheds, and mitigating flood, hazard and climate change damage; expenditures on fishing, boating, swimming and eco-tourism; and increased property values. For example, by protecting aquifer recharge zones and surface water sources, costs of drinking water treatment may be reduced. A survey of the treatment costs and watershed characteristics of 27 drinking water utilities found that for every 10 percent increase in forest cover of the source area, chemical and treatment costs decrease by 20 percent (Ernst, C., 2004).[2]

1. https://blog.epa.gov/waterforum/wp-content/uploads/2011/04/ComingTogether-for-Clean-Water-FINAL.pdf
2. Ernst C. *Protecting the Source: Land Conservation and the Future of America's Drinking Water.* Trust for Public Land and the American Water Works Association, Water Protection Series. 2004, 56 pp.

> ***"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 reinforcing the fundamental importance of the Clean Water Act on the Senate floor, 1977*

Also, healthy watersheds have an important role in climate change mitigation and adaptation. Healthy watersheds provide sufficient natural land cover and soil resources capable of providing carbon storage functions, thereby offsetting greenhouse gas emissions. Intact floodplains and riparian zones of healthy watersheds enable them to be better adapted to changes in precipitation associated with climate change. Further, introduced species are less likely to become invasive in healthy watersheds, as naturally functioning ecosystems reduce opportunities for colonization by favoring indigenous species and helping them out-compete invasives.

The ecological services that healthy watersheds provide—and the benefits they create—are often taken for granted when they exist in natural systems, and are difficult, expensive or impossible to achieve when they must be reproduced.

Case Study: New York City Watershed Economic Benefits and Costs Savings of Protecting the Clean Water Supply

A case study in the *Natural Resources Forum Journal* (Postel & Thompson, 2005)[3] captured how one of our largest cities, New York City, was able to protect their drinking water source through a unique agreement that links ecosystem-service providers and beneficiaries.

The New York City case study demonstrates that watershed protection can be a highly cost-effective alternative to technological treatment in meeting water quality standards that can work for both upstream and downstream parties.

New York City was faced with building an estimated $6 billion dollar filtration plant with an annual operating cost of $300 million to ensure compliance with the Safe Drinking Water Act.

The City had the option of requesting a waiver, however, if they could demonstrate that they could meet their water quality standards through protection of their source watersheds. The City went through a long agreement-building process with the private landowners and communities within the Catskill-Delaware watershed, which supplies 90 percent of its drinking water.

Terms of the agreement included that the City would not condemn any land through the state's health eminent domain process. The City would purchase properties for their actual face value from willing sellers and pay taxes on the properties so it would not erode the local tax revenues. The total amount of land purchased was estimated at $94 million, which doubled the area of the protected buffer. The overall investment was estimated at $1 billion. The City also initiated other programs and a trust fund within the area to promote best management practices. These practices, along with the protected lands, increased property values, provided additional income, created healthier streams and habitats, and provided additional recreational opportunities. Future protection of this area will be dependent on population and development growth and any future regulations.

3. Postel S & BH Thompson, Jr. *Watershed Protection: Capturing the Benefits of Nature's Water Supply Services.* Natural Resources Forum. 2005, pp.98-108.

Minnesota Driftless Area Stream

Case Study: The Economic Impact of Recreational Trout Angling in the Driftless Area

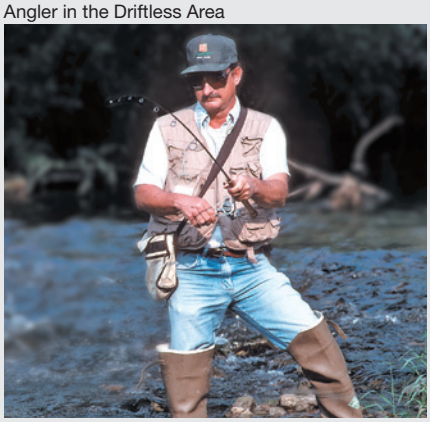
Restored streams in the Driftless Area

Reprinted with permission from the United States Department of Agriculture-Natural Resources Conservation Service. *The Economic Impact of Recreational Trout Angling in the Driftless Area*, April 2008.

The Driftless Area is a 24,000 square-mile area that encompasses portions of southeast Minnesota, northeast Iowa, southwest Wisconsin and northwest Illinois bypassed by the last continental glacier. According to a study by Trout Unlimited, recreational angling in the Driftless Area generates a **$1.1 billion annual economic benefit** to the local economy, far exceeding the combined revenues of Illinois' professional sports teams (the Bears, Bulls, Cubs and White Sox) of $728 million. Anglers in the Driftless Area spend an impressive **$647 million each year** that goes directly into the local economy. The total economic impact is actually much bigger than that. The money produces a "ripple effect" of approximately **$3,000** additional spending **per angler**.

These indirect and induced effects represent the money spent by Driftless Area anglers continuing to flow through the local economy as local business people turn around and buy additional goods and services. The total annual "ripple effect" of spending by anglers in the Driftless Area is approximately **$465 million**. Adding the direct spending total to the indirect and induced spending total reveals that trout anglers produce an economic benefit to the Driftless Area in excess of **$1.1 billion** every year. The authors attribute those economic benefits to the natural potential of the streams, good land stewardship, public access and wise investment in restoration. Overall, trout anglers have a light impact on natural resources. Many anglers release the fish they catch back to the stream and treat the areas they fish with respect. It is clear that clean water, resilient streams and healthy fish populations help support a thriving economy in the Driftless Area. For more information, go to **http://www.tu.org/atf/cf/%7BED0023C4-EA23-4396-9371-8509DC5B4953%7D/TroutUnlimited-EconStudySummaryFinal.pdf**

Angler in the Driftless Area



Reprinted with permission from Trout Unlimited—Driftless Area Restoration Effort. *The Economic Impact of Recreational Trout Angling in the Driftless Area*, April 2008.

Why a Healthy Watersheds Initiative?

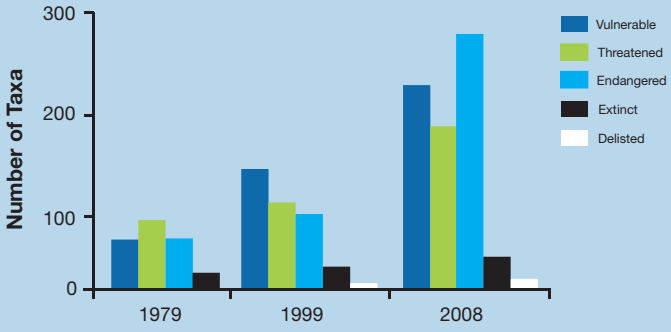
If successfully implemented, the HWI will greatly enhance our ability to meet the Clean Water Act (CWA) Section 101(a) objective, "…to restore and maintain the chemical, physical and biological integrity of the Nation's waters." The Committee Report written in support of the 1972 Federal Water Pollution Control Act amendments clarified that the term *integrity* "...refers to a condition in which the natural structure and function of ecosystems is [sic] maintained,"[4] rather than simply improving water quality in a narrow sense. The HWI is intended to preserve and maintain natural ecosystems by protecting our remaining healthy watersheds, preventing them from becoming impaired, and accelerating our restoration successes. It is based on an integrated, systems-based approach to watershed protection, supported by the latest science that views watersheds as dynamic systems that include surface water (instream flow in rivers and lake levels) and subsurface groundwater quantity variability, water quality, biological resources and their habitat, and other key processes (e.g., geomorphic) that support healthy aquatic resources.

