Terrestrial Management Indicator Species for the Boise, Payette, and Sawtooth National Forests

Introduction

This paper presents the legal requirements for selection of Management Indicator Species (MIS) from the 1982 NFMA implementing planning regulation 36 CFR 219.19, and describes MIS in the original Forest Plans for the three Southwest Idaho Ecogroup (Ecogroup) Forests, MIS proposed for the revised Forest Plans, and rationale for changes between the original and revised Plans.

Legal Requirements For MIS

Federal regulation 36 CFR 219.19 requires that viable populations of all native and desirable non-native vertebrate species be maintained at the planning area level (generally considered the Forest). The regulations recommend the use of MIS populations to reflect the effects of management activities. MIS may be selected from plant and animal species that are: threatened or endangered; sensitive; ecological indicators; important for recreational, commercial, subsistence, or aesthetic values; representative of special habitats, habitat components, or plant and animal communities; and/or species that are of high concern.

The following are some of the key elements related to MIS from the federal regulation:

> "Each alternative shall establish objectives for the maintenance and improvement of habitat for MIS --- to the degree consistent with overall multiple use objectives of the alternative" 219.19(a)
>
> "In order to estimate the effects of each alternative on fish and wildlife populations, certain vertebrate and /or invertebrate species present in the area shall be identified and selected as MIS and the reasons for their selection will be stated. These species shall be selected because their population changes are believed to indicate the effects of management activities." 219.19(a)(1)
>
> "Planning alternatives shall be stated and evaluated in terms of both amount and quality of habitat and animal population trends of the MIS" 219.19(a)(2)
>
> "Populations trends of MIS will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with State fish and wildlife agencies, to the extent practicable." 219.19(a)(6)

The National Forest Management Act (NFMA) also directs national forests to identify MIS whose populations and habitat conditions indicate potential impacts from Forest management. By monitoring and assessing habitat conditions of indicator species, managers can estimate effects on other species with similar habitat needs.

MIS In The Original Forest Plans

MIS in the original Forest Plans (USDA Forest Service 1987, 1988 and 1990) for the Ecogroup are listed in Table F-1, below. Each Forest has a different combination of MIS, as reflected in the third column of the table.

Table F-1. Terrestrial Management Indicator Species in the Original Forest Plans

Type	Common Name	Forests with MIS
Mammal	Rocky Mountain elk	All 3
	mule deer	Boise, Sawtooth
	red-backed vole	Boise
	meadow vole	Boise
	mountain goat	Sawtooth
Bird	pileated woodpecker	All 3
	yellow warbler	Boise
	mountain chickadee	Boise
	Williamson's sapsucker	Payette
	vesper sparrow	Payette
	Lewis' woodpecker	Sawtooth
	Brewer's sparrow	Sawtooth
	sage grouse	Sawtooth
	Columbian sharp-tailed grouse	Sawtooth

Proposed Deletions from Original Plan MIS Lists

Forest Service vegetation management is designed to achieve desired conditions (see Appendix A to the revised Forest Plans), and the desired conditions are largely based on the historic range of variability (HRV) for vegetation in which native species evolved. The main assumption behind this management philosophy is that vegetation conditions that approach the HRV should also provide a diversity of habitats for the native species that historically occurred in this area.

However, vegetation management activities cannot simultaneously improve habitat conditions for all species. Some conditions may improve, stay roughly the same, or decline as a result of activities, along with the species that use them. This situation is also true for natural disturbance events, but the legal intent behind MIS requires that the Forest Service select those species and habitats that may be affected by management activities. Of particular concern are those habitats that have changed substantially from the HRV due to past management activities, or that may change substantially due to ongoing and future management activities. Another related and important consideration in selecting MIS is whether these Forest management-related habitat changes are a primary influence on the species viability or survival, or whether factors outside Forest Service control may be exerting equal or greater influence.

The re-evaluation of MIS was identified MIS as a Need For Change in the *Preliminary Analysis of the Management Situation* (USDA Forest Service 1997). MIS in the original Forest Plans were selected primarily because their habitat requirements encompassed a diverse range of conditions. However, monitoring and management experience with MIS since the Plans were developed have indicated that some species may not be the best indicators for the habitats they are intended to represent. For instance, adult chinook salmon may not be the best fish species indicator for on-Forest habitat because their populations are substantially affected by many off-Forest activities and conditions, including hydro-electric dam modification of migratory habitat, commercial harvest and predation, and genetic dilution due to hatchery introduced fish.

This section describes the terrestrial MIS in the original Forest Plans that are being dropped as MIS in the revised Plans, and provides rationale for the deletions.

Vesper Sparrow *(Pooecetes gramineus)*
The vesper sparrow was selected as an MIS for the Payette National Forest's 1988 Plan as an indicator of non-forested or early successional forest vegetation following timber harvest.

This species is a migratory land bird. It summers throughout Idaho in non-forested areas, but winters south of Idaho. Vesper sparrows prefer dry, open areas with short, sparse, and patch vegetation, including shrub steppe, grasslands, sagebrush, woodland edges, and clearings. This species utilizes a narrow set of habitat conditions for nesting—sparsely or patchily distributed brush with abundant grass cover. Nesting habitat may be affected by grazing activities that cause changes in early successional stages of forest habitat (Groves et al. 1997).

The vesper sparrow is a moderate-priority species for Idaho Partners in Flight (IPIF) (IPIF 2000). Wisdom et al. (2000) estimated a 38 percent decrease in source habitat within the Columbia River Basin (CRB) and a 13 percent decrease in Ecological Reporting Unit 13 (ERU). The Payette National Forest lies within ERU 13. The loss of source habitat within the CRB and ERU 13 was attributed to the conversion of sagebrush to agriculture and conversion of sagebrush to exotic weeds and grasses. The species can use some agricultural crops for nesting, but may face nest loss due to crop harvest timing. No special habitat feature was identified for this species. Cowbirds are known to parasitize this species (Wisdom et al. 2000).

Rationale for Removal from MIS List - As a migratory land bird, population changes may be a result of situations occurring on wintering grounds or through parasitism by cowbirds rather than management activities over which the Forest Service has administrative control (Burleigh 1972, Groves et al. 1997). Most conversion of sagebrush to agriculture or exotic species has occurred off Forest Service administered lands in the past, and no extensive conversion is expected to occur on Forest Service administered lands in the future. Therefore, vesper sparrows may not meet the intent of CFR 219.19 to use MIS populations to reflect the effects of Forest management activities.

Rocky Mountain Elk *(Cervus elaphus)*
Elk are an MIS in the Boise, Payette, and Sawtooth original Forests Plans. This species is a habitat generalist and is present across all three Forests. Elk use all forest successional stages available. Primarily due to hunting issues, this species generates a high amount of interest from the public, state wildlife agencies and organizations, government land management agencies, and American Indian tribes. Current populations are believed to be greater than historic levels. Harvest levels for elk in the past several years have been at or above record numbers in most management units.

Rationale for Removal from MIS List – Although elk can be affected by Forest management activities, including access management, such effects are typically not exclusive, nor rarely even primary. Vegetation management, for example, may alter elk habitat, but because elk are habitat generalists, they can adjust to utilize altered habitat. Thus, timber harvest activities may displace elk temporarily through disturbance, but elk will likely remain in the area as long as a variety of key habitat components (forage, cover, movement corridors, security area) are present. Cumulatively, state wildlife agency decisions, annual harvests, predation, access management, disease, and management of off-Forest winter range and migration routes can also greatly influence elk populations. These influences are described in more detail below.

Elk are a hunted species and are affected by hunting season regulations (sex, number of permits, and season length) and changes in access management, which can affect their vulnerability to harvest. Hunting regulations are set by Idaho Department of Fish and Game in Idaho, and the Utah Division of Wildlife Resources in Utah. Depending on winter conditions, elk are supplementally fed to maintain current population levels on portions of the Boise and Sawtooth National Forests. The Idaho Department of Fish and Game and the Fish and Game Commission make the decisions to supplemental feed.

The gray wolf has recently been re-introduced into central Idaho and is found on all three Ecogroup Forests. The wolf is an additional predator on elk that has not been an influence in the recent past, although elk historically evolved with wolf predation. The extent of current predation is unknown, but it will likely increase as wolf populations grow, and will then likely level off once wolf populations stabilize. Until that time, the extent of annual predation on elk will be difficult to predict.

Chronic Wasting Disease (CWD) is a highly contagious and fatal disease that is increasing in elk populations in the western U.S., and it is a potential concern for elk in Idaho. During the 2002 hunting season, some harvested elk were tested for CWD in many locations within Idaho, and no CWD was detected. This disease has been confirmed in elk populations as near as Colorado, and in some states it has resulted in a large-scale effort to remove diseased animals within defined geographic areas. Strategies to control this disease through changes in big game populations would be under the jurisdiction of the Idaho Department of Fish and Game and the Utah Division of Wildlife Resources.

Several areas where elk winter are off Forest-administered lands, and the management of these lands may not be in the best interest of the elk. Agricultural production may be the highest demand for these lands, or urbanization and development may occur at the expense of wintering animal habitat, which can have impacts on elk populations.

Hunting season regulations, predation, chronic wasting disease, and off-Forest winter range decisions are outside the administrative control of the Forest Service. Even supplemental feeding on the National Forest is controlled by the state agency and not a Forest Service management decision. The Forest Service can exert control over access management and vegetation management on Forest administered lands. However, these two factors alone are not influential enough alone to correlate to elk population fluctuations. Therefore elk do not meet the intent of CFR 219.19 to use MIS populations to reflect the effects of management activities.

Mule Deer *(Odocoileus hemionus)*

Mule deer are an MIS in the original Boise and Sawtooth Forest Plans. Mule deer use all forest and non-forested habitats and successional stages available. They are considered a general habitat user and are present across all three Forests.

Rationale for Removal from MIS List – Although mule deer can be affected by Forest management activities, including access management, such effects are typically not exclusive, nor rarely even primary. Vegetation management, for example, may alter mule deer habitat, but because mule deer are habitat generalists, they can adjust to utilize altered habitat. Thus, timber harvest activities may displace mule deer temporarily through disturbance, but mule deer will likely remain in the area as long as a variety of key habitat components (forage, cover, movement corridors, security area) are present. Cumulatively, state wildlife agency decisions, annual harvests, predation, access management, disease, and management of off-Forest winter range and migration routes can also greatly influence mule deer populations. These influences are described in more detail below.

Mule deer are a hunted species and are affected by hunting season regulations (sex, number of permits, and season length) and changes in access management. Hunting regulations are set by Idaho Department of Fish and Game in Idaho, and the Utah Division of Wildlife Resources in Utah.

The gray wolf has recently been re-introduced into Central Idaho and is found on the three Forests. Wolves are known to prey on mule deer. The wolf is an additional predator on mule deer that has not been an influence in the recent past, although mule deer historically evolved with wolf predation. The extent of current predation is unknown, but it will likely increase as wolf populations grow, and will then likely level off once wolf populations stabilize. Until that time, the extent of annual predation on mule deer will be difficult to predict.

Chronic Wasting Disease (CWD) is a highly contagious and fatal disease increasingly found in big game populations in the Western U.S. During the 2002 hunting season mule deer that were harvested were tested for CWD. No CWD was detected through this effort. This disease has been confirmed in white-tailed deer populations as near as Colorado, and in some states it has resulted in a large-scale effort to remove diseased animals within defined geographic areas. Strategies to address controlling this disease through control of big game populations would be under the jurisdiction of the Idaho Department of Fish and Game and the Utah Division of Wildlife Resources.

Most of the winter range for mule deer is located off of Forest Service administered lands. These winter ranges are very important to maintaining current populations of mule deer. The Forest Service has no control over the management of these lands, which may not be in the best interest of mule deer. Agricultural production may be the highest demand for these lands, or urbanization and development may occur at the expense of wintering animals.

