

CONSERVATION STRATEGY FOR LANDBIRDS OF THE
EAST-SLOPE OF THE CASCADE MOUNTAINS IN
OREGON AND WASHINGTON

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EXECUTIVE SUMMARY

This document has been prepared to stimulate and support an active approach to conservation of landbirds in the East-Slope Cascades of eastern Oregon and Washington. It represents the collective efforts of individuals from multiple agencies and organizations within the Oregon-Washington Chapter of Partners in Flight. Participants included biologists and ecologists from Federal and State agencies, industry, private consulting firms, environmental organizations, and academia in order to ensure a full range of ideas, information flow, and practicalities.

Recommendations included in this document are intended to guide planning efforts and actions of land managers, direct expenditures of government and non-government organizations, and stimulate monitoring and research to support landbird conservation. The recommendations also are expected to be the foundation for developing detailed conservation strategies at multiple geographic scales to ensure functional ecosystems with healthy populations of landbirds.

Background

Vegetation of the East-Slope Cascades has changed in the last 150 years since European settlement of the region. Primary changes have been the loss of old forest habitat due to intensive timber harvesting, and the degradation of habitats (e.g., ponderosa pine forest) from a number of factors including fire suppression, over-grazing, invasion of exotic vegetation, and human development. The loss and alteration of historic vegetation communities has impacted landbird habitats and resulted in species range reductions, population declines, and some local and regional extirpations. For example, white-headed woodpecker and Lewis' woodpecker have been locally extirpated throughout parts of the planning area.

Conservation Strategy

The overall goal of Partners In Flight Bird Conservation Planning is to ensure long-term maintenance of healthy populations of native landbirds. This document is intended to facilitate that goal by describing the process and the recommended actions to implement landbird conservation in the Columbia Plateau. The four principal components of that process are:

- identify habitats and habitat attributes important to landbirds,
- describe the desired habitat conditions based on the habitat relationships of a select group of priority species,
- provide interim management targets (i.e., biological objectives) to achieve the desired conditions, and

- recommend management actions (i.e., conservation strategies) that can be implemented by various entities at multiple scales to achieve the biological objectives.

Because of the diversity of landbird species and habitats in the East-Slope Cascades, conservation will require a complex array of conditions within variable landscape patterns. Management goals need to be carefully designed and integrated across several scales to meet the needs of multiple species. Landbird conservation will likely require areas that function as reserves, and areas that incorporate a wide range of management activities within various land uses. Thus, our conservation emphasis is three-fold:

- initiate conservation actions in accordance with the ecological potential of the site (i.e., within the framework of potential natural vegetation and natural ecosystem processes),
- emphasize conservation within high priority designated conservation areas and where opportunities exist (i.e., receptive land owners and land managers), and
- emphasize conservation at multiple scales such that habitat conditions for one or a few species are nested within a landscape that provides a mosaic of conditions for multiple species.

Our conceptual approach for landbird conservation was to emphasize ecosystem management through a hierarchy of conservation recommendations for priority habitat types, habitat attributes or conditions within those habitat types, and landbird species highly associated with those habitats and habitat attributes. The priority habitats are:

- Ponderosa Pine forest,
- Mixed Conifer forest (late-successional),
- Oak-Pine Woodland, and
- several unique habitats.

Our strategy for achieving functioning ecosystems for landbirds is described through the habitat requirements of "focal species" highly associated with important attributes or conditions within each habitat type. The rationale for using focal species is to draw immediate attention to habitat attributes most in need of conservation or most important in a functioning ecosystem. By managing for a group of species representative of important components in a functioning ecosystem, many other species and elements of biodiversity also will be conserved. The following focal species were selected based on their conservation need, and/or degree of association with important habitat attributes in the East-Slope Cascades:

<u>Habitat</u>	<u>Habitat Attribute</u>	<u>Focal Species</u>
Ponderosa Pine	old forest-large patches	white-headed woodpecker
Ponderosa Pine	large trees	pygmy nuthatch
Ponderosa Pine	open understory - regeneration	chipping sparrow
Ponderosa Pine	burned old forest	Lewis' woodpecker
Mixed Conifer	large trees	brown creeper*
Mixed Conifer	large snags	Williamson's sapsucker
Mixed Conifer	grassy openings, dense thickets	flammulated owl
Mixed Conifer	multi-layered, structural diverse	hermit thrush
Mixed Conifer	fire edges and openings	olive-sided flycatcher *
Oak-Pine Woodland	early seral, dense understory	Nashville warbler
Oak-Pine Woodland	large oaks with cavities	ash-throated flycatcher
Oak-Pine Woodland	large pine trees/snags	Lewis' woodpecker
Lodgepole Pine	mature/old-growth	black-backed woodpecker
Whitebark Pine	mature/old growth	Clark's nutcracker
Montane Meadows	wet and dry	sandhill crane
Aspen	large trees/snags, regeneration	red-naped sapsucker
Subalpine Fir	patchy presence	blue grouse*

* Significantly declining population trends in the Cascade Mountains BBS Physiographic Region.

Based on the habitat relationships of these species, biological objectives are recommended and management actions (i.e., conservation strategies) to achieve them are described. Simply stated, biological objectives are "**what we think the birds need.**" They are intended to stimulate conservation actions, but are **not regulatory** nor do they represent the policies of any agency or organization. Biological objectives provide a management target for planning and implementation, and a benchmark for measuring success. They also should be used as a starting point for discussion of integration with broader ecosystem-based objectives. Because data are limited for many species, biological objectives often are based on assumptions. These are stated as such, and are considered to be testable hypotheses for research.

Biological objectives may include site- and/or landscape-level habitat objectives or population objectives. Habitat objectives are derived from current knowledge and professional judgement about bird-habitat relationships (see Appendix C for a summary). Population objectives are primarily trend objectives for declining focal species, and density or distribution objectives for a few species.

Conservation is emphasized in areas where it is ecologically appropriate and where presumably the habitat is most suitable for the focal species. To facilitate this at a regional scale, recommended management is prioritized for focal species and their associated habitat attributes by habitat type and physiographic subprovince.

Implementation

Implementation of this conservation strategy will require careful consideration of options to maximize conservation efforts, and the integration of diverse values and goals of land owners/managers with that of bird conservation. Implementation also will require a broad range of partnerships, extensive cooperation, and considerable financial resources. To be successful, participation will not only include land owners and managers, but also increased public awareness, commitment, and political support.

The conservation strategy has been designed for participation at any level. This includes directing management actions for small landowners to provide habitat for a single species, and as the foundation for comprehensive, integrated, multi-agency/organization, multi-species conservation within large-scale management units (e.g., watersheds, land management districts, physiographic regions). When this ecosystem-driven conservation strategy is fully implemented at large geographic scales, the aggregated effect will be the creation of landscapes that should function to conserve landbird communities.

The strategy has broad applicability to many other conservation planning efforts. Information presented in this document can be used in development of site-specific conservation plans such as State and private Habitat Conservation Plans, agency and inter-agency Management Plans, and local land-use planning strategies. Conversely, areas designated for conservation or management in other land management plans (e.g., The Nature Conservancy Ecoregion Plans) should be evaluated for potential support of landbird conservation as recommended in this document.

Adaptive Management

All conservation actions implemented on the basis of recommendations described in this document should include a monitoring and/or research component. This will be necessary not only to test the effectiveness of management actions, but also to evaluate assumptions upon which many of the biological objectives are based. The direct outgrowth of monitoring and research conducted as part of this strategy will be adaptive management. Monitoring and research are an integral part of the adaptive management component of this document, and will function to

increase our knowledge base and provide scientific data to revise biological objectives as necessary .

The Future

This is the first version of what is intended to be a "dynamic" document with continual revisions and expansions as new information becomes available. Future versions will likely include an expansion of the number of species addressed, and additional habitat and population objectives. As additional species are added and biological objectives are updated, a more complex ecosystem management plan will be formulated. Ultimately, we envision a regional landscape of Bird Conservation Areas where integrated conservation for multiple species is being implemented as part of ecosystem management.

Acknowledgments

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CHAPTER 1. INTRODUCTION

Continental and local declines in numerous bird populations have led to concern for the future of migratory and resident landbirds. Reasons for the declines are complex. Habitat loss, degradation, and fragmentation on breeding and wintering grounds and along migratory routes have been implicated for many species. Additional factors may include reproductive problems associated with nest predation, brood parasitism, and competition with exotic species.

Scientists and the concerned public agreed that a coordinated, cooperative, conservation initiative focusing on landbirds was needed to address the problem. In late 1990, Partners in Flight (PIF) was conceived as a voluntary, international coalition of government agencies, conservation groups, academic institutions, private organizations, and citizens dedicated to "keeping common birds common" and "reversing the downward trends of declining species".

PIF functions to direct resources for the conservation of landbirds and their habitats through cooperative efforts in the areas of monitoring, research, management, and education, both nationally and internationally. The foundation of PIF's long-term strategy for bird conservation is a series of geographically based Landbird Conservation Plans, of which this document is one.

A. Goal

The primary goal of PIF Landbird Conservation Planning is to ensure long-term maintenance of healthy populations of native landbirds. This document is intended to facilitate that goal by stimulating an active approach to landbird conservation. An overview of the process and recommended actions is presented in Figure 1. The strategy primarily addresses nongame landbirds, which have been vastly under-represented in conservation efforts, and many of which are exhibiting significant declines that may be reversed if appropriate management actions are taken. PIF Landbird Conservation Planning provides the framework to develop and implement conservation strategies by recommending actions on the ground that may prevent the need for future listings.

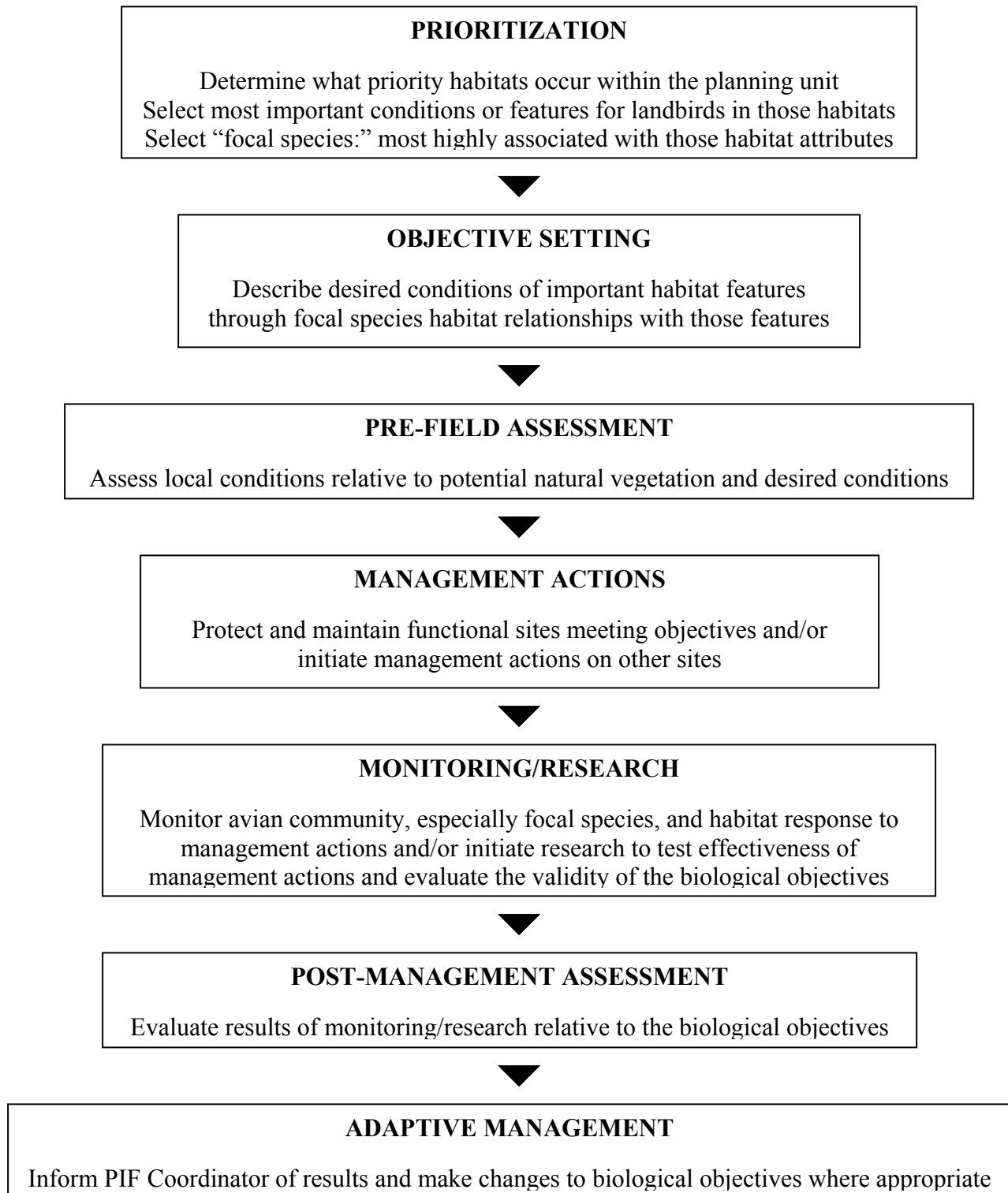
B. Process

PIF Landbird Conservation Planning emphasizes effective and efficient management through a four-step process designed to describe and achieve actions necessary for landbird conservation. These include:

- identify habitats and species that are conservation priorities,
- describe desired conditions for priority habitats and species,

- develop biological objectives that can be used as management targets to achieve desired conditions, and
- recommend conservation strategies that can be implemented at multiple scales to achieve biological objectives.

Figure 1. Flow chart of the process for implementing landbird conservation in the East-slope Cascades Landbird Conservation Planning Region.



C. Integration

This conservation plan is one of five plans that will be coalesced into a bi-state plan that will cover all the priority habitats and landbirds in Oregon and Washington. PIF Landbird Conservation Plans also are intended to complement other conservation initiatives such as the North American Waterfowl Management Plan, the National Shorebird Conservation Plan, and North American Colonial Waterbird Plan. Ongoing efforts to integrate with these initiatives during objective setting and implementation will help ensure that healthy populations of all native bird species continue to exist, and that all of our native ecosystems have complete and functional avifaunal communities.

PIF Bird Conservation Plans are one of many recent efforts that address conservation of natural resources and ecosystems in the Pacific Northwest. This plan is intended to supplement and support other planning and conservation processes (e.g., Habitat Conservation Plans, Washington State Landowner Landscape Plans, The Nature Conservancy Ecoregion Plans) and regulatory enactments (e.g., State Forest Practices Act, Endangered Species Act) by describing a conservation strategy for landbirds that are often not addressed or only incidentally addressed in other plans. In particular, we envision extensive integration with the two most comprehensive land management plans for the region, the Northwest Forest Plan (NFP) and the Interior Columbia Basin Ecosystem Management Plan (ICBEMP). It is anticipated that biological objectives and conservation strategies described in this document and future versions will be integrated not only with NFP and ICBEMP, but also with other ongoing and future conservation planning in the East-Slope Cascades to provide functioning ecosystems for the region's diverse array of landbird species.

CHAPTER 2. THE PLANNING UNIT

A. Scope

The East-Slope Cascades Landbird Conservation Planning Unit (Figure 2) includes mostly mid to high elevation forest cover types along the east-slope of the Cascade Mountains in Oregon and Washington. The planning unit encompasses several ecoregions including the Northern Cascades and Southern Washington Cascades in Washington, and the High Cascades in Oregon (Franklin and Dyrness 1973). Geographic boundaries are not rigorously defined but dependent more upon the presence of our priority habitats (see Chapter 5). For the purposes of consistency with the ICBEMP, we use the boundaries of their Northern Cascades, Southern Cascades, and Upper Klamath Ecological Reporting Units (ERUs) (Wisdom et al. in press) for our planning unit boundaries.

This conservation strategy does not include riparian, shrub-steppe, juniper-steppe, and juniper woodland habitats in eastern Oregon and Washington that extend into or are adjacent to the East-Slope Cascades. These areas are covered in another PIF plan entitled Conservation Strategy for Landbirds in the Columbia Plateau of Eastern Oregon and Washington. The strategy also does not include areas on the west-slope of the Cascade Mountains which are included in the PIF plan Conservation Strategy for Landbirds in Coniferous Forests of Western Oregon and Washington. Both these plans can be viewed and downloaded from the Oregon-Washington PIF web page at www.gorge.net/natres/pif.html.

