

4.4.8 Migratory Birds

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4.4.8.1 Methodology for Assessing Impacts

Migratory bird species that winter and breed in the project study area are critical components of ecosystems within GSMNP. Assessment of impacts to migratory birds and their habitats is required by law prior to any action, as directed by Executive Order 13186 and the Migratory Bird Treaty Act (MBTA). Secondly, these impacts are outlined due to the importance of migratory birds to biodiversity, ecosystem functions and to human monitoring of environmental conditions. Impacts of each of the alternatives on migratory birds were assessed using current, scientific literature regarding impacts of human activity on migratory birds and bird habitats and consultation with experts in the field of avian ecology. Additional details are provided in Appendix N.

Type

Type describes whether a possible impact would benefit (be beneficial to) or harm (be adverse to) migratory bird populations.

Context

The context of an impact can be site-specific, local, or regional. Site-specific is defined as the area within the construction footprint; local as the area within 2 miles (3.2 km) of the construction footprint or the northern shore of Fontana Lake (whichever is less); and regional as the area bounded by the northern shore of Fontana Lake, the North Carolina/Tennessee state line, Twentymile Ridge to the west, and Noland Creek to the east.

Duration

Short-term impacts are those that would occur for less than 1 year, typically as an episodic or temporary event. Long-term effects occur as a result of construction activities at a specific location throughout the life of construction (this is assumed to be between 1 year and 15 years), but the impact is more than that of a temporary event. Permanent impacts are considered to be anything that persists throughout the construction period.

Intensity

Intensity is the degree to which resources would be affected and is categorized as no/negligible, minor, moderate, or major. The intensity definitions for migratory birds were based on consideration of a wide range of factors including the diversity of species included in this topic, the breadth of breeding area requirements, direct loss of habitat and indirect modifications to the remaining bisected habitat, avoidance behaviors due to noise and traffic, nest predation, and changes to the habitat quality.

Clarification of the term "baseline" for this project:

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NTMBs discussed in this section utilize different habitats and have different breeding territory sizes based upon species-specific breeding behavior, interspecific competition, and various factors related to habitat quality. Roads and other facilities can modify the surrounding foraging habitat making it less suitable for invertebrates in leaf litter, a main source of food for some birds (Haskell 2000). Changes in animal behavior have been noted in areas adjoining roads. Human disturbance and road noise can lead to animal avoidance behavior (Clevenger and Waltho 2000; Trombulak and Frissel 2000). In woodlands, the density of birds can be reduced up to several hundred meters away from roads and it is assumed that noise (Reijnen et al. 1987) or reduced food supply (Ortega and Capen 1999) are the causes of this avoidance distance. Potential habitat modifications considered include factors such as potential changes in the introduction of invasive exotic species which can lead to changes in forest habitat and nest predation/competition.

The following intensity definitions apply to migratory birds found within or adjacent to the construction footprint of the proposed project. The construction footprint includes the proposed area of pavement, the adjoining cut and fill slopes, and the surrounding construction access buffer. There is no scientific literature available that provides a scale to define or rank the severity of impacts from a project. Therefore, the following intensity definitions are based on best professional judgment of what is reasonable considering the complex interactions of the factors noted.

No/Negligible

The project impacts would affect less than 25 acres (10 ha) of migratory bird habitat.

Minor

The project would impact between 25 acres (10 ha) and 100 acres (40.5 ha) of migratory bird habitat.

Moderate

The project would impact between 100 acres (40.5 ha) and 200 acres (81 ha) of migratory bird habitat.

Major

The project would impact more than 200 acres (81 ha) of migratory bird habitat.

4.4.8.2 Summary of Impacts

Construction alternatives involving a construction footprint may negatively affect migratory birds via three mechanisms: habitat loss, habitat fragmentation/edge effect, and noise. However, the respective magnitudes of these effects would vary with the size of any construction footprint. For all alternatives that would involve construction, those with larger construction footprints would likely result in greater negative effects

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to migratory birds. There are also secondary impacts such as invasion of exotic species. These impacts are summarized in this section and described in more detail in Appendix N.

