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Width of Riparian Zones for Birds

BACKGROUND: Over the past several decades, more than 450 Corps of Engineers Civil Works reservoir projects have been constructed in 43 states encompassing nearly 12 million acres (at normal pool elevations, about one half is water and the remaining half is associated land). The majority of inland Civil Works projects are constructed along streams and rivers. There is increasing interest in managing the riparian buffer strips (i.e., vegetation adjacent to streams, rivers, and lakes) along these watercourses. Retaining riparian vegetation of proper width not only minimizes the impacts of erosion and nonpoint-source pollution; these areas also provide habitat and movement corridors for wildlife as well as benefits to fish populations (Fischer et al. 1999) (Figure 1). Unfortunately, when decisions are made to restore or manage buffer strips adjacent to streams and rivers, the basis for determining strip width has been almost completely dominated by water quality considerations. Few studies have addressed the compatibility of recommended buffer strip widths with other important ecological functions, especially their ability to sustain native faunal and floral species.

Figure 1. Riparian buffer strips protect water quality and provide habitat for plants and animals, and movement corridors for a variety of wildlife species

Many riparian zones in North America are degraded to the point that they do not provide the resources needed to make them suitable as habitat or as movement corridors. This degradation also negatively affects many of the other important functions and values these landscape features provide. Providing bird habitat often is a management objective on Corps lands, and restoration of riparian zones is a viable option. However, there is little guidance available on the design or management of riparian zones for birds.

IMPORTANCE TO AVIAN COMMUNITIES

About half of the approximately 720 birds that breed in North America are considered neotropical migrants (Figure 2), those that breed in North America but migrate to wintering grounds in the Caribbean, Mexico, and Central and South America. The remaining are either resident birds (non-migratory) or short-distance migrants (typically breed in the northern United States and Canada and winter in the southern United States). Information from long-term surveys across the nation indicates that many bird species are declining, especially the neotropical migrant species.

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Figure 2. Many neotropical migrant birds, like this black-and-white warbler, use riparian buffers and corridors for breeding and wintering habitat, as well as stop-over habitat during spring and fall migration (photo by Greg Fleming)

Although riparian zones typically are a small component of the landscape, they provide essential habitat for many species of birds (Stevens et al. 1977, Knopf 1985). For example, riparian zones in many areas of the western United States comprise less than 1 percent of the total land area, yet these areas are used by more species of breeding birds than any other habitat in North America (Knopf et al. 1988). Brinson et al. (1981) reported that avian density in riparian areas is often double that of adjacent uplands, although there is regional variation throughout the United States. Approximately 50 percent and 82 percent of bird species of the southwestern United States (Johnson, Haight, and Simpson 1977) and northern Colorado (Knopf 1985), respectively, nest in riparian habitats. Many breeding-bird species are riparian obligates, meaning they need the presence of quality riparian habitat for successful reproduction and survival (Hunter, Ohmart, and Anderson 1987, Rich 1998). Such species include the southwestern willow flycatcher (*Empidonax traillii extimus*) and least Bell's vireo (*Vireo bellii pusillus)* in the Southwest and swallow-tailed kite (*Elanoides forficatus*) in the Southeast.

LITERATURE ON APPROPRIATE WIDTHS

Recent research has shown the importance of considering habitat needs of birds in riparian zones. The suitability of a riparian zone as avian habitat varies depending on several factors, including width, length, degree of fragmentation, dominant vegetation, and number of vegetation layers. Unfortunately, avian habitat requirements are rarely included in the designation of riparian zone width in restoration and management plans. Throughout riparian areas of the United States, riparian zone width often is related positively to avian species richness both within and adjacent to riparian zones (Stauffer and Best 1980; Triquet, McPeek, and McComb 1990; Keller, Robbins, and Hatfield 1993; Kilgo et al. 1998). Several recent studies in North America, mostly in the eastern United States, have attempted to identify minimum widths of riparian zones necessary to sustain bird populations (Table 1). For example, many neotropical migrants in Virginia (e.g., Acadian flycatcher [*Empidonax virescens*], American redstart [*Setophaga ruticilla*], hooded warbler [*Wilsonia citrina*], and Louisiana waterthrush [*Seiurus motacilla*]) have strong affinities for riparian buffer strips, but many will not inhabit strips narrower than 50 m (Tassone 1981). In Kentucky, neotropical migrants were more abundant in corridors wider than 100 m; riparian areas less than 100 m wide were inhabited mainly by resident or short-distance migrants (Triquet, McPeek, and McComb 1990). Similarly, Spackman and Hughes (1995) investigated stream corridor widths along mid-order streams in Vermont. Corridor widths of 150 and 175 m were necessary to include 90 and 95 percent of bird species, respectively, at most sites. In the boreal forests of Canada, Darveau et al. (1995) compared bird abundance and species composition in riparian forest strips of varying widths and found that riparian strips at least 60 m wide were