Hunting season regulations, predation, chronic wasting disease, and off-Forest winter range management are outside the administrative control of the Forest Service. The Forest Service can exert control over access management and vegetation management on Forest administered lands. However, these two factors alone are not influential enough alone to correlate to mule deer population fluctuations. Therefore, mule deer do not meet the intent of CFR 219.19 to use MIS populations to reflect the effects of management activities.

Mountain Goat (*Oreamnos americanus*)

The mountain goat is an MIS in the original Sawtooth Forest Plan. Mountain goats use steep rocky high elevation habitats. They generally spend most of their life cycle on Forest Service administered lands. They were selected as an MIS because of suspected conflicts with domestic sheep grazing (forage competition) and dispersed recreational use (displacement/ avoidance from habitat) in alpine and sub-alpine habitats.

Rationale for Removal from MIS List - Mountain goats are a species whose population levels do not indicate the effects of Forest management activities very well. The majority of mountain goat habitat is in steep, rocky, high-elevation areas, and Forest management activities are limited in their effects to this habitat or species. Little if any vegetation management occurs in mountain goat habitat, except occasional fire use. Some livestock grazing and recreational trail use occurs in goat habitat, but use is restricted to the summer and fall. Other factors that are known to influence goat populations are hunting and predation. Goats are a hunted species and are affected by hunting season regulations (sex, number of permits, and season length). The gray wolf has recently been re-introduced into the Ecogroup area, and wolves are known to prey on mountain goats. The extant of any predation is unknown. However, these

factors are outside the control of the Forest Service, and thus changes in goat populations may not be in response to management activities over which the Forest Service has administrative control. Therefore, mountain goats do not meet the intent of CFR 219.19 to use MIS populations to reflect the effects of Forest management activities.

Williamson's Sapsucker (*Sphyrapicus thyroideus*)
This species is an MIS in the original Payette Forest Plan. It was selected because of its dependence on large snags for nesting. This species is a migratory land bird migrant. It summers in the central mountains of Idaho, but winters south of Idaho. In Idaho, this sapsucker has a limited and patchy breeding range, and an association with mature forests. Williamson's sapsucker has a low overall density, and is uncommon in forests at higher elevations in the central parts of Idaho (Groves et al. 1997, Wisdom et al. 2000). This species selects for spruce-fir, Douglas-fir, lodgepole pine, and ponderosa pine forests, and uses deciduous coniferous forest with quaking aspen for nesting. This woodpecker may be affected by changes in successional stages of forest habitat. Wisdom et al. (2000) estimated a 56 percent decrease in source habitat within the CRB and a 33 percent decrease in ERU 13.

Rationale for Removal from MIS List - Although this species may be affected by forest successional stage changes, it is uncommon on the Forest, and its nesting habitat (aspen) is patchy and limited in extent. Also, Williamson's sapsucker is a migratory land bird. Population changes may be a result of situations occurring on wintering grounds rather than a response to management activities on Forest Service administered lands (Burleigh 1972, Groves et al. 1997). Therefore, this species may not meet the intent of CFR 219.19 to use MIS populations to reflect the effects of Forest management activities.

Red-backed Vole *(Clethrionomys gapperi)*
The red-backed vole is an MIS in the original Boise Forest Plan. The species was selected as an MIS because it was believed to be closely tied to old-growth habitats with high crown cover and ground litter in shaded, damp understory conditions. Populations of red-backed voles are believed to be non-cyclic (Groves et al. 1997). Maximum longevity is about 20 months, but most individuals do not live more than 10-12 months, and only a few survive two winters.

Rationale for Removal from MIS List - The red-backed vole is often the most common small mammal in coniferous forest. Idaho studies of logging impacts on the species have provided ambiguous results (Groves et al. 1997). This species is not a good MIS because no relationship to habitat variables has been identified. The species is likely responding to changes in herbaceous vegetation due to climatic changes, but there has been difficulty in determining this cause-and-effect relationship (Johnson and Johnson 1982). Use of the red-backed vole as a MIS does not meet direction in CFR 219.19(a) that states, "These species shall be selected because their population change are believed to indicate the effects of management activities."

Meadow vole (*Microtus pennsylvanicus*)
The meadow vole is an MIS in the original Boise Forest Plan. The species was selected as an MIS because it was believed to represent moist meadows and streamside riparian habitats, with abundant cover and litter, which are sensitive to over-grazing. It has the greatest distribution of any vole species in North America (Groves et al. 1997), and it is an important prey to many mammalian and avian predators.

Rationale for Removal from MIS List - Populations of the meadow vole can fluctuate from highs of 50-60 individuals per 0.4 ha to 8-10/0.4 ha, and they are believed to cycle every 2-5 years. These population fluctuations are well documented for this species, although the reasons for these fluctuations are not understood (Groves et al. 1997). The species is likely responding to changes in herbaceous vegetation due to climatic changes, but there has been difficulty in determining a cause-and-effect relationship (Johnson and Johnson 1982). Regardless, these fluctuations have little or no documented correlation to

Forest management influences on moist meadows or streamside riparian habitats. Changes in grazing management or streamside habitats to increase suitable habitat conditions may or may not increase populations, depending on factors outside Forest Service control, such as climatic change or populations cycles. Therefore, use of the meadow vole as a MIS may not meet direction in CFR 219.19(a) that states, "These species shall be selected because their population change are believed to indicate the effects of management activities."

Mountain Chickadee (*Parus gambeli*)
The mountain chickadee is an MIS in the original Boise Forest Plan. This species was selected as an MIS because it requires snags of at least 4 inches in diameter (d.b.h.) with either natural or excavated cavities for nesting. This species forages on insects. It is considered a habitat generalist other than the use of snags for nesting, and it is found throughout Idaho's forests (Groves et al. 1997). The mountain chickadee migrates off of Forest Service administered lands in the fall to spend the winter in low-elevation valley riparian systems with willows and cottonwoods.

Rationale for Removal from MIS List - Because of the chickadee's seasonal migrations, population changes may be a result of situations occurring on wintering grounds predominately in private ownerships rather than a response to management activities on Forest Service administered lands within the Boise National Forest (Burleigh 1972, Groves et al. 1997). Therefore, use of this species as a MIS may not meet direction in CFR 219.19(a) that states, "These species shall be selected because their population change are believed to indicate the effects of management activities."

Yellow Warbler (*Dendroica petechia*)
The yellow warbler is a MIS in the original Boise Forest Plan. The species was selected as an MIS because it uses riparian areas with shrubby deciduous vegetation. This species is a migratory land bird. The yellow warbler migrates to southern California, southern Arizona, northern Mexico, and further south to Brazil to winter.

Rationale for Removal from MIS List - Because of the yellow warbler's migrations, population changes may be a result of situations occurring on wintering grounds rather than a response to management activities on Forest Service administered lands within the Boise National Forest (Burleigh 1972, Groves et al. 1997). Therefore, use of this species as a MIS may not meet direction in CFR 219.19(a) that states, "These species shall be selected because their population change are believed to indicate the effects of management activities."

Lewis' Woodpecker (*Melanerpes lewis*)
Lewis' woodpecker is an MIS in the original Sawtooth Forest Plan. The species was selected as an MIS because it is dependent on snags. This species is a migratory land bird. The Lewis' woodpecker migrates off of Forest Service administered lands to Baja California and northern Sonora and west Texas.

Rationale for Removal from MIS List - Because of this woodpecker's migrations, population changes may be a result of situations occurring on wintering grounds rather than as a response to management activities on Forest Service administered lands within the Sawtooth National Forest (Burleigh 1972, Groves et al. 1997). Therefore, use of this species as a MIS may not meet direction in CFR 219.19(a) that states, "These species shall be selected because their population change are believed to indicate the effects of management activities."

Brewers Sparrow *(Spizella brewri)*
The Brewers sparrow is an MIS in the original Sawtooth Forest Plan. This species was selected as an MIS because it is dependent on sagebrush habitats and nests in sagebrush. Sagebrush communities account for a large portion of the vegetation on the Sawtooth National Forest. This species' distribution

is influenced by local vegetation cover and landscape-level features, such as patch size of sagebrush communities (Groves et al. 1997). The Brewers sparrow winters in portions of the southwestern U.S., south into Mexico.

Rationale for Removal from MIS List - Because the Brewers sparrow's is a migratory land bird, population changes may be a result of situations occurring on wintering grounds rather than a response to management activities on Forest Service administered lands within the Sawtooth National Forest (Burleigh 1972, Groves et al. 1997). Therefore, use of this species as a MIS may not meet direction in CFR 219.19(a) that states, "These species shall be selected because their population change are believed to indicate the effects of management activities."

Columbian Sharp-tailed Grouse *(Tympanuchus phasianellus)*
The Columbian sharp-tailed grouse is an MIS in the original Sawtooth Forest Plan. The species is only found on the southern units of the Forest. It has been recently transplanted to an additional location within the south end of the Forest. The species was selected as an MIS because there was a concern that habitat may be converted to introduced grass species to increase livestock forage, and habitat relationships were poorly understood.

Rationale for Removal from MIS List - Columbian sharp-tailed grouse are a hunted species and are affected by hunting season regulations (bag limits and season length). Both male and female birds are legally harvested. There have been no vegetation management activities that converted shrub communities on-Forest during the last 15 years. This concern in the original plan for this MIS did not come to fruition. A change in population numbers may be a result of hunter harvest and activities on other ownerships rather than in response to management activities on Forest Service administered lands within the Sawtooth National Forest. Therefore, use of this species as a MIS may not meet direction in CFR 219.19(a) that states, "These species shall be selected because their population change are believed to indicate the effects of management activities."

Proposed MIS For The Revised Forest Plans

Species proposed for MIS in the revised Forest Plans are described below, with the supporting rational for their use as MIS.

Pileated Woodpecker (*Dryocopus pileatus*)
The pileated woodpecker is currently an MIS on all three Forests and is being proposed as a MIS on all three Forests under Forest Plan Revision.

This woodpecker is native to North America and is a resident species. It is found in forested portions of all the eastern states. It is also known to occur across southern Canada. In the western states they occur in Washington, Oregon, California, Nevada, Montana, and Idaho in forests that can grow large-diameter trees. Wisdom et al. (2000) estimated a 21 percent decrease in source habitat basin-wide (within the CRB) and a 21 percent increase within the Central Idaho Mountains ERU from historical to current times. Breeding Bird Surveys in Idaho, which show an increasing presence of this species from the recent past in areas surveyed, support the conclusions of Wisdom et al. (2000) that habitat has increased. Pileated woodpeckers inhabit areas under private, state, and other federal administrations; however most of their habitat is on forested lands administered by the Forest Service.

Pileated woodpeckers occur on all ranger districts within the Ecogroup Forests, except in the southern portion of the Sawtooth. Habitat primarily occurs in mixed conifer forests, including spruce-fir and lodgepole pine, that are capable of growing large-diameter trees (>20" diameter) with multi-storied stands. Pileated woodpeckers nest in standing snags, and are the largest woodpeckers occurring within

the Ecogroup area. Because they are so large, this species needs snags of sufficient diameter to accommodate their body size when excavating nest cavities. Studies in Montana and Idaho have shown that old and mature larch, ponderosa pine, grand fir, and Douglas-fir are used for nest cavities (Burleigh 1972, Groves et al. 1997). Carpenter ants are a major food source. Dead and dying trees, snags, logs, and stumps are important foraging substrates containing carpenter ants. Pileated woodpeckers also dig directly into anthills (Groves et al. 1997).

The pileated woodpecker is a large tree cavity excavator that is ecologically tied to mature mixed-conifer stands. This association is predominantly a result of the species' need for large dead trees for nesting, large hollow trees for roosting, and standing and down dead trees for foraging on carpenter ants.

The pileated woodpecker is a long-lived and wide-ranging non-migratory resident species. It nests and roosts in large-diameter dead trees or snags that are found most commonly in mesic mature and older forests with a high canopy closure and numerous down logs. It favors dense coniferous forest, but also uses open forests and second growth, particularly if there are isolated, large dead trees and down logs amid the younger forest (Burleigh 1972, Groves et al. 1997). This woodpecker may be affected by changes in successional stage of forest habitat that removes large-diameter dead trees or snags, alters forests with high canopy closure, convert forest to an earlier successional stage and removal of down logs that are used as foraging sites.