Habitat Loss

Habitat loss is a leading cause of migratory bird declines (Askins et al. 1990; Robbins et al. 1989). In the project study corridors, forest-dwelling bird habitat loss would occur due to deforestation in the construction footprint if any partial-build or build alternative were selected. These activities would decrease the available nesting and foraging habitat for breeding birds, as well as species that winter in the project study area. Studies have shown the interior forest-dwelling birds are lower in relative abundance adjacent to roads where as edge-dwelling birds have higher relative abundance adjacent to roads (Ortega and Capen 2002; Ortega and Capen 1999; Rich et al. 1994).

Habitat Fragmentation and Edge Effect

Migratory birds not only suffer from direct losses in habitat, but also from the negative impacts of this habitat loss on the quality of remaining patches of habitat in the landscape. As small parcels of habitat are removed from the perimeter and/or the interior portions of once larger habitat patches, many habitat edges are formed throughout the landscape. In fact, the type and position of a newly created edge in a habitat patch can produce a variety of results in terms of amount of remaining habitat and amount of edge. Specifically, creating habitat edges can pose a suite of detrimental impacts to migratory birds, especially interior forest-dwelling species. These impacts include increased nest predation (Wilcove 1985; Forsyth and Smith 1973), increased nest parasitism (Brittingham and Temple 1983), possible changes in vegetation structure and increased competition with species that prefer more fragmented habitats (Zannette et al. 2000; Askins et al. 1990). Forest-dwelling birds forced to nest nearer edges are more prone to nest failure due to predation. Boulet and Darveau (2000) found that nest predation along forest edges resulting from roads was greater than edges caused by logging roads, rivers or lakes.

Habitat edges resulting from roads attract nest parasites such as the brown-headed cowbird (*Molothrus ater*). Brown-headed cowbirds are known for their especially high success in parasitizing migratory bird nests (Askins et al. 1990; Brittingham and Temple 1983) and decreasing these species' reproductive success rates (Brittingham and Temple 1983). In fact, brown-headed cowbirds have been found to invade not only habitat edges, but even the narrowest of corridors resulting from roads, especially when mowed grass is present (Rich et al. 1994). The partial-build and build alternatives would increase the amount of edge habitat near forest openings, and may thereby attract brown-headed cowbirds to these previously interior forest openings. Cowbirds have been found to infiltrate several hundred meters into forests to parasitize migratory bird nests (Brittingham and Temple 1983). As a result, cowbirds may not only negatively impact the nesting migratory birds adjacent to the construction footprint and newly accessible forest openings, but also those breeding in forests well outside the construction footprint. However, in heavily forested landscapes similar to the project study corridors several studies have found no increase on nest predation (Ortega and Capen 2002; Hartley and Hunter 1998).

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When edges are created within forests, forest interior migratory birds are forced to compete with many edge-dwelling species that tend to be more aggressive. These species may outcompete forest-dwelling migratory birds for food (Zannette et al. 2000). Construction may also lead to outbreaks in exotic plant populations (Forman and Hersperger 1996; Trombulak and Frissel 2000). When native plant communities are replaced with assemblages of invasive, exotic plant species, it is often accompanied by a decrease in insect abundance, and thus less valuable forage for breeding migratory birds (see Section 4.4.9 for more information on the impacts of invasive exotic species).

Noise

Studies have shown that car traffic and not the presence of a road is the main cause of decreased bird breeding activity near roads (Rheindt 2003; Reijnen et al. 1995; Reijnen and Foppen 1994; Ferris 1979). Therefore, noise is the likely cause of disturbance to migratory bird populations (Forman and Hersperger 1996) by disrupting vocal communication required for mate selection, mate location, foraging communication, predator detection and avoidance, and parent-nestling/fledgling communications. Wintering birds may be affected in terms of foraging and predator location/avoidance. Soundscape impacts are discussed in Section 4.3.5.

4.4.8.2.1 No-Action

The No-Action Alternative would involve no construction or alteration to the natural environment. For this reason, no impacts to migratory birds or their habitats would be expected.