B. Physical Features

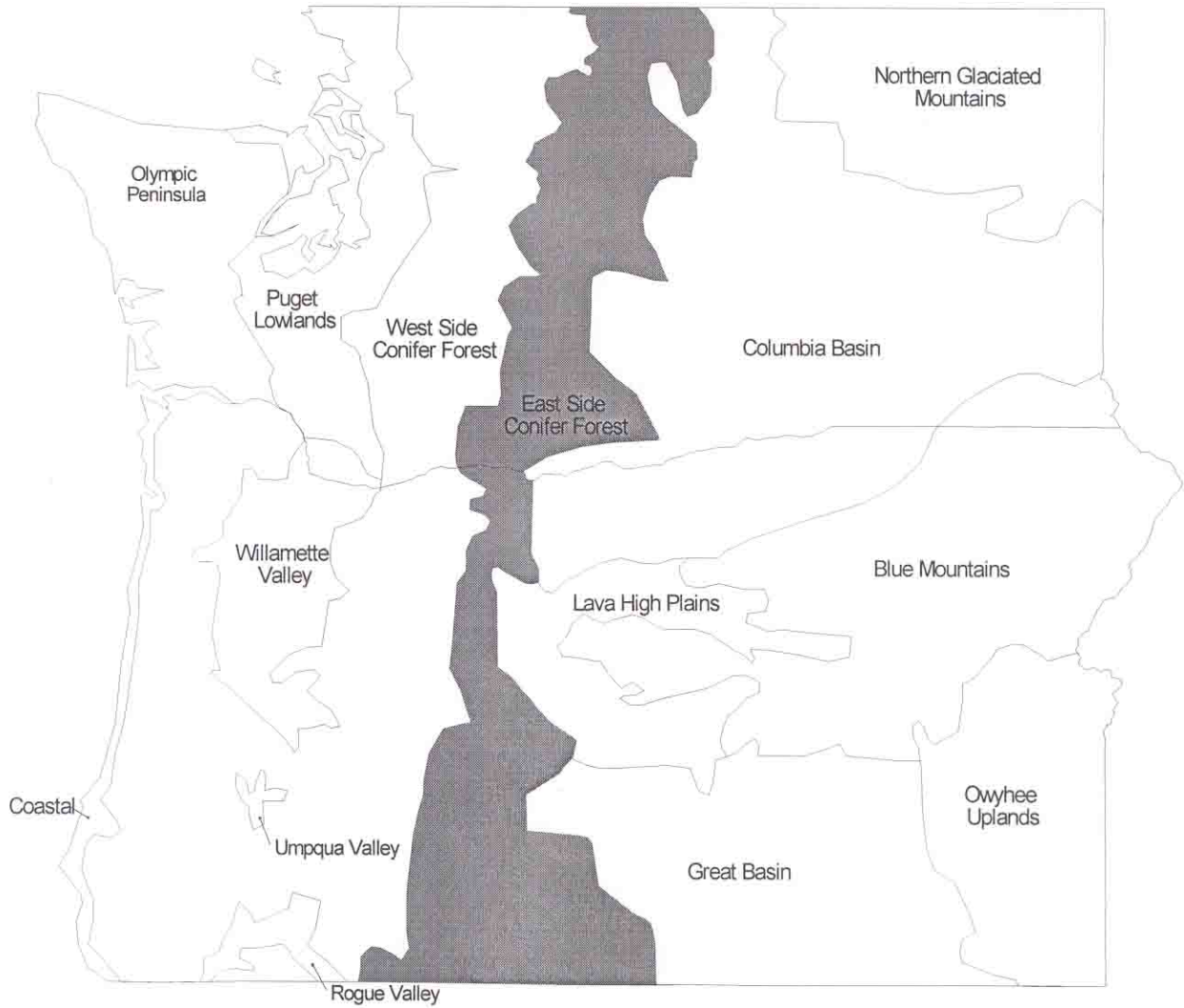
The East-Slope Cascades is a linear expanse of mostly forested land that begins at the crest of the Cascade Mountains in northern Washington and southern Oregon and extends east until it abuts the high desert country of shrub-steppe and juniper habitats in eastern Oregon and Washington. Within higher elevations of the planning unit, elements of forests on the west slope of the Cascades Mountains merge with those of the east-slope to create a complex landscape. At the southern end of the planning unit, the complexity is even greater where the Klamath-Siskiyou Mountains transition into the planning unit. In addition, many transitional areas occur where forest vegetation mixes with that of steppe and shrub-steppe communities, especially at lower elevations.

C. Vegetation

A thorough description of the historic and current vegetation in the planning area is beyond the scope of this document. The information presented below is a cursory overview of the principal features of the vegetation and plant associations that provide habitat for landbirds. More detailed accounts have been described in several sources, especially Franklin and Dyrness (1973).

Vegetation and plant associations are diverse, dependent on a number of interrelated factors including soils, slope, rainfall, and elevation. In general, there is a progression of vegetation

Figure 2: Location of the East-Slope Cascades Landbird Conservation Planning Region.



types with increasing elevation, beginning with the transition to shrub-steppe juniper at the lowest elevations, and changing to oak woodlands, oak-conifer forest, ponderosa pine forest, mixed conifer forest, subalpine forest and parkland, and alpine meadows.

1. PRE-EUROPEAN SETTLEMENT

The landscape at the time of European settlement was primarily dominated by coniferous forest vegetation communities, but also included a complex mosaic of non-forest types such as shrublands, grasslands, wetland, and alpine habitats. Forest and other habitat types were determined and maintained by numerous topographic (e.g., slope, aspect) and physical factors (e.g., temperature, moisture) and natural disturbances (e.g., fire). Historically, vegetation communities were relatively well-defined by elevation and natural processes (e.g., fire).

Among forest vegetation zones, ponderosa pine forests occupied a narrow band (15-30 km wide) along the east flank of the Cascade Mountains (Franklin and Dyrness 1973). Ponderosa pine occurred on the warmest and driest sites, and generally at relatively low elevations; 600-1,200 meters except in the pumice zone of south-central Oregon (1,450-2,000 meters) (Franklin and Dyrness 1973, Henjum et al. 1994). Much of the climax ponderosa pine forest was characterized by an open park-like understory maintained by regular low intensity fires which seldom killed adult trees (Hejl 1992). Grand fir and white fir were also locally important components of this dry forest type (Table 1).

Table 1. Native vegetation characteristic of the East-Slope Cascades Landbird Conservation Planning Region.

Habitat	Tree Species	Common Shrubs	Common Herbaceous Plants
Oak-Pine Woodland	Oregon white oak, ponderosa pine	antelope bitterbrush, saskatoon serviceberry	blue wildrye, elk sedge, bluebunch wheatgrass
Ponderosa Pine	ponderosa pine	common snowberry, antelope bitterbrush	Idaho fescue, bluebunch wheatgrass, needle and thread grass, pinegrass
Mixed Conifer	grand fir, white fir, Douglas-fir, western larch, ponderosa pine	Wood's rose, bearberry manzanita, thinleaf huckleberry, baldhip rose, prickly currant	pinegrass, elk sedge, broadleaf amica, bluebunch wheatgrass, Columbia brome
Subalpine Fir	subalpine fir, Englemann spruce, lodgepole pine	American devilclub, grouse huckleberry, pachistima, rustyleaf menziesia	lady fern, coolwort foamflower, queencup beadlily, beargrass, spreading fern

The mixed conifer zone was historically dominated by true firs (grand and white) and occurred at relatively mid elevations and sites that were not moisture-stressed. Douglas-fir, grand fir, and western larch were the principal tree species (Table 1), but there was considerable regional

variation in importance among tree species in this zone. The mixed conifer zone was more mesic than the ponderosa pine zone, and more diverse in vegetation.

The subalpine fir zone is the coolest and wettest forest zone and it includes a deep winter snowpack. Dominant tree species included subalpine fir, Englemann spruce, and lodgepole pine (Table 1). The lower elevation boundary is approximately 1,000 meters and it extends upward to the ecotone with alpine habitat (Franklin and Dyrness 1973). These forests are conspicuous in frost pockets and other habitats characterized by accumulation of cold air. At tree line scattered throughout the planning area, whitebark pine was an important forest community. Some of the more common native species characteristic of all these forest zones are listed in Table 1.

2. CURRENT VEGETATION

Current vegetation has changed substantially due to a number of factors associated with human occupation of the area. Coniferous forest still dominates the landscape, but the composition of forest types and conditions has changed from anthropogenic factors rather than the natural forces that used to maintain the landscape. These include fire suppression, intensive forest management, grazing, and widespread development of roads associated with development, recreation, and timber harvest (Hann et al. 1997). Consequences from these activities that impact the current landscape include exotic species invasion, alteration of natural disturbances, and fragmentation and isolation of habitat patches.

Douglas-fir, grand fir, and Engleman spruce have expanded their range to lower elevations beyond their normal mesic locations. Old-growth stands of ponderosa pine have been harvested, and fire suppression and encroachment of other species has resulted in denser thickets of fir-dominated forest where ponderosa pine used to occur. Estimates of the extent of alteration vary. Most of the remaining patches are likely too small to maintain ecosystem processes and many old-growth dependent species (DellaSala et al. 1996). Habitat for white-headed woodpecker, a species dependent on late-seral ponderosa pine forest, has declined by >60% from historical to current periods, and been completely eliminated in >40% of the watersheds within the ICBEMP (Wisdom et al. in press).

The effect of extensive road development networks also has adversely affected wildlife. Based on an extensive synthesis of the literature, Wisdom et al. (in press) identified 13 direct or indirect factors associated with road development that impacted >70% of the 91 vertebrate species analyzed (includes many landbirds). Additionally, the adverse effects on wildlife from road-associated factors may be additive to that of habitat loss and alteration (Wisdom et al. 1999).

In addition to forest ecosystems, other ecosystems have been degraded to the point of reduced functional integrity. For example, in lower elevation subalpine parkland, fire suppression has likely altered patterns of succession that favor a denser tree canopy and changes in species composition (Franklin and Dyrness 1973). There also has been an extensive invasion of meadows with tree species throughout the planning unit (Franklin and Dyrness 1973), perhaps due to climatic change in the last 50 years.

D. Conservation Issues

Landbird conservation faces numerous obstacles, either directly or indirectly arising from conflicts with human economic issues. The principal post-settlement conservation issues affecting bird populations include habitat loss, alteration, and fragmentation resulting from timber harvesting; and habitat alteration from changes in historic fire regimes and large-scale grazing by livestock. Physical consequences of these alterations include changes in structural diversity, reductions in habitat patch size and increases in fragmentation, and reductions in the amount of old forest. Consequences for bird populations vary by species; favoring those associated with younger and denser forests and adversely affecting those associated with older forests and more open conditions.

Fragmentation resulting from timber harvesting can have several negative effects on landbirds such as insufficient patch size for area-dependent species, and increases in edges and adjacent hostile landscapes, which can result in reduced productivity through increased nest predation, nest parasitism, and reduced pairing success of males. Additionally, fragmentation has likely altered the dynamics of dispersal and immigration necessary for maintenance of some populations at a regional scale.

Results of the ICBEMP scientific assessments (e.g., Hann et al. 1997, Hessburg et al. in press, Wisdom et al. in press) suggest four principal challenges for forest managers in the Interior Columbia Basin: 1) conservation of existing late-seral habitats, 2) long-term restoration of early- and late-seral habitats, 3) restoration of natural disturbance regimes, particularly the restoration of wildfire, and 4) mitigation of road-associated effects (Wisdom et al. 1999).

Other issues adversely affecting landbird populations and their habitats in the East-Slope Cascades:

- encroachment of exotic species and concomitant reduction in native vegetation,
- water management - stream channelization, dams, diversions, and irrigation,
- urban development,
- cats (feral and domestic),
- resource competition from aggressive non-native competitors (e.g., starlings for cavities),
- recreation, particularly in alpine, sub-alpine habitats (e.g., whitebark pine, montane meadows),
- understory brush removal often done for "restoration" reasons, but lack of knowledge of effects and poor timing (e.g., breeding season),
- grazing in meadows and riparian,

- BT spraying ramifications on lepidopteran and non-target avian species

E. Conservation Opportunities

Despite extensive habitat losses and conversions from original plant communities, opportunities exist for restoration and enhancement of habitats to provide landbird habitat within some semblance of pre-settlement conditions. There is an underlying assumption that the forested landscape has lost a significant representation of certain historic forest types and conditions; and that it is desirable to restore those conditions where possible in some areas. In many cases, there has been a concurrent reduction in landbird species associated with those historic conditions, and the habitat restoration efforts also support bird conservation for this group of species. There has been a recent emphasis on state and federal lands to restore historic habitats (e.g., ponderosa pine) and ecological processes (e.g., fire). Additionally, increased emphasis on road closures for wildlife should benefit a number of species (e.g., common poorwill).

Large tracts of forest are under state or federal ownership where the public can participate in the process of land management decisions. Federal agencies such as the Bureau of Land Management also are active in land exchanges to acquire important areas for conservation. In addition, programs are in place on federal lands (e.g., Oregon plan for salmon and watersheds, Government Applications Task Force Northwestern Riparian Zone Assessment and Restoration Project, Washington Salmon Recovery Project) to restore altered riparian and associated upland habitats with native species and natural ecological processes. Additionally, large tracts of forest are under corporate ownership and managed under the Sustainable Forestry Initiative which addresses wildlife habitat and biodiversity.

F. Subprovinces

The East-Slope Cascades Landbird Conservation Planning Region is a large area and encompasses three distinct geographic and ecological sub-regions, Northern Cascades, Southern Cascades, and Upper Klamath. Many similarities in habitats, management practices, and land uses are common to the entire area. However, environmental and anthropogenic differences exist within several relatively distinct geographic areas. This provides an opportunity to establish biological objectives at smaller geographic scales where appropriate. Throughout this document, we refer to the following five Subprovinces:

- North Cascades
- Yakima Plateau
- Columbia Foothills
- Central Oregon
- Klamath Basin

CHAPTER 3. AVIFAUNA

A. Scope

This document addresses the conservation of breeding landbirds and their habitats in the East-Slope Cascades of eastern Oregon and Washington. Clearly, factors operating outside the nesting season may be adversely affecting populations of birds breeding in the East-Slope Cascades. This may be particularly true for migratory birds subject to habitat changes and other factors on their wintering grounds and during migration, but also for resident birds where adverse factors affecting breeding populations may be doubly affecting species wintering in the same habitats. There is an underlying assumption throughout this document that maintaining quality habitat for breeding landbirds also is important in supporting populations of wintering and migrant birds of the same and other species.

The conservation strategy does not directly address all landbird species, but instead uses numerous "focal species" to describe the conservation objectives for the avian community. The strategy also does not address birds that primarily use aquatic habitats such as shorebirds and wading birds (e.g., spotted sandpiper, great blue-heron), waterfowl (e.g., mallard), and colonial waterbirds (e.g., yellow-headed blackbird). Conservation planning for these types of birds is being conducted by other entities and programs (i.e., North American Waterfowl Management Plan, National and Regional Shorebird Plans, and North American Colonial Waterbird Plan, respectively).

B. Species Composition

We considered approximately 125 native landbird species to be highly associated breeding species (i.e., associated or closely associated species with habitats in the East-Slope Cascades based on Johnson and O'Neill in prep.) in all or parts of the East-Slope Cascades (Appendix A). This does not include a number of landbird species that may occur in the planning unit (particularly in riparian habitats), even occasionally as breeding species, but which are not considered to be highly associated or regular components of the avifauna in the East-Slope Cascades. Additionally, many other species may occur as migrants or wintering species only. This diversity reflects the variety of habitats and environmental influences within the planning area.

1. Ponderosa Pine

We considered approximately 85 native landbird species to be regularly associated breeding species in Ponderosa Pine habitats (Appendix A). Several species are obligate or near obligate to this habitat type such that they are rarely found in other forest types in Oregon and Washington. These include pygmy nuthatch and white-headed woodpecker. Other regularly associated species include flammulated owl, Williamson's sapsucker, Lewis' woodpecker, Townsend's solitaire, chipping sparrow, and white-breasted nuthatch.

2. Mixed Conifer (Late-Successional)

We considered approximately 85 native landbird species to be regularly associated breeding species in Mixed Conifer (late-successional) habitats (Appendix A). Principal species associated with this habitat type include pileated woodpecker, northern goshawk, brown creeper, olive-sided flycatcher, Hammond's flycatcher, Vaux's swift, blue grouse, golden-crowned kinglet, and varied thrush.

3. Oak-Pine Woodland

We considered approximately 100 native landbird species to be regularly associated breeding species in oak-pine woodland habitats (Appendix A). Species most associated with this habitat include Lewis woodpecker, western bluebird, and white-breasted nuthatch. Species such as ash-throated flycatcher and acorn woodpecker are considered obligate or near-obligate to the oak woodland component.

C. Species and Habitat Associations

An essential component for deciding appropriate management actions to conserve landbirds is an understanding of relationships between species and habitat. Available data on species-habitat relationships are presented under each species account in Chapter 6. A more complex synthesis of knowledge on species and habitat relationships is being compiled as part of a bi-state project entitled Wildlife Habitats and Species Associations in Oregon and Washington (Johnson and O'Neil in prep.). Products resulting from this project should be considered an appendix to this document, and function as an information source used to make appropriate decisions on species management within specific habitat conditions.

