Providing More Acadian Forest Wildlife Habitats in Today's Managed Forests

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There is a need to incorporate more missing features of original Acadian forests into today's managed forest landscapes. Many of these features can be located in riparian zones, which are lands beside waterways that have a disproportionately high amount of use by wildlife. Riparian zones are a potential means to connect the landscape for wildlife.

The Importance of Riparian Zones

Areas bordering water have been called greenbelts, buffer strips, special management zones and riparian zones. The term used here will be *riparian*.

About three-quarters of our wild animal species either depend upon, or prefer, habitats near water. Brinson et al. (1981), in a review paper on riparian (near water) ecosystems, state that the area of riparian vegetation most heavily used by wildlife is the zone within 200 metres (660 ft) of a stream or open water. These long, relatively narrow ribbons can contribute a relatively small amount to the total available habitat, but their wildlife value far outweighs their size.

DiBello (1984) found that 85% of the locations of radio-collared furbearers in Maine occurred within 100 m (330 ft) of a waterway. Coyotes and bobcats frequently move along frozen streams in winter, when traveling their home ranges, while red fox and fisher use the vegetation within 100 m of the waterway (Stocek, 1994). Red fox use lake edges, while coyotes frequently avoid them. Small mammals and birds also travel through riparian zones in dispersing from their original or natal habitats.

Migration routes along rivers and streams are consistently used by birds, bats and deer. Migrating songbirds probably use riparian forests disproportionately because of the abundance of food and dense cover. Some areas are major resting places for many north-south migrating birds, and may contain up to ten times the number of spring migrants than are found in adjacent, non-riparian areas.

The microclimate of riparian zones is different from that of the surrounding forest. There is generally more shade, higher humidity, and increased air movement. The increased humidity is important to plant and lichen growth and tends to make the habitat more favorable for many amphibians and some small mammals. Dense stands of conifers along waterways, with their milder microclimate, provide protective cover for tree swallows in cold, wet springs. Such stands in sheltered river valleys are commonly selected as deer wintering areas in Nova Scotia and New Brunswick. Riparian zones are also favorite moose habitat at various times of the year.

Research by Elliott and others in the State of Maine has demonstrated that many forest songbirds territorial requirements necessitate a riparian zone that is at least 100 metres (330 feet) wide, on

each side of a river or stream. Within that zone dead trees (snags) are retained, den sites, perch and other wildlife trees, while a variety of harvest techniques such as single-tree, small-group selection, patch, shelterwood and seed-tree cuts can be employed to create diverse vegetation both horizontally and vertically. In Maine, taking this approach has been calculated to encompass about 15% of the land base. A few bird species may require a 200 metre (660 ft) wide riparian strip on both sides of the waterway. Bird use of riparian habitat is often related to snag (dead tree) occurrences coupled with plant species diversity (richness) and the vertical stratification (varying elevation) of vegetation.

In boreal mixed wood of Alberta, Machtans et al. (1996) found that 100-m wide buffers enhanced the movement of juvenile songbirds. The buffers had significantly more movement of birds than did clear cuts, showing the value of buffers as wildlife corridors. Focusing on ovenbirds, a forest-interior species, Lambert and Hannon (2000) found birds did significantly better with a 100-m wide buffer than they did with a 20-m wide lakeshore buffer.

In eastern Maine (Meiklejohn and Hughes 1999), the bird community differed greatly among buffer types. Riparian reference sites were dominated by forest-interior species, whereas buffer strips along rivers (averaging 76m wide) were inhabited by equal numbers of forest-interior and edge species. Tributary buffers (averaging 32m wide) were largely inhabited by edge species.

Also in Maine, harvest intensity in lakeshore buffers had negative effects on forest-interior species (Johnson and Brown 1990). In Quebec (Larue et al. 1995), riparian forest had higher abundance and richness than non-riparian forest, because it contained forest-interior species, shrub, and water edge species.

In boreal balsam fir mixedwood in Newfoundland (Whitaker and Montevecchi 1999), riparian buffers of black spruce and alder 20 and 50 m wide both proved to be poor habitat for birds; only 3 of 6 forest interior species were present and they were rare; a 50 m buffer was not significantly better than a 20-m buffer.

Several species of forest-interior passerines are sensitive to buffer width (Darveau et al. 1995) and harvesting of adjacent forest (Hanowski et al. 2002). Species that have declined where buffers were small (15-30 m) include the yellow-bellied flycatcher, golden-crowned kinglet, hermit thrush, Swainson's thrush, bay-breasted warbler, blackburnian warbler, black-throated green warbler, northern parula, and ovenbird.