This species will forage in younger forests, particularly outside of the nesting season if adequate standing and down dead trees are available with carpenter ants present as prey. As a non-migratory resident species, population changes may be a result of management activities and natural events occurring within the home range (Burleigh 1972, Groves et al. 1997).

Fourteen other species of birds within the Ecogroup area are dependent on cavities that these woodpeckers excavate for nesting, because they are not able to excavate their own cavities. Cavities created by pileated woodpeckers are used by some of the large species that need cavities, but do not excavate them, e.g., barred owl, boreal owl, etc. In addition to cavity-nesting birds, mammals such as fisher, bats, and flying squirrels use cavities excavated by pileated woodpeckers for nesting, denning, and roosting sites (Bull et al. 1997, ICBEMP 1996b, Thomas et. al. 1979, Wisdom et al. 2000). The pileated woodpecker is a species whose presence can be correlated with certain habitat characteristics important to a number of other species (large diameter dead and downed wood, cavities). These particular habitat components are directly influenced by vegetative management activities on the Forests.

The analysis of forested vegetation current conditions for the Revision revealed a reduction in the extent of large tree structure over many localized areas of the Ecogroup Forests from levels that may have occurred historically.

It is possible to monitor this species using established protocol. Currently, the amount of monitoring data available for pileated woodpeckers on the three Forests is limited, and there is very little monitoring of this species occurring over the Ecogroup area. Breeding Bird Surveys (BBS) established on and near the three Forests annually collect point count data that detects the presence of pileated woodpeckers; however these surveys are not extensive.

National breeding bird survey data, however, show a very broad description of population trends across the United States. For the pileated woodpecker, population trends are increasing (see map below).

Based on the BBS, there has been in an increasing trend for pileated woodpecker within Idaho during the 1968 to 1998 period. This national and statewide BBS trend data is consistent with the habitat analysis by Wisdom et al. (2000) and the analysis in the FEIS that indicates habitat for this species has increased above historical estimates.

An increase in the amount of suitable habitat for this species is primarily a result of long-term fire exclusion that has resulted in an increase in multi-storied stands with higher portions of shade-tolerant species, and abundant snags and downed logs for nesting and foraging sites (Wisdom et al. 2000).

Figure F-1. Pileated Woodpecker Population Trends Across North America

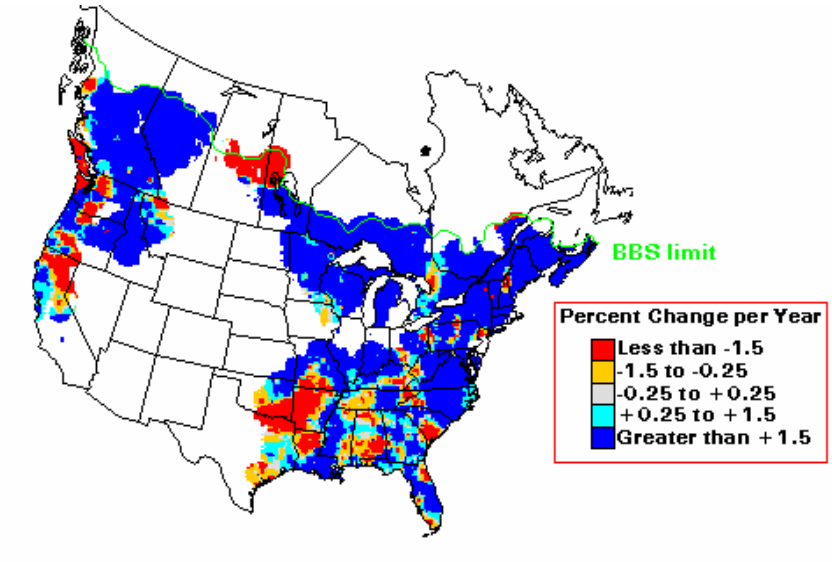
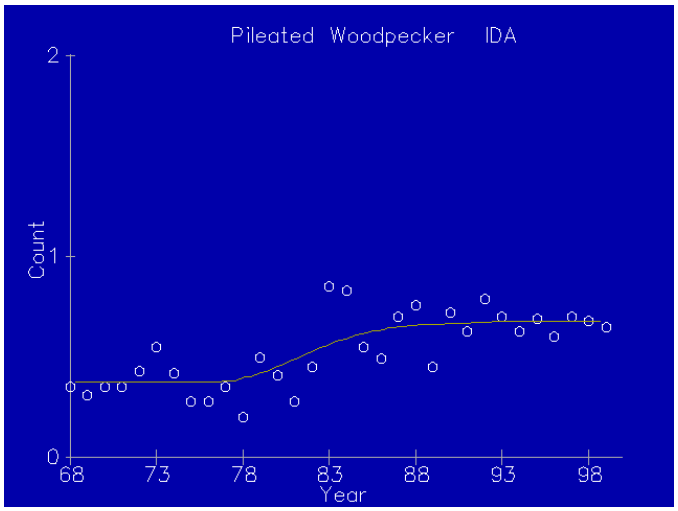


Figure F-2. Overall Increasing Trend in Pileated Woodpecker Populations, 1968-1998



An important management consideration is having trees to grow to sufficient diameter, then die and be available to these species, as opposed to being removed as firewood or other products (Bull et al. 1997, Wisdom et al. 2000). Past management activities have reduced the size and number of large trees and snags in many locations within the Columbia River Basin (ICBEMP 1997c). There are no known population trends for pileated woodpeckers within the Ecogroup area other than the BBS data and some limited surveys related to project analysis. However, Wisdom et al. (2000) estimates an increase of 21 percent in source habitat from historical to current times for this species within the Central Idaho Mountains ERU, which includes 87 percent of the Ecogroup area.

Based on recent research in a large portion of the Ecogroup area, "old-growth" forests were uncommon, but large trees were common (Morgan and Parsons 2001, Wisdom et al. 2000). According to this research, which encompassed the central Idaho batholith, old growth, as a late successional stage, was historically important but not extensive on the landscape (Morgan and Parsons 2001). The following table Morgan and Parsons (2001) shows the estimated percent of forested landscapes in the central Idaho batholith that were historically occupied by stands in the large tree size class (medium tree size class for PVG 10 – persistent lodgepole pine), and by stands with late successional old growth characteristics. Estimates were developed for each of the 11 potential forested vegetation groups (PVG) in the Ecogroup area (Table F-2).

Table F-2. Historical Large Tree Size Class Percentages vs. Old Growth
(From Morgan and Parsons 2001)

	PVG 1	PVG 2	PVG 3	PVG 4	PVG 5	PVG 6	PVG 7	PVG 8	PVG 9	PVG 10	PVG 11
Percentage of PVG historically in the large tree size class (mean value)	91	80	41	34	84	56	21	21	37	19	27
Percentage of PVG estimated to represent old-growth	0	0	8.5	8.4	0.4	2.5	4	5.5	26	0	1.2

Note: Large tree size class refers to stands where the overstory trees average 20 inches dbh or greater. Medium tree size class refers to stands where overstory trees average between 12 and 19.9 inches dbh.

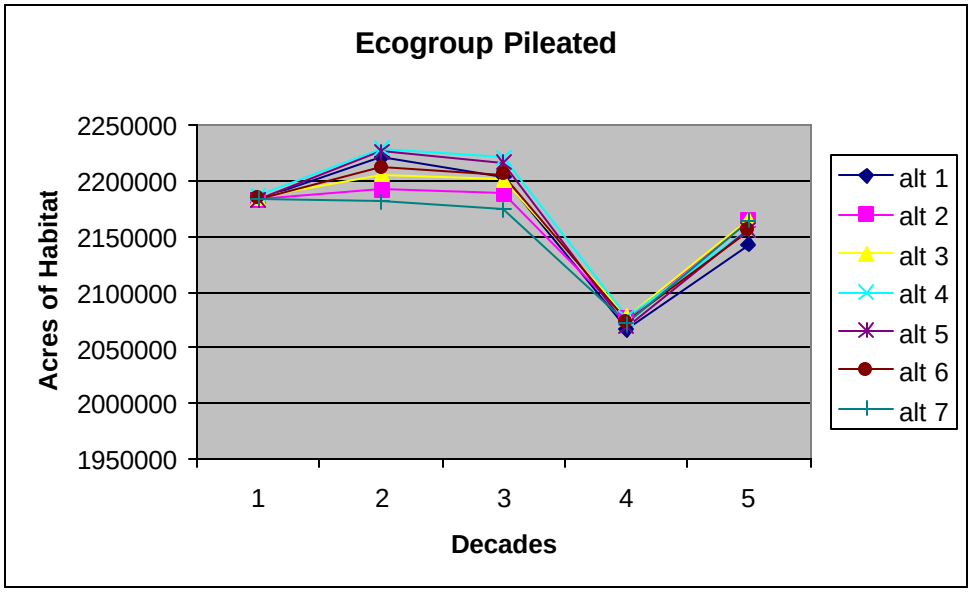
The main reason for the large differences between Large Tree percent and Old Growth percent is that vegetation structural conditions in central Idaho developed in conjunction with disturbance processes (fire, insect, disease, wind, etc.) and climate variations. Conversely, late successional "old growth" characteristics develop in the absence of frequent disturbances (Hamilton 1993). In central Idaho, disturbance was a common occurrence. Historically, forested stands in lower-elevations vegetation groups likely developed large trees and relatively open canopies during mid-successional stages, and these conditions were maintained over time by frequent low-intensity fire disturbance. Dense stands and decadence typically associated with late successional stage conditions (old growth) rarely, if ever, occurred. Thus, historical stands dominated by large and old seral trees like ponderosa pine could be considered old forest, but not as "old growth" under any definition that incorporated a full set of late successional conditions. Thus, the revised Forest Plans have chosen to track the large tree size class, or old forest, rather than old growth as a habitat indicator. The pileated woodpecker is proposed as an MIS for large tree size class, particularly in PVGs dominated by mixed conifer forest (3-7).

Currently, tree species occurrence has shifted from seral to climax in many PVGs compared to the Historic Range of Variability (HRV). Some of these changes are particularly evident in PVGs that historically maintained a large portion of the area in seral species due primarily to fire. For example, in PVGs 1, 2 the dominate cover type is ponderosa pine, which is adapted to the frequent, non-lethal fires that were common in these PVGs. Currently Douglas-fir dominates portions of these PVGs. Many factors, such as the reduction in the frequency of the fire disturbance regime, have contributed to the shift from ponderosa pine toward climax Douglas-fir in portions of these PVGs. In these areas, the amount of ponderosa pine has declined below the estimated historical levels and Douglas-fir and grand fir have increased. Even seral species that were not a dominant feature on the landscape have declined below historical estimates (see Vegetation Diversity, Chapter 3 - FEIS for a more detailed explanation of changes in vegetation). It is assumed this shift has benefited the pileated woodpecker at the expense of species such as the white-headed woodpecker and other species that depend on a high proportion of low-density, large ponderosa pine.

This is consistent with Wisdom et al. (2000) findings, and their work suggested management activities are needed to reduce the dominance of shade-tolerant tree species (e.g., grand fir, Douglas fir) and increase the presence of shade-intolerant species (e.g., ponderosa pine and western larch). Revised direction for the Forest Plans would move PVGs toward their HRV during the coming planning period (10-15 years) through a variety of silvicultural management activities. These types of management activities would move conditions toward or within HRV in treated areas, which is desirable, but this change may be at the expense of habitat for the pileated woodpecker in areas where early seral species dominated historically. Management activities proposed in the revised Forest Plans would likely reduce some pileated woodpecker habitat in PVGs 1, 2, and 5 and increase the habitat for white-headed woodpeckers and other species. Viability of the pileated woodpecker would be maintained across the planning area, but its expected occurrence would decrease within selected treatment areas of the Ecogroup Forests.

The figure below shows habitat trends for this species over the next five decades for alternatives proposed in the Forest Plan Revision FEIS. After the third decade, habitat extent decreases with all alternatives, then increases after the fourth decade.

