

## **CHAPTER FOUR: ACTION PLAN**

### **A. ISSUES OF CONCERN**

#### **A1. Forested Riparian Buffers**

Forested riparian buffers are essential to the health of the Brodhead Watershed. Forested buffers provide water quality enhancement, stream bank stabilization, stormwater and floodwater control. They regulate water temperature, influence stream contours, and supply nutrients in the form of leaf and twig litter to stream organisms. Forested buffers can remove pollutants from stormwater or groundwater, effectively remove sediment, nutrients and bacteria from stormwater runoff and septic system effluent, and provide wildlife habitat and recreation.

Japanese knotweed invasion reduces species richness and the abundance of native understory herbs, shrubs, and juvenile trees. This introduced plant forms dense, impassable thickets of stalks up to 12 feet tall. It inhibits riparian tree establishment and prevents the growth of riparian forests, which in turn affects the quality, distribution, and movement of water throughout the watershed. Disruption of bank stability, micro-habitat conditions and nutrient loading all negatively impact the aquatic organisms in the Brodhead creek and its tributaries.

One of the services of riparian buffers is the denitrification of surface runoff from agriculture, residential lawn fertilization and on-site sewage systems. However, invasive barberries are nitrogen fixing plants, adding nitrogen to the soil. In addition to the inhibition of reforestation by native tree species riparian zones that are dominated by barberry have the potential to increase the nitrogen load to the streams rather than reduce it.

Stiltgrass, garlic mustard, and bush honeysuckle all have the potential to crowd out native species in riparian buffers, reducing biodiversity and the overall health of the watershed.

#### **A2. Wetlands**

Wetlands maintain water quality in the watershed. They capture runoff from the land and remove pollutants before they reach the Brodhead and its tributaries. Wetlands may remove up to 90% of the nitrogen entering them, and 45% of the phosphorus. Wetlands decompose organic matter and oxidize compounds such as sulfides, reducing the biological oxygen demand (BOD) on surface waters, sometimes by nearly 100%. High BOD can lead to aquatic life mortality. Wetlands typically trap more than 80% of the sediment from surface runoff, preventing downstream turbidity, and depending on the metal and type of wetland, may remove 20% – 100% of metals such as lead. Pathogens are trapped by wetland vegetation where they are degraded by sunlight, low pH, and lack of their host organisms. More than one-third of the United States' threatened and endangered species live only in wetlands, even though wetlands now represent approximately 3.5 % of U.S. land area. Wetlands protect downstream and adjacent properties from flood damage, especially urban areas with their large proportion of impervious surfaces. Wetlands are reservoirs for the watershed, storing water from storms and then releasing it into neighboring streams and groundwater.

The Tannersville Cranberry Bog is being invaded by barberry and stiltgrass. The replacement of native wetland plants with aggressive invasives limits the Bog's biodiversity and speeds the succession of the bog to dryer ecosystems, removing these important wetland services. Other wetlands in the Brodhead Watershed are home to the bog turtle, listed as endangered in Pennsylvania, mostly due to habitat destruction. As common reed, or phragmites, and Japanese knotweed extend their reach into wetlands they grow in very thick clumps. These clumps can be impenetrable, restricting the bog turtle movements, threatening their existence even further.

### **A3. Homeowner and Commercial Landscaping**

One of the primary causes of the spread of invasive plants in a developing watershed such as the Brodhead is homeowner and commercial landscaping. Homeowners are anxious to find plants that are “deer resistance” and most invasive plants are. Commercial developers seek plants that are hardy and will withstand the effects of snow removal and ice control. Thus nurseries carry the plants and landscapers

are happy to use them. As we have seen, invasive plants are extremely opportunistic and are spread by a number of vectors. Thus a major target audience for the following actions are landscapers, nurseries and municipal leaders, who can control the types of plants used in commercial applications.

## I. Public Awareness

Goal: Raise awareness of the harmful impacts of invasive plants on water quality, ecosystem services, natural communities, and recreation and management options for invasive plant control.