Pearson and Manuwal (2001) found higher species turnover in narrower buffers. Residents were displaced by generalists that tolerate open, shrubby vegetation. This study also shows that avian richness or diversity is not indicative of ecosystem health.

Hodges and Krementz (1996) reported a rapid increase in bird species occurrence and species richness with increasing corridor width. They found a 100-m buffer was sufficient to maintain functional assemblages of six common species and recommended a 100-m riparian buffer strip for conserving breeding populations of neotropical migrant birds.

In Nova Scotia, Bill Freedman of Dalhousie University and others have studied changes in bird species associated with intense disturbances as a result of forestry operations. Cindy Staicer of Dalhousie University has studied bird use of various forest habitats, including riparian, in Nova Scotia. Her students found lower abundance and fewer species of conservation concern in riparian buffers less than 40 metres wide or subject to harvesting or blowdown (Akerman 2007). Buffers lacked certain species (Yellow-bellied Flycatcher, Black-throated Blue Warbler) and had fewer occurrences of other species (Red-breasted Nuthatch, Swainson's Thrush, Ovenbird, Blackburnian Warbler, Black-throated Green Warbler) than either riparian or upland reference sites. On the other hand, species typical of young, regenerating forest were abundant in buffers.

As vegetation on a site passes through successional sequences after a clearcut, so do trends in wildlife occurrence. The edge effect created between a residual stand (eg. - riparian zone) and a cutover area, for example, may attract more edge species of wildlife and reduce the number of forest interior birds such as ovenbirds. A 100 metre width on each side of the waterway is the kind of distance required to minimize some of these undesirable impacts. A typical forest songbird territory is about a hectare (100 m x 100 m) in size, so this width has potential benefits for wildlife.

It should be noted that most of this riparian research is based on the industry "standard harvest method", the clearcut. Healthy Acadian forests are transformed and degraded by repeated clearcuts. Tree species like original sugar maples, yellow birches, hemlocks, red spruces and white pines that can grow in shade are gradually replaced with tree species like poplar, grey birch and white spruce that grow readily on bare, open ground. Where an area is harvested by more gentle methods like selection or patch cuts, wildlife is generally better-served.

Based on this reference material, **harvests by the clearcut method should leave *a minimum 100 metre (330 ft) riparian zone from bank or shoreline inland on each side of a defined waterway. The closest 40 metres (131 ft) to the water would constitute a zone where live trees would protect banks and shorelines, dying and dead trees will offer cavities, and fallen trees could evolve naturally. The 60 metre (197 ft) band beyond that zone might be harvested on a gradual, small-scale basis. Possible harvest methods include selection, group selection, strip cuts at oblique angles, and patch cuts. They could also be left uncut for wildlife.*** Harvest openings would be designed so as to maintain the visual barrier (screen effect that hides wildlife) of the zone, foster new growth of shade tolerant species, and maintain riparian soil and air humidity. Disturbance in this zone should be minimized during the breeding season, which is generally May to August.

Many forested areas are imperfectly drained. These areas often contain small, spring-fed pools, seeps or ponds where frogs and salamanders can lay their eggs without having them eaten by fish. Humans build these, but call them woodland fire ponds. ***Seeps, small ponds and other perennially wet sites located in forests that are scheduled for any form of cutting should be flagged out of the harvest zone and categorized as a riparian zone.*** Occasionally these sites grow excellent trees (like spruce) on hummocks within the wet area. With the appropriate equipment, and during a dry or frozen time period, it may be possible to harvest a few of these

trees without causing undue drying or destruction of wetland habitat. This might be planned and economically accomplished when a crew is scheduled to conduct a partial harvest in nearby riparian zones.

Small brooks that are less than 50 cm (20 in) wide (as defined in Nova Scotia's Wildlife Habitat and Watercourses Protection Regulations) can be traditional rearing sites for young speckled (brook) trout. These places often have sources of cool water, and are too small to be occupied by larger fish that might eat the young trout. Even small brooks that dry up in the summer can host spawning adult trout after fall rains. Eggs overwinter in bottom gravels, and hatch in the spring. Some young-of-the-year trout will move downstream if drought sets in later in the summer.