D. Population Trends

The Breeding Bird Survey (BBS) (Robbins et al. 1986) is the primary source of population trend information for North American landbirds. However, it only has data for the last 30 years, and

extensive habitat changes occurred prior to that time which undoubtedly affected bird populations, but for which there are no quantitative data. Attempts to assess the extent of bird population changes prior to the BBS have been documented through an examination of historical habitats at the time of European settlement (approximately 1850) and knowledge of bird species habitat relationships (Wisdom et al. in press). This information is presented in Chapter 6 under each species account.

There is one BBS Physiographic Region within the geographic boundaries of this conservation strategy - Cascade Mountains. This BBS physiographic region also includes areas outside of our planning unit, i.e., the west-slope of the Cascade Mountains and a small area of northern California. Thus, BBS trend estimates for the Cascade Mountains Physiographic Region presented in Appendix A for the 30-year period (1968-1998) and the most recent period (1980-1998) should be viewed with caution because they may not reflect populations in the East-Slope Cascades.

There are 16 species with significantly declining trends in the Cascade Mountains BBS Physiographic Region (Table 2). Additionally, some species that lack sufficient BBS data are considered by many to be declining based on anecdotal knowledge of bird species habitat relationships, and the extent of those habitats historically across the planning area (Wisdom et al. in press). This includes local and regional extirpations of breeding populations of white-headed woodpecker and Lewis' woodpecker. There are an equal number of species (16) with significantly increasing trends (Table 2).

Table 2. Native landbird species with significant population trends in the Cascade Mountains BBS Physiographic Region (from Sauer et al. 1999).

Significantly Declining Trends ^a	Significantly Increasing Trends ^a
Blue grouse (L,R)	Spotted sandpiper (L,R)
Vaux's swift (R)	Northern flicker (L)
Rufous hummingbird (L,R)	Hammond's flycatcher (L,R)
Olive-sided flycatcher (L,R)	Cassin's vireo (R)
Western wood-pewee (L)	Warbling vireo (L,R)
Barn swallow (R)	Common raven (L,R)
Brown creeper (L)	Cliffswallow (R)
Golden-crowned kinglet (L,R)	House wren (L,R)
Varied thrush (R)	Winter wren (L)
Cedar waxwing (L)	American robin (L)
Chipping sparrow (L)	Common yellowthroat (L,R)
Fox sparrow (L,R)	Spotted towhee (L)
Dark-eyed junco (L)	Song sparrow (L)
Brown-headed cowbird (L)	White-crowned sparrow (L,R)

Pine siskin (R)	Black-headed grosbeak (L,R)
Evening grosbeak (R)	Lazuli bunting (R)

^a L = long-term trend (1966-1998); R = recent trend (1980-1998)

In addition to identifying declining species, we used BBS data for some species as a baseline to set population trend objectives for reversing or stabilizing declining trends. A list of BBS routes and their location is presented in Table 3.

Table 3. Breeding Bird Survey routes in the East-Slope Cascades Landbird Conservation Planning Region.^a

Region	Route Numbers
North Cascades (WA)	13, 29, 34, 35, 49, 68, 76, 113,
Yakima Plateau (WA)	19, 55, 909 Route 36??
Columbia Foothills (WA and OR)	WA - 25; OR - 43, 47, 203
Central Oregon - Pumice Zone (OR)	20, 29, 60, 220, 238, 245, 252
Klamath Basin (OR)	28, 39, 139, 228, 239, 253

^a includes route if it is mostly within these regions; some routes also extend into other physiographic regions

CHAPTER 4. CONCEPTUAL APPROACH

Numerous approaches for wildlife conservation have been proposed and implemented in recent decades. These approaches have focused on various elements such as single species, management indicator species, guilds, management assemblages, and ecosystems (reviewed by Block et al. 1995). All of the approaches have inherent practical or biological limitations that make implementation of conservation plans or management actions problematic. For example, the single-species approach is usually not cost effective or practical for many species, and a broad-based biodiversity approach can have conflicting objectives among the myriad of species involved, and can be ambiguous in terms of design and evaluation without reference to specific habitat requirements for individual species (Lambeck 1997).

Given the limitations of these approaches, we developed a "hybrid" strategy for landbird conservation in the East-Slope Cascades that emphasizes ecosystem management, but includes components of single-species and guild or indicator species management. This approach is based on the following assumption:

- A conservation strategy that emphasizes ecosystems is more desirable than one that emphasizes individual species.

In the typical PIF approach to bird conservation, species most in need of conservation action are designated as priority primarily by a quantitative scoring system. The National PIF Priority Scores Website (Partners in Flight Bird Prioritization Technical Committee 1999) is the source used for prioritizing birds based on a scoring system of seven variables (Carter et al. in press). If using this process exclusively to direct conservation, the emphasis is on single-species management, but there is an underlying assumption that conservation of priority species supports ecosystem management because other species will likely benefit from actions implemented to conserve priority species. This assumption may be appropriate when priority species are associated with declining habitat (e.g., old-growth forest, grasslands), degraded habitat (e.g., western riparian systems), or habitat features that are reduced across the landscape (e.g., snags).

We supplemented the typical PIF approach by placing a greater emphasis on ecosystems. We recognized that there were a number of habitat features or conditions important for birds in a functioning ecosystem that did not have a priority species associated with them. In addition, we recognized the potential importance of community dynamics operating at various spatial scales that may involve species that are not considered priority. Thus, desired conditions for these habitat features or functional relationships would not be described by the priority species approach. In order to have a more complete ecosystem approach, and provide a better planning

framework for dealing with future species of concern, we first identified the most important habitat conditions and features used by landbirds within the scope of this plan. After the initial PIF priority species were determined and their habitat associations and conditions matched with our list, additional species were selected based on their degree of association with the remaining important habitat conditions and features.

This approach resulted in a conservation strategy that includes both uncommon (even rare) and common species. Uncommon species are typical high priority species based on populations status, declining trends, vulnerability, etc. Common species are representative of some habitat condition or feature that did not have an associated high priority PIF species, but that we felt was important for birds in a functioning ecosystem of that habitat type.

Using this blend of approaches, we feel there is a much greater likelihood of maintaining key habitat attributes and providing functioning ecosystems for birds because the most important habitat conditions and habitat attributes for landbirds are described through this expanded group of species. We refer to these species as "focal species" (see below) because they are our focus for describing desired conditions and attributes. The rationale for using focal species is to draw immediate attention to habitat features and conditions most in need of conservation or most important in a functioning ecosystem. Although conservation is directed towards focal species, establishment of conditions favorable to focal species also will likely benefit a wider group of species with similar habitat requirements.

Most of what we know about landbird ecology in the East-Slope Cascades exists at the scale of individual birds, small populations, or the site-level. Since this strategy is designed to be an ecosystem planning tool, it will be necessary to design and implement management at the landscape-level. Landscape planning will require addressing regional populations or sub-populations of birds that occur across several subprovinces. However, little is known about relationships between landbird populations and habitat at this larger scale. The strategy will introduce hypotheses, using currently known biological information as the basis, to be tested in an effort to expand our knowledge of landbird biology and management toward the landscape scale.

Finally, monitoring of habitat attributes and focal species will provide a means of tracking progress towards conservation. Monitoring will provide essential feedback for demonstrating adequacy of conservation efforts on the ground, and guide the adaptive management component that is inherent in this approach.

A. Biological Objectives

Biological objectives are the cornerstone of this conservation strategy. Stated simply, they are "**what we think the birds need**". They are intended to stimulate conservation action, but are **not regulatory**, nor do they represent the policies of any agency or organization. They also are intended to function as a starting point for discussion of integration with broader ecosystem-based objectives. Our development of biological objectives emphasized the following assumption:

- Measurable, quantitative objectives are more desirable than descriptive, qualitative objectives.

Thus, we attempted to establish quantitative objectives whenever possible. Establishing quantitative biological objectives serves several purposes:

- They stimulate conservation actions to a greater degree than descriptive, qualitative objectives by providing land managers with numerical targets within an ecological context (e.g., habitat, landscape).
- They provide targets for designing management plans and benchmarks for measuring success of management actions.
- They provide hypotheses for research, particularly when objectives are based on assumptions and/or professional judgement due to lack of data.
- They are probably our best form of outreach to communicate to others what is needed to conserve landbirds.

Our biological objectives are primarily habitat-based, and are derived from current knowledge and professional judgement about bird-habitat relationships. Because of variability in the type, quality, and amount of data on focal species, some biological objectives are detailed and quantitative and others are descriptive and qualitative. Because data are limited for many species, biological objectives are often based on assumptions, which become the basis for research as testable hypotheses.

Three factors were paramount in setting quantitative biological objectives:

- means (rather than minimums) of available data were often used because they more likely provide adequate conditions for maintaining populations, and
- a range of values was often used to represent the plasticity of a species relationship with a habitat condition and to acknowledge the Historical Range of Variation (HRV) that likely occurred for many habitat conditions, and

- optimal or high quality habitat was emphasized (to the degree of our knowledge) for self-sustaining populations in geographic areas most suitable for maintaining or providing that habitat.

Focal species also may occur at various population levels in habitats with conditions outside the range of our objectives, and areas outside of our geographic emphasis. These populations may or may not be source habitats (i.e., provide resources for successful reproduction), and may or may not contribute to conservation of that species. However, this strategy emphasizes setting biological objectives for the most desirable habitat conditions within areas where focal species habitat is or should be most suitable.

Unless otherwise indicated, data on population density or abundance are used to indicate habitat suitability. This assumes healthy, viable populations where species are most abundant, despite widely accepted recognition that population density and associated habitat quality can be a misleading or inaccurate measure of population viability (Van Horne 1983). From a practical standpoint, this habitat-based approach has been widely used because of the ease and cost effectiveness of collecting such data, and demographic information is often unavailable. A consistent theme throughout this conservation strategy is that use of habitat quality to represent population health is an assumption that will ultimately need to be validated with demographic data to determine relationships between habitat characteristics and population viability.

B. Conservation Strategies

Conservation strategies are examples of management actions that may be used to achieve biological objectives or enhance conservation relative to a habitat attribute or focal species. They are recommendations that can be incorporated into management practices or implemented on an opportunistic basis within the broader context of ecosystem management. Management techniques suggested include only a few of the wide variety of options available. Land managers and biologists should consult with plant ecologists and scientists from other disciplines to ascertain appropriate conservation options to prescribe for specific areas. These individuals also can be a valuable source of information for additional management actions to achieve biological objectives.

C. Bird Conservation Areas

We identified several Bird Conservation Areas (BCAs) to function as an additional tool for bird conservation (see Appendix B). BCAs are desirable because habitat losses and landbird species declines have been extensive, and habitats that remain are disjunct and threatened by continued

development or conversion to non-suitable habitat. Some bird species may only be able to persist if actions are taken to emphasize conservation in selected areas.

BCAs are intended to provide a focus for any agencies, non-governmental organizations or companies, or private individuals to prioritize where conservation should occur. They represent what we feel are currently the best geographic options for maintaining or enhancing healthy populations of landbirds to stem the tide of declines and prevent further listings of species. It should not be inferred, however, that they are the only areas suitable for bird conservation. It also will be important to initiate conservation actions where opportunities present themselves. BCAs should function to direct conservation efforts where actions have the greatest opportunity for regional success.

BCAs were selected based on the professional knowledge of biologists and ecologists that participated in the planning process. Numerous factors were considered including uniqueness of the area, existing populations of focal species, historic and current condition of the habitat, current and projected land uses and management, risk of loss/degradation of the habitat, and land ownership.

It is hoped that various partners in landbird conservation will adopt either singularly or in partnership each of the BCAs to facilitate coordination of conservation actions within each area. This should include an assessment of existing habitat conditions within the BCA, and specific management strategies on how to achieve conservation objectives. Management and evaluation of BCAs should emphasize healthy, native vegetation within the historical range of variation for each habitat type. The result should be a managed landscape mosaic within the BCA that includes potential habitat for some or all priority species.

CHAPTER 5. PRIORITY HABITATS AND SPECIES

A. Selection

Priority habitats were selected by the East-Slope Cascades Working Group (see Acknowledgments) using a combination of factors including:

- priority status in an Oregon-Washington PIF prioritization scheme (Andelman and Stock 1994),
- loss, alteration, and current condition of the habitat relative to that of historic conditions (e.g., see historical source habitats in Wisdom et al. in press),
- recognition of current threats of loss or conversion of the habitat (e.g., Sallabanks et al. in press), and
- importance of the habitat to one or more high priority species.

Herbaceous dominated wetlands are not emphasized in this conservation strategy for several reasons. First, only a few landbirds are closely associated with these habitats (e.g., common snipe, common yellowthroat, marsh wren, red-winged blackbird). Additionally, these habitats are being addressed by other bird conservation initiatives (e.g., North American Waterfowl Management Plan, Regional Shorebird Plans) and by several regulatory enactments (e.g., Section 404 of the Clean Water Act). Thus, our emphasis was to focus on upland habitats that are not receiving as much conservation emphasis or regulatory protection.

Priority species were selected using a combination of several factors including:

- primary association with priority habitats for breeding,
- specialist species that are obligate or highly associated with key habitat features/conditions important in functioning ecosystems,
- declining population trends (Table 2) or reduction in their historic breeding range (may include extirpated species),
- special management concern or conservation status such as threatened, endangered, species of concern, management indicator species, etc.,
- high Management Index scores in the OR-WA PIF prioritization process (Andelman and Stock 1994) or the ICEBEMP conservation assessment process (Saab and Rich 1997),
- high total or AI (Area Importance) + PT (Population Trend) scores in the PIF National Database for the Cascade Mountains physiographic province (Appendix A),

- species for which the Cascade Mountains Physiographic Region has a high national responsibility (i.e., high percent population scores) (Appendix A), and
- professional knowledge on species of local interest.

B. Priorities

Four habitat types were selected as priority habitats:

- Ponderosa Pine
- Mixed Conifer Forest (Late-successional)
- Oak-Pine Woodland
- Unique habitats

Unique habitats include old-growth lodgepole pine, whitebark pine, wet and dry meadows, and subalpine fir, all of which are considered priority habitats for conservation. Our intent was to avoid rigorous definitions for these habitats, and to allow land managers flexibility to ascertain if the conditions we describe are ecologically appropriate for management on their lands within the broad context of the habitat types. However, the following descriptions may help when considering the applicability of our objectives.

1. Ponderosa Pine

The justification for Ponderosa Pine as a priority habitat is the extensive loss and degradation of forests characteristic of this type, and the fact that several highly associated bird species have declining populations and are species of concern. Declines of Ponderosa Pine forest, are among the most widespread and strongest declines among habitat types in an analysis of source habitats for terrestrial vertebrates in the Interior Columbia Basin (Wisdom et al. in press). Within the Northern Cascades, Southern Cascades, and Upper Klamath ERUs of the Interior Columbia Basin Assessment, old forest, single overstory ponderosa pine habitat has declined by 97, 55, and 18%, respectively (Wisdom et al. in press). The result of degradation of Ponderosa Pine forest from fire suppression and extensive timber harvest has been the change of large areas of late-seral ponderosa pine forest to mid-seral stands of Douglas-fir and grand/white fir. Because of the extensive loss of Ponderosa Pine forest, habitat restoration is the most important strategy for conservation of landbirds associated with this habitat type. The desired condition in Ponderosa Pine forest is a large tree, single-layered canopy with an open, park-like understory dominated by herbaceous cover with scattered shrub cover and pine regeneration. Ponderosa Pine forest within the planning unit occurs extensively at low elevations in all the subprovinces except Columbia Foothills where it is a minor component.

Bird species associated with Ponderosa Pine forest have suffered the greatest population declines and range retractions in the planning unit. In addition to the overall loss of this forest type, two

features, snags and old-forest conditions, have been diminished appreciably and resulted in declines of bird species highly associated with these conditions or features.

Landbird conservation in Ponderosa Pine forest emphasizes maintaining healthy ecosystems through representative focal species for four habitat conditions. These include large patches of old forest with large snags, large trees, an open understory with regenerating pines, and patches of burned old forest (Table 4).

Table 4. Priority habitat features and associated focal species for conservation in priority habitats of the East-Slope Cascades Landbird Conservation Planning Region.

Habitat	Habitat Feature/ Conservation Focus	Focal Species by Subprovince		
		North Cascades	Yakima Plateau/ Columbia Foothills	Central Oregon/ Klamath Basin
Ponderosa Pine	large patches of old forest with large snags	white-headed woodpecker	white-headed woodpecker (YP only)	white-headed woodpecker
	large trees	pygmy nuthatch	pygmy nuthatch	pygmy nuthatch
	open understory with regenerating pines	chipping sparrow	chipping sparrow	chipping sparrow
	patches of burned old forest	Lewis' woodpecker	Lewis' woodpecker	Lewis' woodpecker
Mixed Conifer (Late Successional)	large trees	brown creeper	brown creeper	brown creeper
	large snags	Williamson's sapsucker	Williamson's sapsucker	Williamson's sapsucker
	interspersed grassy openings and dense thickets	flammulated owl	flammulated owl	flammulated owl
	multi-layered/dense canopy	hermit thrush	hermit thrush	hermit thrush
	edges and openings created by wildfire	olive-sided flycatcher	olive-sided flycatcher	olive-sided flycatcher
Oak-Pine Woodland	early successional/dense understory with regeneration	na	Nashville warbler	Nashville warbler
	large oaks with cavities	na	ash-throated flycatcher	ash-throated flycatcher
	large conifer trees and snags	na	Lewis' woodpecker	Lewis' woodpecker

na = not applicable

2. Mixed Conifer (Late-Successional)

Late-successional Mixed Conifer forest within the planning unit occurs in all the subprovinces at mid-high elevations, except it is only a minor component in Columbia Foothills subprovince. This type includes coniferous forest composed primarily of cool moist Douglas-fir/Grand fir, cool dry Douglas-fir, western larch, hemlock, and occasional ponderosa pine. This habitat does not include sites that were historically ponderosa pine but are mixed conifer now due to fire suppression and encroachment of other conifers.

