ISSUE 14: MIGRATORY BIRDS

Changes from the Draft to the Final EIS

Following is an overview of changes made to this section from what was presented in the Draft EIS.

- Alternative 7 of the Draft EIS has been replaced with Alternative 7-Modified (7-M). Analysis and comparison of alternatives discussed in this section have changed accordingly.
- The Cumulative Effects Analysis was expanded based on the "General Description of Other Activities and Programs" report (Christiansen 2006). A summary is provided for the FEIS, including a discussion of individual migratory bird species of concern (MNHP2006, MFWP 2006). A detailed analysis of effects to migratory bird species from other activities and programs is available in the project file (Dixon 2006a).
- Programmatic Direction (e.g. goals, objectives, standards and guidelines) changed slightly and were organized differently for Alternative 7-M, so the evaluation of the effects of programmatic direction changed accordingly between Draft and Final EIS.

Introduction

Travel management planning is used to identify and establish opportunities for public recreation use and access on National Forest lands. Implementation of travel management decisions would directly influence the spatial and temporal distribution of human activities on National Forest lands. Human activities, including motorized and non-motorized access and associated recreation, can directly, indirectly and cumulatively influence migratory bird species habitat, distribution, reproduction and survival, and therefore have the potential to affect migratory bird populations.

Migratory bird species are protected under the Migratory Bird Treaty Act (16 USC 703-711). A January, 2001 Executive Order requires agencies to ensure that environmental analyses evaluate the effects of federal actions and agency plans on migratory birds, with emphasis on species of concern. Over 200 species of migratory birds inhabit the Gallatin National Forest at some stage in their life cycle (Cherry 1993). Migratory birds are a very diverse group, and include raptors, waterfowl, shore birds, game birds and songbirds. Species of concern include those listed under the Endangered Species Act, Forest Service Sensitive Species, and those identified as species of concern by the Montana Natural Heritage Program and the Montana Department of Fish, Wildlife and Parks (MNHP 2006, MFWP 2006). Most migratory bird species of concern are addressed as separate Issues within this document. This Issue addresses potential effects of the Travel Plan alternatives on migratory bird species in general, with non-TES species addressed separately in the Cumulative Effects Analysis.

Affected Environment

Migratory bird species are an extremely diverse group, and as such, occupy all types of habitat available on the Gallatin Forest, including lakes, streams, wetlands, riparian areas, grasslands, shrub lands, deciduous forest, coniferous forest, mixed forest, recently burned forest, alpine tundra, rock outcrops and sheer cliff walls. Many migratory bird species use habitat within the Forest as

breeding grounds, while others breed in more northern climes and winter here. Some species are habitat specialists and are relatively restricted to certain cover types such as wetlands, riparian, forest interior or cliff habitat. Others are habitat generalists and can occupy a wide variety of cover types. Some bird species are extremely sensitive to habitat modifications and human disturbance, particularly in breeding areas, while others are much more tolerant of human intrusions, and might actually benefit from habitat modifications resulting from human activities.

Direct and Indirect Effects

It is difficult to address effects to migratory bird species collectively, since travel management actions can have adverse effects on some species, while being neutral, or benefiting others. However, it would not be practical to attempt to address all migratory bird species separately. Therefore, this Issue addresses effects of travel management actions on migratory bird species and habitat in general. Land use effects to individual migratory bird species of concern are addressed in the Cumulative Effects Analysis section. "Species of Concern" for this analysis included those species known to occur on the Gallatin Forest, and identified as being of concern by the Montana Natural Heritage Program (MNHP 2006) and Montana Fish Wildlife and Parks (MFWP 2006).

Analysis Methodology

Effects of travel management on migratory bird species were assessed using a variety of tools. Public comments received in response to the Travel Planning Benchmark (2002) (i.e. initial proposal) were reviewed to identify any potential issues not previously recognized by Forest Service specialists. Agency monitoring and surveying records were reviewed for insight to migratory bird species occurrence, distribution and habitat use patterns across the Forest. A literature review was conducted for additional information on migratory bird habitat use and possible impacts associated with human travel on Forest Service lands. GIS technology was used to quantify impacts of Forest transportation facilities (e.g., roads and trails) on key and/or rare bird habitats such as forest interior/old growth and riparian areas (see Issue 3: Biological Diversity and Ecological Sustainability for old growth and rare habitats, and Issue 17: Riparian Areas).

National Forest transportation systems (i.e. travel management facilities and use) can affect migratory bird species through two primary mechanisms: habitat alteration and disturbance. Habitat alteration involves the modification of habitat by converting one vegetation type to another, loss of habitat due to permanent conversion to a road or trail facility, and habitat fragmentation where continuous vegetation types are broken up by clearing of road and trail corridors. Pollution is basically another form of habitat alteration that results from emissions, toxins and other refuse left behind by humans after working on or using Forest transportation facilities. Disturbance effects result from noise and human presence associated with construction and maintenance of travel facilities in the short term, as well as long term disturbance effects caused by ongoing administrative, commercial and recreational use of facilities.

Effects Common to All Alternatives

Habitat Modification

Habitat modification can alter the quality and quantity of habitat available for migratory bird species. While this Issue will focus on the potential adverse impacts to bird species, it should be noted that some species may benefit from habitat modifications associated with human travel corridors. For example, edge habitat created by the presence of roads and trails is selected by some bird species. Also, road and trail maintenance can increase the availability of grasses, shrubs and/or fruit-bearing plant species required by some birds. Roadside features such as signs, fences, power poles, etc. provide perches for many bird species. Generally speaking, habitat alterations associated with road and trail corridors will typically benefit more generalist species, and have negative impacts on habitat specialists.

