Protocol Development Summary (PDS)

ERMN Protocol Name: Rare Riparian Plant Communities (*last updated: February 2010*)

Vital Signs Included in the Protocol: Rare Riparian Plant Communities including "Riverscour" plant communities

Related Vital Signs: Invasive Species – Status and Trends; Invasive Species – Early Detection; Water Chemistry – Core Parameters, Water Chemistry – Expanded Parameters; Surface Water Hydrology; Landscape Dynamics; Weather and Climate

ERMN Parks where protocol will be implemented: Delaware Water Gap National Recreation Area (DEWA), Upper Delaware National Scenic and Recreational River (UPDE), New River Gorge National River (NERI), Gauley River National Recreation Area (GARI), and Bluestone National Scenic River (BLUE).

Justification/Issue being addressed: The ERMN, with more than 211 miles of river, contains diverse, unique, and globally significant plant communities associated with the floodplains and other geomorphic and hydrologic features of large rivers. Conceptual ecological models for riparian plant communities on the Delaware, Gauley, New, and Bluestone Rivers (Podnesinski 2009) indicate that riparian plant communities are shaped by two critical factors:

1) Geomorphology – the underlying bedrock, sedimentary geology, and landforms in and around the river channel. These factors control what types of substrates or sediments are available for the plants to grow in.

2) Flow regime – the timing and volume of water that flows through the river. Fluctuations in the flow regime are influenced by rain, storm events, and melting snow; however the flow regime can be highly altered by dams that influence not only the flow regime, but also the water temperature and the transport of sediment. Scour by ice and water during high flows is an important disturbance that strongly influences the composition and structure of riparian plant communities. Plants that thrive in riparian habitats have reproductive strategies and morphological adaptations that allow them to flourish in the dynamic riparian environment.

In addition to changes in hydrology caused by dams, the Delaware, New, Gauley and Bluestone rivers are impacted by multiple anthropogenic stressors such as: point and non-point-source pollution; acid rain; floodplain and channel alterations from roads, railroads, and bridges; visitor use; and climate change.

The riparian zone of the Delaware, New, Gauley, and Bluestone Rivers are very diverse, both floristically and in terms of number of vegetation associations (plant communities). Eighteen different riparian vegetation associations were described on the Delaware River between UPDE and DEWA. Twenty-three riparian vegetation associations were described among NERI, GARI, and BLUE. Some of these associations are very common, found in numerous river systems in the eastern United States. However, 14 of these associations are globally rare; they occur in very few places in the world and are at least moderate risk of extinction or elimination due to extreme rarity, very steep declines, or other factors. These fourteen rare riparian communities, their global conservation ranks (G Ranks), and their distribution among the five ERMN riverine parks

are summarized in Table 1. Some occurrences of these communities were mapped during the vegetation association mapping projects. The mapped distribution of these communities within the five ERMN riverine parks is shown in Table 2.

These rare vegetation associations also provide unique habitats that numerous rare plant species depend on. Nearly 50 state-rare plant species occur in the riparian zones of the Delaware, New, Gauley, and Bluestone Rivers. The Eastern Red-cedar - Virginia Pine Flatrock Woodland in NERI hosts 8 rare species, while the Calcareous Riverside Outcrop / Calcareous Riverside Seep in DEWA supports over 20 rare plant species.

Specific monitoring questions and objectives to be addressed by this protocol:
The objective of this monitoring protocol is to detect trends in the following variables:

1. Species composition, as measured by:
    a) Dominance (i.e. relative importance values)
    b) Proportion of species richness and cover held by native and non-native species.
2. Community structure (e.g. shift from herbaceous-dominated to shrub-dominated).
3. Presence and abundance of invasive plant species.
4. Litter and soil depth to bedrock.

Basic approach:
At current funding and staffing levels, it is unlikely that ERMN can implement a successful monitoring program for all fourteen rare riparian communities. We will be working with park managers to determine their priorities and to develop realistic monitoring protocols for those priorities.

Principal investigators and NPS lead: Dr. Greg Podniesinski, Western Pennsylvania Conservancy, developed conceptual ecological models for the riparian plant communities in the ERMN riverine parks. Stephanie Perles, ERMN Plant Ecologist, is currently taking the lead in developing the monitoring protocol for this vital sign.

Table 1. Summary of rare riparian plant community types and their distribution across the riverine parks of the Eastern River and Mountain Network.

Potentially Rare Riparian Associations (CEGL code)	Global Conservation Rank	DEWA	UPDE	BLUE	NERI	GARI
Pennsylvania, New Jersey, and New York						
Northern Riverside Rock Outcrop (6284)	G2		X			
Calcareous Riverside Outcrop (6284) / Calcareous Riverside Seep (6969)	G2 / G1	X				
Bitternut Hickory Lowland Forest (6445)	G2G3	X	X			
Riverside Prairie Grassland (6518)	G3	X	X			
Sugar Maple Floodplain Forest (6459)	G3	X	X			
West Virginia						
Oak - Hickory Floodplain Forest (6462)	G1			X	X	X
Eastern Red-cedar - Virginia Pine Flatrock Woodland (8449)	G1				X	
Black Willow Slackwater Woodland (6463)	G1				X	
Sycamore - River Birch Riverscour Woodland (3725)	G3			X	X	X
Lizard's-tail Backwater Slough (7696)	G3				X	
Riverscour Prairie (6283)	G3				X	
Eastern Hemlock Floodplain Forest (6620)	G3?			X		X
(Virginia, Pitch) Pine Floodplain Forest (6622)	G3?					X
Riverscour Shrub Prairie (6623)	G3?					X

Table 2. Distribution and abundance of rare riparian communities as determined from the vegetation association maps. Additional occurrences of these associations may occur in the parks, but have not been documented on the vegetation association maps.

		DEWA		UPDE		BLUE		NERI		GARI	
Rare Riparian Associations (CEGL Code)	Global Conservation Rank	Hectares	Number of Polygons	Hectares	Number of Polygons	Hectares	Number of Polygons	Hectares	Number of Polygons	Hectares	Number of Polygons
Northern Riverside Rock Outcrop (6284)	G2			6.4	24						
Calcareous Riverside Outcrop (6284) / Calcareous Riverside Seep (6969)	G2 / G1	3.8	4								
Bitternut Hickory Lowland Forest (6445)	G2G3	24.6	5	28.6	14						
Riverside Prairie Grassland (6518)	G3	2.8	3	36.8	29						
Sugar Maple Floodplain Forest (6459)	G3	71.4	16	5.2	3						
Oak - Hickory Floodplain Forest (6462)	G1							23.4	17	2.9	5
Eastern Red-cedar - Virginia Pine Flatrock Woodland (8449)	G1							9.4	6		
Black Willow Slackwater Woodland (6463)	G1							18.0	3.4		
Sycamore - River Birch Riverscour Woodland (3725)	G3					3.2	11	69.7	158	2.2	12
Lizard’s-tail Backwater Slough (7696)	G3										
Riverscour Prairie (6283)	G3							2.7	14		
Eastern Hemlock Floodplain Forest (6620)	G3?					2.9	12			21.3	78
(Virginia, Pitch) Pine Floodplain Forest (6622)	G3?									5.1	13
Riverscour Shrub Prairie (6623)	G3?										