

Riverine Aquatic Communities

Piedmont Ecoregion

Piedmont riverine habitats are important for a number of wildlife species that utilize aquatic habitats during part or all of their life cycle. Terrestrial species that are dependent upon riverine aquatic communities are often also intimately tied to floodplain forest habitats. Many of the issues from the floodplain forest section will also have relevance for these taxa. Examples for birds that utilize river and streams include the Louisiana waterthrush, some waterfowl, wading birds and some shorebirds. Piedmont riverine habitats are important for a number of reptiles and amphibians including certain turtles, frogs, and salamanders that utilize aquatic habitats during part or all of their life cycle. These habitats are also important for a variety of mammals that are semi-aquatic and/or that have an aquatic food base (e.g., muskrats, beavers, river otters, and certain bats).

Piedmont rivers and streams provide a number of important habitat, life cycle, or prey components to a vast assemblage of terrestrial, semi-aquatic, and aquatic wildlife. In addition, the importance of maintaining water quality of riverine habitats cannot be overstated, both in terms of the species that rely upon rivers and streams for habitat, as well as those species which rely indirectly upon the habitat by virtue of provision of habitat for their prey.

Table 1. Priority species associated with piedmont riverine aquatic habitat.

Group	Scientific name	Common name	State status (Federal status)
Amphibians	<i>Eurycea guttolineata</i>	Three-lined Salamander	
Reptiles	<i>Apalone spinifera aspera</i>	Gulf Coast Spiny Softshell	
	<i>Farancia abacura abacura</i>	Eastern Mudsnake	
	<i>Kinosternon baurii</i>	Striped Mud Turtle	
	<i>Thamnophis sauritus sauritus</i>	Common Ribbonsnake	

Other fully aquatic taxa (fish, mussels, crayfish, and snails) are referenced in the river basins descriptions. See the Roanoke, Tar-Pamlico, Neuse, Cape Fear, Lumber, White Oak, Chowan, and Pasquotank River basin sections or Chapter 5B of the Wildlife Action Plan for more detailed information on aquatic species and habitats, by basin.

Location And Condition Of Habitat

Riverine aquatic communities are found alongside and within all Piedmont rivers. Human-influenced alterations have affected much of the Piedmont's riverine and floodplain habitats. Water quality and quantity have been impacted by run-off from municipalities, some poorly managed agricultural operations and especially sediment pollution from construction and road building. Dam construction has altered flows and river hydrology and morphology. Removing woody debris from streams after storm events has influenced in-stream habitat structure. The ecological condition of some Piedmont rivers is greatly reduced due to these impacts. However, some sections of Piedmont rivers are designated High Quality Water and Outstanding Resource Water Management Zones and provide excellent opportunities for maintaining

relatively pristine waterways (see *Broad, Catawba, Yadkin-PeeDee, Roanoke, Cape Fear, Neuse, and Tar-Pamlico River Basin sections*). A map of this habitat is not provided due to scale.

Problems Affecting Species And Habitats

Water quality deterioration, and changes in river morphology and hydrology are the most serious problems affecting wildlife that utilize riverine habitat. Water pollution, originating from both point and non-point sources, continues to pose a threat directly to species that occur in riverine habitat, and also impacts these species indirectly through alteration of the food base or habitat. A brief discussion of these issues, as well as others that affect riverine aquatic communities, follows.