For Montana, Hutto et al. (1995) reported that changes in vegetation associated with road corridors, such as wide forest openings and increases in grass or shrub cover, are likely important factors contributing to the differences in bird species detections near roads versus away from roads. Roadside features such as fences or other structures may also influence nesting bird species by providing cover for mammalian predators and perches for avian predators and brood parasites (Bergin et al. 1997, Forman et al. 2003:127).

Habitat Loss

Habitat loss results from the permanent removal of vegetation or other natural features to provide the facilities (e.g. roads, trails, parking lots, trailheads) associated with human travel. Habitat loss was evaluated for wildlife in general in Issue 9: General Wildlife. Construction and maintenance of roads, trails and associated facilities can directly affect bird species through removal of security cover, loss of potential nest sites, destruction of roosting areas and loss of hunting perches. Road and trail construction can also have indirect effects to adjacent habitat through stream siltation and wetland desiccation due to interrupted water flow (Forman et al. 2003:115, 123). Noxious weeds are often spread along road and trail systems. Weed infestations can result in loss of cover and/or forage for numerous bird species.

The greatest impact from loss of bird habitat due to travel facilities occurs in rare habitats such as riparian, wetland, grass/shrub land and old growth, since these habitats are disproportionately affected by travel facilities relative to their presences on the landscape. These habitats also tend to support a high diversity of bird species, including many habitat specialists, relative to other habitat types available on the Gallatin Forest. Another habitat type that is notable in terms of habitat loss due to human travel corridors is forest interior, which typically hosts a wide variety of bird species, many of which are relatively restricted to forest interior habitat. Habitat loss within forest interior patches has additional impacts in terms of habitat fragmentation, which will be addressed later. With the ability to fly, birds are highly mobile and therefore potentially better able to adjust to habitat loss than are more sedentary species (Forman et al. 2003:123). Table 3.14.1 lists a number of bird species that might be considered habitat specialists by virtue of their being relatively restricted to a particular type of habitat.

Table 3.14. 1 Bird species relatively restricted to habitats typically affected by travel facilities. (from Hutto and Young 1999)

Habitat Affiliation	Species Common Name	Scientific Name
Old Growth / Forest Interior	Brown Creeper	*Certhia americana*
	Winter Wren	*Troglodytes troglodytes*
	Golden-crowned Kinglet	*Regulus satrapa*
	Hermit Thrush	*Catharus guttatus*
	Varied Thrush	*Ixoreus naevius*
	Townsend's Warbler	*Dendroica townsendi*
Wetland	Red-winged Blackbird	*Agelaius phoeniceus*
	Common Snipe	*Gallinago gallinago*
	Common Yellowthroat	*Geothlypis trichas*
	Lincoln's Sparrow	*Melospiza lincolnii*
Riparian	Willow Flycatcher	*Empidonax trailii*
	Ruffed Grouse	*Bonasa umbellus*
	Western Wood-Pewee	*Contopus sordidulus*
	Cordilleran Flycatcher	*Empidonax occidentalis*
	Red-eyed Vireo	*Vireo olivaceus*
	Yellow Warbler	*Dendroica petechia*
	Cedar Waxwing	*Bombycilla cedrorum*
	American Redstart	*Setophaga ruticilla*
	Northern Waterthrush	*Seiurus noveboracensis*
	Song Sparrow	*Melospiza melodia*
Grassland/Sage	Grasshopper Sparrow	*Ammodramus savannarum*
	Horned Lark	*Eremophila alpestris*
	Brewer's Sparrow	*Spizella breweri*
	Vesper Sparrow	*Pooecetes gramineus*
	Western Meadowlark	*Sturnella neglecta*

Grassland and shrub/steppe-associated species have shown the most significant declines in populations across their range. However, this guild is relatively poorly represented in breeding communities in the more arid and semi-arid habitats of the west, compared to grass/shrub habitat in the midwest and eastern parts of the United States. In this arid climate, neotropical migrant bird species comprise a greater proportion of breeding bird populations in riparian habitat than in any other major habitat type in the western states (Dobkin 1992:A-5). Riparian cover types represent a small percentage of land area on the Gallatin Forest, and have been disproportionately affected by travel management, as well as other human uses such as housing, recreation, agriculture and livestock grazing. A detailed analysis of travel management impacts on riparian habitat can be found in Issue 17: Riparian Areas.

Habitat Fragmentation

A considerable amount of literature is devoted to habitat modification that results in fragmentation of homogenous vegetation types. Fragmentation effects to wildlife in general are discussed in Issue 3: Biological Diversity and Ecological Sustainability. This Issue will address travel corridor-associated fragmentation effects to migratory bird species. Travel management can affect habitat fragmentation by dissecting contiguous vegetation types with road and trail corridors.

Fragmentation effects have been reported to impact bird species in riparian habitat and grass/shrub lands (Joslin and Youmans 1999:3.22, 3.24), but most of the attention to this issue has been focused

on fragmentation of forest habitat. There is a lack of consistency in the literature about what size opening results in forest fragmentation. Some studies suggest a forest patch is discreet if it is separated by more than 10 m (33 ft) from the nearest neighboring forest patch. Most studies consider forest fragmentation to involve separation of forest patches by at least 100 m (328 ft) of open land (Rich et al. 1994:1110). Perhaps this difference is because most studies of forest fragmentation effects have been focused on large-scale cover type conversion associated with timber harvest and forest clearing for agriculture and housing development. Relatively few studies have considered the potential for narrow corridors (e.g., roads and trails) to produce fragmentation effects (Hickman 1990, Askins 1994, Rich et al. 1994, Miller et al. 1998, Hutto and Young 1999).