Table 1. Recommended Minimum Widths of Riparian Buffer Strips and Corridors for Birds

Authors	Location	Minimum Width	Benefit
Darveau et al. 1995	Canada	>60 m	There was evidence that 50-m-wide forested buffer strips were required for forest-dwelling birds. Bird populations may decline in strips before regeneration of adjacent clearcuts provide suitable habitat for forest birds.
Hodges and Krementz 1996	Georgia	>100 m	Riparian strips >100 m were sufficient to maintain functional assemblages of the six most common species of breeding neotropical migratory birds.
Mitchell 1996	New Hampshire	>100 m	Need >100-m-wide buffers to provide sufficient breeding habitat for area-sensitive forest birds and nesting sites for red-shouldered hawks.
Tassone 1981	Virginia	>50 m	Many neotropical migrants will not inhabit strips narrower than 50 m
Triquet, McPeek, and McComb 1990	Kentucky	>100 m	Neotropical migrants were more abundant in riparian corridors wider than 100 m; riparian areas <100 m wide were inhabited mainly by resident or short-distance migrants.
Spackman and Hughes (1995)	Vermont	>150 m	Riparian buffer widths of at least 150 m were necessary to include 90 percent of bird species along mid-order streams.
Kilgo et al. (1998)	South Carolina	>500 m	Although narrow bottomland hardwood strips can support an abundant and diverse avifauna, buffer zones at least 500 m wide are necessary to maintain the complete avian community.
Keller, Robbins, and Hatfield 1993	Maryland; Delaware	>100 m	Riparian forests should be at least 100 m wide to provide some nesting habitat for area-sensitive species.
Gaines 1974	California	>100 m	Provide riparian breeding habitat for California yellow-billed cuckoo populations.
Vander Haegen and DeGraaf 1996	Maine	>150 m	Managers should leave wide (>150 m) buffer strips along riparian zones to reduce edge-related nest predation, especially in landscapes where buffer strips are important components of the existing mature forest.
Whitaker and Montevecchi 1999	Canada	>50 m	50-m-wide riparian buffers only supported densities <50 percent of those observed in interior forest habitats.
Hagar 1999	Oregon	>40 m	Although riparian buffers along headwater streams are not expected to support all bird species found in unlogged riparian areas, they are likely to provide the most benefit for forest-associated birds species if they are >40 m wide.

needed to sustain forest-dwelling birds. Kilgo et al. (1998) investigated breeding bird communities in bottomland hardwood (BLH) stands of varying widths in South Carolina and concluded that although narrow strips can support an abundant and diverse avifauna, BLH habitats at least 500 m wide are necessary to maintain the complete avian community.

Narrow riparian zones may often appear to have high diversity but the majority of species present tend to be forest-edge species. Few forest-interior species, or those requiring large contiguous

blocks of forest habitat to maintain stable populations, occur in these narrow strips of habitat (Robbins, Dawson, and Dowell 1989; Keller, Robbins, and Hatfield 1993). There are other potential problems associated with narrow riparian zones. For example, Vander Haegen and DeGraaf (1996) investigated the relationship between riparian buffer zone width and the effects of predation on songbirds in Maine. They suggested that managers leave vegetated buffer strips at least 150 m wide to reduce edge-related predation.

PARTNERS IN FLIGHT (PIF)

An organization called Partners In Flight was launched in 1990 in response to growing concerns about declines in the populations of many land bird species, and to emphasize the conservation of birds not covered by existing conservation initiatives. The initial focus was on species called neotropical migrant landbirds, but has spread to include most land birds and other species requiring terrestrial habitats.

Partners In Flight is a cooperative effort involving partnerships among many entities. Current partners include 16 federal agencies, 40 non-government organizations (e.g., Audubon Society, The Nature Conservancy), over 60 state and provincial fish and wildlife agencies, numerous universities, and the forest industry. The central premise of PIF is that the resources of public and private organizations in North and South America must be combined to achieve success in conserving bird populations in the Western Hemisphere.

Specific objectives of the PIF initiative include: (a) conservation action before species become endangered (i.e., while common birds are still common), (b) conservation based on sound science and good information, (c) conservation that stresses both healthy ecosystems and management of natural resources, (d) local and timely conservation within the context of large-scale objectives and long- term plans, (e) conservation of habitats in breeding, migration, and wintering areas, (f) an informed constituency of people concerned about bird conservation, and (g) creation of partnerships that foster voluntary cooperation among public and private landowners.

