Introduction

The Raritan River Basin (Fig. 1) encompasses over 1,100 square miles within the State of New Jersey (NJ). The total Raritan Basin consists of 706,899 acres, and 262,941 (37%) of this total acreage has been identified as critical habitat (based on the criteria described below). The River itself and its adjacent floodplain provide 18,960 acres of critical habitat, or 7% of the habitat identified as critical in the Basin (NJ Water Supply Authority data).

Today, the Raritan River watershed contains approximately 116,508 acres that have some level of protection from development. Additional open space acreage is being protected or preserved through easements, preservation of farmland and historic sites, golf courses, and cemeteries. However, there are still many critically important sites and habitats that are not yet protected from future development; and many of the properties that are now protected have no management plan or active management entity in place. Furthermore, where local management is available, there is often no mechanism to provide scientifically sound Best Management Practices (BMPs) for maintaining the various types of habitat as detailed in the State Wildlife Action Plan (SWAP). In most cases, no reliable funding mechanisms are in place to institute these BMPs.

In order to better visualize the current status of preserved and critical habitats within the Raritan River Basin, maps detailing riparian areas (blue areas), preserved open space (green areas), and critical habitat (pink areas) as defined by the 2002 NJ Landscape Project (version 2.1) were generated by the New Jersey Water Supply Authority (NJWSA). Criteria for riparian areas include streams and wetlands with their regulatory buffers, lakes with 300’ buffers, alluvial and hydric soils, flood hazard areas (FEMA 100 yr storm), and flood prone areas (NJDEP data). Data identifying preserved open space were obtained from Green Acres, municipalities and counties (except Union), the NJ Conservation Foundation, D & R Greenway, and NJWSA. Criteria for critical habitats include beach, forest, emergent and forested wetlands, wood turtle and bald eagle habitat, and grasslands. Not shown on these maps are farmlands, golf courses, or historic properties. The subcommittee determined that viewing this detail at the County level (Figs. 2-8) was the scale most usable by the greatest number of stakeholders. We strongly recommend that these county-scale maps be made available to the municipalities for ground-truthing and further refinement.
Figure 1. Raritan River Watershed. Map courtesy of NJ Water Supply Authority
Figure 2. Raritan River Watershed in Middlesex County. Map courtesy of NJWSA.
Figure 3. Raritan River Watershed in Somerset County. Map courtesy of NJWSA.
Figure 4. Raritan River Watershed in Hunterdon County. Map courtesy of NJWSA.
Figure 5. Raritan River Watershed in Mercer County. Map courtesy of NJWSA.
Figure 6. Raritan River Watershed in Monmouth County. Map courtesy of NJWSA.
Figure 7. Raritan River Watershed in Morris County. Map courtesy of NJWSA.
Figure 8. Raritan River Watershed in Union County. Map courtesy of NJWSA.
As part of the Rutgers University 2009 Sustainable Raritan Summit, representatives from state, county and municipal governments and agencies, nonprofit environmental organizations (NGOs), and Rutgers University faculty participated in developing an action agenda for habitat preservation and stewardship activities within the Raritan River Basin (see Appendix I for a list of subcommittee meeting participants).

Three strategic priority issues were identified by the Stewardship Subcommittee:

1. **Habitat & Biodiversity Protection**
2. **Restoration, Rehabilitation, & Regeneration (3 Rs)**
3. **Property Maintenance and Management of Preserved Open Space**

Each of these three areas has specific needs and action steps (described below) that are required to preserve and protect the natural resources of the Raritan River Basin. All proposed databases and maps discussed in the following text are easily accessible and publically available via the Rutgers Sustainable Raritan web site (raritan.rutgers.edu).

### Strategic Objectives and Tasks

#### 1. Habitat & Biodiversity Protection

**Background**

Habitat boundaries within the Raritan River Basin do not conform to lot and block numbers, municipal, or county boundary lines. There is currently a lack of knowledge with respect to what the boundaries are for the various habitats found within the Raritan ecosystem. It is also unknown what the effects of a given habitat’s spatial scale are on sustaining and increasing biodiversity within the Raritan River ecosystem.