Migratory bird species have often been the focus of forest fragmentation issues. Fragmentation has been noted for creating an environment that facilitates nest predation and brood parasitism of forest interior species (Rich et al. 1994:1110). Forest interior migratory bird species tend to be vulnerable to predation and parasitism because they often have open cup nest structures, poorly developed defense mechanisms, nest close to the ground and typically only produce a single, relatively small clutch each breeding season (Dobkin 1992:A-2, Rich et al. 1994:1110). Reduced nest success due to nest predation and/or brood parasitism can ultimately result in widespread reproductive failure and have subsequent impacts at the population level for numerous bird species.

Nest predation can be an important cause of mortality for many bird species (Bergin 1997:437). Small mammals, snakes and even other avian species are the most common nest predators. Predators might be attracted to nests by a number of cues, including visual stimuli such as the presence of humans, trampled vegetation and increased activity of parent birds, as well as olfactory cues such as unfamiliar scents. Skagen and associates (1999:418) suggest that nest predation impacts in response to human cues are more commonly associated with avian nest predators than with mammalian or reptilian predators. Road and trail corridors through continuous forest habitat can lead to increased nest predation rates since smaller forest patches may be easier for predators to penetrate, and roads and trails provide travel corridors for predators to access forest interior from nearby open habitat (Joslin and Youmans 1999:3.23, Askins 1994:339).

Brood parasites are birds that lay their eggs in the nests of other species, leaving the host species to rear their young. Obligate brood parasites are those species incapable of building their own nest, and so must depend upon other species to hatch and raise their young (Ehrlich et al. 1988:287, 289). The brown-headed cowbird is an obligate brood parasite that was historically absent, or very uncommon in the western United States. Their recent appearance in western states has been attributed to the spread of human land uses, particularly agriculture. Brown-headed cowbirds are now fairly common in south-central Montana, where landscapes are characterized as relatively dry, sparse forest with wide agricultural valleys (Young and Hutto 1999:41, 45).

Cowbirds show a distinct preference for edge habitats between shrub or forest types and open land, due to the combination of breeding and foraging opportunities available along or near edges. Riparian areas can be heavily impacted by cowbirds. Riparian habitats contain a high diversity of songbirds and hence host species, and are often more common at lower elevations in closer proximity to agricultural lands where foraging opportunities are greatest for cowbirds. Songbird species relatively restricted to riparian habitat could be at serious risk from cowbird parasitism (Young and Hutto 1999:51).

Road and trail corridors are relatively permanent features on the landscape, and can result in forest fragmentation by creating permanent openings in the forest canopy. Since road and trail corridors remain in the same location for many years, they can become learned features used by multiple generations of predatory and/or parasitic species (Askins 1994:339).

Hickman (1990 *cited in* Joslin and Youmans 1999) found that nest predators and brood parasites were attracted to edge habitat along nature trails only 2-3 m (6-10 ft) wide in Illinois. In Colorado, Miller and others (1998 *cited in* Joslin and Youmans 1999) reported that predation of songbirds was notably higher along forest trails than in forest interior habitat. Various authors (Askins 1994, Knight and Gutzwiller 1995, Skagen et al. 1999) have noted the potential for nest predators to follow human scent along trails or through vegetation. In Montana studies, Hutto and Young (1999:12) pointed out that trails are likely to be in undisturbed habitats, whereas roads in forested environments are often associated with additional habitat modification factors such as timber harvest units.

Rich and associates (1994) studied the impacts of forest fragmentation associated with cleared road corridors on bird species in southern New Jersey. They found significantly greater relative abundance of forest interior bird species in edge habitat along narrow (approximately 8 m or 26 ft wide) unpaved forest roads than along wider (16 m or 53 ft wide) paved secondary roads. No significant differences in forest interior bird species abundance was found between narrow unpaved Forest road edges and forest interior habitat. Based on these findings, they concluded that forest interior nesters did not perceive a difference between forest interior habitat and edge habitat along unpaved forest roads. However, although most forest interior nesting species did not appear to avoid edge habitat along paved or unpaved forest road corridors, there were differential rates of nest predation and brood parasitism along varying widths of road corridors, suggesting that some corridors, particularly wider corridors with mowed edges, may be creating ecological traps for some migratory species of forest interior nesting songbirds.

Hutto et al. (1995) examined the rate of bird detections between on-road and off-road point counts in Montana. The majority of all species detected were found in both on-road and off-road points. However, points along roads less than 10 m (33 ft) wide did not show a difference in number of species detected from off-road points, whereas point counts along wider roads detected significantly more bird species than found in corresponding off-road points. Most species detected in the on-road points were those that typically forage in forest openings and shrubby habitat often present along road corridors. Those species detected in greater proportions in off-road points were forest interior associates. The most notable differences in number of species detected for on-road and off-road points occurred in forested cover types, with closed canopy forest showing the greatest difference, followed by open forest, and then early succession forest types.

It appears that corridor width can influence bird species composition and associated nest predation and parasitism rates along roadways. Studies that specifically addressed the fragmentation impacts of road corridors on bird species (Rich et al. 1994, Askins 1994 and Hutto et al. 1995) generally reported that narrow (8-10 m, 26-33 ft) road corridors had few notable impacts on nesting bird species, whereas wider corridors, particularly where shoulders were maintained with mowing, had more notable effects associated with nest predation and brood parasitism. Approximately 99% of

inventoried Forest Service road corridors on the Gallatin are less than 10 m (33 ft) wide. Roadside vegetation on the Forest is periodically managed through brush removal, but only the high use roads receive treatment, and only when the need arises (i.e., there is no set schedule for brush removal). Unpaved Forest road edges are rarely ever mowed, and therefore do not typically provide the type of grassy roadside vegetation preferred by cowbirds and some edge-associated nest predators.