The justification for Mixed Conifer as a priority habitat is a substantial loss of the late-successional stage of this habitat type. It is commonly harvested by regeneration prescriptions such as clearcuts or shelterwood cuts to reduce insect and disease and reduce the risk of catastrophic fire. The desired condition in Mixed Conifer (Late-Successional) forest is a multi-layered old forest with a diversity of structural elements (e.g., snags, dense shrub patches, high canopy closure) in patches across the landscape.

Bird species associated with Mixed Conifer (Late-Successional) forest have been adversely impacted primarily by the loss and reduction of late-seral conditions and structural elements such as snags. Landbird conservation in late-successional mixed conifer forest emphasizes maintaining healthy ecosystems through representative focal species for five habitat conditions. These include large trees, large snags, interspersion of grassy openings with dense thickets, a multi-layered/dense canopy stand, and edges and openings created by fire (Table 4).

3. Oak-Pine Woodland

Oak-Pine Woodland habitats within the planning unit occur mostly in Klickitat (WA) and Wasco (OR) counties of the Columbia Foothills and Yakima Plateau subprovinces. They are also a minor component in the Klamath Basin subprovince, especially in the Klamath River Canyon. We refer to Oak-Pine Woodland as including both oak-dominated woodland and mixed oak-pine habitats.

Bird species associated with Oak-Pine Woodland have been adversely impacted primarily by the loss of large oak and pine trees and old-forest conditions, and the lack of recruitment for replacement of old trees. Landbird conservation in Oak-Pine Woodland emphasizes maintaining healthy ecosystems through representative focal species for three habitat conditions: early successional or dense understory conditions with regeneration, large oaks with cavities, and large pine trees and snags (Table 4).

4. Unique Habitats

Landbird conservation is also directed toward several unique habitats in the East-Slope Cascades (Table 5). In Lodgepole and White-bark Pine, the conservation emphasis is the presence of old-growth trees. In Aspen, the emphasis is large trees with regeneration. In Subalpine Fir, the emphasis is a patchy presence. Both Wet and Dry Meadows also are emphasized.

Table 5. Priority habitat features and associated landbird species for conservation in unique habitats in the East-Slope Cascades Landbird Conservation Region of Oregon and Washington.

Habitat	Habitat Feature/ Conservation Focus	Focal Species by Subprovince		
		North Cascades	Yakima Plateau/ Columbia Foothills	Central Oregon/ Klamath Basin
Lodgepole Pine	old growth	black-backed woodpecker	black-backed woodpecker	black-backed woodpecker
Whitebark Pine	old-growth	Clark's nutcracker	Clark's nutcracker	Clark's nutcracker
Meadows	wet/dry	sandhill crane	sandhill crane	sandhill crane
Aspen	large trees with regeneration	red-naped sapsucker	na	red-naped sapsucker
Subalpine Fir	patchy presence	blue grouse	blue grouse	blue grouse

CHAPTER 6. LANDBIRD CONSERVATION

Because of the diversity of landbird species, habitats, land uses, and land ownerships in the East-Slope Cascades, conservation will require a complex array of conditions within variable landscape patterns. Management goals need to be carefully designed and integrated across several scales to meet the needs of multiple species. Landbird conservation will likely require areas that function as reserves, and areas that incorporate a wide range of management activities within various land uses. Thus, our conservation emphasis is three-fold:

initiate conservation actions in accordance with the ecological potential of the site (i.e., within the framework of potential vegetation and natural ecosystem processes),
emphasize conservation within high priority designated conservation areas and where opportunities exist (i.e., receptive land owners and land managers), and
emphasize conservation at multiple scales such that habitat conditions for one or a few species are nested within a landscape that provides a mosaic of conditions for multiple species.

Meeting the goal of healthy landbird populations in the East-Slope Cascades begins with the maintenance and restoration of functioning forest and non-forest ecosystems. Currently, considerable emphasis is being placed on restoration of these habitats to some semblance of presettlement conditions (approximately 1850). It is important to recognize that habitat alterations during restoration activities may temporarily or permanently displace landbird species currently using those areas. However, most degraded habitats tend to support habitat generalist species that are usually widespread and fairly common and not of high conservation concern. Because of the degree of loss and degradation of most properly functioning ecosystems, restoration in many areas will be a long-term process. The vision and practical realities of this process are described in the following sections.

Each section begins with a brief overview of conservation issues, biological objectives, and general conservation strategies for each priority habitat. This is followed by a focal species account for each important habitat feature or condition, and biological objectives and conservation strategies to achieve the objectives. Assumptions upon which the biological objectives are based are stated, with suggestions for research or monitoring to provide data to refine and update biological objectives. Examples are listed of other species expected to benefit from management for each focal species, although conservation of these species is not dependent upon or synonymous with conservation of focal species.

For each focal species, information on habitat relationships was generally limited to data from Oregon and Washington because habitat types and management are unique relative to other areas.

When little data were available from this region, occasional references were used from California and British Columbia or elsewhere in western North America.

A. Ponderosa Pine

1. Conservation Issues:

- T reduction of old forest stages and large diameter trees and snags from timber harvesting, particularly at low elevations
- T loss and degradation of properly functioning ecosystems where there is encroachment of urban and residential development
- T habitat degradation from fire suppression/exclusion, particularly declines in characteristic herbaceous and shrub understories from increased density of small shade-tolerant trees
- T high risk of loss of remaining ponderosa pine overstories from stand-replacing fires due to high fuel loads in densely stocked understories
- T overgrazing contributing to lack of recruitment of sapling trees, particularly pines
- T invasion of exotic plants contributing to alteration of understory conditions and increase in fuel loads
- T some areas are among the most popular and intensively used recreation sites in the west
- T fragmentation of remaining tracts negatively impacts species with large area requirements
- T hostile landscapes, particularly those in proximity to agricultural and residential areas, may have high density of nest parasites (brown-headed cowbird), exotic nest competitors (European starling), and domestic predators (cats), and may be subject to high levels of human disturbance
- T restoration issues such as techniques (mowing, thinning, burning) and timing (spring/summer versus fall) of understory removal which is especially detrimental to single-clutch species
- T BT spraying ramifications on lepidopterans and other non-target avian species

2. Biological Objectives:

- < **Institutionalize a policy of "no net loss" of Ponderosa Pine habitat (i.e., discourage loss and conversion of habitat, but when unavoidable, mitigate with equal or greater restoration efforts).**
- < **Retain all large diameter (>53 cm [20 in]) Ponderosa Pine trees and snags.**

- < **Maintain existing areas of moderate to high quality Ponderosa Pine habitat, and actively manage to promote their sustainability.**
- < **Initiate actions to enhance size and connectivity of existing quality Ponderosa Pine patches (i.e., reduce fragmentation).**
- < **Initiate actions to avoid or minimize further degradation of Ponderosa Pine habitat (e.g., thinning, prescribed fire).**
- < **Initiate actions to improve quality of degraded Ponderosa Pine habitat through appropriate management (see Conservation Strategies throughout the plan), particularly the use of natural disturbance regimes such as fire.**
- < **In the next 25 years (by 2025), initiate actions to restore/maintain at least 30% (greater if other directives exceed 30%) of the potential vegetation of late-successional (mature and old-growth) Ponderosa Pine forest within landscape management units (e.g., watershed, township, section, USFS district, etc.). Specific desired conditions for stands are described below using white-headed woodpecker as the focal species. NOTE: We recognize that restoration of late-successional forest is a long-term process, but this short-term (i.e., 25 years) objective is for the commitment and initiation of the process of restoration.**
- < **In the next 25 years (by 2025), initiate actions to establish/maintain 6 areas of forest >5,000 acres (3 in Washington and 3 in Oregon) that are moving towards a dominance of late-successional Ponderosa Pine forest conditions. Specific desired conditions for stands are described below using white-headed woodpecker as the focal species.**

Assumptions/Rationale: "No net loss" includes permanent conversion or degradation that compromises the ecological integrity of the habitat and/or reduces its suitability for our focal species. Natural events (e.g., wildfire) and some restoration activities (e.g., prescribed fire) that result in short-term "loss" are not considered here.

The 30% restoration target represents a minimum target for areas where other directives do not apply. We recognize the long-term nature of restoration of this forest type (i.e., > 150 years), thus the >30% target by 2025 is for that amount of the landscape dedicated to establishment of Late-Successional Ponderosa Pine Forest, and having management actions already initiated (e.g., understory thinning, prescribed burning, etc.) to move the land towards that condition. The objective for blocks of forest in Ponderosa Pine Forest conditions is to stimulate landscape-level evaluations and ensure suitable habitat for area-sensitive species.

Restoration of ponderosa pine forest towards historic levels will likely reduce populations of species that are provided suitable habitat in the closed canopy, dense understory mixed conifer forests that now dominate what was historically ponderosa pine forest. This would

include species such as Townsend's warbler, red-breasted nuthatch, and the endangered spotted owl. These may be concerns at the project level, but these habitats represent degradation of historic ponderosa pine conditions and they dominate throughout the planning region. Even with emphasis on restoration of historic conditions, there is not likely to be a shortage of current conditions in what was historically ponderosa pine forest throughout the planning area. To counter these local concerns, decisions need to be made across landscapes as to how to reduce impact on the current bird species composition where restoration is occurring. However, where conflicts occur with spotted owl in Mixed Conifer forest, Endangered Species regulations apply.

3. Conservation Strategies

These general recommendations are presented to support conservation of landbirds in Ponderosa Pine habitats. Specific directives as described below for priority focal species should supercede those presented here if there is a direct conflict between recommendations.

û Data Collection:

- Conduct community and species research to test the biological objectives described throughout this document.
- Establish permanent roadside and off-road censusing stations to monitor bird population and habitat changes.

û Research Coordination:

- Coordinate research activities between government and private entities.

û Conservation Areas:

- Seek to expand Ponderosa Pine Forest focal species distribution and abundance throughout the East-Slope Cascades by establishing Ponderosa Pine Forest Bird Conservation Areas (PPBCAs) and promoting their proper management (see Appendix B).

û Acquisition/Restoration:

- Support partnerships that seek to acquire/restore Ponderosa Pine Forest habitat.
- Develop conservation agreements with private landowners to enhance the quality of Ponderosa Pine Forest habitat.
- Seek to maximize contiguous area of Ponderosa Pine Forest habitat, and thus minimize fragmentation. The larger the area, the greater the likelihood of maintaining populations of area-sensitive and large territory species.
- Develop a Ponderosa Pine Forest "scorecard" for government and non-government use in prioritizing and evaluating habitat for landbirds. The scorecard should provide guidelines for rating the habitat at various scales (local, landscape).
- Use planting where appropriate for reestablishment of pine, especially where seed source is gone.

- Use native species and local seed sources in restoration.
- û Management:
 - Use understory prescribed burning and/or thinning when and where appropriate to reduce fuel loads and accelerate development of late-seral conditions.
 - Retain all large trees, especially ponderosa pine, >20 in dbh.
 - Initiate snag creation and recruitment where necessary.
 - Retain all existing snags and broken-top trees >10 in dbh in harvest units.
 - Implement road closures (obliteration) where necessary to limit access to snags.
 - Where mechanized harvest activities are occurring, minimize actions that increase susceptibility to invasion of exotic and noxious weeds and soil erosion.
 - Discontinue fuelwood cutting or restrict to trees <38 cm (15 in) dbh where snag objectives are not being met (Blair et al. 1995).
 - Permit stand-replacing wildfires to burn where possible (e.g., wilderness areas, research natural areas).
- û Pesticides/Herbicides: Use of insecticides can reduce the insect food base for many bird species. Use of herbicides can reduce cover and indirectly affect the insect food base.
 - Use Integrated Pest Management (IPM) practices or non-spraying in low human use areas (e.g., mosquito spraying).
 - Encourage biological controls rather than chemical controls wherever possible.
 - Applications should be by hand if practical to target appropriate species (e.g., noxious weeds).
 - Applications on lands adjacent to riparian areas should avoid environmental conditions where the riparian zone may be threatened.
- û Grazing:
 - Eliminate or properly manage grazing to ensure adequate recruitment of young pines.
 - Consider retirement of grazing allotments when they come up for renewal, especially where habitat degradation is occurring and/or where cowbirds are common.
 - Integrate grazing influences of wild herbivores with those of livestock for planning purposes in areas of high common use.
- û Recreation:
 - Minimize timing and extent of human recreation in important Ponderosa Pine Forest bird habitat during the nesting season.
- û Prioritization: In general, the highest priority for restoration is to expand Ponderosa Pine Forest habitat and bird populations where most proximate to existing high quality, productive sites. This is appropriate because expansion and recolonization into new or

restored sites is most likely to occur from surplus production near existing source populations. Prioritization should also consider the following factors:

- proximity to a designated PPBCA
- benefit to multiple species
- risk of habitat loss to development or conversion to unsuitable habitat
- quality of the habitat - existing and potential
- compatibility of current and projected adjacent land uses
- uniqueness of the site in a local and regional context
- the likelihood of securing the land for conservation
- long-term ease of management (i.e., perpetual easements, fee ownerships).

û Incentives/Programs: Economic incentive-based programs (new and old) are likely to be most successful in reaching the greatest number of private landowners to increase the land base of suitable Ponderosa Pine Forest bird habitat.

- Increase the amount of land under incentives programs for wildlife habitat, targeting land within or adjacent to PPBCAs.
- Support existing programs and develop new economic incentive programs to solicit conservation and management agreements with private landowners to certify their land as a PPBCA.

û Education/Outreach:

- Develop brochures or other educational materials for private landowners describing Ponderosa Pine Forest values and management strategies to provide habitat for landbirds and other wildlife.

Conservation Focus – Focal Species: LARGE PATCHES OF OLD FOREST WITH LARGE SNAGS
– WHITE-HEADED WOODPECKER (*Picoides albolarvatus*)

T According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for white-headed woodpecker included most of the Northern Cascades and all of the Southern Cascades and Upper Klamath ERUs (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were extensive in the Northern Cascades (89%) and Southern Cascades (66%) ERUs. There has been an slight increase (13%) in source habitat in the Upper Klamath ERU. Within the entire Interior Columbia Basin, areas predominated by declining trends were in the northern part of the basin and the central and southwestern parts of the basin had mixed trends (Wisdom et al. in press).

Populations:

T Anecdotal:

- numerous local and regional extirpations of populations

T Breeding Bird Survey (Sauer et al. 1999)

- insufficient sample size for population trend analyses in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
- bird characteristic of large tracts of mature ponderosa pine forest with large snags for nesting and large trees for foraging
 - primary cavity excavator of soft snags, therefore limited suitability by snag decay classes (Garrett et al. 1996)
- T Wallowa-Whitman National Forest, central Blue Mountains (Bull et al. 1986):
- 80% of foraging during breeding season on live trees and only on ponderosa pine
 - mean dbh of foraging trees 44 cm (17 in) (n = 142)
- T Central Oregon Cascades (Dixon 1995a,b):
- fragmented habitats require larger home ranges/pair than continuous tracts of old-growth (e.g., home range mean 104 ha in continuous old-growth and 321 ha in fragmented sites)
 - used large diameter snag classes for nesting and roosting in greater proportion than available
 - large diameter trees preferred (>61 cm) (24 in)
 - snag density on study areas ranged from 0.7-3.9 snags/0.4 ha
 - shrub cover >30%
- T Central Oregon Cascades (Frenzel 1998):
- mean dbh nest trees 70.1 cm (27.6 in) (range 14.7-118.1 cm [5.8-46.5 in] n = 30)
 - mean height nest trees 15.4 m (range 1-39 m, n = 30)
 - 26 of 30 nests (87%) in ponderosa pine
 - proportional nest success 67%; Mayfield estimates 58%
 - mean 12.2 snags/ha (5/ac) >53 cm (21 in) dbh associated with nest sites
 - mean 2.8 trees/ha (1.1/ac) >79 cm (31 in) dbh associated with nest sites
 - mean canopy closure 6.4% (range 0-28) and shrub cover 23.7% (range 0-90%) associated with nest sites
- T Ponderosa pine forest east-central Oregon Cascades (Bate 1995):
- abundance increased with increasing densities of large (>50.8 cm) dbh green trees and hard snags
 - abundance increased with height of the first layer (layers only detectable in older, more advanced seral stages) and hard snag density (>20.3 cm dbh)
- T West-central Idaho (Frederick and Moore 1991):
- mean height of nest snags 2.5 m (n = 5)
 - all observations in open canopy stands (mean 56%) with relatively low tree density (mean 289 trees/ha)
 - mean dbh of ponderosa pine tree in 17 foraging observations was 70 cm
 - did not nest in stands with >26% canopy cover or tree density >411 trees/ac
- T Central and southern Sierra Nevada, California (Milne and Hejl 1989):
- 42% of nests in stands with <40% canopy cover and 40% in stands with 40-69% canopy cover
 - mean height of nest trees 8 m
 - mean dbh nest trees 73 cm (range 21-190 cm)

Conservation Issues:

These are specific to white-headed woodpecker; see page 22 for general Conservation Issues in Ponderosa Pine forest.