EPA is embarking on the HWI as part of a comprehensive approach to integrate protection and restoration. Similar complementary approaches also have been adopted by the Association of Fish and Wildlife Agencies and the Departments of the Interior and Commerce – National Fish Habitat Action Plan[5], and the U.S. Forest Service – Watershed Condition Framework.[6] The need for this approach has become increasingly clear: despite our best efforts and many local successes, overall, our aquatic ecosystems are declining nationwide. This trend has been documented by many, including the Heinz Center (State of the Nation's Ecosystems, 2008)[7] and the American Fisheries Society (see figure at top right).

The rate at which new waters are being listed for water quality impairments exceeds the pace at which waters are removed from the list (EPA, Region 3, see figure at bottom right). Pollution and water quality problems continue to be causes, but other significant sources of the decline include loss of habitat and habitat fragmentation, hydrologic alteration and fragmentation, invasive species and climate change. It is clear that a better strategy is needed if we are to achieve the Section 101(a) objective of the CWA.

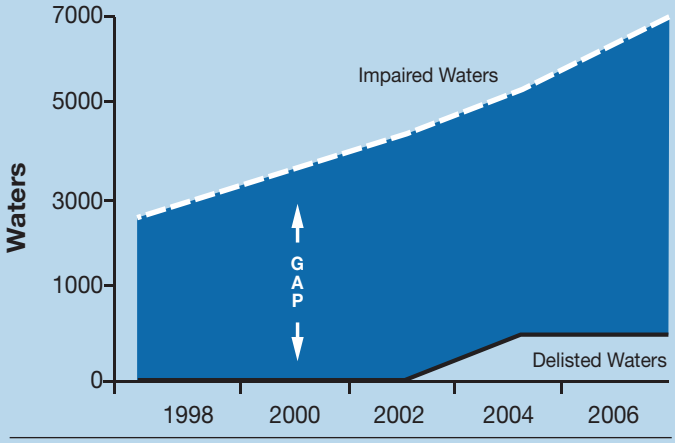
The HWI is a further refinement and enhancement of EPA's existing watershed approaches; an explicit recognition that restoration will not succeed without maintaining healthy watershed "infrastructure" of habitat, biotic communities, water chemistry, and intact watershed hydrologic (surface and subsurface) and geomorphic processes. The HWI is based on a key, overarching concept: the integrity of aquatic ecosystems is tightly linked to the watersheds of which they are part. There is a direct relationship between land cover, hydrology and key watershed processes and the condition of aquatic ecosystems. Healthy, functioning watersheds provide the building blocks that anchor water quality restoration efforts. Without this ecological support system, we will not only fail to successfully restore impaired waters, but also waste limited financial resources as additional waters become impaired and other socio-economic benefits are lost.

Numbers of imperiled North American freshwater and diadromous fish taxa in each status category as listed previously by the American Fisheries Society Endangered Species Committee in Deacon et al. (1979), Williams et al. (1989), and Jelks et al. (2008).



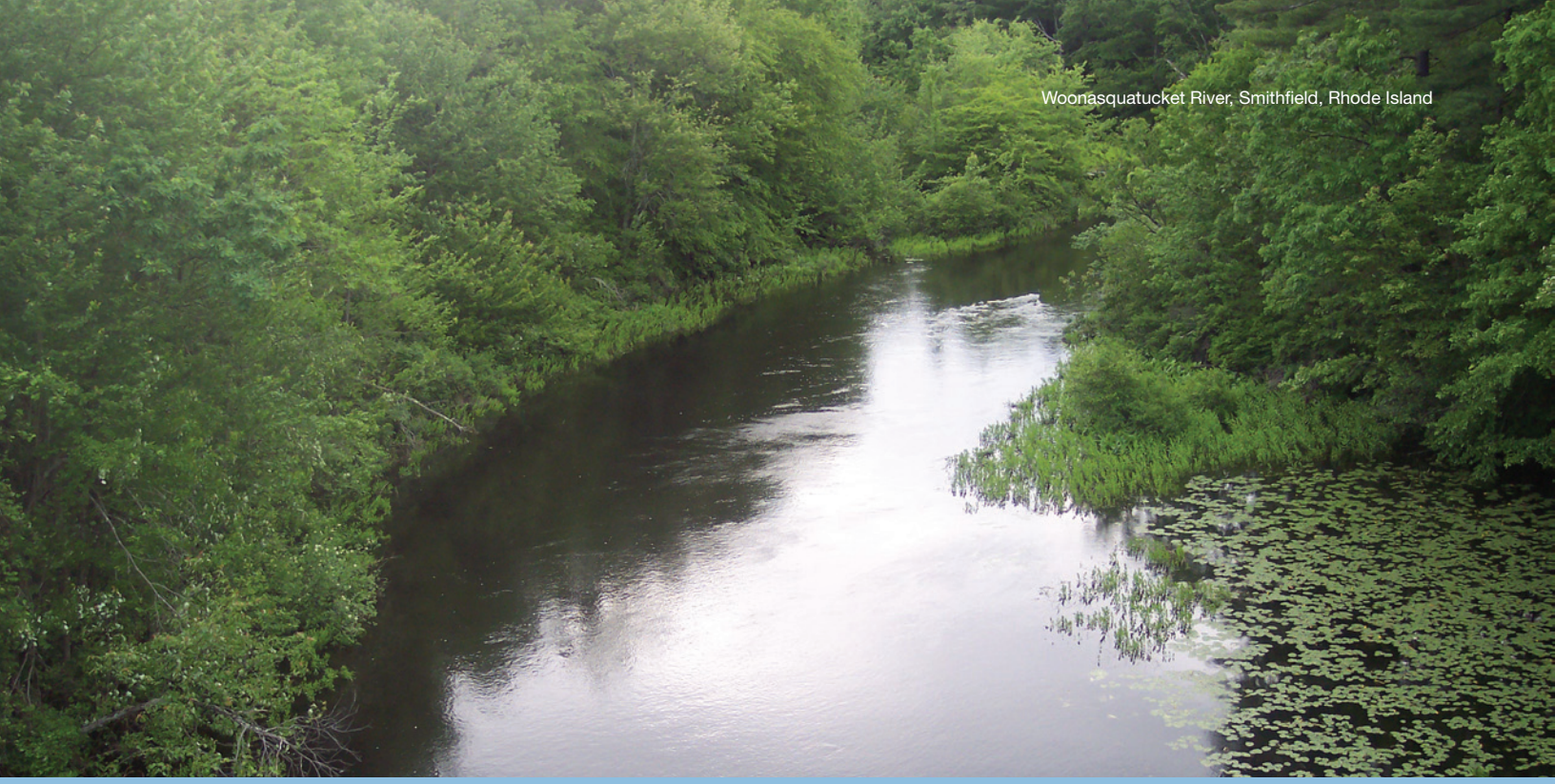
Conservation status of imperiled North American freshwater and diadromous fishes. Jelks HL, et al. *Fisheries* 2008;33(8):372-407.

Gap between impaired waters and delisted waters



EPA Region 3.

4. U.S. Government Printing Office. Report for the Committee on Public Works–United States House of Representatives with additional and supplemental views of H.R. 11896 to amend the Federal Water Pollution Control Act. House Report 92-911. 92nd Congress, 2nd session, 11 March 1972, page 149.
5. National Fish Habitat Action Plan. 2006. www.fishhabitat.org.
6. U.S. Department of Agriculture, Forest Service. *Watershed Condition Framework.* Publication Number FS-977, May 2011.
7. Heinz Center. *State of the Nation's Ecosystems Report.* Washington, DC: Island Press, 2008.