Pollution

Pollution associated with travel management could include chemical treatment of road surfaces and surrounding vegetation, or might result from food and garbage left behind by humans as they travel through the Forest. De-icing agents used on road surfaces in winter can be lethal to migrating bird species. Salt is highly toxic to birds and can cause lethargy or reduced escape reactions to threats (Jacobsen, in press). Chemical treatments of Forest Service road surfaces on the Gallatin have been limited to occasional use of magnesium chloride (liquid) or calcium chloride (flakes) on a few major road surfaces for dust abatement. Although de-icing agents are not used on Forest Service roads, chemicals used for dust abatement include various forms of salt, which could be toxic to birds if ingested. Weed treatment commonly occurs along Forest roads and trails. Although most herbicides are generally non-toxic to birds, the resulting habitat modification can affect birds by removing potential nesting and/or security cover (Gard et al. 1992:311). Food or garbage left by humans can attract bird species such as crows, ravens and jays (Forman et al. 2003:129). Attractants left along busy road corridors could result in bird mortalities due to collisions with vehicles. In addition, birds may consume indigestible items, which can have serious health consequences. Lead contained in shot used for upland game bird hunting and target practice, along with sinkers used for fishing, is a pollutant that can harm birds. Lead poisoning in migratory bird species is most likely to affect carnivorous species (e.g. raptors, scavengers), which are apt to feed on carcasses of upland game birds killed or wounded with lead shot, but not retrieved by hunters.

Disturbance

The presence of travel facilities on the landscape generally affects bird species through habitat modification and associated impacts discussed above. The presence of humans using travel facilities typically affects birds through disturbance mechanisms. Knight and Gutzwiller (1995:135) stated: *"human occupation and activity are clearly and directly correlated with declines in breeding populations of birds."* Human disturbance associated with travel management can elicit both physiological and behavioral responses from birds, which can affect reproductive success and survival.

Physiological responses can include elevated heart rate and increased energy expenditure due to forced avoidance flights, as well as decreased energy intake and potential malnutrition due to displacement from foraging areas. Disturbance during the breeding season can affect reproductive success, while disturbance outside the breeding season can influence a bird's energy balance, and consequently affect survival rates (Knight and Gutzwiller 1995:52, 73, 75).

The most severe physiological response to human disturbance is mortality. Although some migratory species of waterfowl are legally hunted, most migratory bird species are protected under the Migratory Bird Treaty Act and consequently, direct mortality of birds due to human disturbance

factors is generally not a significant factor at the population level. However, bird mortality indirectly related to human disturbance can be an important factor driving population levels. For example, predators may learn to follow human scent to nest sites, and avian predators appear to learn about nest locations by visual cues from humans visiting nest sites (Knight and Gutzwiller 1995:55).

Behavioral responses to human disturbance can influence reproductive success and survival rates of migratory birds. In areas where human disturbance is common, researchers have detected a curtailment of male singing activity in some bird species. Reduced singing efforts may be an indication of diminished breeding activity (Joslin and Youmans 1999:3.24). Human disturbance can reduce the rate of food delivery to dependent young at the nest site, with subsequent impacts on nestling survival rates (Andersen et al. 1990:140). Such disturbance during years of food shortage may result in nest abandonment, or preclude females from breeding (Knight and Gutzwiller 1995:57).

Many songbird species have been noted to alter their behavior patterns after repeated interactions with humans. Nest defense behavior and aggressive responses to humans not only increase energy costs to parent birds, but also might be used as visual cues by predators and nest parasites to detect nest locations (Knight and Gutzwiller 1995:55). Disturbance from human activity can cause some bird species to expand their home ranges, requiring greater energy expenditures to accomplish daily routines (Andersen et al. 1990).

When adult birds are flushed from a nest in response to human intrusion, nestlings are exposed to increased thermal and water stress. Prolonged exposure to the elements can result in nestling mortality (Joslin and Youmans 1999:3.24). Pets traveling with humans can flush adult birds from nests, and may end up killing the young or the parent birds. Some bird species have shown a stronger fear response to domestic dogs than to native predators (Knight and Gutzwiller 1995:57). Birds flushed from nesting, resting or foraging sites near roads may be at greater risk of mortality due to collision with a vehicle. Fledgling birds are inexperienced flyers and are therefore more vulnerable to collision with passing vehicles (Jacobson, in press).

Birds may change nest locations in response to human disturbance. Alternate nest sites may be less suitable in terms of security and thermal cover, availability of foraging habitat, perch sites, etc. (Knight and Gutzwiller 1995:55). Breeding birds use various vertical positions in the vegetation layers for different functions such as feeding, nesting and resting. Human intrusions can influence vertical bird distribution in vegetation strata by causing displacement from some layers. Changes in vertical distribution could result in greater energy expenditures, increased interspecific competition and reduced nesting success. Birds displaced into higher levels of the forest canopy may be susceptible to increased stress from environmental factors such as wind, greater temperature variation, and heightened exposure to avian predators. Changes in vertical location of nests may also require greater energy expenditure for adults to access the nest to feed nestlings (Gutzwiller et al. 1998:502).