- *Urban runoff* - A high priority concern is runoff from impervious surfaces. As more of a watershed is paved, flooding after storm events can become more severe, causing scouring and sedimentation in rivers. Scouring flows can strip salamander eggs from river banks and vegetation, reducing reproductive success. Lawn pesticides, road oil, and other pollutants are also carried into waterways. Direct and indirect impacts of decreased water quality upon wildlife associated with riverine habitat are difficult to quantify, and have not been as fully explored as have impacts upon fully aquatic species. However, there is little doubt that clean water is critical to a host of species that live in rivers and streams for a portion of their lives, and that sedimentation, channel scour, and other alterations of the physical habitat can lead to both deterioration of the habitat quality and negative impacts upon aquatic flora and fauna, which form the base of the food web for numerous wildlife species.
- *Agricultural runoff* - Another potential source of pollution is runoff of pesticides, fertilizers, and sediment from agricultural row crop fields. These problems are most severe where there are not sufficient vegetated buffers between agricultural fields and waterways. The presence of drainage tiles can circumvent the benefit of vegetated borders by carrying runoff directly to waterways.
- *Livestock operations* - Cattle that water in rivers and streams can cause bank erosion and increase sedimentation downstream. To alleviate this problem, cattle should be fenced out of natural waterways and provided with alternative water access.
- *Impoundments* - River and stream impoundments exist along most major (and many minor) waterways in the Piedmont. These impoundments serve a variety of purposes including hydroelectric power generation, flood control, water supply, and recreation/aesthetics. Impoundments convert lotic habitat to lentic, causing a shift in the food base and both direct and indirect effects on wildlife communities. We do not know the overall impact upon the presence of wildlife species from the indirect effects of river or stream impoundment. Alteration of hydrology, geomorphology, and connectivity (both within river systems and between river and floodplain) through artificial levees, rip rap, or dams can also impact in-stream habitat structure.
- *Development* - Human development in floodplains or riparian areas can degrade riverine habitat. River or stream-front development without sufficient buffers may impact water or habitat quality in the stream or river. The impacts of development includes potential problems associated with direct input of contaminants and sediment, alteration of hydrologic patterns and processes, temperature regimes, and loss of critical habitat adjacent to aquatic habitat that may be of equal importance to species that only spend a

portion of their lives in the water, like some amphibians. Development can also lead to disturbance for birds nesting or foraging along rivers, such as bald eagle.

- *Habitat fragmentation* - Some priority species associated with riverine habitats may be dramatically affected by isolation or fragmentation of particular habitat stretches, due to limited distributions, unknown distributions or widely dispersed but small populations.
- *Exotic species* - The introduction of exotic plant and animal species (e.g., *Corbicula*) can have negative impacts on aquatic communities that provide the prey base for the terrestrial animals in this group. Some introduced exotics, like flathead catfish, may directly prey upon native species. The individual and collective impacts of exotic species on high-priority native fauna are not well known.
- *Stream snagging* - Clearing woody debris within stream channels after storms can reduce habitat structure, particularly for reptiles and amphibians, though the impact of this practice on wildlife populations is unknown.

Species And Habitat Conservation Actions and Priorities For Implementation

In general the most critical conservation actions necessary to sustain populations of riverine habitat species involve protection of water quality and aquatic habitats. Immediate and continuing efforts need to be undertaken to limit water quality deterioration from point sources of pollution as well as non-point sources through enacting new laws, better enforcement of existing laws, or through the development of voluntary incentive programs to reduce water pollution. The NC Citizens for Clean Water is one private organization that is working toward these goals. Regulatory agencies should be encouraged to protect wide buffers for riparian areas and adopt strict rules for stormwater and wastewater management. Cooperation from agencies and organizations at local, state and federal levels, in addition to public support and pressure on elected officials will be critical for improving water quality.

Land-use planning at the watershed scale will help to mitigate the cumulative and secondary impacts of impervious surfaces. Counties should be encouraged to adopt growth management plans that steer development away from riparian areas and other important habitats. This effort will require the coordination and collaboration of many stakeholder, including local, county, and state planning boards and natural resources agencies, and it will require the support of landowners and the general public.