Figure F-3. Acres of Pileated Woodpecker Habitat by Alternative Over Fire Decades



The reduction in habitat for the third decade is likely a result of the conversion of mult-storied stands to single-storied stands. This reduction is not a concern in this regional area because it is estimated that extent of source habitat for this species in ERU 13 has increased from historic times by 21 percent. The reduction in the fourth decade accounts for only 7 percent of the habitat within the Ecogroup area, which means the remaining habitat would still be well above historical estimates. The species is a concern at the basin scale, though because it has been estimated that a 21 percent decrease within the Columbia River Basin has occurred (Wisdom et al. 2000).

The pileated woodpecker is being proposed as an MIS for all three Ecogroup Forests because;

- They are non-migratory residents of the area,
- Populations occur all over the Ecogroup area except the southern part of the Sawtooth Forest,
- Some population trend data are available, and survey points are established to collect more,
- Specific vegetation components can be monitored and tracked at the Forest and project scale,
- It is estimated that habitat has changed significantly from historic to current times, and
- Potential on-Forest vegetation management activities can have impacts on their habitat, and these activities are within the administrative control of the Forest Service.

White-headed Woodpecker

White-headed woodpeckers are found mainly in open and mature ponderosa pine and mixed ponderosa pine/Douglas-fir forests in Idaho (Frederick and Moore 1991, Groves et al. 1997). They feed on conifer seeds during the fall and winter. Cone crops are different from year to year, and large trees usually produce more cones then small trees. During other times of the year, flying insects are important. Nests are usually excavated in large-diameter snags that have a moderate degree of decay (Bull et al. 1986, Bull et al. 1997). Nesting snags need to be greater than 20 inches in diameter (Wisdom et al. 2000). Nesting stands of ponderosa pine used by white-headed woodpeckers have a low canopy cover, generally less than 30 percent (Frederick and Moore 1991). Based on studies done in Idaho, little migration occurs, and they are considered year-round residents.

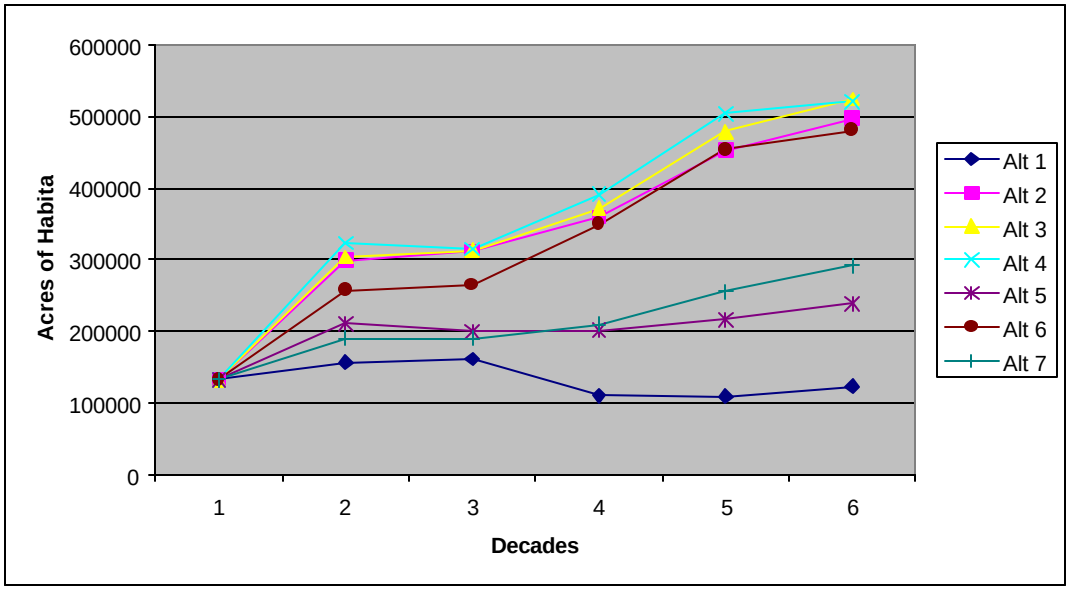
On the Ecogroup Forests, white-headed woodpeckers occur in forest types (PVGs 1, 2, 3, and 5) with a high proportion of large ponderosa pine at low tree densities. There are currently an estimated 130,000 acres of habitat for this species within the Ecogroup area. It is estimated that historically there was a much greater amount. Many unmanaged areas do not presently benefit the white-headed woodpecker because they have higher tree densities due to fire exclusion and little or no improvement treatments. Conversely, many areas of historical habitat have been converted by the removal of large trees, primarily through timber harvest.

The figure below shows habitat trends for this species over the next five decades for alternatives proposed in the Forest Plan Revision FEIS. All action alternatives show an increasing trend in the amount of white-headed woodpecker habitat through time compared to the current condition. This increasing trend should decrease the risk to this species from a habitat standpoint.

This species habitat will benefit from increasing the extent of large ponderosa pine and reducing tree densities. Alternatives that have a restoration and fire use emphasis, such as 2 and 3, benefit this species, because non-lethal fire use reduces tree densities. Direction for the management of snags will also benefit this species. Because this species is sensitive and proposed as an MIS, all alternatives would have to maintain or improve its habitat conditions.

White-headed woodpeckers inhabit ponderosa pine areas that occur on National Forest and other federal, private, and state land ownerships. Vegetation management on other ownerships has not featured the retention of large trees and snags in the past, and it may not in the future. It is therefore assumed that Forest Service administered lands will likely contribute the most to re-establishment and maintenance of these important habitat attributes.

Figure F-4. Acres of White-Headed Woodpecker Habitat by Alternative Over Five Decades



The habitat that white-headed woodpeckers occupy has changed during the last hundred years due to human activities (Morgan and Parsons 2001, Sloan 1998). Major changes in habitat have occurred within the Ecogroup area from selective harvesting of large-diameter ponderosa pine, snag removal in harvest areas, extensive areas (14 percent) of ponderosa pine mortality from wildfires during the last 15 years, and a change in composition and density of remaining stands because of long-term fire exclusion (Geier-Hayes 1995, ICBEMP 1997c, Morgan and Parsons 2001, Sloan 1998, Wisdom et al. 2000). These and other changes have reduced habitat of white-headed woodpeckers in terms of quality, quantity, and distribution.

White-headed woodpeckers have been observed on all three Forests, but are restricted to areas that have a significant composition of ponderosa pine, which are more common on the west side of the Boise and Payette Forests (Burleigh 1972). Management of large, low-density ponderosa pine, including snags, is an important consideration in mid- to low-elevation forest habitat for this species (Wisdom et al. 2000). There are no known population trends for white-headed woodpeckers within the Ecogroup area. Wisdom et al. (2000) estimate a reduction of 62 percent in source habitat from historical to current times for this species within the Central Idaho Mountains ERU (13), which includes a majority of the Ecogroup area. It is assumed that the extent of large-tree and snag reduction on the landscape and fire exclusion has had a negative effect on species such as the white-headed woodpecker.

This species is being proposed as an MIS for the Boise and Payette National Forests in selected Management Areas for the following reasons:

- The species is found primarily on the western side of the Boise and Payette National Forests,
- They are non-migratory residents of this area,
- Some research data are available on this species from the Payette National Forest,
- Specific vegetation components can be monitored and tracked at the Forest and project scale,
- It is estimated that habitat has been significantly altered from historic to current times,
- Potential on-Forest vegetation management activities can have impacts on their habitat, and these activities are within the administrative control of the Forest Service.

The Management Areas on the Boise National Forest that have adequate white-headed woodpecker habitat are: 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15, and 16. The Management Areas on the Payette are: 1, 2, 3, 5, and 10.

Sage Grouse (*Centrocercus urphasianus*)

Sage grouse are native to western North America, historically occurring within the eleven western states that have extensive areas of sagebrush steppe habitat meeting habitat requirements. Sage grouse have been extirpated in Arizona, British Columbia, Kansas, Nebraska, New Mexico, and Oklahoma. In areas where they are still present, trend counts have been decreasing since the 1950s. Sage grouse are expected to continue to decrease over their current range because of habitat loss and degradation. Degradation is being caused by conversion of native habitat to intensive agricultural uses, the increasing spread of non-native plants, improper livestock grazing, and urban development.

Within the Ecogroup area, sage grouse occur only on the Sawtooth National Forest, and the southeastern portion of the Boise National Forest. Adjacent BLM and private lands also contain habitat. The sage grouse is totally dependent on sagebrush/grassland vegetation to meet its habitat requirements. Some populations migrate long distances, some do not. Despite some wide-ranging annual movements, sage grouse have high fidelity to seasonal ranges for both nesting and wintering, and birds need extensive areas of native sagebrush/grassland year-round. Abundant native grass/forb composition in the snow-free

season appears to be important within sagebrush-grassland communities during all life stages. In summer, shrubs are used for cover, and grass and forbs are used as food, along with insects. During winter, sagebrush increases in importance because it protrudes above snow in wintering areas, and sagebrush leaves are used exclusively as food during the winter and early spring (Apa 1998, Braun 1998, Burleigh 1972, Groves et al. 1997, IDFG 1997, Connelly et al. 2000).

Sage grouse statewide have declined 40 percent during the last 40 years. Populations in other western states and within the Ecogroup area have shown similar declines (IDFG 1997). State Fish and Game, in cooperation with other agencies, monitor sage grouse population trends, usually annually in the spring. Additional information is gathered during the hunting season with harvested animals. Sage grouse are hunted where they occur within the Ecogroup area, and both male and female birds are legally harvested. There is a concern over legal harvest when local sage grouse numbers are low (Connelly et al. 2000). Some organizations petitioned this species for listing as a threatened or endangered species as recently as 2002, but the USFWS dismissed the petition as unwarranted. Because of habitat loss and steep population declines, the remaining habitat on Forest Service administered lands and adjacent ownerships are increasingly important to this species and other sagebrush-obligate species. Population trends are improving in some locations, but are still reduced from past decades.

Sagebrush/grassland in Idaho has changed greatly over the past 150 years. Much of the lower-elevation private areas supporting sagebrush have been converted to agriculture. Some of this conversion has made former habitats unusable by sage grouse and other sagebrush-dependent species. The extent of this conversion varies by location within and adjacent to the Ecogroup area. Some of this conversion has caused the remaining habitats to become fragmented, resulting in barriers to movement between populations (Apa 1998, Braun 1998, ICBEMP 1997c, IDFG 1997, Wisdom et al. 2000, Connelly et al. 2000). The overall quality of existing sage grouse habitat will likely become increasingly important as the quantity of these habitats continues to decrease due to modifications and development on non-federal lands.

Many sagebrush communities that have not been converted to agriculture have changed due to a variety of factors including: livestock grazing, changes in fire regimes, road building, invasion of noxious weeds, and introduced livestock non-native forage grasses (Apa 1998, Wisdom et al. 2000). Sagebrush has been "treated" on grazing lands by burning, plowing, chaining, disking, spraying, and seeding to increase or maintain livestock forage. These changes have occurred both on public and private lands, resulting in a change to the native sagebrush/grassland vegetation that is generally not beneficial to sage grouse habitat. Remnant sage grouse populations have become more dependent on native habitat remaining on and adjacent to the Forest Service and BLM administered lands (Quigley and Arbelbide 1997, IDFG 1997, Wisdom et al. 2000). Prescribed fire has been used to change successional stages to the 0-10 percent canopy cover in the recent past and is likely the preferred method for future use in areas where analysis determines it to be appropriate.

Fire and herbivory in the past played a role in modification of sage grouse habitat. Fires started by lightning historically modified the growth stages of sagebrush communities to the greatest extent. Additionally small-scale and infrequent herbivory may have been the predominant mechanism of stand renewal, but this process has been overshadowed during this century by large-scale fires (Longland and Young 1995). Fires that burn in sagebrush communities usually result in total mortality of the sagebrush. These fires cause sage grouse and other species to move into areas that did not burn, until the sagebrush re-establishes itself in 10-15 years or more. Herbaceous plants usually re-establish within 3-5 years, depending on whether climate conditions are conducive. Because of habitat loss and conversion, the opportunities for sage grouse to relocate into unburned areas has been reduced or eliminated is many locations.