Development of a regional planning process would contribute to: downstream water quality by preserving upstream land; determining habitat scale based on actual boundaries rather than artificial municipal or county divisions; supporting preservation decisions based on the regional importance of specific land parcels.

**Identified Constraints**

Data collected by numerous agencies, governments, and NGOs are fragmented and not easily accessible by local managers. The on-site habitat stewards need to be able to easily access reliable digital maps and databases that clearly delineate preserved or critical habitat(s). These materials need to be available via the Internet for easy access and download.

Deforestation, wetland loss, and water quality and quantity within the Raritan River Basin have a disproportionate affect on preservation of wetland and riparian habitats. Because habitat boundaries do not respect local regulatory delineations, there is a critical need to coordinate...
municipal and county urban planners and water resource specialists/planners so Master Plans at the municipal and county levels adequately address the issues that have direct affects on habitat quality. There is a need to approach planning in the Basin on a regional level to insure habitat preservation at an appropriate scale. Development of Future Land Use maps that coordinate habitat preservation across man-made boundaries will prevent fragmentation of critical parcels, and reduce the possibility that incompatible land use decisions are made.

Tasks

1. **Assemble a team of municipal and county experts to coordinate development of a ‘Regional’ approach to Raritan River Basin Master Planning.** This will require assistance from individuals in municipal and county governments, Rutgers University, and watershed groups who support stewardship of Raritan River resources, as well as planners, and NGOs who are knowledgeable about the critical habitats in the Basin.

2. **Raise Public Awareness of the Raritan Basin Natural Resources.** People protect what they know and love. To increase stewardship of the Raritan River’s critical habitats, local residents must be able to visit and experience these habitats in active and passive ways. Integrating public access opportunities with stewardship awareness and training benefits both initiatives. A series of public access/stewardship events needs to be developed and implemented on a sustainable basis. Raising awareness of the importance of habitat ecological functions and values is crucial to obtaining support for stewardship, and multiple media that can reach municipal residents should be employed. Newsletters, web sites, and local access cable channels can ‘showcase’ species and habitats and provide residents with information to protect their natural resources.

3. **Complete Municipal Environmental Resource Inventories.** Without completed Environmental Resource Inventories (ERIs) for each municipality, identification of critical habitat is based on collected data that for the most part has not been ‘ground-truthed.’ Each municipality in the Raritan Basin needs to complete a thorough ERI identification. ANJEC is a potential source of partial funding for this task.

4. **Engage in the Stakeholder Support Process.** Local stakeholders are the key to ongoing habitat protection and preservation of critical habitats in the Raritan Basin. Continued acquisition and protection of critical parcels requires significant funding sources and the support of municipal officials. Partnering with ANJEC to conduct workshops for municipal and county Environmental Commissioners could disseminate habitat information and BMPs to the local communities.

5. **Develop a Land Acquisition Funding Plan.** This involves the identification of potential funding sources and then matching these sources with critical habitat parcels that remain unprotected. Further strategy development is needed to determine how this activity could be integrated with existing NGO land preservation and stewardship activities that are currently ongoing in the Raritan River Basin.
Evaluation Tools

Evaluation tools would include wildlife assessments of the preserved and critical ecosystems that document current ‘on the ground’ conditions, current species presence and densities, and future changes. Positive trajectories will be judged by an increase in the reproduction and absolute numbers of threatened and endangered species in the Raritan River Basin. A second evaluation tool will be an increase in the total number of protected/preserved Basin acres, with particular emphasis on wetland and forest preservation. A third evaluation tool will be the creation and implementation of a ‘Regional’ approach to Basin-wide land use decisions and planning that allows for decision making that can bridge artificially created regulatory boundaries. Such a regional approach will be based on completion of accurate ERIs for each municipality in the Raritan Basin.