Approximately 60 bird conservation plans, one for each physiographic region of the United States, currently are being drafted. These plans identify priority species and habitats most in need of conservation, identify the microhabitat requirements of these priority species and the types and quality of habitats required by birds at the landscape scale, establish objectives for bird populations and habitats in each physiographic area and state, and provide specific management information for improving priority habitats. Within most of the physiographic regions, riparian zones are considered priority habitats that provide breeding habitat for many priority bird species.

THE CORPS' ROLE IN BIRD CONSERVATION

The Department of Defense now plays a key role in the PIF initiative. Corps of Engineers lands likely represent a critical network of habitats for neotropical migratory birds. The majority of Corps projects are located along the migration routes of many neotropical migratory birds,

especially in the Mississippi and Ohio River Valleys, the Great Plains, and California (Figure 3). Many of these projects contain a wealth of riparian habitats offering birds migratory stopover areas for resting and feeding during spring and fall migration, and suitable sites for breeding, nesting, and rearing their young.

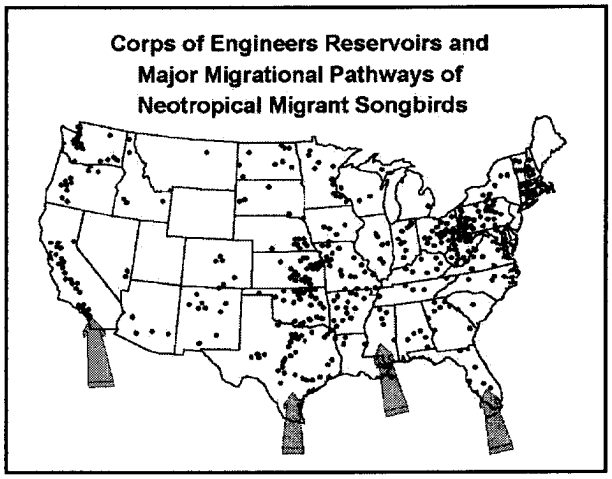

Figure 3. The majority of Corps projects occur within the major migration routes of neotropical migrant birds

The U.S. Army Engineer Research and Development Center, Waterways Experiment Station, is assisting the Corps in developing strategies to further the goals of PIF. The opportunity now exists for the Corps to cooperate in implementing state and regional bird conservation plans by managing riparian and other habitats in support of migratory birds. Future actions may include: (a) providing more information to Corps Districts and projects on PIF to encourage them to incorporate information from bird conservation plans into their own management plans, (b) determining the potential of Corps lands in providing seasonal bird habitat within PIF physiographic regions, (c) facilitating communication between the Corps and national/regional PIF members, (d) identifying opportunities for the Corps to cooperate with other agencies and organizations in migratory bird habitat management, especially where Corps lands are adjacent to other agency or private organization/industry lands involved in PIF, and (e) increasing public awareness of Corps projects as birding sites through such programs as Watchable Wildlife.

CONCLUSIONS AND RECOMMENDATIONS: Riparian zones provide extremely important seasonal habitats for a large number of bird species. Recent research has shown that riparian zones must meet certain minimum width criteria to provide suitable habitat for most bird species. To encourage a diverse avian community, riparian corridors should be as wide and long as possible, and be relatively free from improved roads, human settlements, and other potential impacts. If avian habitat is a management objective, managers should consider managing for riparian zones that are at least 100 m wide. This recommendation applies to either side of the channel in larger river systems and to total width for lower-order streams and rivers. Wider riparian zones may be warranted in some plant communities, such as southeastern BLH. Ongoing research will provide improved recommendations for Corps personnel when making decisions to restore or manage riparian buffer strips and corridors.

The Corps has an excellent opportunity to positively affect riparian habitats and their associated bird populations through proper riparian corridor management. Some Corps Districts have initiated a proactive approach to regional bird conservation efforts by addressing migratory bird habitat needs in their project management plans, as well as mitigation and restoration efforts. Other Districts and projects may be seeking this information, but are unable to find clear guidelines or recommendations. Partners in Flight is a useful resource that will provide a wealth

of information on habitat management in bird conservation plans. All Districts and projects likely would benefit from this emerging information. Additional information on PIF, bird conservation plans, and how riparian management can benefit bird communities can be obtained by contacting Dr. Richard A. Fischer, CEERD-EN-S, *fischer@wes.army.mil* or (601) 634-3983.

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