Livestock grazing increases successional rates, which results in an increase in the density of shrub-dominated communities and a subsequent reduction in the herbaceous understory, when crown cover of shrubs exceeds 15 percent. Livestock grazing is likely occurring in all areas identified as sage grouse habitat. Fire exclusion has some of the same effects on sagebrush as livestock grazing, increasing shrub densities and reducing herbaceous understory production. Another concern is the invasion of non-native plants that are not always used by native wildlife species. It is estimated that 16 species of non-native plants are a concern to sagebrush/grassland vegetation in the Ecogroup area, as well as to the wildlife species that are adapted to these plant communities.

Based on LANDSAT imagery, the table below displays differences in canopy coverage of sagebrush likely having implications for sagebrush obligate species, including sage grouse. Shown are 15 Management Areas on the Sawtooth and one Management Area on the Boise National Forest that are known to have supported sage grouse populations in the recent past.

Canopy coverage of sagebrush is important to sage grouse in different ways. Most of the documented nesting of sage grouse occurs in sagebrush with canopy coverage of 15 to 25 percent. Nests are usually under sagebrush plants, but not always (Apa 1998, Braun 1998, Gregg et al. 1994, IDFG 1997, Sveum et al. 1998). Nest predation of sage grouse was found to be lowest at nests that had more cover of tall, residual grasses and medium height shrubs (Gregg et al. 1994). Sagebrush canopy coverage changes due to succession and other factors. Natural-occurring lightning fires have influenced succession rates and the extent of canopy coverage changes through time (see Non-forested Vegetation in the Vegetation Diversity section in Chapter 3 of the FEIS for a more complete explanation).

Losses or changes to sage grouse breeding habitat or a reduction in canopy coverage that exceed 40 percent of a large-scale area are detrimental to sage grouse (Connelly et al. 2000). These areas would equate to those within the less then 10 percent canopy cover in Table F-3. Based on this type of analysis, four management areas exceed the recommended threshold of greater than 40 percent in the 0-10 percent canopy cover within sage grouse habitat. At some point in time, as canopy cover of sagebrush increases, understory grasses and forbs decrease. Wildfire with failed suppression has been and will be an important factor for causing changes in sagebrush communities, with or without other management considerations.

Table F-3. Sage Grouse Habitat in Management Areas With Differing Canopy Cover Of Sagebrush (McClure et al. In Press)

Management Area	Acres of Sage Grouse Habitat	Acres and % in Low Canopy Cover, <10%	Acres and % in Moderate Canopy Cover, 11-20%	Acres and % in High Canopy Cover, >21%
Lower South Fork Boise River (BNF)	7,897	1,750 acres 22%	2,161 acres 27%	3,985 acres 51%
Big Wood River	1,328	308 acres 23%	938 acres 71%	81 acres 6%
Little Wood River	2,073	490 acres 24%	1,500 acres 72%	84 acres 4%
Little Smokey Creek	2,443	20 acres 1%	1,388 acres 56%	1,036 acres 43%
Lime Creek	2,114	0 acres 0%	1,182 acres 56%	932 acres 44%
Soldier Creek/ Willow Creek	2,296	169 acres 7%	1,211 acres 53%	916 acres 40%
Rock Creek	40,343	5,795 acres 14%	20,060 acres 50%	14,488 acres 36%

Management Area	Acres of Sage Grouse Habitat	Acres and % in Low Canopy Cover, <10%	Acres and % in Moderate Canopy Cover, 11-20%	Acres and % in High Canopy Cover, >21%
Cottonwood Creek	10,079	1,851 acres 18%	4,187 acres 42%	4,042 acres 40%
Trapper Creek/ Goose Creek	46,193	21,850 acres 47%	13,677 acres 30%	10,665 acres 23%
Shoshone Creek	22,425	7,193 acres 32%	9,373 acres 42%	5,859 acres 26%
Albion Mountains	1,832	490 acres 26%	935 acres 51%	405 acres 23%
Howell Creek	377	81 acres 21%	178 acres 47%	118 acres 32%
Independence Lakes	537	284 acres 53%	194 acres 36%	59 acres 11%
Raft River*	5,279	4,035 acres 76%	569 acres 10%	675 acres 14%
Black Pine	6,134	3,568 acres 59%	1,310 acres 21%	1,226 acres 20%
Sublett	4509	326 acres 7%	2,604 acres 58%	1,579 acres 35%

*The acreage figures for the Raft River management area are not accurate because of lightning fires that burned approximately 2100 acres during the summer of 2002. These fires likely resulted in an increase of the 0-10 percent canopy coverage from the numbers displayed in Table W-5, with corresponding decreases in other canopy cover percentages.

It is believed that most of the sage grouse habitat within the administrative boundary of the Forests is used for nesting, brood rearing, and summering habitat. Most of the wintering areas are on adjacent lower-elevation BLM, state, and private lands. Depending on climatic conditions, some wintering may occur within Forest Service administered lands near the boundary with other lower-elevation ownerships. Additionally, there are areas on-Forest that contain sagebrush that are not habitat for sage grouse, but are used by other species.

The IDFG developed a sage grouse management plan (IDFG 1997) and have implemented it through a MOA in Idaho with the Forest Service and BLM to further the management of sage grouse and its habitat. Guidelines to manage sage grouse populations and their habitats within the species range have recently been updated (Connelly et al. 2000). Because of the dramatic declines in sage grouse numbers in Idaho and other western states, a MOU was signed in 2001 by the Western Association of Fish and Wildlife Agencies, Forest Service, BLM and the US Fish and Wildlife Service to consider guidelines from Connelly et al. (2000) when actions may affect sage grouse or their habitat. Based on these updated guidelines, no other management-controlled reduction should take place in the near term in areas where over 40 percent of the sagebrush canopy cover has been reduced (Connelly et al. 2000). Both the MOA with Idaho and the MOU with the Western Association of Fish and Wildlife Agencies are in effect. Wisdom et al. (2000) suggested that a loss or change in habitat of greater than 20 percent is significant and should be analyzed at the Basin and ERU scale during proposed management activities that may further change the extent.

Most sage grouse populations use lands in other ownerships adjacent to the Forest such as BLM, state, and private lands. The condition and canopy cover of sagebrush habitat on other ownerships is unknown. While population fluctuations are likely, due to habitat and climatic changes, long-term trends may reflect changes in habitat conditions and harvest regulations.

Based on the large area of sagebrush that has burned because of wildfires during the past few years, none of the action alternatives in the Forest Plan Revision FEIS propose changes in successional stages of sagebrush communities within sage grouse habitat. The risk of wildfires is still present and could potentially increase the 0-10 percent canopy cover. The largest concern is if this occurred in Management Areas that currently have a large extent of area in the 0-10 canopy cover. Maintaining a balance between shrub and herbaceous understory cover should be a management objective (Sveum et al. 1998), but no "optimal" balance has been determined (Johnson and Braun 1998).

There is a relationship between sagebrush canopy cover, herbaceous understory, and sage grouse nesting (Apa 1998, Braun 1998, Connelly et al. 2000, Gregg et al. 1994, IDFG 1997, Sveum et al. 1998). Livestock grazing influences the vegetation, both overstory and understory. Not every area where nesting and brood rearing occurs is grazed every year. Livestock do not graze the same pasture at the same times of the year, year after year, e.g., late spring, not until summer and not until fall. Some localized areas are not grazed for several years when large portions of pastures have burned from a wildfire to allow for recovery of vegetation. These areas were also grazed similarly in the past when sage grouse populations were higher and there was not a concern for the sage grouse. Livestock grazing results in varied effects to nesting and brood rearing habitat.

Wisdom et al. (2000) estimate a 27 percent decrease in source habitat basin-wide, an 11 percent increase within ERU 13, a 13 percent decrease in ERU 10, and a 53 percent decrease in ERU 11 from historical to current times. Sage grouse inhabit areas that occur on National Forest and other federal, private, and state land ownerships. Vegetation management on these other ownerships may not take into consideration the needs of sagebrush-dependent species. Mortality can occur from insecticide spraying and hunting, as well as collision with vehicles. Much of the habitat occupied by sage grouse is susceptible to the spread and invasion of non-native plants, which alters the understory communities of shrub/steppe habitat. Within Forest Service administered lands, habitat is still available for this species, but within the entire Snake River Valley there has been a significant reduction. Loss on this large scale will likely persist into the future. Therefore, Forest Service administered lands will play a major roll in maintaining habitat for species dependent on sagebrush for some stage of their life history. Management areas that have the greatest extent of altered sagebrush need special management consideration when proposed activities would have the potential to change the structural stages of sagebrush on Forest Service administered lands.

Sage grouse habitat also occurs on one management area on the Boise National Forest that is adjacent to the western boundary of the Sawtooth National Forest. We do not believe this area is appropriate for the inclusion of the sage grouse as an MIS to the Boise National Forest because of two reasons. First, the entire area that is considered sage grouse habitat burned during the 1990s in several wildfires and has not yet re-established enough sagebrush to be used by sage grouse. Sage grouse will have to re-establish themselves from adjacent habitat on other ownership and also the Sawtooth National Forest, and it is assumed additional time measured in years will be needed before this happens. Second, the area that is considered sage grouse habitat on the Boise is relatively small, amounting to an estimated 7,800 acres. This amount of area does not provide enough habitat to support a population of sage grouse, but is assumed to part of a larger portion of habitat that occurs to the south and east. We believe because of the limited extent of habitat available in this one management area, and the current unsuited conditions due to recent large fires, that it would not be appropriate to use the sage grouse as a MIS on the Boise.

This species is being proposed as an MIS on the Sawtooth National Forest in 15 Management Areas because:

- There have been recent population declines and a long-term downward trend in numbers,
- Some population data are available through IDFG surveys,
- This species is sagebrush-obligate, representing needs of other sagebrush-dependent species,
- This species shows high fidelity to specific sagebrush communities, using the same localized areas on Forest year after year,
- Specific vegetation components can be monitored and tracked at the Forest and project scale,
- It is estimated that on-Forest habitat has been altered from historic to current times, especially by recent wildfires,
- Historical local habitat loss has occurred on other adjacent ownerships,
- Habitat is highly susceptible to exotic weed invasion,
- Potential on-Forest vegetation management activities can have impacts on their habitat, and these activities are within the administrative control of the Forest Service, and
- There is a strong interest in this species by many individuals and agencies.

Monitoring

Monitoring approaches are designed to detect population and habitat changes. They require the ability to track and detect population changes, an understanding of how changes in populations reflect changes in habitats, and the ability to detect changes in populations and habitat as a result of management actions. The key question to answer is: how are the population trends of MIS species changing as a result of management actions and revised Forest Plan direction? Monitoring will be conducted to assess MIS population and habitat trends at the project and Forest scale.

The pileated woodpecker will be monitored in all Management Areas where potential forested vegetation management activities may affect pileated habitat for all three Forests except the southern portion on the Sawtooth.

The white-headed woodpecker will be monitored in Management Areas 1-4, 6-11, and 13-16 on the Boise National Forest. It will also be monitored in Management Areas 1-3, 5, and 10 on the Payette National Forest. These are the areas where known habitat or populations exist, and where forested vegetation management may occur.

The sage grouse will be monitored where habitat occurs on the Sawtooth National Forest in Management Areas 4, 5, 7, and 9-20. These areas have a high percentage of sagebrush habitat and either known or potential species occurrence.

Effects Analysis

A complete discussion of effects to bull trout by alternative can be found in Chapter 3 of the FEIS, in the Terrestrial Wildlife Habitat and Species section.

This paper was prepared by Howard Hudak, revision team terrestrial wildlife biologist; and reviewed by Lisa Nutt, wildlife biologist on the Boise National Forest; Floyd Gordon, wildlife biologist on the Payette National Forest; and Tom Bandolin, wildlife biologist on the Sawtooth National Forest.