Forman et al. (2003:125) reported that breeding birds seem to be affected by noise disturbance associated with traffic on roads and trails. Noise disturbance from use on roads and trails likely has greater impact on grass and shrub/steppe-associated species than on forest nesting species, due to

the greater potential for sound to travel through more open habitat (Joslin and Youmans 1999:3.24). Variation in bird breeding strategies influences the degree to which human intrusion along roads and trails might affect breeding success (Skagen et al. 1999:415). For example, forest interior breeding birds are less likely to nest near roads and trails than shrub nesters, and are therefore less vulnerable to disturbance from human travel along access routes. Bird species with a low tolerance for noise disturbance often exhibit a behavioral avoidance of roads and roadside habitat, and are less susceptible to mortality from vehicle collisions, but may suffer from reductions in availability of suitable habitat. On the other hand, species that utilize food sources found along roads (e.g., road kills, garbage, spilled grain) are more susceptible to road mortality (Forman et al. 2003:122).

Although noise associated with human travel is certainly a disturbance factor that can influence bird behavior, birds are able to adapt and habituate more quickly to mechanical (or motorized) noise than to human presence (Knight and Gutzwiller 1995:104). Therefore, non-motorized use on and off trails may be a more severe disturbance factor for some birds than motorized travel restricted to designated routes.

Comparison of Direct and Indirect Effects by Alternative

For comparison purposes, Alternative 1 best represents the existing condition regarding landscape scale effects on migratory bird species habitat. Most of the habitat alteration (e.g. modification, loss and fragmentation) associated with Forest travel management already exists, and any future construction, relocation or major reconstruction of existing or proposed facilities will require separate, site-specific NEPA analyses prior to initiating major ground-disturbing actions. Alternative 1 reflects the recent past situation where off-route travel by motorized vehicles was allowed, and also represents the existing condition where many project roads and user-built routes are not currently restricted for motorized use by the public. Alternative 1 also best represents the existing condition for evaluating disturbance effects to migratory bird species, since this alternative considers impacts currently resulting from public motorized use on many project roads and user-built routes.

Alternative 1 represents a worst-case scenario for both habitat alteration effects and disturbance impacts to migratory bird species. Alternative 1 would sustain overall higher travel route densities by keeping all existing Forest System routes open, plus leaving many project roads and user-built routes open to public motorized use. In addition, Alternative 1 would have the greatest potential for off-route travel by OHVs. This combination of factors would not only keep habitat alteration patterns at existing levels, but would allow for further habitat loss, modification and/or fragmentation due to continued proliferation of off-route use and user-created permanent routes. Under all other Alternatives (2 through 7-M), motorized travel would be restricted to designated routes. Project roads and user-built routes would be closed to public motorized use. Road widths and levels of roadside treatment would not likely vary greatly between alternatives. However, Alternatives 2 through 7-M would reduce the overall miles of road corridor from the existing condition. In addition, road closures under these alternatives would result in vegetative regrowth, eventually reducing or eliminating habitat modification effects in some places across the Forest, whereas most existing road corridors would be expected to remain under Alternative 1.

Alternatives 2 through 7-M embrace a basic change in travel management philosophy from all routes and areas open for motorized use unless designated closed, to a system where all summer motorized traffic is restricted to designated routes, which would result in a notable reduction of direct and indirect effects associated with travel management when compared with Alternative 1. Some illegal off-designated-route motorized travel would likely occur with implementation of Alternatives 2 through 7-M; however, such use is expected to decrease over time with education and enforcement. Restricting motorized use to designated routes would likely result in an overall reduction of non-motorized use, on and off-routes, simply due to a net decrease in access. Human use levels on Forest roads and trails during the peak bird breeding season are often low, due to poor road conditions associated with spring break-up and wet weather. Higher traffic volumes on Forest Service roads and trails are associated with mid-summer recreation use and fall hunting season.

In summary, travel management activities clearly can have adverse effects on migratory birds, and all alternatives have the potential for causing negative impacts to individual birds. However, there is no evidence that Gallatin Forest travel management activities alone have had adverse effects at the population level for any migratory bird species. Rather, population-level effects to migratory bird species have been attributed to cumulative effects of multiple land use practices. Cumulative effects analysis is presented below.

Cumulative Effects

Net Effects of Past and Present Programs and Activities

It is difficult to address cumulative effects to migratory bird species collectively, since various management actions can have adverse effects on some species, while having no effect or benefiting others. With over 200 migratory bird species known to occupy habitat on the Gallatin Forest (Cherry 1993), it would not be practical to attempt to address them all individually. Therefore, this section summarizes cumulative effects of land uses to migratory bird species in general, focusing on those activities considered to have the greatest impacts on birds. A detailed analysis of cumulative effects to migratory bird species from specific land use activities occurring within the Gallatin National Forest is contained within the Travel Plan project files (Dixon 2006a). The January 2001 Executive Order regarding the Migratory Bird Species Act directs agencies to evaluate the effects of federal actions and agency plans on migratory birds, with emphasis on species of concern. Therefore, this section also addresses cumulative effects of land use actions on species of concern as identified by the Montana Natural Heritage Program and Montana Fish Wildlife and Parks.

Forested landscapes in the intermountain western states has historically been shaped by dynamic disturbance processes such as widespread fire, insects and disease, resulting in a naturally-fragmented landscape compared to the more homogenous forest habitats of the eastern United States and Pacific northwest states. Human-induced habitat modification in the inland west has been a function of timber harvest and fire suppression. In general, western populations of migratory bird species have faired better than eastern North American populations (Dobkin 1992:A-4).

Timber harvest can result in habitat loss, forest fragmentation and increased edge, which could lower nest success of forest interior nesting species near forest/non-forest ecotones by attracting edge-associated nest predators and brood parasites. However, timber harvest within large forest

tracts (typical of the Gallatin Forest) results in internal rather than external edge habitat, and is therefore less likely to attract cowbirds (primary brood parasite) than agricultural and/or housing development near the forest edge. In Montana, Young and Hutto (1994:45) found cowbirds to be uncommon in higher elevation, densely forested habitats, although they were fairly common in logged forests, but were found more often in partial harvest units than in clear cuts. Timber harvest results in temporary habitat modification whereas agriculture and housing development create permanent changes on the landscape (Askins 1994:339).