Budget – TBA

2. Restoration/Rehabilitation/Regeneration (3Rs)

Background

Where habitat is degraded, there is a need to identify ecologically beneficial reuses for a site. Professional expertise is required for planning and implementing rehabilitation projects that are appropriate for each preserved or protected site. We use the term “rehabilitation” rather than “restoration” in this urbanized watershed, because restoration implies returning a site to a previous pristine state – an unlikely scenario in the Raritan River Basin. A determination needs to be made as to the appropriate level of rehabilitation and management needed for each site, and a funding plan developed that identifies the financial resources to pay for ongoing site management and maintenance after rehabilitation is completed.

Information from the State Wildlife Action Plan (SWAP) database with respect to habitat management and BMPs for a given habitat type needs to be integrated into basin-wide habitat maps. The maps and the SWAP information must be easily accessible to the local site manager so appropriate rehabilitation decisions can be made.

Within the Raritan Basin, the American Water Resources Association (AWRA) has identified urban areas at the HUC level whose habitat is either:

1) “in need of restoration” (16 HUCs),
2) high habitat value in need of preservation (5 HUCs), or
3) HUCs whose habitat value is between these two extremes, and in the future, could go either way (115 HUCs).

The evaluation was done using available maps and databases. The next step in this evaluation process is to “ground-truth” the index assessment values.

The Stewardship Subcommittee recognizes that rehabilitation needs in the estuarine portion of the lower Raritan Basin may be quite different from upper watershed needs. The first draft of
the Hudson-Raritan Estuary (HRE) Comprehensive Restoration Plan (CRP) was published by the US Army Corps of Engineers and the Port Authority of NY & NJ in March, 2009. This report identifies a number of restoration opportunities and Best Management Practices (BMPs) in the lower watershed.

**Identified Constraints**

There is frequently a lack of monitoring after rehabilitation of a site is completed, and so the long-term ecological successes, benefits, or failures are unknown. Long-term monitoring needs to be a component in a site’s rehabilitation plan. Funding for site rehabilitation typically covers “in-the-ground” costs, without including the monies required for ongoing monitoring to determine the effectiveness of the rehabilitation activities, or the financial resources to pay for longer-term monitoring and on-going maintenance.

Ground-truthing of existing maps and databases requires significant manpower to verify the accuracy of existing information. Verification of existing habitat and ecological data and the collection of new data require both knowledgeable manpower and funding.

Habitat information and BMPs available in the SWAP are not easily accessible in the plan’s present format.

**Tasks**

1. **Securing volunteers to verify the status of critical habitats.** Agencies and volunteer groups have completed initial steps required to identify parcels in need of remediation/protection. The next step is to organize volunteers who can go out and verify the accuracy of the data/assumptions based on actual site conditions. Coordinating the efforts of the numerous NGOs working in the watershed, and housing the field data obtained in a single easily accessible database for use by local managers and planners is a crucial outcome of this task.

2. **Assemble a comprehensive habitat Rehabilitation Plan.** Based on actual on-site conditions, a Basin-wide plan to rehabilitate preserved and/or critical habitat parcels needs to be developed for the Raritan River watershed. Parcels identified as critical habitat in need of rehabilitation need a mechanism to receive funding priority.

3. **Rehabilitation Evaluation Criteria.** All Raritan Basin rehabilitation project plans should include measurable success criteria and long-term monitoring plans to ensure accurate evaluation of rehabilitation strategies. Achieving this objective requires outreach to local and county governments throughout the watershed. The outcomes of rehabilitation initiatives (both positive and negative) should be shared with the public via the Sustainable Raritan web site and on local web sites.

4. **Coordinate Stewardship Activities with the HRE CRP.** The data and information contained in this report should be used in identifying viable restoration sites and potential restoration funding sources for the estuarine portion of the Raritan River watershed.
Evaluation Tools
Completion of the ground-truthing portion of the HUC level analysis and development of rehabilitation or preservation plans for each identified HUC.

Pre- and Post-Rehabilitation evaluations conducted before on-site activities begin and at 5, 10, 15, and 20 year intervals to determine the achievement of pre-determined rehabilitation goals and objectives and/or the failure to meet these goals.

