



Riparian Zones



A riparian zone can be described in many ways, but is essentially the narrow strip of transitional land between upland habitats and perennial or intermittent bodies of water, including creeks, streams, rivers, wetlands and lakes. A healthy riparian system supports a great diversity of upland and wetland-adapted plant species and provides habitat for both wildlife and aquatic organisms. Although they often comprise only a small percentage of total land area, riparian zones represent a vital element in the overall landscape, acting as both a buffer and an ecological link between water-based and land-based ecosystems.

Because riparian corridors represent the area where upland and aquatic habitats merge, well-developed riparian corridors tend to contain a relatively high degree of wildlife diversity, having both upland-dependent and aquatic-dependent wildlife species present. Due to periodic flooding, these corridors also tend to be rich in nutrients and very diverse in both structural and vegetational characteristics, thus creating and sustaining a diversity of micro-habitats capable of supporting many different wildlife species. The accumulation of rich, organic debris provides important feeding and breeding habitat for a wide range of invertebrates, including amphibians and reptiles, whose life cycles are closely tied to the aquatic environment. Well-developed riparian zones also shade the watercourse, providing lower water temperatures important for fish and other aquatic organisms.

Beyond providing food, nesting habitat, and cover for upland wildlife, riparian corridors also serve as travel lanes, allowing highly mobile species to securely move from one habitat to another. In a similar manner, they serve as dispersal routes for young wildlife, allowing populations to expand and become established in other areas.

Riparian zones are important migration corridors for migratory songbirds, especially in intensively farmed areas. They provide important stopover areas for the resting, feeding, and watering of migrating songbirds that have depleted energy reserves. Well-developed riparian zones are typically rich in insects and other invertebrates, which are high in protein and are

important foods for maintaining body weight and energy reserves necessary for further migration and breeding success. Thus, the continuing loss, fragmentation, and deterioration of riparian corridors may be partially responsible for long term population declines associated with many of our migratory songbird species.

Several avian species are strongly dependent on the woodland component associated with riparian corridors for nesting structure, breeding, and feeding requirements, including the bald eagle, osprey, wood duck, hooded merganser, belted kingfisher, prothonotary warbler, Bell's vireo, alder flycatcher, tree swallow, Louisiana and northern waterthrush, yellow-crowned and black-crowned night-heron, great blue heron, and green heron.

In intensively farmed areas, riparian corridors may also provide the only nesting habitat for many birds typically associated with woodland or shrubland habitats, and may very well be the only habitat available locally to support small game and upland game populations. In addition, riparian corridors are important insect foraging areas for many of Indiana's bat species, including the Indiana bat, little and big brown bats, eastern pipistrel, evening bat, hoary bat, red bat, and silver-haired bat. Riparian corridors are also the primary habitat for many of Indiana's fur bearing mammals, including the river otter, mink, and weasel.

Riparian zones also function to improve water quality by stabilizing bank erosion; trapping sediments, nutrients, herbicides, and pesticides; decreasing the velocity and peak levels of flood waters; and increasing groundwater recharge by slowing the overland flow of water.

Riparian Zone Protection

Because riparian zones provide multiple wildlife and water quality benefits, protection of existing riparian habitats is extremely important. It is also easier and less expensive to protect existing habitat than to restore that which has been degraded. Depending on the size and slope of the floodplain, riparian corridors should be at least 50 to 100 feet in width on each side of the watercourse to adequately address wildlife and water quality needs. To provide quality wildlife habitat, riparian zones should be at least 130 feet in width and contain a component of native or cool season grasses along the upland edge. Existing riparian buffers should be evaluated to determine if the buffer width and composition of vegetation should be enhanced.

Riparian corridors can be valuable timber production areas. If timber is to be harvested from riparian corridors, felling of trees should be avoided within 15 feet of the active watercourse channel to maintain watercourse shading and streambank stabilization. In the remainder of the riparian zone, tree harvesting should be conducted in such a manner as to retain at least a 50% tree canopy, evenly distributed throughout the harvested area. Care should be taken to protect cavity, denning and roosting trees. Avoid harvesting timber during the months of April through July to avoid the accidental taking of the endangered Indiana Bat (*Myotis sodalis*). Landowners are strongly encouraged to seek professional advice from their local IDNR District Forester prior to conducting riparian zone timber harvests.