4.4.8.2.2 Monetary Settlement

The Monetary Settlement Alternative would not impact migratory birds within GSMNP. Potential impacts to migratory birds outside of GSMNP would depend on local use of funds.

4.4.8.2.3 Laurel Branch Picnic Area

This alternative would have the smallest construction footprint which would be approximately 9.0 acres (3.6 ha). Impacts to migratory birds via habitat loss due to construction are considered adverse, negligible, site-specific, and permanent. Adverse, negligible, local, and permanent impacts were characterized for habitat fragmentation and facility-related soundscape impacts.

4.4.8.2.4 Partial-Build Alternative to Bushnell (Primitive and Principal Park Roads)

Possible impacts for this alternative include migratory bird habitat loss, habitat fragmentation, and noise disturbance. Impacts due to direct habitat loss would be adverse, minor, site-specific, and permanent. Indirect impacts of habitat fragmentation and noise intrusion would be adverse, minor, local and permanent. These estimated impacts do not differ between the Principal Park Road and Primitive Park Road. The

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Primitive Park Road would result in a construction footprint of approximately 99.4 acres (40.2 ha). The construction footprint resulting from the Principal Park Road would be approximately 7.0 acres (2.8 ha) smaller. This reduction in acreage could result in decreased noise and habitat fragmentation.

Southern Option at Forney Creek Embayment (Primitive and Principal Park Roads)

This option, using the Primitive Park Road, would impact approximately 9.5 fewer acres (3.8 ha) than the baseline Partial-Build Alternative to Bushnell. The Principal Park Road of this option would impact approximately 15.6 fewer acres (6.3 ha) than the baseline Partial-Build Alternative to Bushnell. With either road type, less noise and habitat fragmentation would result from using the Southern Option at Forney Creek Embayment.

4.4.8.2.5 Northern Shore Corridor (Primitive and Principal Park Roads)

The Primitive Park Road would impact approximately 400.6 acres (162.2 ha) of migratory bird habitat within the construction footprint. The Principal Park Road would impact approximately 8.4 fewer acres (3.4 ha) of habitat. Impacts do not differ between the Primitive and Principal Park Roads in type, context, duration, or intensity. Potential impacts due to habitat loss would be adverse, major, site-specific, and permanent. Indirect impacts from noise generated by construction activities and facility operations, habitat fragmentation, and edge effects would be adverse, major, local, and permanent.

Southern Option at Forney Creek Embayment (Primitive and Principal Park Roads)

The construction footprint of the Primitive Park Road would impact 9.5 fewer acres (3.8 ha) of migratory bird habitat than would the baseline Northern Shore Corridor. The Principal Park Road would impact approximately 15.9 fewer acres (6.4 ha) in comparison with the baseline Northern Shore Option. In either case, the Northern Shore Corridor with Southern Option at Forney Creek Embayment would provide a small decrease in the construction footprint, noise intrusion, and possible negative effects of habitat fragmentation relative to the baseline Northern Shore Corridor.

Southern Option at Hazel Creek and Eagle Creek Embayments (Primitive and Principal Park Roads)

The construction footprint under this option for the Primitive Park Road would impact approximately 25.4 fewer acres (10.3 ha) of habitat than would the baseline Northern Shore Corridor. The Principal Park Road would result in approximately a 37.1-acre (15.0-ha) reduction in the construction footprint. These options may result in less noise intrusion and habitat fragmentation than with the baseline Northern Shore Corridor.

Southern Option Crossing Fontana Dam (Primitive and Principal Park Roads)

Construction of this option using the Primitive Park Road would impact approximately 20.7 fewer acres (8.4 ha) of migratory bird habitat than the baseline Northern Shore Corridor. The Principal Park Road under this

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option would affect approximately 21.2 fewer acres (8.6 ha) than the baseline Northern Shore Corridor. In both options, decreases in noise and habitat fragmentation may accompany the smaller construction footprint.