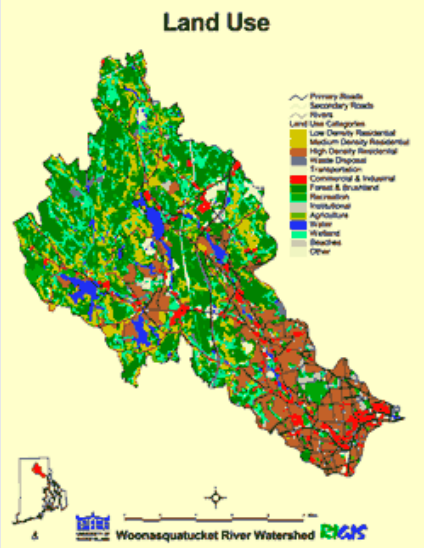
Woonasquatucket River, Smithfield, Rhode Island

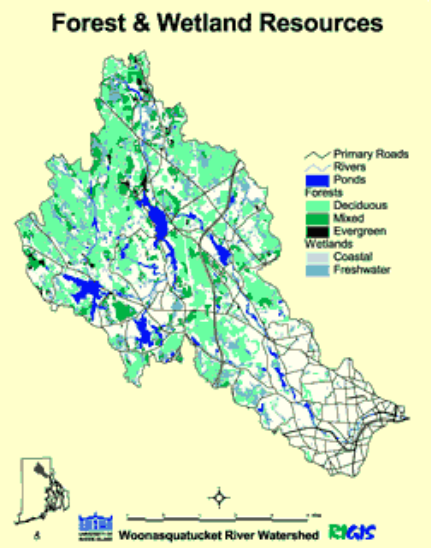
"Healthy watersheds protection is the insurance policy for successful water quality restoration."

— EPA Region 3 Program Manager

Linking Watershed Protection With Restoration

The Woonasquatucket River Watershed (land use and forest and wetland resources thematic maps)





Reprinted with permission from the University of Rhode Island Environmental Data Center.

The Woonasquatucket River is a small, 19-mile river originating 300 feet above sea level in the town of North Smithfield, Rhode Island. From several ponds there, the river flows south and east to downtown Providence, and at sea level, it joins the Moshassuck River to form the Providence River, which flows into Narragansett Bay. The lower reaches of the river are tidal before blockage by the first dam in Providence. The Native Americans who lived here named it "Woonasquatucket," meaning "the place where the salt water ends" or the meeting of the river and the sea.

These maps illustrate the challenges and opportunities in promoting a healthy watershed approach. Although the river itself is only 19 miles long, its watershed drains 50 square miles in parts of six towns, ranging from the rural headwaters of North Smithfield to the channelized post-industrial corridors of Johnston, North Providence and Providence, and passing 18 dams, a Superfund site and numerous official and unofficial brownfields. The contrast between the northern half of the watershed and its urbanized south is not only stark, but also it is misleading. With funding from the U.S. Forest Service, an intensive study of the entire river corridor found scores of sites with riparian restoration potential. Although some 80 percent of the existing riparian forestlands are in the upper part of the watershed, the key fisheries of alewife, shad and herring only spawn there if they can make it through the dams of Providence and the southern watershed. The two halves need each other: restoration of the impaired reaches and fish passage in the urbanized south is only sustainable if the healthy sections in the northern half remain so.

What Is a Healthy Watershed?

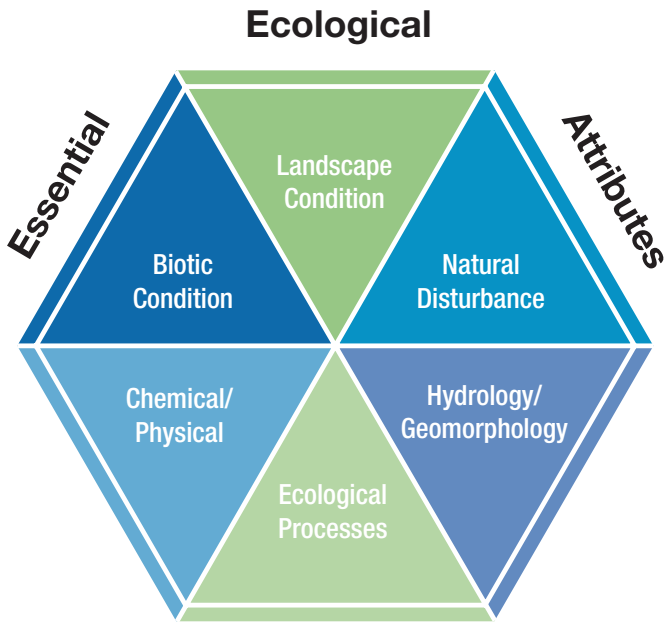
Ideally, a healthy watershed has the ability to provide the following:

- Habitat of sufficient size and connectivity and hydrologic (surface and subsurface) connectivity to sustain native aquatic and riparian species;
- Native vegetation and green infrastructure (network of habitat hubs and corridors) in the landscape to maintain natural hydrology (including recharge of groundwater) and nutrient and organic matter inputs essential to maintaining aquatic ecosystem functions;
- Biotic refugia or critical habitat (e.g., deep pools, seeps and springs, cold water tributary junctions for survival during droughts all sustained by sufficient water levels in lakes and instream flows in rivers);
- Natural hydrology (e.g., flow regime, lake water levels) that supports aquatic species and habitat;
- Natural transport of sediment and stream geomorphology that provide a natural habitat;
- Natural disturbance regimes (e.g., floods and fire) on which biota depend;
- Water quality that supports aquatic and riparian biotic communities and habitat; and
- Healthy, self-sustaining aquatic and riparian biological communities.

A healthy watershed has, either in its entirety or as components, intact and functioning headwaters, wetlands, floodplains, riparian corridors, biotic refugia, instream and lake habitat, and biotic communities; green infrastructure; natural hydrology (e.g., range of instream flows, lake water levels); sediment transport and fluvial geomorphology; and natural disturbance regimes expected for its location. Healthy watersheds range from those undisturbed by humans to developed areas that still retain healthy components and habitat connectivity (e.g., Fairfax County, VA).[8]

Healthy watersheds are identified through integrated assessments of landscape condition, biotic communities, habitat, water chemistry and intact hydrologic (surface and subsurface) and geomorphic processes. This is similar to the essential ecological attributes assessment approach (see figure below) proposed by EPA's Science Advisory Board in its report, *A Framework for Assessing and Reporting on Ecological Condition*: *An SAB Report* (EPA, 2002[9]) and many other approaches (e.g., Doppelt, et al., 1993[10] and Annear, et al., 2004[11]).

Essential ecological attributes[8]



Landscape condition is the patterns and connectivity of habitat in the landscape, both terrestrial and aquatic (e.g., forest cover, headwaters, riparian corridors, floodplains, wetlands, lakes and stream network connectivity). Green infrastructure assessments are useful in providing this information. Green infrastructure is an interconnected network of natural areas and open spaces that sustains ecosystems (Benedict MA and ET McMahon, 2006).[12]

8. Virginia Department of Conservation and Recreation and Virginia Commonwealth University Center for Environmental Studies. *Healthy Waters – A New Ecological Approach to Identifying and Protecting Healthy Waters in Virginia.* www.dcr.virginia.gov/healthywaters. 2009, 28 pp.
9. EPA. *A Framework for Assessing and Reporting on Ecological Condition: An SAB Report.* EPA Science Advisory Board, Washington, DC, 2002, Publication Number EPA-SAB-EPEC-02-009.
10. Doppelt B, M Scurlock, C Frissell, & J Karr. *Entering the Watershed: A New Approach to Save America's River Ecosystems.* The Pacific Rivers Council. Washington, DC: Island Press, 1999.
11. Annear T, I Chisholm, H Beecher, A Locke, P Aarrestad, C Coomer, et al. *Instream Flows for Riverine Resource Stewardship.* Revised Edition. Instream Flow Council, Cheyenne, WY, 2004.
12. Benedict MA and ET McMahon. *Green Infrastructure Linking Landscapes and Communities.* The Conservation Fund. Washington, DC: Island Press, 2006.