- T extensive loss of large diameter ponderosa pine trees to timber harvesting

- T lack of recruitment of young ponderosa pine due to factors such as fire suppression which has allowed understory encroachment of firs and exotics, and intensive grazing which can suppress development of young pines
- T dependent on large pine seeds as food during non-breeding season and almost all ponderosa pine seed production is by large, dominant trees in open situations (Oliver and Ryker 1990)
- T fire suppression which has allowed understory encroachment and increased fuel loads which predisposes these areas to stand-replacement fires
- T fragmented habitat increases energy expenditure and risk of predation to secure resources
- T loss of snags and down wood (foraging) from timber harvest and fuelwood cutting

Biological Objectives:

Habitat:

- Ø ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in Ponderosa Pine stands to provide the following late-seral conditions:**
 - mean of >25 trees/ha (10/ac) >53 cm (21 in) dbh, and at least 2 of the trees >79 cm (31 in) dbh (foraging trees and replacement snags)
 - mean >3.6 snags/ha (1.4/ac) >20 cm (8 in) dbh with >50% >64 cm (25 in) dbh in a moderate to advanced state of decay
 - mean canopy closure 10-40%
- Ø ***East-Slope Cascades:* Where ecologically appropriate, provide conditions described above in the following minimum areas (patch size) relative to amount of old-growth or late-seral forest present:**
 - in predominantly old-growth provide >140 contiguous hectares (350 ac)
 - in 26-75% old-growth provide >280 contiguous hectares (700 ac)

Population:

- Ø ***East-Slope Cascades:* Maintain known breeding sites and provide habitat as described above to establish breeding populations (>10 pairs/area) in at least 10 new locations (5 in the Oregon Cascades and 5 in the Washington Cascades) in the next 25 years (by 2025).**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and ecosystem processes. Habitat is not suitable without relatively large snags for nest sites and large trees for foraging. Ponderosa pine is preferred seed cone for foraging. The objective for large trees and canopy cover is based on Dixon (1995a). Large trees are necessary for insect foraging substrate, seed cone production, and recruitment snags. The objective for snags is based

on Milne and Hejl (1989). Large snags are necessary for nesting. The objectives for patch size are based on Dixon (1995b). Large areas of older forest are necessary to maintain populations. Continuous tracts of late-successional forest provide higher quality habitat than fragmented areas, and there is little overlap in home range per pairs. Remnant stands of late-successional Ponderosa Pine forest may provide adequate foraging and reproductive source habitats in otherwise severely fragmented areas.

Conservation Strategies:

These are specific to white-headed woodpecker; see pages 23-25 for general Conservation Strategies in Ponderosa Pine forest.

- û Inventory to identify stands meeting desired conditions and stands that can be managed to meet desired conditions in the next 25 years (by 2025).
- û Where aforementioned stands occur on private lands, initiate actions to provide incentives for conservation such as land or resource trades, conservation agreements, or economic compensation.
- û Conduct management such as thinning, planting, snag creation, or prescribed burning as appropriate to meet desired conditions.
- û Appropriate timber harvests to achieve desired conditions might include partial cuts, group selection cuts, and shelterwood prescriptions, but not clearcuts or overstory removal.
- û Manage for large diameter trees through wider tree spacing and longer rotation periods.
- û Eliminate or restrict fuelwood cutting in suitable or potential white-headed woodpecker habitat.
- û Retain all snags and high cut stumps >10 in dbh and all Ponderosa Pine trees >17 in dbh
- û Where snags are targeted for removal for safety reasons, cut them high enough to allow for their potential use by white-headed woodpeckers.
- û All soft snags that are not hazards should be retained.
- û Retain broken-topped snags, leaning logs, and high stumps for potential nesting.
- û Retain or provide downed woody debris for foraging sites

Species to Benefit: The species most likely to benefit from the presence of large patches of old ponderosa pine forest with large trees and snags include flammulated owl, Lewis' woodpecker, white-breasted nuthatch, pgymy nuthatch, Williamson's sapsucker, northern goshawk, Hammond's flycatcher, hairy woodpecker, and brown creeper.

Information Needs:

1. Thorough inventory of white-headed woodpecker distribution within the East-Slope Cascades.
2. Data are needed on all aspects of white-headed woodpecker nesting ecology and habitat use within the East-Slope Cascades.
3. Do restored (treated) sites attract white-headed woodpeckers and provide viable habitat? What are the treatment conditions most effective in doing this?
4. Does an intensively harvested landscape that meets snag and large tree objectives support viable populations?

Conservation Focus - Focal Species: LARGE TREES – PYGMY NUTHATCH (*Sitta pygmaea*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for pygmy nuthatch included most of the Northern Cascades and all of the Southern Cascades and Upper Klamath ERUs (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were extensive in the Northern Cascades ERU (88%) and moderate in the Southern Cascades ERU (50%). There has been a slight increase (13%) in source habitat in the Upper Klamath ERU. Within the entire Interior Columbia Basin, areas predominated by declining trends were in the northern part of the basin and the central and southwestern parts of the basin had mixed trends (Wisdom et al. in press).

Populations:

- T Anecdotal: none
- T Breeding Bird Survey (Sauer et al. 1999)
 - insufficient sample size for population trend analyses in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
 - open ponderosa pine forest and mixed conifer forest with a significant component of ponderosa pine
- T British Columbia (Campbell et al. 1997):
 - nesting habitat types - unfragmented forest (55%), human-influenced forest (32%), grassland-shrubland with scattered ponderosa pine (12%)
 - burned forest heavily used for nesting

Conservation Issues:

These are specific to pygmy nuthatch; see page 22 for general Conservation Issues in Ponderosa Pine forest.

- T extensive loss of large diameter ponderosa pine trees to timber harvesting
- T lack of recruitment of young ponderosa pine due to factors such as fire suppression which has allowed understory encroachment of firs and exotics, and intensive grazing which can suppress development of young pines

- T fire suppression which has allowed understory encroachment and increased fuel loads which predisposes these areas to stand-replacement fires
- T fragmented habitat increases energy expenditure and risk of predation to secure resources

Biological Objectives:

Habitat:

- û ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in Ponderosa Pine forest to maintain or provide the following conditions:**
 - mean of >25 trees/ha (10/ac) >53 cm (21 in) dbh, and at least 2 of the trees >79 cm (31 in) dbh (foraging trees and replacement snags)
 - mean >3.6 snags/ha (1.4/ac) >20 cm (8 in) dbh with >50% >64 cm (25 in) dbh in a moderate to advanced state of decay

Population:

- û ***East-Slope Cascades:* Maintain current populations, and where appropriate initiate actions to expand density of breeding populations at these sites.**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. Habitat is not suitable without relatively large snags for nest sites and large trees for foraging. The objective for large trees is based on white-headed woodpecker (Dixon 1995). Large trees are necessary for seed cone production and recruitment snags. The objective for snags is based on Milne and Hejl (1989). Large snags are necessary for nesting.

Conservation Strategies:

These are specific to pygmy nuthatch; see pages 23-25 for general Conservation Strategies in Ponderosa Pine forest.

- û Manage for large diameter trees through wider tree spacing and longer rotation periods.
- û Eliminate or restrict fuelwood cutting in suitable or potential habitat.
- û Retain all snags >10 in dbh and all Ponderosa Pine trees >17 in dbh.

Species to Benefit: The primary species to benefit from large trees in Ponderosa Pine forest include white-headed woodpecker, white-breasted nuthatch, pine siskin, northern goshawk, and flammulated owl.

Information Needs:

1. Thorough inventory of pygmy nuthatch distribution and populations within the East-Slope Cascades.
2. Data are needed on all aspects of pygmy nuthatch nesting ecology and habitat use.
3. Does an intensively harvested landscape that meets snag and large tree objectives support viable populations?

Conservation Focus – Focal Species: OPEN UNDERSTORY WITH REGENERATING PINES – CHIPPING SPARROW (*Spizella passerina*)

Populations:

- T Anecdotal: none
- T Breeding Bird Survey (Sauer et al. 1999)
 - Cascade Mountains BBS Physiographic Region: significant ($p < .05$) long-term (1966-1998) declining trend of 4.3%/year, and non-significant short-term (1980-1998) declining trend of 1.2%/year

Habitat Relationships:

- T Anecdotal:
 - relatively open overstory with a heterogeneous understory of herbaceous openings and patches of shrubs and/or seedling/sapling trees, especially pines
 - dry upland sites
- T Oak and pine woodlands, south-central Washington, Klickitat County, Columbia Foothills (Manuwal 1997):
 - most abundant species in small pine-small oak habitats
 - abundance negatively correlated with height of oak and height of other tree species, dbh of oak, and number of non-oak and pine
 - abundance positively correlated with number of oak and number of pine
- T Ponderosa pine, east-central Washington, east-slope Cascades (Putnam 1983):
 - abundance not significantly different between thinned and unthinned sites
 - abundance positively correlated with small tree density and negatively correlated with shrub foliage volume
- T Mixed conifer forests, Selkirk Mountains, northeastern Washington (O'Connell et al. 1997):
 - stand-level negative relationships with shrub cover and canopy cover, number of down logs and tree height
 - stand-level positive relationship with coniferous regeneration and bare ground
 - landscape level significant positive relationships with number of disturbed patches and number of closed-canopy patches
 - landscape-level negative relationships with total perimeter of disturbed habitat patches and clearcut patches, number of clearcut patches, and total area of closed canopy patches
- T Mixed conifer forests, northeastern Oregon (Mannan and Meslow 1984):
 - nest sites had greater % cover of ground vegetation, greater canopy volume of Ponderosa pine, lower total canopy cover, and lower density of trees in size class 11-30 cm dbh (i.e., large sapling - small pole trees) than random sites
 - foraged on the ground or in low shrubs 61% of time; of the remaining foraging activity, 67% in Ponderosa pine trees which was greater than expected

- densities greater in managed (i.e., thinned) stands (more open) than old-growth
- T Grand fir forests, Blue Mountains, northeastern Oregon (Sallabanks and Riggs unpubl. data):
- most common in stands with relatively short trees (<27 m) and open canopies (<40%); benefits most when canopy cover 10-30% and few large trees
 - canopy height explained the greatest amount of variation (65%) in bird abundance
- T Mixed conifer forest of west-central Idaho (Medin 1985):
- abundance negatively associated with diameter-cut logging that reduced tree density from 309-342 stems/ha (125-138 stems/ac) to 180-231 stems/ha (73-94 stems/ac)
- T Mixed conifer forest, west-central Idaho (Medin and Booth 1989):
- positive numerical response to single tree selection logging that removed timber volume by 29% from 47 trees/ac >9 in dbh to 38 trees/ac
- T Mixed conifer forest in central Idaho (Evans and Finch 1994):
- more abundant in managed areas than untreated ones

Conservation Issues:

These are specific to chipping sparrow; see page 22 for general Conservation Issues in Ponderosa Pine forest.

- T understory removal because of fire hazard or as apart of restoration activities - timing, extent, and location of removal
- T intensive grazing may reduce adequate herbaceous cover for foraging and inhibit development of regenerating seedlings of pine for recruitment trees and nesting habitat for chipping sparrow
- T vulnerable to cowbird parasitism where matrix land-use provides habitat for cowbirds

Biological Objectives:

Habitat:

- T ***East-Slope Cascades: Where ecologically appropriate, initiate actions in Ponderosa Pine forest to maintain or provide the following conditions:***
 - interspersion of herbaceous ground cover with shrub and regenerating pine patches
 - 20-60% cover in the shrub layer (includes shrubs and small trees) and >20% of the shrub layer in regenerating sapling conifers, especially pines
 - mean canopy cover 10-30%
- T ***East-Slope Cascades: Where ecologically appropriate at the landscape level, ensure a mix of understory conditions such that 10-30% of the landscape meets site-level conditions as described above.***

Population:

- T ***East-Slope Cascades: Reverse long-term declining population trends to achieve stable populations (non-significant trends of <2%/year) or increasing population trends in the next 10 years (by 2010).***
- T ***East-Slope Cascades: Maintain cowbird parasitism rates below 10% within specific-study areas.***

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The 10-30% landscape objective supports regional ponderosa pine conditions described earlier to maintain this portion of the landscape in a mix of open herbaceous and dense understory shrub layer condition. This species is highly susceptible to cowbird

parasitism, therefore it is appropriate to maintain cowbird parasitism at low levels (<10%).

Monitoring BBS trends provides a coarse means of assessing progress of conservation actions relative to populations with a known baseline. This is not intended to replace monitoring that should occur to track progress at specific locations where conservation actions occur. The objective for stable or increasing BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through stable or increased abundance of chipping sparrow on randomly located BBS routes.

Conservation Strategies:

These are specific to chipping sparrow; see pages 23-25 for general Conservation Strategies in Ponderosa Pine forest.

- T Evaluate historical plant communities and current landscape conditions when assessing where restoration activities should occur.
- T Conduct understory removal and burning outside the nesting season (April 15 - July 15).
- T Conduct thinning and/or overstory removal to provide suitable open conditions.

Species to Benefit: The primary species to benefit from herbaceous-shrub openings with regenerating pines in ponderosa pine forest include dark-eyed junco, Townsend's solitaire, American robin, common poorwill, dusky flycatcher, and gray flycatcher.

Information Needs:

1. Data are needed on all aspects of chipping sparrow nesting ecology and habitat relationships.
2. Does grazing result in reduced productivity either through nest destruction or increases in cowbird parasitism?

Conservation Focus – Focal Species: PATCHES OF BURNED OLD FOREST – LEWIS'S WOODPECKER (*Melanerpes lewis*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for Lewis' woodpecker included only small portions of the Northern Cascades and approximately half of the Southern Cascades ERUs (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats have been extensive - 80% in the Northern Cascades and 63% in the Southern Cascades ERU. Within the entire Interior Columbia Basin, there has been

widespread declines in source habitats (83%) - the greatest of any species analyzed (Wisdom et al. in press).

Conservation of post-fire old ponderosa pine forest implies the need for two substantially reduced conditions across the landscape; first, old forest, and secondly, old forest that is burned.

Populations:

- T Anecdotal: none
- T Breeding Bird Survey (Sauer et al. 1999):
 - insufficient sample size for trend analyses in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
 - common characteristic of all suitable habitat is openness due to foraging method of hawking for insects; in some instances, brushy undergrowth is necessary to support insect populations (Sousa 1983)
 - populations can be unreliable due to food supply fluctuations (e.g., insect hatches and acorn crops) (Bock 1970)
 - burned old ponderosa pine forest created by stand replacing fires are highly productive source habitats compared to unburned ponderosa pine or cottonwood riparian forest (Tobalski 1997)
 - require large snags in an advanced state of decay or trees with soft sapwood for ease of cavity excavation (Bock 1970, Raphael and White 1984, Saab and Dudley 1995)
- T Burned ponderosa pine/Douglas-fir forests of southwestern Idaho (Saab and Dudley 1997):
 - most abundant cavity nester in the burns, but rarely found in unlogged controls
 - 85% nest success (n=206)
 - mean dbh of nest snags 17.5 in
- T Oak-Pine habitat East-Slope Cascades, Oregon (Galen 1989):
 - nested primarily in open pine-oak woodlands and in burned conifer forest in live or dead oak trees and in ponderosa pine snags

	oaks	ponderosa pine
• mean nest tree height	32 ft (range 10-50)	40 ft (range 20-62 ft)
• mean dbh nest tree	22 in (range 13-39)	30 in (range 16-43 in)
• canopy cover around nest tree	mostly <30%	mostly <30%
- T Optimum habitat (range-wide) defined by the following factors (Sousa 1983):
 - tree canopy closure $\leq 30\%$
 - shrub crown cover $\geq 50\%$
 - crown cover of mast-producing shrubs $\geq 70\%$
 - % canopy of hard mast trees $\geq 70\%$
 - corn crop left standing throughout winter
 - distance to potential mast storage sites ≤ 0.8 km (0.5 mi)
- T require understory shrub component $>13\%$ for insect production

Conservation Issues:

These are specific to Lewis woodpecker; see page 22 for general Conservation Issues in Ponderosa Pine forest.