Aquatic Management Indicator Species for the Boise, Payette, and Sawtooth National Forests

Introduction

The *Preliminary AMS for the Southwest Idaho Ecogroup* (USDA Forest Service 1997) identified a "Need For Change" to establish fish Management Indicator Species (MIS) or management indicators that more accurately reflect the effects of Forest management activities under the Forest Plans. This paper presents the legal requirements for selection of Management Indicator Species (MIS) from the 1982 NFMA implementing planning regulations 36 CFR 219.19, and describes past MIS for the three Ecogroup Forests and rationale for changes between current and proposed MIS for the revised Forest Plans. This paper also provides a summary of effects to MIS species and a general monitoring approach.

Legal Requirements for MIS

Federal regulation 36 CFR 219.19 requires that viable populations of all native and desirable non-native vertebrate species be maintained at the planning area level (generally considered the Forest). The regulations recommend the use of MIS populations to reflect the effects of management activities. These are primarily contained in 36 CFR219.19. Following are the key elements related to MIS:

Selection
"In order to estimate the effects of each alternative on fish and wildlife populations, certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated. These species shall be selected because their population changes are believed to indicate the effects of management activities. In the selection of management indicator species, the following categories shall be represented where appropriate: Endangered and threatened plant and animal species identified on State and Federal lists for the planning area; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped; non-game species of special interest; and additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality . . ." (36 CFR 219.19(a)(1))

Planning
"Each alternative shall establish objectives for the maintenance and improvement of habitat for management indicator species selected under paragraph (g)[sic] (1) of this section, to the degree consistent with overall multiple use objectives of the alternative. To meet this goal, management planning for the fish and wildlife resource shall meet the requirements set forth in paragraphs (a)(1) through (a)(7) of this section." (36 CFR 219.19(a).

Effects Analysis
"Planning alternatives shall be stated and evaluated in terms of both amount and quality of habitat and of animal population trends of the management indicator species." 36 CFR 219.19(a)(2)

Monitoring
"Population trends of the management indicator species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with State fish and wildlife agencies, to the extent practical." (36 CFR 219.19(a)(6))

MIS in the Original Forest Plans and Draft EIS

Aquatic MIS in the original Forest Plans (USDA Forest Service 1987, 1988, and 1990) for the three Southwest Idaho Ecogroup (Ecogroup) Forests include sockeye, chinook, steelhead, westslope cutthroat and redband/rainbow trout, Wood River sculpin, and macro-invertebrates (mayfly, trufly, and stonefly) as aquatic MIS species (Table F-4). In the Forest Plan Revision Draft EIS, sockeye and macro-invertebrates were recommended for deletion, and bull trout and Yellowstone cutthroat trout for inclusion as aquatic MIS species.

Many of these species were recommended in the original Plans or Draft EIS because they are: (1) sensitive to detecting habitat change; (2) widespread across the Ecogroup; (3) "Keystone species" or "habitat specialist"; and (4) have inherent tribal, economical, and ESA importance.

Table F-4. Current Aquatic Management Indicator Species for the Ecogroup Forests

Fish Species	Status	Location by Forest	Current Forest Plans	MIS for Draft EIS
Sockeye salmon	Listed - endangered	Sawtooth	Sawtooth	No
Chinook salmon	Listed - threatened	All 3 Forests	All three Forests	No
Juvenile chinook salmon	Listed - threatened	All 3 Forests	No	All 3 Forests
Steelhead trout	Listed - threatened	All 3 Forests	Boise/Sawtooth	No
Juvenile steelhead trout	Listed - threatened	All 3 Forests	No	All 3 Forests
Bull trout	Listed - threatened	All 3 Forests	No	All 3 Forests
Westslope cutthroat trout	Region 4 sensitive	All 3 Forests	All three Forests	All 3 Forests
Yellowstone cutthroat trout	Previously petitioned for listing	Sawtooth	No	Sawtooth
Wood River sculpin	Region 4 sensitive	Sawtooth	Sawtooth	Sawtooth
Redband/rainbow trout	Region 4 sensitive	All 3 Forests	All three Forests	All 3 Forests
Macro-invertebrates	Not sensitive	All 3 Forests	Sawtooth	No

Proposed Deletions from Original Forest Plans and Draft EIS MIS Lists

Several recent legal challenges throughout the country have alleged failure to comply with requirements pertaining to monitoring MIS and the lack of use of such information for evaluating proposed projects. In many cases the plaintiffs have prevailed because the project record contained little or no information on population trend data for MIS species; the record did not indicate whether or how MIS population trend data was considered in NEPA analysis for the project; and/or the conclusions about effects on forest-wide viability were not substantiated.

In the past the Forest Service has relied heavily on habitat condition and inventory both for Forest Plan monitoring as well as project evaluation. Earlier Ninth Circuit Court decisions did indicate habitat could be used as a proxy for population surveys under certain circumstances. Subsequent rulings, however, have determined that population monitoring is needed to monitor MIS trend. In general, changes in habitat are no longer sufficient to be used as a surrogate for change in population trend.

In response to recent issues raised by these court challenges, the Draft EIS aquatic MIS list was revisited to see if: (1) recommended species still met MIS criteria, (2) what population data on each species were available, and (3) if the population data were sufficient to determine trend in MIS at Forest scale. The pros and cons of existing aquatic MIS species were discussed to establish a clear rationale on which MIS to use for the Forest Plan revision. The variables and results are displayed in Table F-5. Variables considered a negative influence on selecting an MIS species included:

(1) Presence of stocking and hatchery fish. Stocking and hatcheries were a negative influence because any changes due to Forest Service management to native populations could be masked by supplementation.

(2) Outside influences beyond Forest Service management activities. Those species that are wide ranging are subject to numerous management effects and would be difficult to use as indicators of Forest Service actions.

Variables, that if met, were considered a good reason to pick an MIS species included:

(1) Occurrence across the Ecogroup area. This was considered a positive because all three Forests could share monitoring responsibilities and better track population trends.

(2) Sensitivity of the species to habitat or watershed condition change. Those species whose populations are sensitive enough to detect habitat change from Forest Service activities are a good reason to retain as an MIS.

(3) Ability to monitor effectively using existing techniques.

Table F-5. Evaluation Criteria for MIS Species in Original Plans and Draft EIS

Species	MIS Criteria						
	Stocking (-)	Does MIS occur across the Ecogroup (+)	How sensitive is MIS to detecting changes (+)	Ability to monitor (+)	Availability of data (abundance and presence/absence) (+)	Outside influences (-)	Recommendation for MIS
Sockeye	-	-	+	+	+	-	No
Chinook juvenile	-	+	+	+	+	-	No*
Steelhead juvenile	-	+	+	+	+	-	No*
Bull trout	+	+	+	+	+	+	Yes
Westslope cutthroat	-	+	+	+	-/+	+	No
Rainbow and Redband	-	+	-	+	+	+	No
Wood River sculpin	+	-	+	-	-	+	No
Yellowstone cutthroat	+	-	+	+	-	+	No
Macro-invertebrates	*	*	*	-	-	+	No

(-) = Criteria not met for selecting MIS; (+) Criteria met for MIS; No* = may be appropriate in specific subbasins where stocking is not an issue.

Sockeye salmon – Sockeye salmon, while extremely depressed in numbers (listed "endangered"), was not recommended as an MIS species. This is because (1) it has a very limited in distribution (restricted for spawning and rearing only to the Upper Salmon River subbasin); (2) is strongly influenced by many off-forest activities (traveling hundreds of miles to reach the ocean and back); and (3) are sustained primarily through a captive brood stock program to recover the species. Returning spawners are captured, spawned and their progeny reared to maturity. Out-migrants from the lake are also intercepted and reared to maturity. These programs, while needed to sustain the species in the near future, make it difficult to track changes in population trends due to Forest Service activities.

Chinook salmon and steelhead trout – Chinook salmon and steelhead trout meet most positive criteria for MIS species. However, their wide range and anadromy causes them to be exposed to a number of outside influences making it difficult to tie adult abundance and trend to effects of Forest Service activities. Incubation and rearing success of juveniles, however, are more directly influenced by Forest Service activities, and could more accurately reflect project effects. Unfortunately, many subbasins in the Ecogroup are stocked with juvenile steelhead and chinook. This stocking makes tracking of juvenile population changes due to Forest Service management difficult and masks any changes in trend.

Westslope and Yellowstone cutthroat, and redband trout – These native trout species met much of the MIS criteria. However, they were not selected as MIS species for two reasons. First, many subbasins across the Ecogroup area are stocked for rainbow and cutthroat trout. As discussed for anadromous species, stocking can mask many natural changes in population trend resulting from Forest Service activities. Stocking is also a particular problem for redband trout because they are difficult to distinguish from rainbow trout without genetic testing.

Yellowstone cutthroat historically occurred only in the Goose Creek and Raft River subbasins on the Sawtooth National Forest. Many decades of stocking have extended some populations well out of their historical range. This species is currently not stocked in its historic range in the Ecogroup (personal communication Doug Megargle, Idaho Department of Fish and Game), but many populations are believed to be hybridized. Hybrids may appear virtually identical to native cutthroat (Ferguson et al. 1985) making tracking native populations problematic.

Wood River sculpin – The Wood River sculpin is endemic to the Wood River drainage in south-central Idaho. While, sensitive to habitat modification and temperature extremes, very little information exists on their population numbers or trend. The small size and secretive nature of the species requires difficult monitoring mainly through techniques that can be destructive to habitat or harmful to sculpin and other aquatic organisms making them problematic as an MIS.

Macroinvertebrates – Macro-invertebrates have been used as key indicators for detecting changes in water quality and aquatic habitat. However, tracking changes in population trend over a subbasin or Forest can be problematic. This is for several reasons. First, there is a high degree of variability in species within or between sites (Minshall and Andrews 1973). Therefore, it can be difficult to define what comprises a population (reach, stream, subbasin) to monitor. Second, the species of interest may not be present over a wide enough area to track population trend. Third, consistent information is not available across the Ecogroup area to track specific macro-invertebrate species. Some agencies only report data on species assemblages or specific biological indices, while others may report the number of individual species at each site. Finally, samples require specialized taxonomic expertise to identify certain species making monitoring very costly and limiting the number of sample sites to detect change.

Proposed MIS for the Revised Forest Plans

Bull trout were selected as the aquatic MIS for all three Forests in the revised Forest Plans. Table F-6 shows which subbasins bull trout have been found in. With the exception of the North Fork Payette River, bull trout would be monitored in all subbasins as an MIS.

Table F-6. Bull Trout Presence by Subbasin Across the Ecogroup Forests

Salmon River Drainage	Boise River Drainage	Payette River Drainage	Other Drainages
Upper Salmon River	North/Middle Fork Boise	Payette River	Weiser River
Lower MF Salmon River	SF Boise River	MF Payette River	Brownlee Reservoir
Upper MF Salmon	Boise-Mores	NF Payette River	Hells Canyon
MF Salmon-Chamberlain		SF Payette River	
SF Salmon River			
Little Salmon River			
Lower Salmon River			

Bull trout will not be used as an MIS in the North Fork Payette because only small populations remain in the upper Gold Fork on the Boise National Forest and factors affecting this population are strongly influenced by non-Forest Service management. Re-colonization by this last population to other stream may be difficult due to thermal and biological barriers downstream. Extensive surveys by the Payette National Forest, Boise Cascade Corporation, and Idaho Department of Fish and Game in the 1990s and 2000 to 2002 have not found bull trout in many streams historically occupied by this species. Kennally Creek and Lake Fork Creek where bull trout were found in the early 1980s now are only dominated by brook trout. In fact, brook trout now dominate most streams in the North Fork Payette drainage and there are passage barriers throughout the basin caused by dams at Upper Payette Lake, Payette Lake, Little Payette Lake, Brown's pond, etc. In addition, lake trout inhabit Payette Lake and fill any bull trout niche there. Little Payette Lake and Cascade Reservoir both contain tiger muskie and smallmouth bass. These factors make tracking bull trout as an MIS species difficult. Furthermore, introduced species are so widespread that any Forest Service management short of biological control is unlikely to change this bull trout trend.