"I ask that your marvelous natural resources be handed on unimpaired to your posterity."

— Theodore Roosevelt, Sacramento, CA, 1903

Aquatic biota, habitat and water chemistry are assessed in state water quality monitoring programs, natural heritage, fishery and other programs. These include bioassessments (e.g., macroinvertebrates, fish, periphyton), habitat assessments, wetland assessments, biodiversity surveys, fish population assessments and ecologically relevant water chemistry (e.g., temperature, dissolved oxygen, pH and nutrients).

Hydrology includes instream flow, lake level and groundwater regimes characterized by seasonal varying components of magnitude, frequency, duration, timing and rate of change, which are required to sustain healthy freshwater ecosystems (Poff, et al. 1997).[13] Instream flow and lake level requirements are assessed using a variety of hydroecological assessment approaches (e.g., Ecological Limits of Hydrologic Alteration [ELOHA]) that are similar to bioassessment approaches and result in ecologically relevant flow and water level standards for different river and lake types as well as ecological condition goals.

Geomorphology describes the channel form and sediment transport processes that define instream habitat. Fluvial geomorphic assessments identify rivers and streams that have a natural channel form and dynamic equilibrium in sediment transport (i.e., the volume of sediments moving in equals the volume of sediments moving out of a stream segment).

Protection programs span a wide range, including habitat and stream corridor protection, conservation tax credits, landowner stewardship, sustainable forestry, instream flow and lake level water protection, water resource policy, source water and groundwater protection, anti-degradation, wetland protection, invasive species control, monitoring, and education. Some state and local examples of these diverse watershed protection programs are included as success stories at the end of this document.

13. Poff NL, et al. The natural flow regime: a paradigm for river conservation and restoration. *Bioscience* 1997;7(11): 769-784.

What Is the Healthy Watersheds Initiative?

The key components of the HWI are to:

1. Establish partnerships to identify and implement protection of healthy watersheds;
2. Identify healthy watersheds and intact components of altered watersheds state-wide through integrated assessments;
3. Implement state-wide strategic protection plans and programs based on vulnerability and other opportunities;
4. Implement local protection programs based on priorities from state and local assessments;
5. Provide information to inform ecological recoverability and help set priorities for restoration of impaired waters; and
6. Provide information to the public on healthy watersheds, including the socio-economic benefits of their protection.

How Does the Healthy Watersheds Initiative Enhance and Supplement Existing EPA Water Quality Programs?

The HWI promotes the utilization of a set of analyses (e.g., hydroecology, fluvial geomorphology and green infrastructure) using state-of-the-science and improvements to methods that were not fully developed or available until the past decade, and combines the results of these analyses using modern computing power to assess watersheds as functional systems. These and similar technical tools and approaches are used to support a holistic systems approach. Going beyond watershed planning approaches that focus on impaired waterbodies and specific pollutant-based impairments to those waterbodies, healthy watersheds assessments focus on also identifying those habitats and critical watershed processes that are intact and in good condition. Once identified, those habitats and processes can be protected as part of a comprehensive watershed plan that includes both protection and restoration. Moreover, healthy watersheds assessments are meant to be strategic at the state scale in terms of focusing state and local protection resources towards the remaining high-quality areas throughout the state, and to help target restoration opportunities.

Purpose of the HWI National Framework and Action Plan:

The purpose of this HWI National Framework and Action Plan is to provide a clear and consistent framework with sufficient flexibility for appropriate action by EPA and our partners. EPA will work with states and other partners to implement the HWI linking to other related initiatives and programs, and including the actions herein. EPA Regions will develop healthy watershed strategies that are consistent with this national framework, but also tailored to the unique opportunities within the Regions.

Clinch/Powell Watersheds: Local Protection of Healthy Watersheds

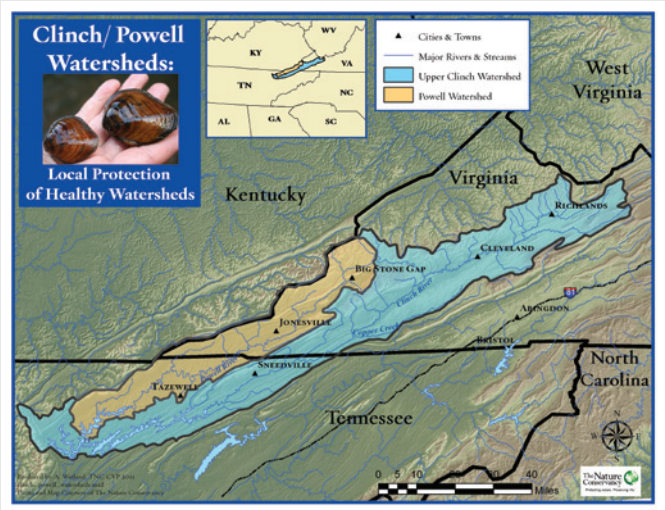


Photo and map are courtesy of The Nature Conservancy.

The Upper Clinch and Powell River Watersheds, located in southwestern Virginia and northeastern Tennessee, harbor one of the most diverse fish and mussel assemblages in North America with 118 native fish species and 45 species of mussels. The Commonwealth of Virginia and State of Tennessee both identified these watersheds as priorities for coordinated protection and, in 2007, along with EPA Regions 3 and 4, established the Clinch Powell Clean Rivers Initiative (CPCRI). The main goal of the CPCRI is to protect and restore water quality by: (1) conducting cutting-edge science and river monitoring to advance understanding of watershed stressors and the causes of rare mussel decline; (2) translating the results of science and monitoring into more effective regulations, best management practices and conservation strategies; (3) fostering increased coordination between state and Federal agencies, the regulated community and other key watershed stakeholders; and (4) elevating awareness of the Clinch River system as a national model for collaborative environmental management. The CPCRI, led by The Nature Conservancy, represents an excellent example of coordination and leveraging of multiple stakeholders and their programs towards protecting and restoring high-priority healthy watersheds.

Part 2

HWI Vision

Guiding Principles

EPA's broad mission charges us with protecting the Nation's environment, including land, water and air that comprise a whole ecosystem. We will promote achievement of the intended use of the term "integrity" in Section 101(a) of the Clean Water Act (CWA), "… to restore and maintain the chemical, physical and biological integrity of the Nation's waters," by recognizing the importance of preserving natural aquatic ecosystems to fully meet the goals and objectives of the CWA.

EPA recognizes that our Federal partners, state and local governments, and non-government organizations already have made great progress in protecting healthy watersheds and bring significant resources and complementary tools to this work. The HWI both supports and expands on this work. This Initiative only can be successful if we collaborate with others to integrate protection and restoration in watersheds. The proposed action plan presented here aims to provide a clear, consistent framework for action, both internally among our own programs, and externally in working with our partners.

Goals and Objectives

Goal 1

Identify, protect and maintain a network of healthy watersheds and supportive green infrastructure habitat networks across the United States.

Objectives

In collaboration with states, other Federal agencies and non-governmental partners:

- Support state-wide assessments of green infrastructure, hydrology, geomorphology, and biotic, habitat and chemical condition, as well as integrated assessments of the above to help identify healthy watersheds.
- Establish state watershed goals that help protect and maintain a healthy watershed condition.
- Implement strategic state programs and plans to protect identified healthy watersheds, including green infrastructure and restored watersheds.

Healthy Watersheds Initiative Vision:

Protect and maintain the aquatic ecological integrity of watersheds and supporting habitat networks to ensure that future generations may enjoy these resources and the social and economic benefits that they provide.