Fuel reduction projects on the Gallatin Forest often involve removal of understory vegetation such as grasses, shrubs, young conifers and lower tree branches. These projects may also remove mature trees to break up a closed canopy in order to prevent or retard the spread of crown fire. Such manipulation of habitat components can influence survival and reproductive rates of migratory bird species by altering cover, forage and predator/prey relationships. Changing habitat structure through fuel reduction projects could ultimately influence bird species composition in treated areas.

Fire can have dramatic effects on bird species, whether through direct mortality or indirectly through habitat alteration. Most bird species native to this area are highly adapted to our fire dependent ecosystem. Large-scale high intensity burns are largely responsible for maintaining natural forest succession patterns and providing habitat diversity. Natural ignition fires (lightning-caused) typically occur mid to late summer when most young birds are fledged and are capable of rapid and prolonged flight to escape wild fire. Human-caused fire can occur any time of year, and prescribed fires on the Gallatin Forest are often planned for spring-time ignition in order to use high fuel moisture levels, standing water and/or snow to help contain fire within prescribed burn units. Spring burns occur during the nesting season when birds are vulnerable, and could result in reproductive failure for some individuals.

Fire suppression has increased the proportion of mature forest on the landscape, potentially to the detriment of some grass and shrub nesting bird species. Natural fire regimes are responsible for maintaining forest succession patterns and providing habitat diversity. However, past fire suppression efforts have resulted in unnatural levels of fuel buildup, which is now having the effect of producing proportionately more catastrophic wild fires, and consequently having severe impacts on native habitat. Recently burned forest habitat provides snags for perch or nest trees, as well as a wide variety of insects attracted to the dead and dying trees in burned areas. These features are required by many migratory bird species including woodpeckers and several other species of cavity-nesters and insectivorous birds. Fire suppression efforts have altered the amount and distribution of recently burned forest habitat across the landscape.

Livestock grazing can affect migratory birds in a number of ways, such as destruction or disturbance of ground and shrub nests, removal of ground cover, and attraction of cowbirds. Young and Hutto (1994:51) reported distance to agricultural land as the strongest predictor of cowbird presence. Their study suggests that cattle grazing and agricultural uses are directly related to the expansion of cowbirds into western landscapes in recent times. Riparian habitat in the western states has been particularly heavily impacted, often resulting in serious degradation, by livestock grazing (Dobkin 1992:A-5). Some riparian habitat has been affected by livestock grazing on the Gallatin Forest, but new riparian grazing standards should reduce negative effects.

Robertson and Flood (1980 *in:* Knight and Gutzwiller 1995:60) reported decreased bird species diversity and reduced nest success in developed recreation areas. Songbird diversity and density is often lower in habitat within or near developed campgrounds. Facilities associated with campgrounds are often located in riparian habitat, which when unimpaired, supports a proportionately high diversity of bird species relative to other habitats available. Loss of the shrub component in and around campgrounds reduces key nesting habitat for a number of species. Campground facilities in riparian habitat can also reduce the availability and/or quality of stream bank nesting habitat. Rock climbing is becoming more popular as a recreation activity. Rock climbing activities could reduce nest success in cliff-nesting birds, and may also affect species diversity and bird behavior in cliff-nesting communities (Joslin and Youmans 1999:3.24, 3.25).

Migratory birds species of concern; i.e. those known or suspected to have experienced population declines due to human activities, are most notably those listed as threatened or endangered species (e.g. bald eagle – currently listed as threatened, peregrine falcon – listed as endangered until 2000). Forest Service sensitive species are those identified by the Regional Forester for which population viability is of concern, as evidenced by current or predicted downward trends in population numbers or downward trends in habitat capability that would reduce a species' existing distribution. Migratory bird species currently on the sensitive species list for the Gallatin Forest include the peregrine falcon (added to the sensitive species list upon removal from the endangered species list), northern goshawk, flammulated owl, harlequin duck and trumpeter swan. Threatened, endangered and sensitive species are treated in separate sections within this EIS.

The Montana Natural Heritage Program and Montana Fish Wildlife and Parks have joined together to produce a list of "Species of Concern" for the state of Montana (MNHP 2006). This list includes federally listed species such as threatened, endangered and sensitive species, but also includes non-TES species. Migratory bird species of concern on the state list that are not classified as threatened, endangered or sensitive, and are known to occur at least occasionally on the Gallatin Forest include the American White Pelican, Swainson's Hawk, Brewer's Sparrow, Grasshopper Sparrow, and Olive-sided Flycatcher. These species are considered potentially at risk due to habitat concerns or other factors with potential to have adverse effects at the population level.

The primary threat or limiting factor for the American White Pelican is the potential loss of water supply (MFWP 2006). This factor is not influenced by Forest Service actions in general or Travel Management considerations under the jurisdiction of the Gallatin Forest. Swainson's Hawks typically nest in lowland river bottoms, habitat that is not generally found on NFS lands within the Gallatin Forest boundary. Nesting habitat for Swainson's Hawk has most likely been influenced by housing development and conversion to agriculture on private lands. However, this species tends to be more tolerant of human presence than other hawks. They commonly hunt in agricultural fields and sometimes even nest in close proximity to housing developments (MFWP 2006). Swainson's Hawks feed on small mammals, birds and insects. Foraging habitat for this species could be impacted by Forest management actions such as livestock grazing, timber harvest, fuel reduction projects, prescribed burns and fire suppression efforts. The Swainson's Hawk is one of the longest distance migrating raptors in North America (Rich, et al. 2004:53) and could be facing risk factors on wintering range.