- T fire suppression policies which have reduced the extent of this habitat condition across the landscape
- T salvage logging of burned ponderosa pine trees
- T extensive alteration of old forest, single stratum ponderosa pine to younger structural stages (Hann et al. 1997, Wisdom et al. in press)
- T extensive high-grade harvest of individual old ponderosa pine trees before decay and snag formation occur
- T fuelwood cutting may reduce potential snags for nest sites
- T increasing road network provides access that may increase levels of disturbance and fuelwood cutting (Wisdom et al. in press)
- T fire suppression has resulted in dense, young stands with an invasion of Douglas-fir and reduced recruitment of young pines
- T high energetic costs associated with high rates of competitive interactions with European starling for cavities may reduce reproductive success even when outcome of competition is successful for Lewis' woodpecker (Siddle and Davidson 1991)
- T killed at orchards
- T not a primary excavator, so existing cavities, natural or created, or soft snags are necessary
- T brush control and grazing limit understory growth which provides insect productivity (Galen 1989)
- T insect control during the breeding season could have adverse affects (Galen 1989)
- T pesticides and other contaminants have a suspected but unstudied role in population declines (Sorensen 1986)

Biological Objectives:

Habitat:

- T ***East-Slope Cascades:* Where ecologically and socially appropriate, through natural events (i.e., wildfire) or management (i.e., prescribed burning) maintain:**
 - **>1% of the landscape (i.e., large areas such as ecoregions, forests) as post-fire old ponderosa pine forest habitat**
 - **>50% of the post-fire landscape as unsalvaged**
- T ***East-Slope Cascades:* Where salvage logging is occurring in post-fire old ponderosa pine forest, maintain or provide the following conditions:**
 - **in burns >40 ha (100 ac), salvage <50% of the standing and down dead**

- in all burns, retain all trees/snags >51 cm (20 in) dbh and >50% of those 30-51 cm (12-20 in) dbh
- retained snags should be clumped rather than evenly spaced, with both hard and soft decay classes to lengthen the period that stands are suitable nesting habitat

T ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in old forest habitat to maintain or provide the following conditions (Saab and Dudley 1998):**

- approximately 59 snags/ha (24/ac) >23 cm (9 in), and of these approximately 15/ha (6/ac) should be > 53 cm (20 in)
- provide recruitment snags (e.g., fungal inoculation, topping, girdling), particularly in areas with high risk of stand-replacement fires
- provide shrub understory with >13% cover

Population:

T ***East-Slope Cascades:* Provide post-fire habitat as described above to maintain breeding populations (>10 pairs/area) in at least 10 locations (5 in Oregon Cascades and 5 in Washington Cascades).**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and ecosystem processes. The objective for snag clumping is based on Saab and Dudley (1997). The objective for minimum snag size is to provide large old snags which last longer and lengthen the time the habitat is suitable (Saab and Dudley 1997). Socially appropriate refers to areas where fires pose minimal risk to human life or structure. The shrub component objective is necessary to attract and produce insect prey, particularly aerial insectivores which are a primary prey item.

Conservation Strategies:

These are specific to Lewis woodpecker; see pages 23-25 for general Conservation Strategies in Ponderosa Pine forest.

- û Consider local presence of starling and starling habitat when deciding on conservation sites for Lewis' woodpecker.
- û Increase the level of acceptable opportunities to allow wildfires to burn or ignite fires when conditions and opportunities exist.
- û Use prescribed burns and understory thinning to maintain existing old forest ponderosa pine stands and accelerate development of mid-successional stages to old forest (Wisdom et al. in press).

- û Where appropriate within the Ponderosa Pine forest landscape (i.e., lands with conservation or reserve emphasis) allow stand-replacing fires to burn, and prohibit salvage logging.
- û If salvage logging is to occur in post-fire ponderosa pine, retain snags in clumps rather than evenly spaced, and retain both hard and soft snags (see Habitat Objectives for specifics) (Saab and Dudley 1997).
- û Initiate actions to recruit and create snags in green forests (e.g., fungal inoculations, girdling) where risks of wildfire are great or prescribed burns are planned to provide immediate trees/snags for excavation when the fire occurs (Saab and Dudley 1997).
- û For protection of snags: close roads or restrict fuel wood permits in areas where large ponderosa pine snags are present, and actively enforce fuel wood regulations to minimize removal of snags (Wisdom et al. in press).
- û Eliminate or minimize pesticide spraying near nesting pairs which may reduce insect prey base.
- û Retain standing dead or diseased trees where they occur.
- û If snags are limiting, create suitable snags through girdling, topping, etc.
- û If nest cavities are limiting, initiate fungal inoculations to provide nest cavity sites.
- û Use underburning or other techniques to promote a shrubby understory for insect production; minimize brush control.
- û Use thinning of young pines in dense stands to open canopy and encourage development of large trees.
- û Selective logging can be used to increase suitability of habitat as long as sufficient large living and dead trees are retained.
- û Limit or prohibit fuelwood cutting in areas where Lewis' woodpecker is known or suspected of nesting.

Species to Benefit: The species most likely to benefit from stand replacement fires in Ponderosa Pine forest are olive-sided fly catcher, American kestrel, black-backed woodpecker, three-toed woodpecker, mountain bluebird, and northern flicker.

Information Needs:

1. What are the site and landscape-level parameters that determine suitability of post-fire ponderosa pine habitat?
2. What patch sizes under what conditions are most productive for Lewis' woodpecker populations?

B. Mixed Conifer (Late-Successional)

1. Conservation Issues:

- T loss of older forests and large diameter trees and snags from timber harvesting particularly at lower elevations
- T high risk of loss of remaining Mixed Conifer overstories from stand-replacing fires due to high fuel loads in densely stocked understories
- T invasion of exotic plants contributing to alteration of understory conditions and increase in fuel loads
- T fragmentation of most of remaining tracts negatively impacts species with large area requirements
- T some areas are among the most popular and intensively used recreation sites in the west
- T hostile landscapes, particularly those in proximity to agricultural and residential areas, may have high density of nest parasites (brown-headed cowbird), exotic nest competitors (European starling), and domestic predators (cats), and may be subject to high levels of human disturbance
- T restoration issues such as techniques (mowing, thinning, burning) and timing (spring/summer versus fall) of understory removal or prescribed burning
- T BT spraying ramifications on lepidopterans and other non-target avian species

2. Biological Objectives:

NOTE: The following objectives apply to sites where Mixed Conifer Forest is the ecologically appropriate condition. Some current Mixed Conifer forest may exist in areas historically dominated by another forest type (e.g., ponderosa pine forest) and these may be targeted for restoration of the historic type.

- Q **Institutionalize a policy of "no net loss" of Late Successional Mixed Conifer forest habitat (i.e., discourage loss and conversion of habitat, but when unavoidable, mitigate with equal or greater restoration efforts).**
- Q **Retain all large diameter (>53 cm [20 in]) trees and snags.**
- Q **Maintain existing areas of moderate to high quality Late Successional Mixed Conifer forest habitat, and actively manage to promote their sustainability.**
- Q **Initiate actions to enhance size and connectivity of existing quality Mixed Conifer forest patches (i.e., reduce fragmentation).**
- Q **Initiate actions to avoid or minimize further degradation of Mixed Conifer forest habitat (e.g., thinning, fire restoration).**

- Q **Initiate actions to improve quality of degraded Mixed Conifer forest habitat through appropriate management (see Conservation Strategies throughout the plan), particularly the use of natural disturbance regimes such as fire.**
- Q **In the next 25 years (by 2025), initiate actions to establish/maintain 10 blocks of forest >5,000 acres (5 in Washington Cascades and 5 in Oregon Cascades) that are moving toward dominance by Mixed Conifer (Late-Successional) forest conditions (can include a mosaic of other conditions).**
- Q **In the next 25 years (by 2025), initiate actions to establish/maintain >25% of landscape units (e.g., watersheds, management units, etc.) where Mixed Conifer is appropriate as moving towards late-successional conditions.**

Assumptions/Rationale: "No net loss" includes permanent conversion or degradation that compromises the ecological integrity of the habitat and/or reduces its suitability for our focal species. Natural events (e.g., wildfire) and some restoration activities that result in short-term "loss" are not considered here. The objective for blocks of forest in Mixed Conifer conditions is to stimulate landscape-level evaluations and ensure suitable habitat for area-sensitive species.

Restoration of ponderosa pine forest towards historic levels will likely reduce populations of species that are provided suitable habitat in the closed canopy, dense understory Mixed Conifer forests that now dominate what was historically ponderosa pine forest. This would include species such as Townsend's warbler, red-breasted nuthatch, and the endangered spotted owl. These may be concerns at the project level, but these habitats represent degradation of historic ponderosa pine conditions and they dominate throughout the planning region. Even with emphasis on restoration of historic conditions, there is not likely to be a shortage of current conditions in what was historically ponderosa pine forest throughout the planning area. To counter these local concerns, decisions need to be made across landscapes as to how to reduce impact on the current bird species composition where restoration is occurring.

3. Conservation Strategies:

These general recommendations are presented to support conservation of landbirds in Mixed Conifer habitats. Specific directives as described below for priority focal species should supercede those presented here if there is a direct conflict between recommendations.

Q *Data Collection:*

- Conduct community and species research to test the biological objectives described throughout this document.

- Establish permanent roadside and off-road censusing stations to monitor bird population and habitat changes.
- û *Research Coordination:*
 - Coordinate research activities between government and private entities.
- û *Conservation Areas:*
 - Seek to expand Mixed Conifer focal species distribution and abundance throughout the East-Slope Cascades by establishing Mixed Conifer Bird Conservation Areas (MCBCAs) and promoting their proper management (see Appendix B).
- û *Acquisition/Restoration:*
 - Support partnerships that seek to acquire/restore Mixed Conifer habitat.
 - Develop conservation agreements with private landowners to enhance the quality of Mixed Conifer habitat.
 - Seek to maximize contiguous area of Mixed Conifer habitat, and thus minimize fragmentation. The larger the area, the greater the likelihood of maintaining populations of area-sensitive and large territory species.
 - Develop a Mixed Conifer "scorecard" for government and non-government use in prioritizing and evaluating habitat for landbirds. The scorecard should provide guidelines for rating the habitat at various scales (local, landscape).
- û *Management:*
 - Use understory prescribed burning and/or thinning when and where appropriate to reduce fuel loads and accelerate development of late-seral conditions.
 - Retain all large trees, especially ponderosa pine, >18 in dbh.
 - Initiate snag creation and recruitment where necessary.
 - Retain all existing snags and broken-top trees >10 in dbh in harvest units.
 - Implement road closures (obliteration) where necessary to limit access to snags.
 - Minimize mechanized harvest activities that increase susceptibility to invasion of exotic and noxious weeds and soil erosion.
 - Discontinue fuelwood cutting or restrict to trees <38 cm (15 in) dbh where snag objectives are not being met (Blair et al. 1995).
 - Permit stand-replacing wildfires to burn where possible (e.g., wilderness areas, research natural areas).
- û *Pesticides/Herbicides:* Use of insecticides can reduce the insect food base for many bird species. Use of herbicides can reduce cover and indirectly affect the insect food base.
 - Use Integrated Pest Management (IPM) practices or non-spraying in low human use areas (e.g., mosquito spraying).
 - Encourage biological controls rather than chemical controls wherever possible.

- Applications should be by hand if practical to target appropriate species (e.g., noxious weeds).
 - Applications on lands adjacent to riparian areas should avoid environmental conditions where the riparian zone may be threatened.
- û *Grazing:*
- Eliminate or properly manage grazing to ensure appropriate understory conditions.
 - Consider retirement of grazing allotments when they come up for renewal, especially where habitat degradation is occurring and/or where cowbirds are common.
- û *Recreation:*
- Minimize timing and extent of human recreation in important Mixed Conifer bird habitat during the nesting season.
- û *Prioritization:* In general, the highest priority for restoration is to expand Mixed Conifer habitat and bird populations where most proximate to existing high quality, productive sites. This is appropriate because expansion and recolonization into new or restored sites is most likely to occur from surplus production near existing source populations. Prioritization should also consider the following factors:
- proximity to a designated MCBCA
 - benefit to multiple species
 - risk of habitat loss to development or conversion to unsuitable habitat
 - quality of the habitat - existing and potential
 - compatibility of current and projected adjacent land uses
 - uniqueness of the site in a local and regional context
 - the likelihood of securing the land for conservation
 - long-term ease of management (i.e., perpetual easements, fee ownerships).
- û *Incentives/Programs:* Economic incentive-based programs (new and old) are likely to be most successful in reaching the greatest number of private landowners to increase the land base of suitable Mixed Conifer bird habitat.
- Increase the amount of land under incentives programs for wildlife habitat, targeting land within or adjacent to MCBCAs.
 - Support existing programs and develop new economic incentive programs to solicit conservation and management agreements with private landowners to certify their land as a MCBCA.
- û *Education/Outreach:*
- Develop brochures or other educational materials for private landowners describing Mixed Conifer values and management strategies to provide habitat for landbirds and other wildlife.

Conservation Focus – Focal Species: LARGE TREES – BROWN CREEPER (*Certhia americana*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for brown creeper included all of the Northern Cascades, Southern Cascades, and Upper Klamath ERUs (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were extensive in the Northern Cascades ERU (63%) and moderate in the Southern Cascades ERU (46%). There has been an extensive increase (60%) in source habitat in the Upper Klamath ERU. Within the entire Interior Columbia Basin, there has been a broad shift in the geographic distribution of source habitats away from the north and towards the southern portion of the basin (Wisdom et al. in press).

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999)
 - Cascade Mountains BBS Physiographic Region: significant ($p < .05$) long-term (1966-1998) declining trend of 5.6%/year, and non-significant short-term (1980-1998) increasing trend of 3.1%/year

Habitat Relationships:

- T Anecdotal:
 - a bark-gleaning insectivore associated with late-successional forests and mature trees
- T Western Oregon (multiple studies):
 - abundance positively correlated with hard Douglas-fir snags >50 cm (20 in) dbh (Lundquist and Mariani 1991)
 - positive relationship with large tree (>100 cm [39 in] dbh) density (Carey et al. 1991)
 - significantly more abundant in old-growth than mature and young forests (Carey et al. 1991, Anthony et al. 1996)
 - significantly decreased abundance in stands with heavy thinning, but no change in abundance with moderate thinning (Weikel 1997)

Conservation Issues:

These are specific to brown creeper; see pages 36-37 for general Conservation Issues in Mixed Conifer forest.

- T reduction in the presence of large trees across the landscape due to timber harvests, high-grading, and shorter rotations
- T shows a preference for Douglas-fir which offers better foraging opportunities in the deeply fissured bark
- T indications that it may be a forest interior species that is area-sensitive (Rosenberg and Raphael 1986, Nelson 1989, McGarigal and McComb 1995)

Biological Objectives:

Habitat:

- û ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in mixed conifer forest to maintain or provide the following conditions:**
 - **blocks of late-successional habitat >30 ha (75 ac)**
 - **>10 trees/ha (4/ac) >46 cm (18 in) dbh with at least 2 trees >60 cm (24 in) dbh**

Population:

- û ***East-Slope Cascades:* Reverse long-term declining population trends to achieve stable populations (non-significant trends of <2%/year) or increasing population trends in the next 10 years (by 2010).**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The biological objective of 10 trees/ha (4/ac) >46 cm (18 in) dbh is modified from several westside studies (Carey et al. 1991, Vega 1993, Hansen and Hounihan 1995), and the 60 cm (24 in) dbh is the lowest mean of nest tree dbh from several studies. Stand size of 30 ha (75 ac) is based on adjusted data (i.e., minimum of 20 ha) from winter wren in northwestern California (Rosenberg and Raphael 1986), another species considered a forest interior species.

Monitoring BBS trends provides a coarse means of assessing progress of conservation actions relative to populations with a known baseline. This is not intended to replace monitoring that should occur to track progress at specific locations where conservation actions occur. The objective for stable or increasing BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through stable or increased abundance of brown creeper on randomly located BBS routes.

Conservation Strategies:

These are specific to brown creeper; see pages 38-40 for general Conservation Strategies in Mixed Conifer forest.

- û Maintain stands in largest tracts possible to reduce the amount of edge and fragmentation.
- û Designate areas of unmanaged late-successional forest likely to provide the most suitable nesting habitat.
- û Extend rotation ages on intensively managed lands to >80 years to allow for development of large trees, and retain these trees and recruit replacements at each harvest entry.

- û In harvest units, retained trees should be clumped rather than dispersed and should be primarily Douglas-fir.

Species to Benefit: The primary species to benefit from large trees in late-successional mixed conifer forest include Townsend's warbler, red-breasted nuthatch, evening grosbeak, golden-crowned kinglet, pine siskin, and red crossbill.