Reasons for selecting bull trout as a MIS, other than in the North Fork Payette are as follows:

(1) <u>Bull Trout have a low tolerance to habitat and watershed disturbances</u>
Bull trout appear to have more specific habitat requirements than other salmonids, and are more strongly tied to the stream bottom and substrate (Rieman and McIntyre 1993). Five related elements comprise suitable bull trout habitat: (1) substrate composition that includes free interstitial spaces; (2) complex cover including large woody debris, undercut banks, boulders, shade, pools or deep water; (3) cold water temperatures; (4) channel and hydraulic stability; and (5) connectedness through migratory corridors. In-channel wood, clean substrate, cold clean water, deep pools, undercut banks, channel stability, winter high flows, and summer low flows consistently appear to influence bull trout abundance and distribution (State of Idaho 1996). Bull trout have repeatedly been associated with the coldest stream reaches within basins. The lower limits of bull trout distributions correspond ground water temperatures of about 5-7 º C (Meisner 1990).

These habitat requirements makes them highly vulnerable to land management activities that raise water temperatures, increase sedimentation, decrease connectivity, modify streamside/riparian function, and encourages fishing/poaching access.

(2) Bull trout are present throughout most of the Ecogroup area
Bull trout were historically found throughout the Ecogroup area, except for the Snake River above Shoshone Falls (Lake Walcott, Raft, Goose, and Curlew Valley subbasins) and the Wood River system (Camas, Big Wood and Little Wood subbasins) (State of Idaho 1996, Quigley and Arbelbide 1997). Bull trout currently occur in 17 of the 28 subbasins across the Ecogroup area.

The advantage of being widely distributed across the Ecogroup area is that Forests can share responsibilities to better monitor population trends.

(3) Bull trout represent a wide range of aquatic habitat needs for other aquatic species
Because bull trout overlap much of the same habitat as cutthroat, steelhead, and chinook, require many of the same watershed and habitat conditions (e.g. clean substrate, cover, low road densities, etc.) as other aquatic species, and are very sensitive to certain management effects, changes to bull trout populations would be indicative of changes other aquatic species.

(4) Local populations of bull trout generally do not extend be yond the Ecogroup area
Many bull trout sub-populations or core areas occur entirely within a specific subbasin. A core area represents the closest approximation of a biologically functioning unit for bull trout. The combination of core habitat (i.e., habitat that could supply all elements for the long-term security of bull trout) and core populations (i.e., bull trout inhabiting core habitat) constitutes the basic unit on which to gauge recovery within a recovery unit. Within core areas several local populations may exist. A local population is a group of bull trout that spawn within a particular stream or portion of a stream system, which may typically be represented by a headwater tributary or complex of tributaries.

In the Southwest Idaho Recovery Unit, the U.S. Fish and Wildlife Service identified two bull trout populations in the Boise River basin (Arrowrock Reservoir – Boise-Mores/North Fork and Middle Fork Boise and Anderson Ranch Reservoir – South Fork Boise), four in the Payette River basin (Black Canyon Reservoir – Payette subbasin, South Fork-Middle Fork Payette River, Deadwood Reservoir – South Fork Payette subbasin, and North Fork Payette River), and two in the Weiser River basin (Little Weiser River and East Fork Weiser River) (USDI FWS 1998).

Bull trout populations (core areas) in the Salmon River Recovery Unit also follow subbasins. The U.S. Fish and Wildlife Service identified eight populations. These include the Upper Salmon River (Pashimeroi River to its headwaters in the Sawtooth mountains), Pahsimeroi River (entire 4th field HU), Lemhi River (entire 4th field HU), Middle Salmon River-Panther Creek (Salmon River 4th field HU from the Main Salmon River's confluence with the Lemhi River to its confluence with the Middle Fork Salmon River), Middle Fork Salmon River (includes two 4th field HU watersheds that cover the entire Middle Fork Salmon River drainage, most of which is in the Frank Church-River of No Return Wilderness), Middle Salmon River - Chamberlain (Salmon River from its confluence with the Middle Fork Salmon River on the east then downstream to the French Creek), and Little Salmon/Lower Salmon (includes two 4th field HUs - Little Salmon River and lower Salmon River watersheds).

(5) Bull trout have not been stocked
Bull trout have not been considered a game species. Thus, there has been no stocking to mask trends in populations.

(6) <u>There is a fair amount of information on bull trout collected within the Ecogroup</u>
Population monitoring for bull trout varies across the Ecogroup area. In the late 1980s to early 1990s, most monitoring consisted of electro-fishing or snorkeling short reaches to determine presence/absence of species or their relative abundance. Since bull trout and other aquatic species were proposed and listed under the Endangered Species Act, the intensity of monitoring has increased. A number of agencies including Idaho Department of Fish and Game, Department of Environmental Quality, Tribes, Forest Service, Bureau of Reclamation, etc., now conduct some type of yearly monitoring in the Ecogroup. Unfortunately, a coordinated monitoring effort between these multiple agencies has not yet taken shape. This monitoring has better defined the distribution of bull trout and given managers idea on where to focus their monitoring. However, some data gaps still exist in certain subbasins. Monitoring techniques have also varied greatly being tailored to specific study objective.

Payette National Forest - Monitoring for bull trout across the Payette National Forest varies by subbasin. Most distributional data for bull trout comes primarily from presence-absence surveys and basin-wide surveys using techniques such as electrofishing, radio telemetry, spawning ground surveys, snorkeling, and traps. The greatest amount of population information occurs in the South Fork and Middle Fork Salmon River and Middle-Salmon Chamberlain subbasins as a result of increased monitoring for anadromous species.

Boise National Forest - Monitoring for bull trout across the Boise National Forest varies by subbasin. The following is a summary of what has been completed to date.

North and Middle Fork Boise River: An estimated 40 streams have been sampled since the early 1990s, with bull trout having been found in 17 of them. In recent years in this drainage a thesis study by Salow (2001), a telemetry study by Flatter (1998), a cooperative genetics study by the U.S. Bureau of Reclamation, Forest Service Rocky Mountain Research Station, and University of Montana, and a cooperative population study by the Bureau of Reclamation and Forest Service have been conducted. Sampling has included snorkeling and electrofishing at the stream reach level, and out-migrant trapping with rotary screw trap and weirs operated by the Forest Service.

Boise-Mores: An estimated 15 streams have been sampled since the early 1990s, with bull trout having been found in 3 of them. In recent years in this drainage a thesis study by Salow (2001), a telemetry study by Flatter (1998), a cooperative genetics study by the U.S. Bureau of Reclamation, Forest Service Rocky Mountain Research Station, and University of Montana, and a cooperative population study by the Bureau of Reclamation and Forest Service have been conducted. Sampling has included snorkeling and electrofishing at the stream reach level.

South Fork Boise River: An estimated 20 streams have been sampled since the early 1990s, with bull trout having been found in 3 of them. In recent years in this drainage a radio-telemetry study by Partridge et al. (2000), a cooperative genetics study by the U.S. Bureau of Reclamation, Forest Service Rocky Mountain Research Station, and University of Montana, and installation of weirs operated by the Forest Service have been conducted. Sampling intensity has also changed from electrofishing relatively short stream reaches to sampling entire 7th field sub-watersheds.

Lower Boise River: An estimated 10 streams have been sampled since the early 1990s; no bull trout have been found in any of them. Sampling has included snorkeling and electrofishing at the stream reach level.

South Fork Payette River: An estimated 50 streams have been sampled since the early 1990s; bull trout have been found in 14 of them. Sampling has included snorkeling and electrofishing at the stream reach level.

Middle Fork Payette: An estimated 20 streams have been sampled since the early 1990s; bull trout have been found in 3 of them. Sampling has included snorkeling and electrofishing at the stream reach level.

Payette: An estimated 15 streams have been sampled since the early 1990s; bull trout have been found in 3 of them. Sampling has included snorkeling and electrofishing at the stream reach level.

North Fork Payette: An estimated 20 streams have been sampled since the early 1990s; bull trout have been found in 3 of them. Sampling has included snorkeling and electrofishing at the stream reach level.

Upper Middle Fork Salmon: An estimated 20 streams have been sampled since the early 1990s; bull trout have been found in 18 of them. Sampling has included snorkeling and electrofishing at the stream reach level.

South Fork Salmon River: An estimated 40 streams have been sampled since the early 1990s; bull trout have been found in 12 of them. Sampling has included snorkeling and electrofishing at the stream reach level.

Sawtooth National Forest – Monitoring for bull trout across the Sawtooth National Forest varies by subbasin. In the S.F. Boise subbasin approximately 60 streams have been sampled since the early 1990s, with bull trout having been found in 20 of them. In recent years in this drainage a radio-telemetry study by Partridge et al. (2000), a cooperative genetics study by the U.S. Bureau of Reclamation, Forest Service Rocky Mountain Research Station, and University of Montana, and installation of weirs operated by the Forest Service have been conducted. Sampling intensity has also changed from electrofishing relatively short stream reaches to sampling entire 7th field subwatersheds.

In the Upper Salmon River subbasin, approximately 70 streams have been examined since the early 1990s, with bull trout having been found in 35 percent of them. Due to required precautions for the protection of ESA listed anadromous species most surveys have been completed using snorkeling methods. Comprehensive habitat and population condition inventories have been completed on approximately 130 miles of stream since 1990, while reconnaissance surveys have evaluated species presence on another 95 miles. Information on the distribution of bull trout has also been supplemented by Idaho Fish and Game chinook parr monitoring snorkeling transects completed from 1987 to 1996. A few fish weirs operated by Idaho Department of Fish and Game, or the Shoshone-Bannock Tribes within the subbasin, for anadromous fish objectives, also contribute to our understanding of bull trout movements.

Population Monitoring

Limitation with Abundance Data

Successful monitoring of bull trout will require that a number of physical and biological data sources be used. A cursory review of bull trout monitoring completed for this assessment indicates that in many subbasins there is not adequate population data to track changes in species abundance across an entire subbasin. The challenge with existing monitoring is in the variation of what is being collected. Surveys range from species presence/absence to those that only collect juvenile or adult densities. There is not a consistent set of information being collected to measure bull trout abundance at the subbasin scale.

The other challenge with abundance data is that it is often influenced by sampling error and normal inter-annual variation in abundance. Platts and Nelson (1988) found that trout populations exhibit large annual fluctuations in abundance and biomass. Thus, estimates of abundance in individual streams will require relatively intense sampling and still may vary dramatically within streams and among years as a result of both the variation within the population and sampling error. The precision of each monitoring technique used also complicates tracking changes in abundance. For example, estimates of total spawning escapement based on trapping adults at a weir or counting redds are likely to be more precise than snorkel or electro-fishing estimates of population size. The effort required to produce relatively precise estimates useful for monitoring will limit the number of streams that can be surveyed. Because monitoring of MIS species will typically be related to the condition of entire population rather than the condition of individual streams, it may be difficult to produce a representative (unbiased) sample of the entire system.

Alternative Population Monitoring Approach for MIS

An alternate approach to abundance monitoring for bull trout is monitoring the patterns of occurrence in a subbasin across time. Monitoring spatial patterns can be particularly appropriate for bull trout because they have very specific habitat requirements and naturally have patchy distributions. Dunham and Rieman (1999) found that bull trout populations are often structured by the available habitat "patches" or networks of cold water. A patch is defined for bull trout as the contiguous stream areas believed suitable for spawning and rearing (Rieman and McIntyre, 1995). Rieman and McIntyre (1995) analyzed bull trout in the Boise River and found occurrence to be positively related to habitat size (stream width) and patch (stream catchment) area. Patch size (area) was the single most important factor determining bull trout occurrence.