Frequently, riparian buffers include a filter strip of native or cool season grasses that extends beyond the tree and shrub zone and provides additional benefits to upland wildlife. The use of light grazing or haying (after August 1st) can help maintain the wildlife and water quality benefits derived from the grass filter strips. However, livestock should be prevented from having access to the wooded portion of the corridor, as well as the watercourse. Financial assistance programs are available through the USDA, Natural Resources Conservation Service (NRCS) to establish livestock exclusion fencing and alternative watering facilities. Landowners having riparian buffers enrolled in the Conservation Reserve Program (CRP) should consult NRCS regarding any management and use restrictions.

Riparian zones may also occur along intermittent and perennial watercourses within forests. Forestry Best Management Practices (BMP's) should be implemented to maintain riparian zone functions within the forest and still allow for the harvest of timber within the riparian zone. The following Forestry BMP's should be utilized.

1. Make Riparian Management Zones (RMZ's) as wide as possible.
2. When harvesting trees in RMZ's, minimize disturbance of the forest floor and leave adequate tree stocking to shade the stream. Retain at least a 50%, well-distributed canopy cover in the RMZ of perennial watercourses.
3. Locate roads and skid trails outside RMZ's, except where necessary for stream crossing, and keep stream crossings to a minimum.
4. Trees harvested in a RMZ should be felled in a direction away from the watercourse and winched to skid trails outside the RMZ where possible.
5. Place felled tree tops and logging debris a sufficient distance away from the watercourse to prevent flooding.
6. Avoid locating equipment, maintenance sites and log landings within RMZ's.
7. Avoid operating wheeled or tracked equipment within RMZ's and watercourses.
8. Cut few, if any, trees within 15 feet of permanent watercourses.

Riparian Zone Restoration

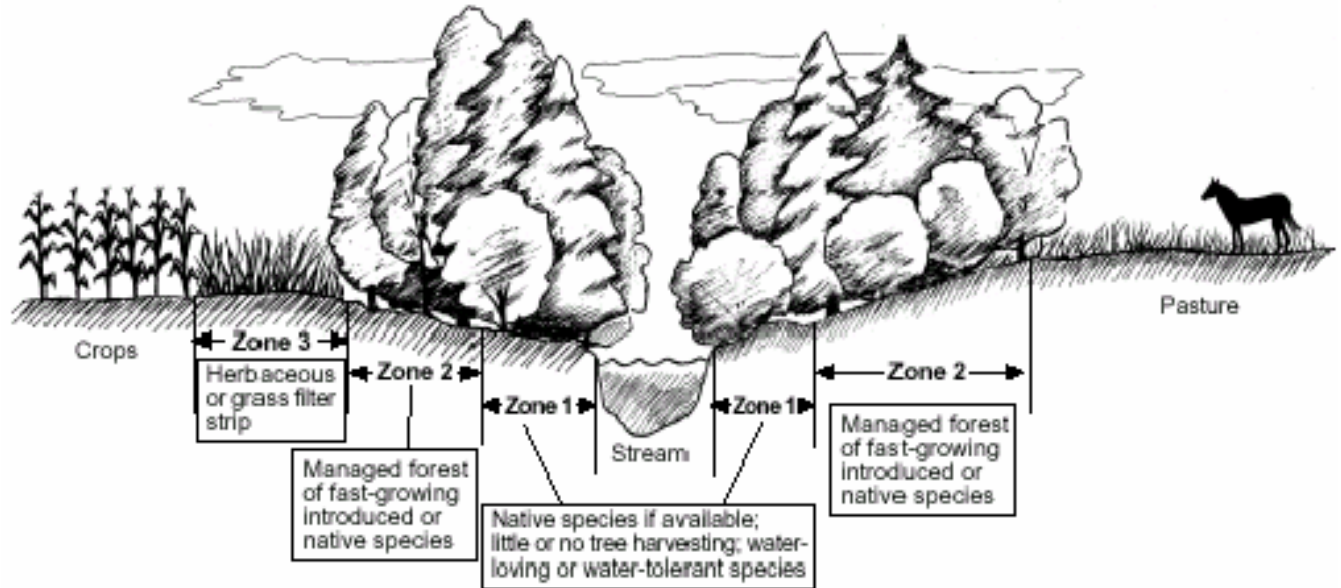
In an effort to maximize land use, riparian zones have often been eliminated or degraded and replaced by row crops, pasture, or urban development. The loss of riparian buffers usually results in soil erosion, increased water pollution, sedimentation, flooding, and a loss of valuable wildlife habitat. Every attempt should be made to restore, develop or enhance riparian zones.