4.4.8.2.6 Cumulative Impacts

Migratory birds dominate the avifauna of the Great Smoky Mountains, making up 80 percent of the breeding bird community (MacArthur 1972) and include the greatest area of relatively undisturbed forests in the eastern U.S. (Davis 1993). However, migratory birds are currently displaying their steepest declines in the southern Appalachians, where 42 percent of forest-breeding species are declining (Franzreb and Rosenberg 1997). The Great Smoky Mountains harbor “source” populations of many migratory species (Farnsworth and Simmons 1999). Source populations are those that reproduce at rates which exceed the number of deaths in a population of a species. Therefore, these populations may be seen as creating a surplus of migratory birds that then may disperse outside the project study area and even beyond the Great Smoky Mountains. For this region, detriment to populations of migratory birds in GSMNP may have impacts on migratory bird abundance that could ripple outward into other regions of the eastern United States. Furthermore, if such declines in migratory bird abundance take place, it could also lead to negative effects on biodiversity and food web structures within and outside GSMNP.

Some of the projects listed in Section 4.1.2 have affected or have the potential to affect migratory birds in the study area. In the past, areas of historically forested landscapes have been reduced by commercial and residential development. Future projects including NCDOT TIP projects, construction on the Ravensford site, and the completion of Foothills Parkway, would also result in habitat loss and fragmentation. Private development, although greatly limited in the study area due to the amount of publicly-owned land, would also affect migratory bird habitat in the study area.

Possible cumulative effects from selection of the partial-build or build alternatives to migratory birds may result in decreased local migratory bird abundance, decreased local biodiversity, altered food webs, and possible contributory impacts on regional avifaunal diversity. When added to those projects it is possible that the major impacts resulting from the Northern Shore Corridor could constitute cumulative impacts to the migratory bird habitat in the region. These cumulative effects have occurred and will continue to occur in the foreseeable future as a result of landscape modification. Mitigation to protect, enhance, and restore sensitive habitats would minimize the potential cumulative effects on the region’s migratory bird habitat.

4.4.8.3 Options to Address Potential Impacts

NPS would employ a sequence of avoiding adverse impacts to migratory birds to the extent practicable, minimizing impacts that could not be avoided, and compensating for unavoidable adverse impacts. However, it will not be possible to avoid or mitigate for all impacts to migratory birds.

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Avoidance Techniques

There are no avoidance techniques that would completely avoid impacts to migratory birds by selection of the partial-build or build alternatives.

Minimization Techniques

Few methods are available for minimizing the negative impacts of possible construction. The direct threats to migratory birds via habitat loss, habitat fragmentation, and noise may be reduced by reducing the size of a construction footprint or the construction time span. Predation to bird nests may be reduced by minimizing litter on construction sites and around tourist areas post-construction, if construction occurs. As construction activities may provide habitat and foraging pathways for nest predators, reducing the amounts of refuse associated with disturbed areas may reduce initial populations of these organisms. This minimization technique may be most effectively attempted via education.

Mitigation Techniques

GSMNP is committed to mitigation of impacts as part of its ongoing Park policies; however, mitigation opportunities for impacts to migratory bird within GSMNP are limited. Mitigation of impacts that cannot be avoided or minimized may include funding for habitat creation and restoration, rare species management, and the establishment of interpretive programs related to interactions between the natural environment and development. Since opportunities within the Park to restore migratory bird habitat are limited, GSMNP will seek cooperative opportunities with established conservation trusts to restore fragmented landscapes adjacent to the park boundaries.

4.4.8.4 Impairment Evaluation

Impairment of migratory birds in GSMNP and along the AT would not occur under the No-Action Alternative, Monetary Settlement Alternative, Laurel Branch Picnic Area, and the Partial-Build Alternative to Bushnell. The Northern Shore Corridor is not likely to impair migratory birds in GSMNP or along the AT based on the information obtained to date. Due to the magnitude of this alternative, it is likely that additional NEPA documentation would be required to address site specific impacts not currently known and to determine detailed mitigation measures as they relate to final design. The impairment determination related to migratory birds would be re-evaluated in such documentation.

4.4.9 Invasive Exotics**4.4.9.1 Methodology for Assessing Impacts**

Analysis of impacts by invasive exotics on floral and faunal communities within the project study corridors utilizes the length of the road to determine potential impacts. Approximate length of impact was calculated

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