

This developing plan content is under construction and is being shared as a snapshot of thinking. Additional changes based on Forest Service and public input are expected.

Aquatic Systems

Background

Aquatic Systems addresses three major aquatic systems on the forest: streams and rivers; ponds; and lakes and reservoirs.

Aside from the river continuum concept of identifying and classifying lotic (flowing) aquatic ecosystems based on topographical, geomorphological, and energy dynamics (Vannote et al. 1980), water temperature is perhaps the primary influencing aquatic community composition. Using elevation as a surrogate for water temperature, streams and rivers on the forest are comprised of coldwater, transitional, and warmwater ecosystems. In this model, coldwater ecosystems occur above 1800', transitional systems occur between 1800' and 1500', and warmwater systems occur at elevations lower than 1500', with none of these delineations being absolute. Most aquatic resources on the Nantahala and Pisgah support coldwater aquatic communities. Although transitional and warmwater ecosystems comprise a relatively small proportion of streams and rivers on the forest, associated high aquatic species diversity is extremely important to the landscape.

The forest supports a small number of ponds (50 acres or less across the Nantahala and Pisgah National Forests) that are managed primarily for recreational opportunities such as fishing.

Additionally, the forest borders several thousand acres of man-made reservoirs, most of which were built for hydropower production. In addition to power, these resources are managed primarily for recreation activities such as fishing and boating. It is important to note that it is the shoreline that is owned and managed by the Forest Service. The reservoir water body itself is managed by partner agencies, although the Forest Service does cooperate in this management through the Wyden authority. Stream and river reaches below hydropower and other dams are included in the appropriate lotic ecosystem, as described above.

Additional information on wetlands, seeps, springs and bogs is covered in the streamside zone and unique habitat sections. Aquatic invasive species information is found in the forest health and invasive species section. Water chemistry and physical properties are addressed in the water section.

Desired Conditions

- Aquatic ecosystems are diverse, with properly functioning streams providing high quality habitat for all native and desired non-native (e.g. brown and rainbow trout) aquatic species, resulting in populations that are robust and resilient. Southern Appalachian Brook Trout are emphasized whenever relevant.
- Habitat in streams, rivers, and lakes provides opportunities for fish and other aquatic organisms (e.g. crayfish, mussels, insects, and salamanders) to hide, spawn, and forage.
- Areas along streams and rivers and around reservoirs, lakes, and ponds are dominated by native vegetation capable of influencing water temperature, adding large woody debris to

This developing plan content is under construction and is being shared as a snapshot of thinking. Additional changes based on Forest Service and public input are expected.

streams for hydrologic stability and aquatic habitat diversity, and nutrient input such as leaves and other coarse organic material.

- Aquatic habitat conditions promote thriving populations of game fish such as, but not limited to, trout and bass.
- Recreational fishing continues as a popular activity where opportunities do not pose a substantial risk to native species.
- Reservoir shoreline in Forest ownership provides a naturally replenishing source of complex shoreline and littoral zone habitat in reservoirs from fallen trees and also allows for enhanced recreational (angling) experiences.
- Hydropower projects that affect streams and rivers are managed to minimize and mitigate the project's impacts on native aquatic species.
- Ponds and reservoirs are minimally affected by sedimentation due to land management activities and forest uses.

Standards

- Management activities shall be designed to avoid, minimize, or mitigate negative impacts on aquatic habitats and species. For example, road and trail stream crossings shall not permanently isolate populations of native aquatic species.

Guidelines

- Management activities should follow all applicable North Carolina and federal best management practices (BMPs) to meet other appropriate laws, regulations, and policies, as described in the streamside zone and water resources sections. Exemptions to regulatory policies may be requested on a case-specific basis where application of the standard policy could result in greater resource damage. For example, the trout spawning moratorium on in-stream construction may be adjusted or waived if completing the project within restricted time period will have long-term benefits that outweigh short-term risks. Note that this type of process often requires communication with and documentation from partner agencies and organizations.
- No herbicide should be aerially applied within 200 horizontal feet, nor ground applied within 30 horizontal feet of perennial streams, intermittent springs and streams, wetlands, or open bodies of water without specific advice from the appropriate resource specialists. No herbicide should be applied within 100 horizontal feet of any public or domestic water source. Selective treatments, which require added site-specific analysis and use of aquatic-labeled chemicals, may occur within these buffers to prevent environmental damage such as non-native invasive plant infestations, or to restore riparian habitat. Buffers are clearly

This developing plan content is under construction and is being shared as a snapshot of thinking. Additional changes based on Forest Service and public input are expected.

marked before treatment, so applicators can easily see and adhere to them.

- Installation of new, or replacement of existing, stream crossings should reconnect fragmented populations of native species (e.g. brook trout, freshwater mussels, hellbenders) or avoid fragmenting existing populations whenever relevant.
- Aquatic organism passage projects should use channel spanning structures or other stream-simulation techniques on fish-bearing streams. This and other passage techniques (e.g., over-sized, sunken pipes that will collect channel substrate, and natural-bottom fords on closed system roads where stream channel gradient and approaches can provide resource protection) should be considered in all other stream crossings to promote passage of all aquatic organisms. At temporary crossings, use portable bridge decks whenever practical to support the guideline above.

Management Approaches

- Aquatic habitat characteristics for species identified in other current, relevant landscape-scale planning efforts such as the Eastern Brook Trout Joint Venture's Roadmap to Restoration and Conservation Strategy, North Carolina Natural Heritage Program's Aquatic Natural Areas, and the North Carolina Wildlife Resources Commission's Aquatic Species of Greatest Conservation Need, as identified in the North Carolina Wildlife Action Plan are considered during management activities.

Other sources of information

NF Forest Practices Guidelines relate to water quality.

See also these related sections

Unique Habitats, Water, Streamside Zones, Forest Health and Invasive Species; Recreation Opportunities