Spatial patterns can also provide information on population persistence and recovery (re-colonization). The stability and persistence of metapopulations is related to the number, size, and relative distribution of populations (Dunham and Rieman 1999). Bull trout populations in larger, less isolated, and less disturbed habitats may be more likely to persist, and these habitats may prove critical in terms of providing long-term refugia and re-colonization potential (Rieman and McIntyre, 1995). Smaller patches are likely to support smaller local populations and fewer or less diverse habitats (Rieman and McIntyre, 1995).

Trends in the frequency of occurrence in habitat patches or of individuals in select sample sites distributed across a large system (e.g., South Fork Boise River above Anderson Ranch Dam) should require less intense sampling at individual sites than abundance monitoring. By limiting the sampling effort within streams it should be possible to sample a much larger and more representative area (e.g., a random distribution of sites) for bull trout.

The metric for considering trends would become the proportion of habitat patches or sample sites where bull trout were detected across time. Sampling effort in each patch or site could be adjusted for known sampling biases related to method and habitat condition to standardize the probability of detection across the subbasin. Such an approach would produce less variation among years, but would still provide information about trends in relative abundance as well as in the patterns of distribution of the species (a primary goal of management is to maintain a broad distribution of populations across the species range). Existing data from other ongoing sampling might be used to augment this kind of monitoring. For example spawning counts, snorkeling, etc. scattered throughout a subbasin may help establish the frequency and pattern of occurrence as long as representative samples are taken. It may also be desirable and even preferable to use other techniques to monitor broad trends when possible. For example redd counts are useful in some systems with large migratory adults. Weirs can be used on main stem rivers to actually census the adult population using a large number of upstream tributaries. In some cases these data may be collected more efficiently than sampling conducted throughout the tributary watersheds.

When looking at patterns of occurrence, it will be important to make sure that the sample sites are "representative". The best way to assure this is typically to randomly select sites. New sites may be selected each year across each subbasin, but some designs may also retain some sentinel sites that are sampled each year. A selection of representative streams maintained through time could be used as an index of spatial diversity. How many permanent or sentinel sites vs. random sites would be determined when detailed monitoring plans are developed once forest plans are revised. Streams where bull trout have not been found, but reasonably might be expected to occur, should also be included to enable detection of bull trout dispersion and re-colonization.

In addition to population (frequency/pattern) monitoring, changes in habitat and watershed condition would be used to help determine changes in species pattern. In particular changes in substrate composition, in stream habitat (e.g., pools, cover, etc.), water temperature, and connectivity would be monitored.

Why Population Data Are Sufficient To Determine Trend In MIS At The Forest Scale

As discussed previously, the level of biological monitoring varies considerably between subbasins and Forests. A key question regarding bull trout as an MIS species is "is the information currently collected for bull trout adequate enough to track and detect population changes?" This question is somewhat beyond the scope of this assessment because it will require a more through review of existing monitoring programs and development of detailed monitoring plans by each Forest. However, the adequacy of monitoring data can be addressed as it relates to a general monitoring approach, which is discussed below.

It is believed that current monitoring is sufficient in several subbasins across the Ecogroup to detect changes in bull trout pattern or frequency. This is because spawning counts, snorkeling, and other monitoring sites are distributed throughout many subbasins and cover enough streams to detect changes in the frequency or pattern of bull trout occurrence. However, it is also clear that in many subbasins monitoring is too infrequent, does not use sensitive enough techniques (spot surveys or limited stream transects), and does not sample enough representative sites to even detect changes in bull trout pattern. Additional monitoring or modifications to existing programs will be needed.

Monitoring Aquatic Ecosystems for Remaining Subbasins and Lentic Systems

MIS for aquatic ecosystems will not be selected for the remaining subbasins or for lentic ecosystems. These will be addressed by monitoring how subwatersheds are responding to management direction and the Watershed Aquatic Restoration Strategy (WARS). High priority subwatersheds for active restoration would likely be an emphasis for most monitoring. However, monitoring would also need to be focused in moderate active restoration and conservation/passive restoration subwatersheds to track change over time. How much monitoring in each subset and the location of this monitoring would need to be developed by the Continuous Assessment Planning team in coordination with each Forest staff and other outside agencies.

Table F-7. Subbasins Across The Ecogroup Area That Do Not Have Bull Trout

Wood River	Boise River	Payette River	Upper Snake River	Other Drainages
Camas Creek	Lower Boise	NF Payette River	Lake Walcott	Northern Great Salt Lake Desert
Big Wood			Upper Snake-Rock	
Little Wood			Raft	
			Goose	
			Salmon Falls	
			Curlew Valley	

Effects Analysis

A complete discussion of effects to bull trout by alternative can be found in Chapter 3 of the FEIS, in the Soil, Water, Riparian, and Aquatic Resources section.

Table F-8. High Priority Breeding Bird Species In Idaho*, Shown By Primary Breeding Habitat

Primary Breeding Habitat	High Priority Bird Species
Riparian	Barrow's goldeneye, hooded merganser, blue grouse, mountain quail, black-chinned hummingbird, calliope hummingbird, rufous hummingbird, willow flycatcher, dusky flycatcher, black-billed magpie, American dipper, yellow warbler, MacGillivray's Warbler
Low-elevation mixed conifer	Lewis' woodpecker, Williamson's sapsucker, sharp-shinned hawk, northern goshawk, black-backed woodpecker, brown creeper, varied thrush, Townsend's warbler, western tanager
Marshes, lakes, and ponds	American white pelican, western grebe, white-faced ibis, cinnamon teal, trumpeter swan, sandhill crane, redhead, killdeer, black-necked stilt, American avocet, Franklin's gull
Sagebrush and salt desert scrub	Swainson's hawk, sage grouse, short-eared owl, loggerhead shrike, rock wren, sage thrasher, Brewer's sparrow, lark sparrow, sage sparrow
High-elevation mixed conifer	Hammond's flycatcher, olive-sided flycatcher
Grassland	Columbian sharp-tailed grouse, long-billed curlew
Aspen	ruffed grouse
Ponderosa pine	Flammulated owl, white-headed woodpecker
Pinyon/juniper/mountain mahogany	Virginia's warbler, ferruginous hawk, pinyon jay, gray flycatcher, black-throated gray warbler, plumbeous vireo
Cliff/rock outcrops/talus slopes	golden eagle, prairie falcon, black swift
Cedar and hemlock	Vaux's swift
Alpine	black rosy finch
Lodgepole pine, mountain brush	None

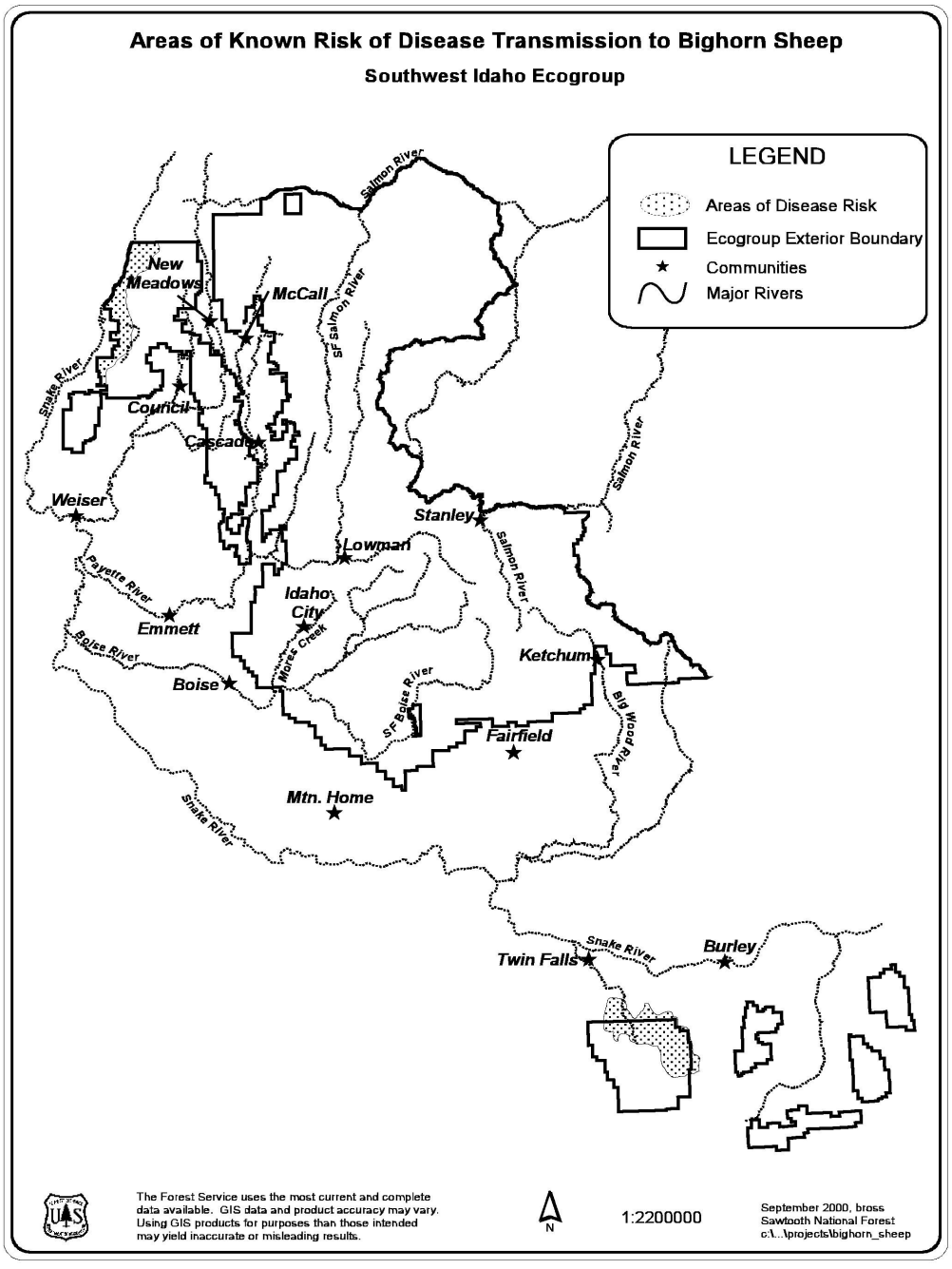
*From Idaho Partners in Flight

Table F-9. High Priority Breeding Bird Species* within Selected Habitats on the Southwest Idaho Ecogroup National Forests, Shown by Primary Breeding Habitat

Habitat	Bird Species	Boise	Payette	Sawtooth
Riparian	Barrow's goldeneye	X	X	X
	hooded merganser	NA	NA	NA
	blue grouse	X	X	X
	mountain quail	X	X	NA
	black-chinned hummingbird	X	X	X
	calliope hummingbird	X	X	X
	rufous hummingbird	X	X	X
	willow flycatcher	X	X	X
	dusky flycatcher	X	X	X
	black-billed magpie	X	X	X
	American dipper	X	X	X
	yellow warbler	X	X	X
	MacGillivray's warbler	X	X	X
Marshes, lakes, ponds	western Grebe	X	X	X
	american white pelican	NA	NA	NA
	white-faced ibis	NA	NA	NA
	trumpeter swan	NA	NA	NA
	cinnamon teal	X	X	X
	redhead	X	X	X
	sandhill crane	X	X	X
	killdeer	X	X	X
	black-necked stilt	NA	NA	NA
	American avocet	NA	NA	NA
	Franklin's gull	NA	NA	NA
Sagebrush	Swainson's hawk	X	NA	X
	sage grouse	X	NA	X
	short-eared owl	X	X	X
	loggerhead shrike	X	X	X
	rock wren	X	X	X
	sage thrasher	X	X	X
	Brewer's sparrow	X	X	X
	lark sparrow	X	X	X
	sage sparrow	NA	NA	NA
Ponderosa pine	flammulated owl	X	X	X
	white-headed woodpecker	X	X	X

*From Idaho Partners in Flight and Idaho Bird Conservation Plan, January 2000.
X = Species is or habitat is present
NA = Not applicable

Figure F-5. Areas of Known Risk of Disease Transmission to Bighorn Sheep On the Ecogroup Forests



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