ACTION REQUIRED	ORGANIZATION/INDIVIDUALS RESPONSIBLE <sup>1</sup>	TIME FRAME
Prepare written information (brochures, fact sheets) on the impacts, prevention and management of invasive plants for distribution to libraries, municipal offices, fishing and garden clubs, and other organizations.	Brodhead Watershed Association	Short
Offer workshops, seminars, and instructional walks dealing with the environmental and economic costs of invasive incursions, and the most effective means of control available, to local municipalities, to hunting, fishing and outdoor clubs, and to businesses and local residents. Develop programs on native plants and habitat restoration, and promote forested riparian buffers.	Brodhead Watershed Association Monroe County Master Gardeners East Stroudsburg University Northampton Community College	Ongoing
Offer individual consultation on invasive plant identification and control when requested.	Brodhead Watershed Association Monroe County Master Gardeners Monroe County Conservation District	Ongoing
Develop programs for children to be presented at library reading programs, scout troops, and schools.	Monroe County Conservation District Local school districts Brodhead Watershed Association East Stroudsburg University Northampton Community College	Ongoing
Staff tables at Community Days, Green Fairs, Festivals, etc. with Invasive Plant displays and games.	Brodhead Watershed Association Monroe County Master Gardeners Monroe County Conservation District	Ongoing

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<sup>1</sup> These organizations and individuals are intended to be representative, not limited merely to those listed.

Engage nurseries and landscapers in eliminating invasive plants and supplying native plants. Have a “green gardens” certificate for presentation to nurseries and landscapers who fulfill certain criteria about not selling invasive plants and supplying native plants.	Brodhead Watershed Association Monroe County Master Gardeners Local gardening clubs	Development – short/medium  Application - ongoing
Present information about invasive and native plants at local garden shows and tours.	Brodhead Watershed Association Monroe County Master Gardeners Local garden clubs Monroe County Conservation District	Early

## I. Public Awareness (Continued)

ACTION REQUIRED	ORGANIZATION/INDIVIDUALS RESPONSIBLE	TIME FRAME
Spread information about future invasive/native plant workshops, seminars, workdays to stakeholders.	Brodhead Watershed Association Monroe County Conservation District Monroe County Master Gardeners Pocono Heritage Land Trust Local Garden Clubs East Stroudsburg University	Ongoing
Encourage local naturalists to identify invasive plants to interested watershed residents. Arrange interpretive hikes about invasive plants and native communities.	Pocono Heritage Land Trust East Stroudsburg University Northampton Community College Brodhead Watershed Association	Early
Obtain funding to execute the actions above.	Brodhead Watershed Association Pocono Heritage Land Trust East Stroudsburg University Northampton Community College	Short/ medium

## II. Management and Control

Goal: Work with landowners, developers and county and local agencies to control invasive plants.

ACTION REQUIRED	ORGANIZATION/INDIVIDUALS RESPONSIBLE	TIME FRAME
Offer individual assistance to landowners on invasive plant identification and control methods	Brodhead Watershed Association Monroe County Conservation District Monroe County Master Gardeners Community Associations Fishing & Hunting Clubs East Stroudsburg University Northampton Community College	Ongoing
Work with organized groups that offer certification programs for landowners such as National Wildlife Federation's Certified Backyard Habitat and Audubon's Bird Friendly Backyard and Birdtown	Monroe County Conservation District Community Associations East Stroudsburg University Northampton Community College East Stroudsburg University Brodhead Watershed Association	Ongoing
Adopt municipal ordinances that restrict use of invasive plants in commercial landscaping and provide information on native alternatives	Monroe County municipalities Monroe County Planning Commission Brodhead Watershed Association Monroe County Conservation District	Early/ Ongoing

## II. Management and Control (continued)

ACTION REQUIRED	ORGANIZATION/INDIVIDUALS RESPONSIBLE	TIME FRAME
Continue to identify high-priority invasive plants and water quality of the Brodhead Watershed.	East Stroudsburg University Northampton Community College East Stroudsburg University Brodhead Watershed Association Monroe County Conservation District	Ongoing
Develop “Streamside Buffers” program that emphasize native plant restoration and present to landowners.	Brodhead Watershed Association Monroe County Conservation District Monroe County Master Gardeners Community Associations	Ongoing
Control invasive plant incursions: <ul style="list-style-type: none"> <li>• Organize invasive plant removal projects</li> <li>• Train volunteers in removal methods best suited to the species targeted.</li> <li>• Practice good stewardship by not leaving</li> <li>• invasive plants parts to be spread downstream.</li> </ul>	Brodhead Watershed Association Pocono Heritage Land Trust Monroe County Master Gardeners Municipalities, EACs Park Commissions Community Associations Fishing Clubs	Ongoing
Restore native communities by replacing invasive species with native plants.	Brodhead Watershed Association Pocono Heritage Land Trust Monroe County Master Gardeners Municipalities, EACs Park Commissions Community Associations Fishing Clubs East Stroudsburg University	Ongoing
Obtain funding to execute the actions above.	Brodhead Watershed Association Pocono Heritage Land Trust Municipalities Northampton Community College East Stroudsburg University	Ongoing

### III. Ecosystem Service Maintenance and Biodiversity Protection

Goal: Prevent loss of ecosystem services and biodiversity due to invasive species incursions in the Brodhead watershed.