Information Needs:

1. Data are needed on all aspects of brown creeper nesting ecology and habitat relationships.
2. Is there a minimum density of foraging sites (i.e., large trees) per territory? If so, is there a threshold of the spatial extent of foraging sites that cannot be exceeded for acceptable levels of energetic sustainability? Does this vary by elevation or forest type?
3. At the landscape-level, does patch size, configuration, or proportional occurrence in the landscape affect reproductive success?
4. In managed forests, do riparian buffer zones or logged stands provide nesting habitat if suitable large trees are retained? If so, are there limiting factors such as buffer width, patch size, or tree density?

Conservation Focus – Focal Species: LARGE SNAGS – WILLIAMSON'S SAPSUCKER
(*Sphyrapicus thyroideus*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for Williamson's sapsucker included all of the Northern Cascades, Southern Cascades, and Upper Klamath ERUs (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were extensive in the Northern Cascades ERU (63%) and moderate in the Southern Cascades ERU (46%). There has been an extensive increase (60%) in source habitat in the Upper Klamath ERU. Within the entire Interior Columbia Basin, there has been a broad shift in the geographic distribution of source habitats away from the north and towards the southern portion of the basin (Wisdom et al. in press).

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - insufficient sample size for population trend analyses in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
 - inhabits mature and old-growth mixed conifer forests (Thomas et al. 1979)
- T Ponderosa pine forest east-central Oregon Cascades (Bate 1995)

- abundance increased as height of the first canopy layer increased (layers only detectable in older, more advanced seral stages)
 - abundance positively associated with hard snags >20.3 cm (8 in) dbh
- T Thomas et al. (1979):
- minimum snag dbh for nest cavities 30.5 cm (12 in) and minimum height 4.6 m (15 ft)
 - maximum populations supported with 150 snags >30.5 cm (12 in) dbh/40 ha (100 ac)
 - territory size 4 ha (10 ac)/pair in ponderosa pine forests
- T HSI Model (Sousa 1983):
- optimum canopy cover 30-60%; unsuitable if <10% or >80%
 - optimum soft snags of ponderosa pine >46 cm (18 in) dbh; other trees >30.5 cm (12 in)

Conservation Issues:

These are specific to Williamson's sapsucker; see pages 36-37 for general Conservation Issues in Mixed Conifer forest.

- T dependent on snags or dying trees for nesting and foraging
- T requires relatively large snags; thus dependent on older forest
- T loss of large snags under intensive forest management practices
- T snag management policies on managed lands are often deficient in large snags required by Williamson's sapsucker unless recruitment snags are maintained through rotations
- T fire suppression has resulted in closed understories which inhibit growth of large trees

Biological Objectives:

Habitat:

- û ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in Mixed Conifer (Late-Successional) forest to maintain or provide the following conditions:**
 - >2.5 snags/ha (1/ac) >30.5 cm (12 in) dbh except ponderosa pine should be >46 cm (18 in) dbh
 - mean canopy cover 25-70%

Population:

- û ***East-Slope Cascades:* Maintain current populations, and where appropriate initiate actions to expand density of breeding populations at these sites.**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The objective for snags and canopy closure are based on Thomas (1979) and Sousa (1983).

Conservation Strategies:

These are specific to Williamson's sapsucker; see pages 38-40 for general Conservation Strategies in Mixed Conifer forest.

- û In managed forests, extend rotation ages to provide snags of sufficient size, and retain these snags and recruit replacement snags (large live trees) at each harvest entry.
- û In harvest units and riparian buffer zones, retain the largest live trees, particularly dying or defective trees (e.g., broken tops, fungal conks, insect infestations), through rotations as recruitment snags for potential nest sites if nesting is documented in logged stands (see information needs below).
- û Retain known or suitable nesting and roosting snags from all harvest and salvage activities and restrict access for fuelwood cutters.
- û If snags have not been retained (or insufficient in number), create snags through blasting tops or inoculation with heart rot if size of trees meets species requirements.

Species to Benefit: The primary species to benefit from snags in late-successional mixed conifer forest include pileated woodpecker, hairy woodpecker, flammulated owl, northern pygmy owl, red-naped sapsucker, brown creeper, Vaux's swift, chestnut-backed chickadee, great-gray owl, red-breasted nuthatch, and winter wren.

Information Needs:

1. In managed forests, do riparian buffer zones or logged stands provide nesting habitat if suitable large snags are retained? If so, are there limiting factors such as buffer width, patch size, snag distribution, density, or configuration?
2. Will birds recolonize areas where suitable snags are created? Are there variables to consider such as proximity to riparian habitats, proximity to other nesting areas?

Conservation Focus – Focal Species: INTERSPERSION GRASSY OPENINGS AND DENSE THICKETS – FLAMMULATED OWL (*Otus flammeolus*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for flammulated owls included all of the Northern Cascades, Southern Cascades, and Upper Klamath ERUs (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were extensive in the Northern Cascades ERU (72%) and moderate in the Southern Cascades ERU (29%). There has been an extensive increase (61%) in source habitat in the Upper Klamath ERU. Within the entire Interior Columbia Basin, there has been a broad shift in the geographic distribution of source habitats away from the north and towards the southwestern portion of the basin (Wisdom et al. in press).

Populations:

- T Anecdotal:
 - localized populations (M. Denny pers. comm.)
 - foraging in ponderosa pine/Douglas-fir forests with grassland edges may allow for exploitation of relatively higher prey densities in grasslands while remaining close to suitable hiding cover in the forest (Goggans 1985)
- T Breeding Bird Survey (Sauer et al. 1999):
 - insufficient sample size for population trend analyses in the Cascade Mountains BBS Physiographic Region
- T Density:
 - Blue Mountains, northeast Oregon: breeding density 0.47 pairs/40 ha (Goggans 1985)

Habitat Relationships:

- T Anecdotal:
 - mosaic of old dry forest with large trees and snags, low canopy closure, openings of grasslands or dry meadows, a primarily herbaceous understory with a few scattered small patches of young sapling thickets
 - mosaic of open forests containing mature or old-growth ponderosa pine with a mix of other tree species and some patches of dense thickets of forest growth with interspersed grassy openings (Marshall et al. 1996)
- T northeastern Oregon (Goggans 1985):
 - home range (n=5) 10.3 ha (4.2 ac) over entire breeding period, but 15.9 ha (6.4 ac) during incubation (n=2)
 - higher densities and biomass of prey in grasslands than in forests suggesting broken overstories may have higher densities of prey

- roosts averaged only 53 m from nests during the nestling period
 - roosted in mixed conifer forest type more than expected from availability; avoided roosting in ponderosa pine forest
 - high foliage density key component of roost sites
 - nests located in snags (n=16), dead portions of live trees (n=3), and live trees (n=1); ponderosa pine (n=17), western larch (n=2), Douglas-fir (n=1)
- T nest sites (n=19) characterized by:
- mature trees 30-50 cm dbh (12-20 in)
 - canopy cover <50%
 - slopes 16-25%
 - 80% of nests were within 30 m of a clearing
 - all in stands with multi-layered canopies
 - mean stem density 589 stems/ha (range 60-809)
 - mean basal area 23.7 m²/ha (range 2.5-66.5)
 - mean nest tree dbh 56.3 cm (22 in) (n=20)
 - mean nest tree height 26.6 m (87 ft) (n=20)

Conservation Issues:

These are specific to flammulated owl; see pages 36-37 for general Conservation Issues in Mixed Conifer forest.

- û loss of mature and old-growth trees and snags for nest and roost sites
- û loss of open understory because of invasion of exotics and fire intolerant species in the fire suppression
- û requires small patches of dense thickets for roosting
- û availability of arthropod prey (i.e., their prey base) may be adversely affected by pesticide spraying programs that are near nest sites or are broadcast over large areas
- û creation of large areas of even-aged stands is detrimental (Marshall et al. 1996, Rodrick and Milner 1991)
- û last of the cavity nesting migrants to arrive, so if cavities are limiting, all may be occupied by other species (Goggans 1985)
- û fuelwood collection reduces the densities of snags

Biological Objectives:

Habitat:

- û ***East-Slope Cascades:* Where ecologically appropriate, initiate actions to maintain or provide late-successional Mixed Conifer forest habitat with the following conditions:**
 - >10 snags/40 ha (100 ac) >30 cm (12 in) dbh and > 1.8 m (6 ft) tall
 - >20 trees/ha (8/ac) >21 in dbh to function as recruitment snags
 - at least one large or two smaller dense, brushy thickets of sapling/pole trees for roosting habitat

- at least one large or two smaller grassy openings within the territory
- û ***East-Slope Cascades:* Where ecologically appropriate at the landscape level, provide conditions described above in patches of suitable habitat >140 ha (350 ac) to provide for a potential nesting population of at least 10 pairs.**

Population:

- û ***East-Slope Cascades:* Maintain current populations, and where appropriate initiate actions to expand density of breeding populations at these sites.**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and ecosystem processes. The objective for snags was based on Thomas (1979), Jones and Stokes, Inc. (1980), and Bull et al. (1990). The objective to retain large trees, snags, and defective trees >12 in dbh (Goggans 1985) is for current and future nest and roost sites. The objective for grassy openings is for foraging sites. The objective for a thicket of young trees is for roosting sites.

Conservation Strategies:

These are specific to flammulated owl; see pages 38-40 for general Conservation Strategies in Mixed Conifer forest.

- û Target conservation efforts near grassland or dry meadow openings.
- û Avoid insect control spraying near known nest areas or suitable habitat.
- û In restoration efforts, leave patches of dense sapling thickets to function as roost sites.
- û Retain large (>30 cm [12 in]dbh) snags during silvicultural practices.
- û Where snags with nesting cavities are a limiting factor and the habitat is otherwise suitable, create snags by fungal, inoculation, topping, girdling etc.
- û Where dense roosting thickets are limited within potential or suitable habitat, avoid forest practices that remove brush from the understory.
- û Where grassy openings in potential or suitable habitat are being encroached on by shrubs and trees, initiate actions such as manual removal and prescribed fire to maintain these openings.
- û Eliminate or restrict fuelwood cutting and application of pesticides in suitable or potential flammulated owl habitat.
- û Use nest boxes as a short-term supplement where restoration activities are occurring.

Species to Benefit: The primary species to benefit from grassy edges and openings in Ponderosa Pine forest would be great-gray owl. Additionally, the presence of old, Ponderosa Pine

forest would benefit numerous species associated with large trees and/or open understory such as white-breasted nuthatch, white-headed woodpecker, pygmy nuthatch, hairy woodpecker, brown creeper, chipping sparrow, Townsend's solitaire, Hammond's flycatcher, Cassin's finch, western bluebird, and western tanager.

Information Needs:

1. Thorough inventory of flammulated owl distribution within the Blue and Northern Glaciated Mountains.
2. Data are needed on all aspects of flammulated owl nesting ecology and habitat use, specifically related to the size, configuration, and abundance of grassy openings for foraging and clumped thickets of sapling/pole trees for roosting.
3. Do restored (treated) sites attract flammulated owls and provide viable habitat? What are the treatment processes and conditions most effective in doing this?

Conservation Focus – Focal Species: MULTI-LAYERED/DENSE CANOPY/VERTICAL COVER – HERMIT THRUSH (*Catharus ustulatus*)

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - Cascade Mountains BBS Physiographic Region: non-significant long-term (1968-1998) declining trend of 0.8%/year, and non-significant short-term (1980-1998) increasing trend of 2.6%/year

Habitat Relationships:

- T Anecdotal:
- T Ponderosa pine, east-central Washington, East-Slope Cascades (Putnam 1983):
 - abundance significantly less in precommercially thinned than unthinned stands
 - abundance positively correlated with foliage volume of shrubs and small trees indicating a preference for areas having a dense understory

Conservation Issues:

These are specific to hermit thrush; see pages 36-37 for general Conservation Issues in Mixed Conifer forest.

- T alteration of habitats (loss of understory and structural complexity) from fire, grazing, and winter recreational activities

Biological Objectives:

Habitat:

- û ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in Mixed Conifer (Late-Successional) forest to maintain or provide the following conditions:**
 - **patches of forest with multi-layered structure and a dense understory shrub layer**

Population:

- û ***East-Slope Cascades:* Maintain stable or increasing population trends over the next 10 years (by 2010).**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes.

Monitoring BBS trends provides a coarse means of assessing progress of conservation actions relative to populations with a known baseline. The objective for stable or increasing trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through stable or increased abundance of hermit thrush on randomly located BBS routes. This is not

intended to replace monitoring that should occur to track progress at specific locations where conservation actions occur.

Conservation Strategies:

These are specific to hermit thrush; see pages 38-40 for general Conservation Strategies in Mixed Conifer forest.

- Retain tracts of forest as unmanaged or lightly managed to ensure structural diversity.

Species to Benefit: The primary species to benefit from a multi-layered, dense canopy and vertical cover in late-successional mixed conifer forest include varied thrush, chestnut-backed chickadee, blue grouse, winter wren, and Townsend's warbler.

Information Needs:

1. Data are needed on all aspects of hermit thrush nesting ecology and habitat relationships.

Conservation Focus – Focal Species: EDGES AND OPENINGS CREATED BY WILDFIRE – OLIVE-SIDED FLYCATCHER (*Contopus cooperi*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for olive-sided flycatcher included all of the Northern Cascades, Southern Cascades, and Upper Klamath ERUs (Wisdom et al. in press). Within this core of historical habitat, there has been substantial increases in source habitat in the Southern Cascades (785) and Upper Klamath (>100%), and a moderate increase in the Northern Cascades (29%). Within the entire Interior Columbia Basin, the trend in source habitat is nearly neutral (Wisdom et al. in press).

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - Cascade Mountains Physiographic Region: highly significant ($p < .01$) long-term (1966-1998) declining trend of 3.0%/year, and significant ($p < .01$) short-term (1980-1998) declining trend of 2.9%/year

Habitat Relationships:

- T Anecdotal:
 - aerial insectivore that breeds in natural or man-made openings and edges of coniferous forests where tall trees and snags are present for singing and foraging perches
- T Mixed conifer forest, west-central Idaho (Medin and Booth 1989):
 - positive numerical response to single tree selection logging that removed timber volume by 29% from 47 trees/ac >9 in dbh to 38 trees/ac
- T Mixed conifer forest in central Idaho (Evans and Finch 1994):
 - more abundant in managed areas than untreated ones
- T Conifer forests of western Oregon (Altman 2000):
 - in managed forest, only variable positively associated with nest success was snags >12 m (40 ft) tall

- nest success higher in post-fire habitat (63%) than several types of managed forest (33-49%)
- T Spruce-fir forest of Blue Mtns., ne. Oregon (Sallabanks unpubl. data):
- significantly more common in moderately (34-66% tree mortality) and heavily (³³67% tree mortality) burned forest than unburned control and lightly (££33% tree mortality) burned forest 1-5 yr post-fire
 - abundance increased in moderately and heavily burned sites 2-5 yr post-fire, including a significant increase in high intensity burns
- T Mixed conifer forest, western Montana and northern Idaho (Hutto and Young 1999):
- most often detected in post-fire habitat
- T Conifer forests of nw. Colorado (Kotliar and Melcher 1998):
- selected burned forest over unburned clearcuts

Conservation Issues:

These are specific to olive-sided flycatcher; see pages 36-37 for general Conservation Issues in Mixed Conifer forest.

- û changes in fire regimes (i.e., fire suppression) that has resulted in fewer fires, but larger more destructive fires that has reduced the amount of edge of early and late seral forest (Wisdom et al. in press)
- û brush control and grazing limit understory growth which provides insect productivity
- û insect control during the breeding season could limit prey availability and reduce olive-sided flycatcher productivity

Biological Objectives:

Habitat:

- û ***East-Slope Cascades: Where ecologically and socially appropriate in Mixed Conifer forest, through natural events (i.e., wildfire) or management (i.e., prescribed burning) maintain:***
 - o **>2% of the landscape (i.e., large areas such as ecoregions, forests) as post-fire habitat**
 - o **>40% of the post-fire landscape as unsalvaged**
- û ***East-Slope Cascades: Where salvage logging is occurring in post-fire old ponderosa pine forest, maintain or provide the following conditions:***
 - o **in burns >40 ha (100 ac), salvage <50% of the standing and down dead**
 - o **in all burns, retain all trees/snags >51 cm (20 in) dbh and >50% of those 30-51 cm (12-20 in) dbh**
 - o **retain patches with mix of live and dead trees/snags to provide potential nest trees (live) within the context of potential foraging and singing perches (dead)**

Population:

- û ***East-Slope Cascades: In conjunction with efforts in the Idaho Bird Conservation Plan (Ritter 1999) and the Montana Bird Conservation Plan (Casey 2000), reverse declining BBS trends to achieve stable populations (non-significant trends of <2%/year) or increasing populations in the next 10 years (by 2010).***

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and ecosystem processes.

Monitoring BBS trends provides a coarse means of assessing progress of conservation actions relative to populations with a known baseline. The objective for reversing declining trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through stable or increased abundance of olive-sided flycatcher on randomly located BBS routes. This is not intended to replace monitoring that should occur to track progress at specific locations where conservation actions occur.