Brewer's Sparrow and Grasshopper Sparrow are shrub (sage) and grassland nesting species respectively. These nesting habitats have been affected by livestock grazing and fire suppression in some places on the Forest, but impacts at the population level for these species are likely due to range-wide land uses including conversion to agriculture and housing development in addition to livestock grazing and fire suppression on both public and private land across the western US. Olive-sided Flycatchers are associated with post fire coniferous forest habitat, but have also been detected frequently in harvested forest types (Hutto and Young 1999:25). Breeding bird surveys have indicated declining population trends for this species. Hutto and Young (1999:25) have questioned whether this trend could be due to timber harvest creating an 'ecological trap' for the species by giving the appearance of early post fire habitat, but not providing essential habitat components. This theory has yet to be tested.

Projected Combined Effects of Reasonably Foreseeable Programs and Activities

Projected effects of reasonably foreseeable programs and activities have potential for both positive and negative cumulative effects to migratory birds and their habitat. Unmanaged recreation, invasive species, unnatural fuel buildup and loss of open space are four major ecological threats recognized by public land management entities. Generally speaking, traditional land management practices are trending toward more ecologically sensitive programs. Accordingly, management practices are being redesigned to have less negative impacts on the land, while still allowing for the maximum spectrum of land uses within the capability of resources. On the other hand, private development is occurring at an exponential rate. Major developments (cities, high-volume/speed transportation systems) result in large-scale permanent habitat loss and have greater potential for direct mortality (through vehicle collision) than most actions predicted to occur on public land.

Effects of Proposed Goals, Objectives, Standards and Guidelines

Alternative 1
Under Alternative 1, the goals, objectives standards and guidelines related to travel management would remain as they are currently stated in the existing Forest Plan (1987). Much of the programmatic direction contained within the 1987 Forest Plan is outdated and less useful than perceived when the Plan was completed. Staying with existing direction would maintain the status quo, which would provide fewer protective measures than proposed for Alternatives 2 through 7-M.

Alternatives 2-6
Under Alternatives 2-6, proposed goals, objectives, standards and guidelines are based on more current science and tier to current direction that is separate from the Forest Plan. Under these alternatives, proposed goals, objectives, standards and guidelines, if implemented, would generally serve to improve migratory bird habitat quality by reducing human disturbance factors in important habitats and during critical times.

GOAL A basically states that the overarching focus of the Forest Travel Plan is to provide a system that promotes public enjoyment of the Forest's resources, including wildlife. Bird watching is one of the most oft-cited activities participated in by recreationists on NFS lands. People will generally

only support conserving a resource that they perceive provides some value to them. If the public were not allowed broad access to the natural resources available on NFS lands, there would be little incentive to support management programs focused on conservation of those resources.

OBJ. A-6 provides designations for backcountry airstrips located throughout the Forest. This objective applies only to Alternative 3. Aircraft landing in the backcountry would add a considerable disturbance factor in migratory bird habitat. In addition, there would be potential for direct bird mortalities due to collisions with aircraft during approach, landing and/or takeoff at airstrips. During the spring nesting season, breeding birds could be displaced from nesting and/or foraging areas, which could affect the reproductive success of individual birds. During the summer fledging period, young birds are learning to fly and their skills are limited. Aircraft use in close proximity to nest sites during this time could frighten fledglings away from the nest before they have the flight skills necessary to return. Young birds would also be more vulnerable to collision with moving aircraft. These factors could affect survival and recruitment rates for birds nesting in close proximity to landing strips. Since migratory bird species use all types of habitat for nesting purposes, all candidate landing site locations identified in Table I-3 would have potential for adverse effects to migratory birds during the nesting and fledging seasons. During the fall migration period, birds flock together in preparation for the journey between breeding and wintering grounds. During this time, energy reserves are critical, and any disturbance that causes unnecessary flight, particularly if it results in displacement from foraging opportunities, depletes these reserves, which could influence over-winter survival rates of some individual birds.

STANDARD A-6 would prohibit wheeled motorized vehicle use off designated routes. This practice would limit potential for nest destruction and associated bird mortality that can result from motorized traffic through ground or shrub nesting habitat. Habitat fragmentation from user-built roads and trails would also be limited through implementation of this standard.

GUIDELINE A-11 would place springtime restrictions on horse and mountain bike use in areas where soils are wet and resource damage can result from use. Implementation of this guideline would reduce disturbance factors in some areas during the primary nesting season for most migratory bird species.

OBJECTIVES C-1 AND C-2 would close and rehabilitate travel corridors that are not designated for public travel. Such closures would promote vegetation growth, which would subsequently restore nesting, foraging and/or security habitat for some bird species, and would also reduce habitat fragmentation in some areas.

GOAL F would manage use of travel facilities to promote recovery of threatened and endangered species and maintain sensitive species and their habitat. Most migratory bird species of concern on the Gallatin Forest are listed as threatened or sensitive species. Special management consideration for protecting these species and their habitat would also benefit numerous other bird species using similar habitat.

GOAL G AND OBJECTIVE G-1 would provide healthy vegetative conditions in key habitats such as willow, riparian and others by eliminating undesignated roads and trails through such areas. Willow and riparian communities contain some of the highest bird diversity on the Gallatin Forest. These communities represent a small fraction of habitat, and are disproportionately affected by travel and other uses.

GOAL H AND OBJECTIVE H-1 would provide security in important nesting habitat by striving to eliminate human stress factors during the nesting season.