Goal 2

Integrate protection of healthy watersheds into EPA programs.

Objectives

- Develop and implement a policy to protect a national network of remaining healthy watersheds, including supporting green infrastructure habitat networks.
- Look for opportunities to integrate healthy watersheds protection into EPA Water and other programs (e.g., implementation of the Compensatory Mitigation Rule, watershed restoration programs, Water Quality Standards, Source Water Protection Program, Clean Water and Drinking Water State Revolving Fund, National Environmental Policy Act [NEPA], Smart Growth, etc.).
- Support state strategic plans that integrate protection and restoration priorities into program implementation to achieve environmental results efficiently and cost effectively through the continuing planning process and in performance partnership agreements.
- Identify funding resources and develop guidance and measures to support healthy watersheds assessment and protection opportunities.

Goal 3

Increase awareness and understanding of the importance of protecting our remaining healthy watersheds and the range of management actions needed to protect and avoid adverse impacts to those healthy watersheds.

Objectives

- Develop and implement public outreach programs on the importance of protecting healthy watersheds, including the ecological services, economic benefits and cost savings they provide, and on actions that can be taken to avoid adverse environmental impacts from land use changes, energy development and climate change.
- Provide information and examples on the myriad of successful healthy watersheds protection and prevention actions.
- Provide support to local and regional planning commissions and governments for implementing programs to protect healthy watersheds.

Part 3

HWI Action Plan

This Action Plan is organized by the roles of EPA Headquarters, EPA Regions and states. It includes six major focus areas that support the Goals and Objectives:

Policy and Guidance	Goal 2
Assessments	Goal 1
Protection	Goals 1, 2 and 3
Outreach and Communications	Goal 3
Partnerships	Goals 1 and 3
Research	Goal 1

The actions below are a sub-set of those in the tables that follow and represent those actions that will be implemented initially.

EPA Headquarters Actions

- Develop as EPA policy that protection of healthy watersheds is a priority and an integral part of water programs under the CWA.
- Develop guidance on how healthy watersheds protection will be integrated into EPA programs.
- Identify and dedicate sources of funding and associated guidance to implement the HWI.
- Develop HWI measures for the EPA Strategic Plan and National Water Program Guidance and a periodic report on the national status of healthy watersheds.
- Document the economic and social benefits as well as cost savings of protecting healthy watersheds.
- Develop Memoranda of Understanding (MOUs) with other Federal agencies and a statement of intent with our partners.

EPA Regions Actions

- Develop and implement Regional HWI Strategies.
- Provide guidance and technical assistance to states and local communities to help them develop healthy watersheds assessments and implement healthy watersheds protection programs.
- Develop and implement partnerships with states, local governments, Federal agencies, non-governmental organizations (NGOs) and others to identify and protect healthy watersheds.
- Pilot demonstrations that incorporate healthy watersheds protection into EPA programs.
- Develop healthy watersheds in-reach and outreach programs.

States Actions

- Inventory healthy watersheds using integrated assessments developed through collaboration across state agencies and with other partners.
- Develop and implement coordinated healthy watershed protection programs both at the state level and collaboratively at the local level.
- Develop partnerships with other states, Federal agencies, NGOs, etc. to inventory and protect healthy watersheds.

Activities are already underway for some of the focal areas outlined below and others are yet to be conceptualized. The actions are intended to be carried out by EPA and the states with our Federal and non-Federal partners. Because the HWI is a new initiative, it is expected that these actions will evolve and perhaps expand with new partners joining the effort. The Action Plan will be updated periodically to reflect changes as the HWI matures into a program.

EPA Headquarters Actions

EPA Headquarters will take the primary lead on Policy and Guidance and have some responsibilities under the other five focus areas. EPA has a unique role and opportunity to institutionalize the HWI through new policy and guidance. Key to the success of the HWI will be the launch of a new healthy watersheds national policy that commits the Agency, working with our state and other partners, to leverage new and existing technical and financial resources towards the assessment and protection of healthy watersheds. This new healthy watersheds national policy would be supported by complementary guidance.

Focus Area	When	Action	Partners
Policy and Guidance (Goal 2)	2011	Develop policy statement on protecting healthy watersheds **Purpose:** To make it a priority and an integral part of water quality and watershed programs at EPA and in the states	Regions
	2011 & ongoing	Develop HWI measures for the EPA Strategic Plan and National Water Program Guidance (NPG) **Purpose:** To create the accountability framework and incentives to implement healthy watersheds protection programs at EPA and in the states	Regions, states
	2011 & ongoing	Identify funding sources for the HWI and develop funding guidance **Purpose:** To support states and others in conducting healthy watersheds assessments and implementing protection programs	Regions
	2012	Develop an annual HWI Report, including guidelines for reporting on healthy watershed activities and progress (healthy watersheds list and national status) at EPA and in the states **Purpose:** To track progress and inform the public on how we are doing	Regions, states
	2012	Integrate healthy watersheds into EPA programs and develop guidelines for leveraging and working with EPA's programs (e.g., wetlands, National Environmental Policy Act, coastal programs, 604 (b) Continuous Planning Process, total maximum daily load and nonpoint source program implementation, water quality standards, source water protection, etc.) **Purpose:** To improve our protection capabilities by using a holistic, system-based approach to aquatic ecosystem protection	Regions
	2011 & ongoing	Support, through the continuing planning process and in performance partnership agreements, the development of state strategic plans that integrate protection and restoration priorities into program implementation **Purpose:** To achieve environmental results efficiently and cost effectively	

EPA Headquarters
Actions

Focus Area	When	Action	Partners
Assessments (Goal 1) Strategic healthy watershed protection is guided by identifying healthy watersheds at the state scale. The healthy watersheds approach advocates assessing watersheds as systems integrating assessments of landscape condition, habitat, biological integrity, water quality, hydrology and geomorphology. Once integrated assessments are complete, vulnerability is assessed to help guide strategic protection. EPA and its partners will promote and provide technical support to interested states to develop (or for assessments underway, complete) healthy watersheds assessments. EPA and its partners will develop assessment tools.	Fall 2011	Develop the document, *Identifying and Protecting Healthy Watersheds Concepts, Assessments and Management Approaches* **Purpose:** Facilitate implementation of the HWI by providing EPA, state and local practitioners with an overview of key concepts behind the healthy watersheds approach, examples of healthy watersheds assessments, an integrated assessment framework for identifying healthy watersheds, examples of management approaches, sources of data and key assessment tools	
	November 2010 (Workshop) April 2011 (Report)	Convene a Healthy Watersheds Integrated Assessment Expert Workshop and produce a report **Purpose:** To develop ideas and further research needed to improve and advance integrated healthy watersheds assessment methods	ORD, Regions, states, NGOs, other experts
Outreach and Communications (Goal 3) A successful HWI will require significant and effective outreach to internal and external stakeholders. This includes outreach within EPA and with the public and others. Some of this is well underway (e.g., HWI website [**www.epa.gov/healthywatersheds**] and the Fact Sheet (on website). Also, future outreach and communications actions will be outlined in the Communications Strategy (ideas may include a newsletter; healthy watersheds on agendas of major conferences, meetings and forums; healthy watersheds course on EPA's Watershed Academy; talking points; Q&As, etc.).	2011 & beyond	Develop and implement an HWI Communications Strategy (emphasizing cost/benefits) **Purpose:** To help implement healthy watersheds approaches and programs at the state and local levels across the country	Regions, states, AFWA[14]
	2011	Prepare a white paper on economic and social benefits and cost savings of protecting healthy watersheds and develop outreach tools **Purpose:** To provide sound evidence to convince the public and others of the value of protecting healthy watersheds	ORD, OPEI
	2011 & ongoing	Update the EPA healthy watersheds website **Purpose:** To provide the latest information on healthy watersheds assessment and protection approaches and the HWI	
	2011 & ongoing	Conduct healthy watersheds webinars at EPA HQ and the Regions **Purpose:** To share information on the latest approaches with larger audiences	