Many farm bill programs, and the Environmental Quality Incentives Program (EQIP) in particular, provide an excellent opportunity to reduce sediment, fertilizer and pesticide runoff by subsidizing vegetated filter strips, reduced tillage farming, fencing to keep livestock out of streams, and other conservation practices. EQIP and other programs can also provide assistance for improving animal waste management. Closing abandoned and sub-standard waste lagoons should be one of the top priorities for protecting riparian ecosystems, particularly for eastern North Carolina. The conservation community should support the research and implementation of new generation animal waste management systems that reduce the risk of animal waste pollution entering the waterways.

River and stream ecosystem enhancement and restoration efforts and programs need to be enhanced and supported as well. And finally, within the frameworks afforded by state, local,

federal, and private initiatives, riverine habitats need to be permanently protected from the negative impacts of development through conservation ownership (fee title or easement) of as much habitat as possible.

Protection actions

- Protect habitat along riverine systems through acquisition and easements. Eno River State Park could be used as a model for protecting a length of river. The state wide Greenways initiative provides an opportunity to protect riparian corridors.

Habitat management and restoration actions

- Promote the adoption of agricultural and forestry best management practices that reduce run-off and erosion, including fencing livestock out of streams and leaving wide buffers between development, agriculture, and some forestry practices (e.g., clearcutting) and riparian areas. The federal Farm Bill and other cost share programs provide incentives for land stewards to adopt these practices. Technical guidance manpower is needed to proactively promote and facilitate participation in these programs.
- Work with power companies to restore or simulate natural river ecological functions. The Federal Energy Regulatory Commission relicensing process offers an excellent opportunity to work towards this goal on the Yadkin, Pee Dee, and Catawba rivers.
- Manage riverine habitats to allow natural movement of woody and rocky structures; work to restore processes like bank dynamics, channel meanders, and flood regimes.

Policy-based actions

- Land use planning and zoning laws needed to limit development, land clearing, and hydrology alterations within floodplains.
- Work with municipalities to reduce stormwater runoff and wastewater discharges.
- Work to identify and promote the designation of Outstanding Resource Waters.

Also see the appropriate river basin sections for more detailed conservation recommendations regarding fully aquatic species.

Priority Research, Survey, And Monitoring

In order to begin to plan conservation strategies for these species, we must have a better understanding of their current distribution and status. Some of the priority species associated with riverine habitat in the Piedmont of North Carolina are known from few Piedmont localities, and are considered uncommon or rare. Priority needs to be placed on conducting baseline surveys to determine the current range and status of those species (e.g., gulf coast spiny softshell, striped mud turtle, eastern mudsnake). Secondary priority should be directed towards gathering better information about the status and distribution of more common species associated with riverine habitats (e.g., three-lined salamander, common ribbonsnake). Collaboration between aquatic and terrestrial biologists will be beneficial for recording ancillary data on riverine species.

- **Surveys**
 - Determine the distribution and abundance of Gulf Coast spiny softshell, striped mud turtle and eastern mudsnake.
- **Monitoring** - When we have a better understanding of the current distribution of these species, survey efforts should be re-directed into development of long-term monitoring strategies to document population trends, from which conservation strategies can be specifically designed to target those species.
- **Research**
 - Gain information regarding the specific microhabitat needs of priority species to develop long term conservation strategies.
 - Study the extent and impact of exotic species introductions, as well as effective control measures for the most problematic exotics.
 - Determine the impacts of “snagging” (removing woody debris after storms) on wildlife populations.
 - Determine the effect beaver ponds have on downstream movement of pollutants (toxins and sediments).

Supporting References

Bailey, M. A., J. N. Holmes, and K. A. Buhlmann. 2004. Habitat management guidelines for amphibians and reptiles of the southeastern United States (DRAFT). Partners in Amphibian and Reptile Conservation.

N.C. Natural Heritage Program. 2001. Descriptions of the biological themes of North Carolina, 2nd edition. N.C. Department of Environment and Natural Resources, Natural Heritage Program, Raleigh, NC.

Wilson, L.A. 1995. Land manager’s guide to the amphibians and reptiles of the south. The Nature Conservancy, Chapel Hill, NC.