GOAL L would emphasize coordinated management such that administrative and project travel facilities are developed and used in a manner consistent with Forest Plan direction for other resources including wildlife.

STANDARD L-1 would prohibit public motorized use on project roads. This standard would keep motorized disturbance levels to a minimum during project implementation.

GOAL M emphasizes protecting water quality, wildlife habitat, fish habitat and historical resources. This goal statement has several associated STANDARDS and GUIDELINES (M-1 through M-7 and M-10) that focus on protecting water quality, aquatic resources and riparian vegetation. This set of direction would help promote healthy riparian habitats, which are extremely important to migratory bird populations.

> **STANDARD M-8** would limit motorized access, which would constrain overall human access to bird habitat within the Forest.
>
> **GUIDELINE M-9** would encourage effective closure of project roads upon completion of project implementation. Road closures allow for regrowth of native vegetation, which would benefit birds by restoring nesting, foraging and security habitat, as well as reducing fragmentation effects.

Alternative 7-M

Under Alternative 7-M, programmatic direction was organized slightly different than for Alternatives 2-6. In some cases, goals, objectives, standards and guidelines actually changed for Alternative 7-M, whereas in other cases, only the identification system changed (i.e. alpha-numeric identifiers for goals, objectives, etc.). In the latter case, the effects analysis for Alternatives 2-6 applies for Alternative 7-M as well.

GOAL A: Same as Alternatives 2-6.

> **OBJ. A-6** is essentially the same as in Alternatives 2-6, with the exception that there are no potential site-specific locations for backcountry airstrips identified, and instead there are geographic areas listed in which backcountry airstrips for public recreation use would be prohibited. Effects to migratory birds from the possible future development of backcountry airstrips would be the same as described for Alternatives 2-6. In addition, Alternative 7-M contains a standard (A-7) that expressly disallows landing and/or takeoff of recreational aircraft, except at designated and authorized sites, of which there currently are none on the

Gallatin National Forest. Any future proposals for backcountry airstrips would have to go through a separate NEPA analysis.

STANDARD A-8 is the same as STANDARD A-6 for Alternatives 2-6.

Alternative 7-M eliminates the Forest-wide GUIDELINE (A-11 under Alternatives 2-6) for spring closures to protect road and trail facilities from impacts associated with early season mountain bike and horse use, and instead such restrictions would be implemented on a route-by-route basis. Although Forest-wide restrictions would reduce access somewhat during the bird breeding season, it is unknown to what degree horse and mountain bike use affect nesting birds, but impacts from such use are considered to be relatively low.

GOAL D, OBJ. D-1 and D-2 are the same as GOAL C, OBJ. C-1 and C-2 for Alternatives 2-6.

STANDARDS D-5 and D-6 are essentially the same as STANDARDS L-1 and M-8 for Alternatives 2-6.

GUIDELINE D-7 addresses new roads constructed for project activity. This guideline in Alternative 7-M would have similar effects as those described above for GUIDELINES M-9 and M-10 in Alternatives 2-6.

GOAL E and all associated OBJ. and STANDARDS are similar to direction under GOAL M in Alternatives 2-6. This set of direction focuses on restoring and maintaining healthy aquatic systems, which provide riparian habitat that is vital to a large proportion of migratory bird species.

GOAL G is similar to GOAL F in Alternatives 2-6, but the wording is changed slightly. Whereas the statement for Alternatives 2-6 specifies "**Threatened, Endangered and *Sensitive* Wildlife Species**" the statement in Alternative 7-M changes "***Sensitive***" to "***Species of Special Management Designation***". Effects to migratory birds would be essentially the same as described above for GOAL F in Alternatives 2-6.

GOAL H along with **OBJ. H-1** and **GUIDELINES H-2 and H-3**, are similar to GOAL G and OBJ. G-1 in Alternatives 2-6. However, the direction in Alternative 7-M is a bit more detailed and would likely provide better protection for key habitats than the language contained in Alternatives 2-6.

GOAL I plus GUIDELINES I-1 and I-2 are essentially the same as GOALS H and I, plus OBJS. H-1 and I-1 in Alternatives 2-6, but worded slightly differently, and replace objectives with guidelines. Effects to migratory birds would be similar to that described above for Alternatives 2-6, but the wording in Alternative 7-M is more accurate and should be better for effectively managing travel facilities and use to the benefit of migratory birds.

Consistency with Laws, Regulations, Policy, and Federal, Regional, State and Local Land Use Plans (including the Forest Plan)

Management of migratory bird species and their habitats are governed by a wide variety of authorities. Most direction regarding conservation of these species falls under the umbrella of the Migratory Bird Treaty Act (16 USC 703-712) and an associated Presidential Executive Order. Under this Act, which implements various treaties and conventions for the protection of migratory birds. It is unlawful to take, kill or possess any migratory birds, except as regulated by authorized hunting programs. Executive Order 13186 directs Federal agencies whose actions have a measurable negative impact on migratory bird populations to incorporate migratory bird conservation into planning processes and take reasonable steps that include restoring and enhancing habitat. The proposed Gallatin Forest Travel Plan has taken migratory bird conservation issues into account through effects analyses. Alternative 1 would maintain the status quo for managing travel facilities and use for potential impacts to migratory bird species and their habitat. There is currently no evidence that existing travel management practices alone (i.e. excluding other types of land management actions) are having adverse impacts on any migratory bird species at the population level. Alternatives 2 through 7-M all include proactive measures that would facilitate restoration and enhancement of bird habitat through elimination of unacceptable travel routes in key habitats, implementation of seasonal restrictions in some areas, and establishment of goals, objectives, standards and guidelines that would facilitate the protection, restoration and enhancement of important nesting areas.