14. Association of Fish and Wildlife Agencies.

Focus Area	When	Action	Partners
Partnerships (Goals 1 & 3) Protecting healthy watersheds requires effective partnerships. We all share the responsibility for protecting the environment. Bringing practitioners and policy makers together will help us integrate and share resources. Partnerships across organizations are particularly important. Our environmental laws and regulations have created stovepipe organizations at the Federal and state levels of government. Ecosystem-based environmental protection calls for integration of programs and approaches; thus, working across Federal and state agencies is a necessity if we are to be successful in protecting the remaining healthy watersheds. Partnerships with key non-governmental organizations (NGOs) and local governments and organizations also are important as they have the most direct effect on the resource. Some partnership building has occurred already with Federal and state agencies, between agencies within states, and with NGOs, and others.	2011	Develop a statement of intent among partners to work together to identify and protect healthy watersheds (initiated and signed by the EPA Administrator) **Purpose:** To establish Federal and non-Federal support and coordination of mutual efforts to achieve a national network of healthy watersheds	Federal agencies, national state organizations, NGOs (TBD)
	2011 & ongoing	Develop partnerships (e.g., MOUs) with (e.g., **U.S. Fish & Wildlife Service [USFWS]** on the Landscape Conservation Cooperatives; **USFWS** and **National Marine Fisheries Service [NMFS]** on the National Fish Habitat Action Plan; **U.S. Forest Service [USFS]** on the Strategic Framework for Water and Watershed Condition Assessments; **Department of Transportation [DOT]** on Ecological; **U.S. Army Corps of Engineers [USCOE]** on Integrated Basin Management Plans, Compensatory Mitigation Rule, Principles and Standards for Water Resources Planning, Sustainable Rivers Program, instream flow program, etc.; **U.S. Geological Service [USGS]** on the National Water Census; **Natural Resources Conservation Service [NRCS]** on Floodplains Easements, Wetlands Reserve Programs) **Purpose:** To coordinate our similar efforts more effectively with our state partners	USFWS, NMFS, USFS, DOT, COE, USGS, NRCS, and other agencies
	2011 & ongoing	Develop partnerships with the states and NGOs such as The Nature Conservancy (TNC), USGS, and the Instream Flow Council (IFC) on instream flow; The Conservation Fund (TCF) on Green Infrastructure; Source Water Collaborative (SWC), and other NGOs **Purpose:** To coordinate our mutual goals and efforts more effectively so that we can achieve a national network of healthy watersheds	TNC, USGS, states, IFC, TCF, SWC, etc.
	2011 & ongoing	Develop partnerships with national state organizations: ASIWPCA, AFWA, ASFM, NASF, ASWM and IFC **Purpose:** To establish effective implementation of the HWI by working across state agencies	ASIWPCA[15], AFWA[16], ASFM[17], NASF[18], ASWM[19], IFC[20]
Research (Goal 1) Research support is critical as some of the science supporting healthy watersheds assessment and benefits analyses is burgeoning. This is particularly relevant for hydroecology, fluvial geomorphology, and economic and social benefits. There is some research support in EPA's Office of Research and Development; however, research needs and a plan have not been developed yet.	2012	Develop a healthy watersheds research plan **Purpose:** To identify critical research and methods needed for improved healthy watersheds assessments, including social and economic benefits assessments, and social marketing	ORD

15. Association of State and Interstate Water Pollution Control Administrators.
16. Association of Fish and Wildlife Agencies.
17. Association of State Floodplain Managers.
18. National Association of State Foresters.
19. Association of State Wetland Managers, Inc.
20. Instream Flow Council.

EPA Regions
Actions

The Regions will develop and implement HWI strategies that are tailored to the interest of the states and unique opportunities within the Region. This will include developing a wide array of partnerships and in-reach and outreach activities, and providing technical assistance to the states. The Regions also will help Headquarters identify program integration opportunities and implement pilot projects.

Focus Area	When	Action	Partners
Policy and Guidance (Goal 2)	2012 & ongoing	Regional healthy watersheds strategies **Purpose:** To develop and refine over time organized strategies supported by management that implement the HWI with the states and our other partners	NGOs, states, Federal Agencies
	2011 - 2014	Pilot demonstrations of incorporating healthy watersheds protection into EPA programs **Purpose:** To begin exploring how healthy watersheds protection can strengthen our programs	HQ, states
Assessments (Goal 1)	Ongoing	Conduct multi-state or regional assessments (e.g., Region 4 Watershed Index Tool, Region 3 Natural Infrastructure), as appropriate **Purpose:** To share data across state boundaries, enhance state assessments, and help set protection and restoration priorities	ORD, states, and others
	Ongoing	Provide technical assistance to states and local governments to implement assessments, including one-on-one workshops, webinars, funding, etc. (e.g., hydroecology, green infrastructure, fluvial geomorphology, integrated assessments, vulnerability) **Purpose:** To share the latest assessment methods	Local governments, states, NGOs, and others
Protection (Goals 1, 2 & 3) Protection of healthy watersheds is implemented by governments, the private sector, non-governmental organizations (NGOs), citizens and others at the national, state and local scales. This can include a range of actions (e.g., land acquisition, local planning and zoning, land stewardship, conservation tax credits, water resource policies, instream flow regulations, flood hazard ordinances, river corridor protection programs, invasive species prevention, watershed protection plans), national programs (e.g., National Fish Habitat Action Plan), healthy watersheds monitoring, education and outreach, and many more.	Ongoing	Provide guidance and technical assistance to states and local communities on implementing healthy watersheds protection programs **Purpose:** To help states and local communities protect healthy watersheds	Local communities, states, and governments
Partnerships (Goals 1 & 3)	Ongoing	Partnerships with other Federal agencies, NGOs, etc. **Purpose:** To collaborate on similar efforts and most effectively implement healthy watersheds identification and protection	Federal agencies, NGOs, others
Outreach and Communications (Goal 3)	2011 & beyond	Develop healthy watersheds in-reach and outreach programs **Purpose:** To educate staff and the public on healthy watersheds protection and to involve them in implementing the HWI	HQ

States Actions

States will be primary implementers of many healthy watershed assessments and protection programs and activities. States will play a key role in identifying and tracking healthy watersheds. They also will work closely with local governments and others implementing protection by providing assessment information and tools to protect healthy watersheds. In addition, states will implement protection programs, for example, conservation tax credits, water quality anti-degradation, and instream flow (e.g., permits or water resource policies). States will implement this by using partnerships with others, including working across state agencies.