A healthy forest environment can offset drought conditions. Forest environments tend to be moist, whereas large-scale forest cutting generally leads to warmer air temperatures and drier soil conditions. Bogs and wet forest areas normally feed their water into small brooks. Two forest bird species that nest in such wet areas are the Canada Warbler and Veery. Populations of both species are declining across North America. This downturn has been linked to reductions in their available habitat.

Small brooks supply water to larger rivers, in addition to the specific in-stream habitat needs of young-of-the-year speckled trout. Riparian zones on brooks that are too small to warrant a 100 metre wide "no clearcut" zone, should still have a substantial buffer from the drying effects of clearcut operations.

Wet areas and small brooks considered too small for the 100 metre buffer should have a 50 metre (115 ft) riparian zone applied around them. In the case of a defined channel, like a brook, this would be 50 metres on each side. The closest 40 metres (131 ft) to the water would constitute a zone where live trees would protect banks and shorelines, dying and dead trees will offer cavities, and fallen trees could evolve naturally. The outside 10 metres (33 ft) could be subject to the gradual harvest removals already discussed under the 100 metre riparian zones. They could also be left uncut for wildlife.

Any harvests in riparian zones should be light enough overall to maintain riparian dampness and shade conditions.

Wildlife Travel Corridors

Ecologists have long debated whether wildlife corridors are just someone's nice idea, or if they actually help species. An extensive study on the effects of wildlife corridors published in 2002, and based in the southern United States, offers positive proof that they encourage the movement of plants and animals across fragmented landscapes.

Wildlife Travel Corridors should be 100 metres (330 ft) wide. They will be considered gradual harvest zones where regular but minor harvests will maintain visual obscurity and encourage

wind-firm, shade tolerant forest regeneration. Over time the entire area could be harvested, with rotations extended for longer-lived tree species, and leaving some (mis-shaped, inaccessible, etc.) standing trees to die and become deadwood on the ground. Snags could be removed from corridors on hilltops if their position posed a potential fire hazard from lightening.

These corridors should connect watersheds and be linked to riparian zones, including wet ground that has the quiet pools and damp sites that some old wood and deadwood inhabitants, like frogs and salamanders, need for breeding.

Weaknesses of Riparian Zones and Wildlife Corridors

Leaving thin ribbons of trees across clearcut landscapes can prove very unstable when riparian and travel corridors are populated by even-aged, shallow-rooted and/or pioneer trees, on certain soil types and with topographic exposure to strong winds. Perhaps the most vulnerable period occurs when adjacent contiguous forests are clearcut harvested on a large scale, leaving riparian zones and wildlife corridors with bared edges for the first time, and open to blowdown. More gradual adjacent harvests might help, by "feathering" the cutting edges. Nevertheless, some sites windthrow with a minor opening as a trigger. The challenge with inherently unstable riparian and wildlife corridors lies in **gradually** converting them to more stable, uneven-aged stands with a variety of site-suited tree species. Shallow soils may make this conversion impossible on some sites.

Riparian zones and wildlife travel corridors should be joined with the uneven-aged, shade-tolerant stands and other special areas set aside to provide connectivity at a landscape level for wild animals and plants.

To produce a reasonable facsimile of natural forest environments within shade-tolerant stands, inside riparian buffers and throughout wildlife travel corridors, the management regime within all these zones should involve extending the longer-lived tree species rotation times. This will enable long-lived, shade-tolerant species (like red spruce, hemlock, yellow birch and sugar maple) to pass through their natural age classes. Less valuable (e.g. misshapen) and more inaccessible individual trees would be selected for "no-cut", over-mature status as potential dead tree habitat material, and for eventual forest nutrient recycling. Poor candidates for the sawmill can be winners for wildlife. These older trees will eventually provide holes for cavity dwellers, and dead woody material as food for a wide variety of wild animals and plants, including the "decomposers" - microscopic bacteria, fungi, and soil animals that work over deadwood on the ground, producing essential nutrients for a new forest.

Legacy Trees

To quote Parker, Doucette and Hache′ (1996) "Studies at Hayward Brook, New Brunswick,

raise serious questions relative to the effects of certain forestry management practices on species of cavity nesting birds. For instance, leaving a few large, mature and often dying white pine or yellow birch trees in the middle of clearcuts to serve as nesting substrate for cavity nesters is of little value to most species." Leaving some older trees along the edge of the cutover might not satisfy existing regulations, but would prove more useful to wildlife, especially if these trees could left to grow old, die and fall to the ground, instead of being cut with the next harvest.

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