Budget TBA

3. Property Maintenance & Management of Preserved Open Space

Background
Typically the main focus of habitat stewardship is acquisition of parcels to be preserved as open space. However, the State of NJ is rapidly approaching a time when there will be little or no open space left to be acquired. It is critical that we turn our attention to the question of managing and maintaining preserved/protected lands.

There is currently a lack of focus on maintaining already preserved habitats within the Raritan River Basin. This problem is exacerbated by the lack of knowledge, and/or financial resources to pay for ongoing management and maintenance. Major constraints contributing to this problem include non-existent dedicated funding streams, no enforcement capabilities for local stewards, and no interested entity at the local level that can responsibly care for preserved/protected sites.

Identified Constraints
Establishment of ongoing funding sources dedicated to long-term management of preserved/protected sites would go a long way in resolving this problem. Potential funding sources could include implementation of municipal open space taxes. Identifying funding sources and producing long-term management plans before site acquisition would eliminate this problem in the future. Identifying local conservancy groups and/or partners to actively manage a protected site could put in place a caring steward prior to completion of an acquisition. Providing easy access to BMPs would provide the local steward with the information necessary to properly manage the habitat.

Tasks
1. Require a site management and maintenance funding plan for Green Acres and Open Space funding support. We recommend that the state, county, and municipal requirements for obtaining open space funding be amended to include an on-going Site Management and Maintenance Plan (SMMP). A critical component of the Plan should include a detailed description of funding sources to support these activities. We suggest that these funding sources consider financing maintenance of preserved properties, rather than acquisition only.
2. **Integrate BMPs in the SWAP with both protected and critical wildlife habitats.** This will require completing system wide maps and then linking the habitats identified on the maps with the appropriate BMPs in the SWAP. The link would ideally consist of a pop up screen that details appropriate BMPs for each habitat parcel(s) designated as protected or critical habitat. The completed maps with BMP information should be made available to local managers through easy access via the Rutgers Sustainable Raritan website.

3. **Identify opportunities for Public-Private partnerships.** Consideration should be given to unique partnerships that couple private monies with public maintenance. For these partnerships to be successful, Total Accountability and Transparency of financial assets is critical. Securing endowments to maintain preserved land should be part of the land acquisition transaction. NGOs can play a key role in securing this long-term funding.

4. **Develop model management and funding plans.** Providing models of site management plans appropriate for critical habitat types that include estimated costs could be helpful to local managers who are trying to secure support and funding for an acquisition and/or site restoration project. Model plans should be made available to the public via the Sustainable Raritan web site.

**Evaluation Tools**

Completion of Site Maintenance and Management Plans for each preserved/protected parcel in the Raritan River Basin. These plans will include an annual budget and identify actual or potential funding sources.

**Budget TBA**

**Conclusions**

Steps taken towards restoring and protecting the natural resources of the Raritan River Basin not only benefit the residents of the Watershed, but also the State of NJ, and provide the country as a whole with urban models to emulate. With support from Rutgers University, Environmental Stewards, residents, and government officials throughout the Watershed, critical habitats in the Raritan River Basin can be preserved and rehabilitated to provide the highest ecological functions possible within this highly urbanized watershed.
## APPENDIX I. Habitat Preservation and Stewardship Subcommittee Meeting Members

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<tr>
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<th>Name</th>
<th>Organization</th>
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<tbody>
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<td>1.</td>
<td>Carl Andreassen</td>
<td>Somerset County engineering Division</td>
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<td>2.</td>
<td>Mirah Becker</td>
<td>Middlesex County Planning</td>
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<td>3.</td>
<td>Richard Bolton</td>
<td>Louis Berger Group</td>
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<td>4.</td>
<td>Ted Chase</td>
<td>Franklin Township Planning Board &amp; Environmental Comm</td>
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<td>5.</td>
<td>Kathy Haake (Co-Chair)</td>
<td>Trust for Public Land</td>
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<td>Julie Hajdusek</td>
<td>New Jersey Water Supply Authority</td>
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<td>7.</td>
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<td>10.</td>
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We would like to give special thanks and acknowledgement to Jen Zhang at the NJWSA for compiling the maps presented and the NJWSA acreage references in this report.

## For More Information

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