Focus Area	When	Action	Partners
Assessments (Goal 1)	2011 & beyond	Inventory healthy watersheds using integrated assessments developed through collaboration across state agencies and with other partners **Purpose:** To identify healthy watersheds across the state for protection by collaborating with experts in related state programs across agencies and with other partners	Other state agencies
	2011 & beyond	Complete and implement instream flow and other hydrological assessments (e.g., lake levels, groundwater) working across state agencies **Purpose:** To develop instream flow, lake level, and groundwater dependent ecosystem protections in state programs and to strengthen integrated healthy watersheds assessments	Federal agencies, states, NGOs, and others
	2011 & beyond	Complete and implement state-wide green infrastructure assessments **Purpose:** To conserve green infrastructure to protect both aquatic ecosystems and drinking water supplies, our natural heritage, and to strengthen integrated healthy watersheds assessments	Federal agencies, states, NGOs, and others
	2015 & beyond	Complete state-wide fluvial geomorphic assessments and implement river and stream corridor protection programs **Purpose:** To protect natural stream dynamics and habitat; human infrastructure and safety; adapt to climate change; and to strengthen integrated healthy watersheds assessments	Federal Emergency Management Agency, states, other partners
Protection (Goals 1, 2 & 3)	2011 & beyond	Develop and implement healthy watershed protection plans and programs both at the state level and in collaboration with the local level (e.g., conservation tax credits), water quality anti-degradation, CWA Section 401 certifications, instream flow (e.g., permits or water resource policies), floodplain protection, etc. **Purpose:** To protect a network of healthy watersheds across the state and maintain the services they provide	Federal agencies, local government, NGOs, and others
Partnerships (Goals 1 & 3)	Ongoing	Develop collaborations with other states, Federal agencies, NGOs, etc. to inventory and protect healthy watersheds **Purpose:** To effectively implement healthy watersheds protection with key partners and stakeholders	Federal agencies, states, NGOs, others
Outreach and Communications (Goal 3)	2011 & beyond	Develop healthy watersheds in-reach and outreach programs **Purpose:** To educate staff and the public on healthy watersheds protection and to involve them in implementing the HWI	Other state agencies, NGOs, Federal agencies, others

Part 4

Implementation Framework

Coordination and Communication

Overall coordination and communication will be maintained through the HWI network of EPA Headquarters and Regional Coordinators and our Federal and state partners under the leadership of EPA Headquarters and the Lead Region. This will take the form of periodic conference calls, electronic communications and national meetings. Task-specific teams will manage their own projects with communications networks.

Tracking Progress

Progress on the actions will be tracked through an annual report to the HWI Network and EPA management and posted on the EPA healthy watersheds website (**www.epa.gov/healthywatersheds**). Additionally, the Office of Wetlands, Oceans, and Watersheds and the Lead Region will present an annual progress report to senior Office of Water and Regional management. Progress on some actions will be tracked through EPA's accountability framework: EPA's Strategic Plan and National Water Program Guidance.

Determining Success

Overall success is embodied in the HWI Vision statement:

Protect and maintain the aquatic ecological integrity of watersheds and supporting habitat networks to ensure that future generations may enjoy these resources and the social and economic benefits that they provide.

In the long-term, success would ultimately be that:

- Each EPA Regional Office develops and implements a healthy watersheds strategy.
- EPA provides both technical and funding support to states and other entities for identifying and protecting healthy watersheds.
- EPA integrates protection of healthy watersheds into all applicable programs to better protect and restore aquatic ecosystems.
- States conduct integrated assessments to identify healthy watersheds.
- States implement strategic protection and restoration programs based on integrated healthy watersheds assessments.
- Localities and watershed organizations use data, information, and support from states to protect healthy watersheds in their comprehensive plans and land use regulations.
- Partnerships are formed with key government, non-government, public and other stakeholders to conduct healthy watersheds assessments and protection activities at the state and local levels.
- EPA, states, local governments and others document the status of healthy watersheds, ecological services benefits to the economy, and the progress towards implementing protective measures that maintain and increase healthy watersheds.

Specific examples of success and what they might look like are on the pages that follow:

Headquarters

Example of Success:

EPA recognition of importance of protecting healthy watersheds (e.g., the *2011 Coming Together for Clean Water: EPA's Strategy to Protect America's Waters*)

What Success Might Look Like

Healthy watersheds protection as an EPA priority
Established funding source and associated guidance
Provisions for healthy watersheds protection in EPA program guidance (e.g., CWA Section 404, total maximum daily load, water quality integrated reports, storm water permits, etc.)
Strong partnerships with national state organizations (e.g., ASIWPCA, AFWA, etc.), Federal agencies (e.g., Forest Service, Federal Housing Administration, USFWS, USGS, USCOE, etc.), and NGOs (e.g., TNC, TCF, Trust for Public Land, etc.)
Public interest, awareness and support for protecting healthy watersheds

REGIONS

Examples of Success:

Technical Assistance

Instream flow protection—EPA New England has worked with the six New England states over the past few years to help them develop policies, guidelines and regulations related to protecting instream flows and aquatic resources, with particular attention to key fish communities dependent on good water quality and adequate base flow.

Watershed-based wetland mitigation—The States of New Hampshire and Maine have been working with the New England District of the U.S. Army Corps of Engineers and EPA New England and have developed an "in-lieu fee" program for mitigation of unavoidable wetland impacts as part of the CWA Section 404 permit process. This program allows for collection of a "fee" based on the amount of impact. These fees are collected across the state then distributed for projects that replace the lost function and values, as well as implement priority restoration and protection projects in the watershed, as determined by a multi-agency and NGO review committee.

What Success Might Look Like

Prioritize National Pollutant Discharge Elimination System permits in headwater streams for review/issuance, and prioritize permits elsewhere based on ecological and cumulative impacts rather than size of the discharge or permittee
Develop a set of criteria using healthy watersheds data for what we expect for "avoidance and minimization" of wetland and water quality impacts from residential development, including low impact development practices and smart growth

STATES

Examples of Success:

Protecting the Stream Corridor

Vermont River Corridor Protection Program

The Vermont River Corridor Protection Program is a program of the Department of Environmental Conservation, within the Agency of Natural Resources (ANR) that seeks to restore and protect the natural values of rivers and minimize flood damage. Achieving natural stream stability over time through a reduction in riparian infrastructure can minimize cost from flood damage and improve aquatic and riparian ecological integrity. Vermont ANR provides technical assistance to communities throughout the state to help delineate river corridors, develop municipal fluvial erosion hazard zoning districts, and implement river corridor easements. The primary purpose of this delineation, with respect to river corridor planning, is to capture the meander belt and other active areas of the river that are likely to be inundated or erode under flooding flows. As part of the stream geomorphic assessment, a stream sensitivity rating is assigned to each reach based on existing stream type and geomorphic condition.

Based on the river corridor delineations, Vermont ANR works with communities to develop river corridor plans that analyze geomorphic condition, identify stressors and constraints to stream equilibrium, and prioritize management strategies. By focusing on "key attenuation assets", flood and fluvial erosion hazards, water quality and habitat are improved at minimum cost. Attenuation areas are captured in the corridor delineation process and include Active River Area components. The river corridor plans are incorporated into existing watershed plans, and ANR also works with municipalities to develop Fluvial Erosion Hazard (FEH) Area Districts in their bylaws or zoning ordinances. A River Corridor Easement Program also has been established to purchase river channel management rights. This prevents landowners from dredging and armoring the channel and gives the easement holder the right to establish vegetated buffers in the river corridor. So far, 19 river corridor easements have been completed and 12 municipalities have adopted FEH Area zones.

For more information, go to: **http://www.anr.state.vt.us/dec/waterq/rivers/htm/rv_restoration.htm**

Critical Areas Protection

Washington Critical Areas Growth Management Act of 1990

Washington State adopted its Growth Management Act in response to rapid uncoordinated and unplanned growth that was threatening the environment, sustainable economic development, and the health, safety and high quality of life afforded to its citizens. The Act requires all Washington counties and cities to designate and protect critical areas and natural resource areas. Critical areas include wetlands, fish and wildlife habitat conservation areas, aquifer recharge areas, frequently flooded areas and geologically hazardous areas. Natural resource areas include forest, agricultural and mineral lands. The Act has 14

goals that include reducing sprawl by focusing growth in urban areas, maintenance of natural resource-based industries and encouragement of sustainable economic development, and protection of the environment by retaining open space and habitat areas. Based on county population and growth rate, some counties (and all cities within them) are required to fully plan under the Act, while others can choose to plan. All cities and counties, however, are required to designate and protect critical areas, and are given wide latitude on how to do so as long as they use the "best available science" and give special consideration to the protection of anadromous fish habitat.