*Ecosystem services are the resources and processes that are supplied by natural ecosystems. They include clean air, wildlife, scenic beauty, water purification, erosion prevention, flood control, carbon sequestration (the removal of carbon dioxide from the atmosphere to either alleviate or defer global warming), and many others. A healthy ecosystem also protects biodiversity – the diversity of plant and animal life in a particular habitat, or in the world as a whole. These services are vital to human health and well being. Invasive species threaten the balance of native ecosystems and their ability to provide these resources and services in the intricate and multifaceted way they developed.*

ACTION REQUIRED	ORGANIZATION/INDIVIDUALS RESPONSIBLE	TIME FRAME
Establish, train and field a volunteer corps of hikers and outdoor enthusiasts to detect invasive plant incursions to add to baseline data.	The Nature Conservancy Pocono Heritage Land Trust Pocono Outdoor Club Brodhead Watershed Association East Stroudsburg University Northampton Community College	Early
Monitor significant wetlands, such as the Cranberry Bog in Tannersville for invasive plants.	Tannersville Cranberry Bog Committee Monroe County Conservation District The Nature Conservancy Pocono Heritage Land Trust Brodhead Watershed Association	Ongoing
Encourage local naturalists to positively identify invasive plants and other species and report observations to Monroe County Conservation District.	Monroe County Conservation District East Stroudsburg University Northampton Community College Pocono Heritage Land Trust Brodhead Watershed Association	Early
Maintain a database of invasive plant incursions in the watershed based on the BWA survey data and add to it as data become available	East Stroudsburg University Brodhead Watershed Association	Ongoing
Establish baseline information on existing and historical native plant cover in riparian areas of the watershed. Create list of native species of concern.	The Nature Conservancy East Stroudsburg University Northampton Community College	Early
Create restoration plans when invasive plant incursion is extensive or loss of native species is threatened.	The Nature Conservancy East Stroudsburg University Northampton Community College	Medium
Establish, train and field a volunteer corps for rapid response to invasive plant incursions into vulnerable riparian areas and wetlands in public areas.	The Nature Conservancy Brodhead Watershed Association Pocono Heritage Land Trust East Stroudsburg University Northampton Community College	Early
Control invasive plants through mechanical removal or well-tested biological controls.	The Nature Conservancy Pocono Heritage Land Trust Fishing Clubs, Community Organizations Landowners Schools Municipalities	Ongoing

### III. Ecosystem Service Maintenance and Biodiversity Protection (Continued)

ACTION REQUIRED	ORGANIZATION/INDIVIDUALS RESPONSIBLE	TIME FRAME
Restore native plants after invasive plant removal when necessary.	Landowners, municipalities The Nature Conservancy Pocono Heritage Land Trust Fishing Clubs, Community Organizations	Ongoing
Obtain funding to execute the actions above.	Brodhead Watershed Association Pocono Heritage Land Trust Municipalities	Short/ medium

### IV. Adaptive Management

Goal: Refine actions to reflect results and new information.

ACTION REQUIRED	ORGANIZATION/INDIVIDUALS RESPONSIBLE	TIME FRAME
Continue monitoring the results of interventions on invasive plant incursions.	Landowners The Nature Conservancy Brodhead Watershed Association Pocono Heritage Land Trust	Ongoing
Adapt interventions to reflect the efficacy of control methods being used, keep up-to-date on new methods of control, and adjust controls accordingly.	The Nature Conservancy Brodhead Watershed Association Pocono Heritage Land Trust East Stroudsburg University Northampton Community College	Later
Monitor the introduction and spread of other invasive species of concern and on their impact on water quality, native species, and recreation in the Brodhead Watershed	The Nature Conservancy Brodhead Watershed Association Pocono Heritage Land Trust	Ongoing
Decide if controls should be applied to invasive species that have not been included previously.	The Nature Conservancy Brodhead Watershed Association Pocono Heritage Land Trust Monroe County Conservation District Municipalities	Later