There are two methods that can be used to restore degraded riparian systems: natural regeneration and/or planting. *Natural regeneration* is the easiest and least expensive method. Simply mark off the area to be dedicated to a riparian zone and allow natural succession to take its course. Early successional species will establish on their own from plants currently on site or from seeds already present or dispersed from nearby sites. Woody species likely to naturally establish in Indiana are willow, river birch, sycamore, cottonwood, hackberry, sweet gum, green ash, box elder, and silver maple. These species will provide year-round soil stability, erosion resistance, and will allow grasses and forbs to establish. Once established, periodic maintenance may be needed to select and maintain the desired species composition.

The second method for restoring a degraded riparian system is by planting. This method is more labor intensive and expensive to implement, though it allows the landowner to directly influence the plant species composition. The first 15 feet adjacent to the edge of the watercourse (Zone 1) should be planted to a diversity of fast growing, flood tolerant tree seedlings, planted 6 to 10 feet apart. Cuttings from dormant willow trees (at least 2 inches in diameter, 3 feet in length, and containing at least one living side branch) can also be used to augment the planting. In areas prone to prolonged flooding, containerized trees (at least 3 feet tall) should be used. The taller height of containerized stock increases the chance that some portion of the tree will remain above prolonged, flood water height, allowing photosynthesis to continue and increase plant survival.

Zone 2 (the land area immediately adjacent to Zone 1) should be a minimum of 20 feet in width and planted to a diversity of trees and shrubs suited to site characteristics. The maximum width of Zone 2 will be dependant on the landowner's water quality, wildlife, and timber production objectives. Consider planting a diversity of trees that will produce acorns, nuts or berries preferred by wildlife, such as pin oak, swamp white oak, swamp chestnut oak, black gum, hackberry, and hawthorn. Shrubs add diversity and increase the diversity of wildlife habitat in the riparian buffer while maintaining a perennial root system to help retain soil. In the event of a flood, shrubs also help to decrease the force of water leaving the stream bank. Shrubs should be selected based on soil type and the species of wildlife the buffer is being designed to attract. Shrubs should be spaced approximately 5 to 8 feet apart. Planting trees and shrubs in rows allows for easier mowing and weed management, but does not look as natural as random planting. Adding artificial nesting structures, such as wood duck nesting boxes and bat boxes, is a good way to promote wildlife use of the buffer while it matures.

For the first few years weeds may need to be controlled to allow trees to establish successfully. This can be accomplished by mowing when weed growth reaches 12 to 18 inches or mulching around the base of the trees. Tilling around trees should be avoided and herbicides should only be used if they are labeled for safe use near water. See the *Tree and Shrub Coverts* and *Wildlife Corridors* Habitat Management Fact Sheets for further information on tree and shrub selection, planting, and maintenance.



To further benefit upland wildlife, an additional zone (Zone 3), a minimum of 20 feet in width, should be planted to a mixture of cool season or warm season grasses, legumes and forbs. The maximum width of Zone 3 will be dependant on the landowner's wildlife objectives. The use of stiff-stemmed, warm season grasses (i.e. switchgrass, indiagrass, or big bluestem) are preferred over cool season grasses in riparian areas due to their ability to withstand inundation, stabilize soils, filter sediments, and reduce the velocity of over-land, flood waters. See the *Warm Season Grass Establishment* and *Warm Season Grass Management* Habitat Management Fact Sheets for further information.

Contact your District Wildlife Biologist, District Forester, and NRCS office for more information on managing riparian buffer.

Related *Habitat Management Fact Sheets*:

Natural Regeneration
 Tree and Shrub Coverts
 Tree and Shrub Corridors
 Artificial Nesting Cavities

Warm Season Grass Establishment
 Warm Season Grass Management
 Cool Season Grass Establishment
 Waterfowl Nesting Structures