Washington State provides technical assistance and other planning tools to assist communities with their performance-based goals. Snohomish County is an example of a local government adopting a wide variety of these techniques.

For more information, go to: **http://www.commerce.wa.gov/site/418/default.aspx**

LOCAL LEVEL

Examples of Success:

Protecting and Restoring Instream Flow
Meeting Urban Water Demands While Protecting Rivers, Rivanna River Basin, Virginia (Richter B., 2007)

The Rivanna River Basin contains some of the highest quality river and stream systems located in piedmont Virginia. In addition to having numerous endemic and rare species, the rivers provide recreational opportunities and drinking water for the growing population of Charlottesville and the surrounding area. The Rivanna Water and Sewer Authority partnered with The Nature Conservancy to develop a new water supply plan that meets growing water demands and improves river ecosystem health. The new plan mimics natural flow regimes through controlled dam releases while ensuring adequate water supplies during drought. The releases are calculated as varying percentages of the inflow to the reservoir.

For more information, go to: **http://www.nature.org/initiatives/freshwater/files/awwa_journal_june07_richter.pdf**

Watershed-Based Zoning
Watershed-Based Zoning in James City County, Virginia

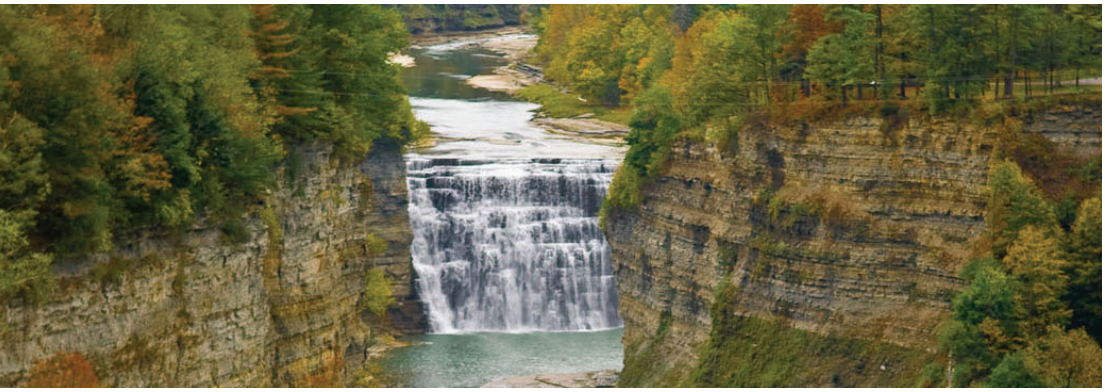
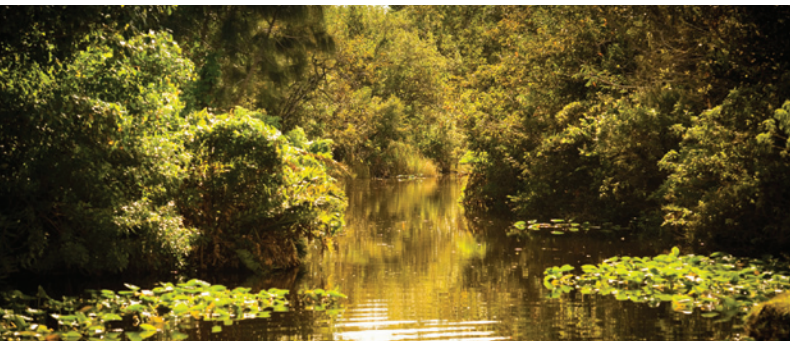
James City County, Virginia, completed its Powhatan Creek Watershed Management Plan in 2001. Due to the rapid development experienced in the previous two decades, the county decided to pursue a watershed-based zoning approach to protect its high-quality streams from future development impacts. An impervious cover and instream/riparian habitat assessment categorized each of the county's subwatersheds as Excellent, Good, Fair or Poor. Using a combination of innovative land use planning techniques, including TDR, conservation development, rezoning, and resource protection overlay districts, the county has directed growth away from its most sensitive and ecologically valuable subwatershed and developed strategies to minimize further impacts in those degraded subwatersheds designated for growth. Each subwatershed also was targeted for other specific management measures to either conserve, protect or restore streams according to the level of threat imposed on each.

For more information, go to: **http://www.jccegov.com/environmental/index.html**

Summary of Actions

Healthy Watersheds Initiative Vision:

Protect and maintain the aquatic ecological integrity of watersheds and supporting habitat networks to ensure that future generations may enjoy these resources and the social and economic benefits they provide

HWI Components	Integrated assessments	State-wide protection strategies for priority watersheds	Multi-partner implementation of conservation and protection priorities	
Goals/ Objectives	Identify, protect and maintain network of healthy watersheds and supportive green infrastructure • State-wide assessments • Watershed goals strategic protection programs	Integrate HW into EPA programs • Policy and guidance • Funding resources • Progress measures	Build awareness and support • Public outreach programs • Support local and regional planning commissions and governments for implementing programs	
EPA Strategies for Implementation	Program Integration	Provide Technical Assistance	Collaborate With Multiple Partners at Multiple Scales	Build Awareness and Support
Action Plan	Policy/Guidance • Policy statement making healthy watersheds protection a priority and an integral part of water quality and watershed programs **Timeframe: 2011** • HWI measures for the EPA Strategic Plan and National Water Program Guidance **Timeframe: 2011 & ongoing** • Identify funding sources and guidance to support programs **Timeframe: 2011 & ongoing** • Annual HWI report and guidelines for reporting activities and progress **Timeframe: 2012** • Integrate healthy watersheds protection into EPA programs and guidelines for leveraging and working with EPA's programs **Timeframe: 2012** • Regional healthy watersheds strategies **Timeframe: 2011** • Regional pilot demonstrations of incorporating healthy watersheds protection into EPA programs **Timeframe: 2011-2012**	Assessments/Protection/Research • Healthy Watersheds technical document **Timeframe: Fall 2011** • Integrated assessment expert workshop **Timeframe: November 2010** • Healthy Watersheds research plan to identify critical research and methods needed for improved healthy watersheds assessments, including social and economic benefits assessments, and social marketing **Timeframe: 2012** • Multi-state or regional assessments **Timeframe: Ongoing** • Technical assistance to states on healthy watersheds assessments **Timeframe: Ongoing** • State inventories of healthy watersheds **Timeframe: 2011 & beyond** • State instream flow assessments and implementation **Timeframe: 2011 & beyond** • State green infrastructure assessments and implementation **Timeframe: 2011 & beyond** • State fluvial geomorphic assessments and river/stream corridor protection programs **Timeframe: 2015 & beyond** • State healthy watershed protection plans and programs **Timeframe: 2011 & beyond**	Partnerships • Statement of intent among partners to work together to identify and protect healthy watersheds **Timeframe: 2011** • MOUs with other Federal agencies **Timeframe: 2011 & beyond** • Partnerships with TNC & USGS on instream flow and with TCF, SWC on green infrastructure **Timeframe: 2011 & ongoing** • Partnerships with national state organizations **Timeframe: 2011 & ongoing** • Regional partnerships with other Federal agencies, NGOs, etc. **Timeframe: Ongoing** • State partnerships with other states, Federal agencies, NGOs, etc. **Timeframe: Ongoing**	Outreach/Communications • Communications Strategy **Timeframe: 2011** • Update website **Timeframe: Ongoing** • Webinars **Timeframe: 2011 & ongoing** • White paper on economic and social benefits **Timeframe: 2011** • Regional in-reach and outreach programs **Timeframe: 2011 & beyond** • State in-reach and outreach programs **Timeframe: 2011 & beyond**

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