Conservation Strategies:

These are specific to olive-sided flycatcher; see pages 38-40 for general Conservation Strategies in Mixed Conifer forest.

- û Use prescribed fire along with manual understory clearing where appropriate to create a patchy mosaic of burned forest.
- û Increase the level of acceptable opportunities to allow wildfires to burn or ignite fires when conditions and opportunities exist.
- û Where possible, prohibit salvage logging to occur in post-fire habitat.
- û For protection of snags: close roads or restrict fuel wood permits in areas where large snags are present, and actively enforce fuel wood regulations to minimize removal of snags.
- û Eliminate or minimize pesticide spraying near nesting pairs which may reduce insect prey base.
- û Retain standing dead or diseased trees where they occur.
- û If snags are limiting, create suitable snags through girdling, topping, etc.
- û Use underburning or other techniques to promote a shrubby understory for insect production; minimize brush control.
- û Selective logging can be used to increase suitability of habitat as long as sufficient large living and dead trees are retained.

Species to Benefit: The primary species to benefit from fire created edges and openings in Mixed Conifer forest would be western tanager, Cassin's finch, western wood-pewee, mountain bluebird, northern flicker, American kestrel, and American robin.

Information Needs:

1. Comparison of reproductive success in managed landscapes with post-fire landscapes.
2. Comparison of insect availability and predator densities relative to nest success in post-fire and managed landscapes.

C. Oak-Pine Woodland

1. Conservation Issues:

- T habitat losses from harvesting, especially large ponderosa pine
- T harvest of oaks for firewood
- T habitat loss from agricultural, rural, and residential development, particularly the loss of individual large oaks which have proportionately more cavities
- T habitat degradation, particularly the lack of recruitment of young oaks and pines, from encroachment of Douglas-fir and non-native shrubs (e.g., Himalayan blackberry, Scot's broom) due to fire suppression, and from intensive grazing impacts on regeneration
- T land ownership is primarily private
- T hostile landscapes, particularly those in proximity to agricultural and residential areas, may have high density of nest parasites (brown-headed cowbird), exotic nest competitors (European starling), and domestic predators (cats), and be subject to high levels of human disturbance
- T high energetic costs associated with high rates of competitive interactions with European starlings for cavities may reduce reproductive success of species such as acorn woodpecker, Lewis' woodpecker, white-breasted nuthatch, western bluebird, and American kestrel, even when outcome of the competition is successful for these species
- T hazard reduction/brush removal is being extensively used despite no information on landbird response and problematic timing of the actions (i.e., breeding season)

2. Biological Objectives:

- Ø **Institutionalize a policy of "no net loss" of Oak-Pine Woodland habitat (i.e., mitigate habitat conversions and natural losses with equal or greater restoration efforts).**

- Ø **Maintain existing moderate to high quality Oak-Pine Woodland stands, and actively manage to promote their sustainability, regardless of size.**
- Ø **Emphasize conservation of large patches of Oak-Pine Woodland habitat with large-diameter and open-form oaks.**
- Ø **Retain all oak and ponderosa pine trees and snags >53 cm (20 in) dbh, regardless of landscape context.**
- Ø **Maintain or initiate actions to ensure <10% canopy cover of conifers in stands where pure oak woodland is ecologically appropriate.**
- Ø **Maintain or initiate actions to provide young, subcanopy oaks and young regenerating pine saplings (i.e., recruitment trees) and native shrubs and herbaceous vegetation in the understory.**
- Ø **Improve quality of degraded Oak-Pine Woodland habitat through appropriate management actions (see Conservation Strategies below).**
- Ø **Initiate actions to enhance size and connectivity of existing Oak-Pine Woodland patches (i.e., reduce fragmentation) through restoration and acquisition efforts.**
- Ø **At the landscape-level, initiate actions to maintain or provide high quality Oak-Pine Woodland habitat in tracts >40 ha (100 ac) in a mosaic of habitat conditions to support viable populations of oak-pine focal bird species.**

Assumptions/Rationale: "No net loss" includes permanent conversion or degradation that compromises the ecological integrity of the habitat and/or reduces its suitability for our focal species. The objectives are based on the following two premises in order of importance: 1) prevent further loss of oak woodland-pine habitat, and 2) improve condition of degraded oak woodland-pine habitat. Large patches of oak woodland-pine may be less susceptible to competition from starlings and parasitism from cowbirds. Open-form oaks have more cavities (Gumtow-Farrior 1991) and produce more acorns for regeneration and wildlife consumption (Larsen and Morgan 1998). At the landscape level, maintaining a mosaic of conditions will provide habitat for multiple species and options for breeding sites for each species within any year. Hostile habitat should not exceed 10% in order to minimize potential impacts of fragmentation and adverse human-related effects (disturbance from increased activity, residences where feral cats and dogs are an issue).

3. Conservation Strategies:

These general recommendations are presented to support conservation of landbirds in oak-pine woodland habitats. Specific directives as described below for priority focal species should supercede those presented here if there is a direct conflict between recommendations.

- Ø *Data Collection/Research:*

- Conduct community and species research to test the biological objectives described below.
 - Establish permanent roadside and off-road censusing stations to monitor bird population and habitat changes.
 - Study the role of fire, mowing, thinning, and other management treatments to maintain/improve habitat quality.
- û *Acquisition/Restoration:*
- Identify opportunities (i.e., receptive land-owners and managers) for conservation and management actions.
 - Develop an oak-pine woodland "scorecard" for government and non-government use in prioritizing and evaluating oak woodland tracts for landbirds. This could be used not only for landbird conservation or acquisition, but also for assessing the impacts of proposed development. The scorecard should provide guidelines for rating the habitat at various scales (local, landscape).
 - Restoration and protection should emphasize conservation and management of large patches of oak woodland-pine forest with large diameter trees outside hostile landscapes (see conservation issues above). The highest priority for protection is oak woodland-pine stands already in reasonably good condition.
 - Use mechanical removal (e.g., girdling of large trees, manual removal of small trees) and/or fire to remove and inhibit development of conifer trees and create/maintain appropriate species composition and growth form cover amounts.
- û *Burning:*
- Encourage judicious use of low-intensity prescribed burns to exclude Douglas-fir encroachment, stimulate oak and pine sprouting, and contribute to multi-aged stands (Larsen and Morgan 1998).
- û *Grazing:*
- Eliminate grazing or limit grazing periods with fewer animals (i.e., less impact) (Larsen and Morgan 1998).
- û *Recreation:*
- Allow but monitor low impact recreational activities if oak and pine regeneration is not compromised and activities are not likely to adversely affect wildlife.
- û *Incentives/Programs:*
- Develop incentive programs through city, county, state, and or federal agencies for enhancement of oak-pine forest for landbirds.

- û *Outreach:*
 - Discourage clearing of large tracts of oak woodland-pine forest.
 - Develop educational materials (e.g., brochure, videos) to foster an appreciation of oak-pine forest and assist landowners in restoration.
- û *Conservation Areas:*
 - Seek to expand oak-pine focal species distribution and abundance throughout the East-Slope Cascades by establishing Oak-Pine Bird Conservation Areas (OPBCAs) and promoting their proper management (see Appendix B).

Conservation Focus – Focal Species: EARLY SUCCESSIONAL-DENSE UNDERSTORY – NASHVILLE WARBLER (*Vermivora ruficapilla*)

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - Cascade Mountains BBS Physiographic Region: non-significant long-term (1968-1998) increasing trend of 0.1%/year, and non-significant short-term (1980-1998) increasing trend of 1.4%/year

Habitat Relationships:

- T Oak and pine woodlands, south-central Washington, Klickitat County, Columbia Foothills (Manuwal 1997):
 - very abundant in small pine-small oak and large fir-large oak habitats
 - abundance negatively correlated with height of ponderosa pine
 - abundance positively correlated with height of non-oak, non-pine species
- T Ponderosa pine, east-central Washington, East-Slope Cascades (Putnam 1983):
 - occurred only in unthinned stands
- T Umpqua Valley (n=6 hardwood stands dominated by oak and madrone) (Cross and Simmons 1983):
 - most abundant in the most structural diverse stands with highest shrub cover and vertical density (especially poison oak), and least abundant where shrub cover in understory was least
 - two stands where most abundant, highest importance value rank was presence of madrone
 - two stands where least abundant, highest importance value rank was presence of oaks
 - abundance high low moderate
 - mean shrub cover 23-32% 1-14% 28-29%
 - mean dead and down 17-30% 41-69% 36-47%
 - mean grass cover 7-11% 18-26% 3-9%

Conservation Issues:

These are specific to Nashville warbler; see pages 50-51 for general Conservation Issues in Oak-Pine Woodland.

- T intensive grazing that limits development of shrub layers
- T moderate to high intensity fires that reduce suitable habitat

Biological Objectives:

Habitat:

- û **East-Slope Cascades: Where ecologically appropriate, initiate actions in Oak-Pine Woodland to maintain or provide the following conditions:**
 - o **>40% native shrub cover interspersed with grassy openings and with or without scattered trees that comprise <30% canopy cover**

Population:

- û **Cascade Mountains BBS Region: Maintain stable or increasing population trends over the next 10 years (by 2010).**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The biological objectives were subjectively developed based on the collective experience of several individuals.

Monitoring BBS trends provides a coarse means of assessing progress of conservation actions relative to populations with a known baseline. This is not intended to replace monitoring that should occur to track progress at specific locations where conservation actions occur. The objective for stable or increasing BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through stable or increased abundance of chipping sparrow on randomly located BBS routes.

Conservation Strategies:

These are specific to Nashville warbler; see pages 52-53 for general Conservation Strategies in Oak-Pine Woodland.

- û Avoid road building and development that fragments existing shrub patches.
- û Wherever possible, restore a fire regime to inhibit encroachment of conifer trees and infestations of invasive exotic plants.

Species to Benefit: The primary species to benefit from early successional dense understory oak-pine habitats include dusky flycatcher, gray flycatcher, American robin, chipping sparrow, spotted towhee, and dark-eyed junco.

Information Needs:

1. Data are needed on all aspects of Nashville warbler nesting ecology and habitat relationships.

Conservation Focus – Focal Species: LARGE PINE TREES AND SNAGS IN OAK-PINE WOODLAND – LEWIS' WOODPECKER (*Melanerpes lewis*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for resident Lewis' woodpecker included small portions of the southern part of the Northern Cascades and the northern part of the Southern Cascades ERUs (Wisdom et al. in press). There has been no apparent broad-scale changes in source habitats (Wisdom et al. in press).

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - insufficient sample size for population trend analyses in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
 - common characteristic of all suitable habitat is openness due to foraging method of hawking for insects; in some instances, brushy undergrowth is necessary to support insect populations (Sousa 1983)
 - populations can be unreliable due to food supply fluctuations (e.g., insect hatches and acorn crops) (Bock 1970)
 - T Oak-Pine habitat East-Slope Cascades, Oregon (Galen 1989):
 - nested primarily in open pine-oak woodlands and in burned conifer forest in live or dead oak trees and in ponderosa pine snags

	oaks	ponderosa pine
• mean nest tree height	32 ft (range 10-50)	40 ft (range 20-62 ft)
• mean dbh nest tree	22 in (range 13-39)	30 in (range 16-43 in)
• canopy cover around nest tree	mostly <30%	mostly <30%
- T Optimum habitat (range-wide) defined by the following factors (Sousa 1983):
 - tree canopy closure $\leq 30\%$
 - shrub crown cover $\geq 50\%$
 - crown cover of mast-producing shrubs $\geq 70\%$
 - % canopy of hard mast trees $\geq 70\%$
 - corn crop left standing throughout winter
 - distance to potential mast storage sites ≤ 0.8 km (0.5 mi)

Conservation Issues:

These are specific to Lewis' woodpecker; see pages 50-51 for general Conservation Issues in Oak-Pine Woodland.

- T high-grade logging has likely reduced the availability of large trees
- T competition with starlings for nest cavities
- T needs large oak and large pine trees/snags; so loss of large, old oaks and pines and lack of recruitment are of concern

- T fire suppression has resulted in dense, young stands with an invasion of Douglas-fir and reduced recruitment of pines and oaks
- T not a primary excavator, so existing cavities, natural or created, or soft snags are necessary
- T brush control and grazing limit understory growth which provides insect productivity (Galen 1989)
- T insect control during the breeding season could have adverse effects (Galen 1989)
- T pesticides and other contaminants have a suspected but unstudied role in population declines (Sorensen 1986)
- T fuelwood cutting may have reduced available nest sites

Biological Objectives:

Habitat:

- û ***East-Slope Cascades: Where ecologically appropriate, initiate actions in oak-pine forest to maintain or provide the following conditions:***
 - o oak trees >10 m (32 ft) tall or >56 cm (22 in) dbh
 - o >2.5 ponderosa pine snags/ha (1/ac) >12 m (40 ft) tall and >76 cm (30 in) dbh; >75% of snags should have <50% of bark remaining
 - o an open overstory with mean canopy closure <40%

Population:

- û ***East-Slope Cascades: Maintain current populations, and where appropriate initiate actions to expand density of breeding populations at these sites.***

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. Biological objectives for tree and snag size and canopy cover are slightly modified from Galen (1989) and Sousa (1983).

Conservation Strategies:

These are specific to Lewis' woodpecker; see pages 52-53 for general Conservation Strategies in Oak-Pine Woodland.

- û Eliminate or minimize pesticide spraying near nesting pairs which may reduce insect prey base.
- û Prohibit salvage logging of fire-burned trees wherever they occur.
- û Retain standing dead or diseased trees where they occur.
- û If snags are limiting, create suitable snags through girdling, topping, etc.
- û If nest cavities are limiting, initiate fungal inoculations to provide nest cavity sites.

- û Use underburning or other techniques to promote a shrubby understory for insect production; minimize brush control.
- û Use thinning of young pines in dense stands to open canopy and encourage development of large trees.
- û Selective logging can be used to increase suitability of habitat as long as sufficient large living and dead trees are retained.
- û Limit or prohibit fuelwood cutting in areas where Lewis' woodpecker is known or suspected of nesting.

Species to Benefit: The primary species to benefit from old trees and snags in oak-pine habitat include American kestrel, northern flicker, screech owl, western bluebird, and ash-throated flycatcher.

Information Needs:

1. Is a shrubby understory important in Oak-Pine Woodland habitat?

Conservation Focus – Focal Species: LARGE OAKS WITH CAVITIES – ASH-THROATED FLYCATCHER (*Myiarchus cinerascens*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for ash-throated flycatcher included patches throughout the northern Cascades and most of the Southern Cascades and Upper Klamath ERUs (Wisdom et al. in press). Within this core of historical habitat, there have been extensive increase in source habitats in the Northern Cascades and Upper Klamath ERUs (both >100%), and a slight decrease in source habitat in the Southern Cascades ERU (9%). Within the entire Interior Columbia Basin, source habitats have strongly increased (Wisdom et al. in press).

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - insufficient sample size for population trend analyses in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
 - secondary cavity nester in live oak trees in mature oak woodlands (Manuwal 1997)
 - needs large oaks with natural or created cavities
- T Oak and pine woodlands, south-central Washington, Klickitat County, Columbia Foothills (Manuwal 1997):
 - most abundant in large pine-large oak habitats
- T Oak woodlands, south-central Washington, Klickitat County, Columbia Foothills (Seavey 1997):

- most nests in live trees (74%, n = 23) and in Oregon white oak (90%, n = 28)
- mean nest tree diameter 36 cm (14 in); mean nest tree height 6.5 m
- mean grass cover around nest tree plot 58%
- mean shrub cover around nest tree plot 10.5%
- mean canopy cover around nest tree plot 80%
- nest success 86% (n = 31)
- nesting landscape habitats characterized by tall, wide oak trees

Conservation Issues:

These are specific to ash-throated fly catcher; see pages 50-51 for general Conservation Issues in Oak-Pine Woodland.

- T reduction in old trees with natural cavities
- T competition with European starling for nest cavities
- T reduction in recruitment of oak trees due to fire suppression, grazing, etc.

Biological Objectives:

Habitat:

- û ***East-Slope Cascades: Where ecologically appropriate, initiate actions in Oak-Pine Woodland to maintain or provide the following conditions:***
 - o oaks with dbh > 36 cm (14 in)

Population:

- û ***East-Slope Cascades: Maintain current populations, and where appropriate initiate actions to expand density of breeding populations at these sites.***

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The objective for size of oak trees was from Seavey (1997).

Conservation Strategies:

These are specific to ash-throated fly catcher; see pages 52-53 for general Conservation Strategies in Oak-Pine Woodland.

- û Reduce, eliminate, or manage livestock grazing to ensure establishment and development of oak seedlings and saplings.
- û Retain old decadent trees; i.e., prohibit salvage.

Species to Benefit: The primary species to benefit from large oak trees with cavities in oak woodlands include Acorn woodpecker, white-breasted nuthatch, Lewis' woodpecker, western screech owl, and western bluebird.

Information Needs:

1. Data are needed on all aspects of ash-throated fly catcher nesting ecology and habitat relationships.

E. Unique Habitats

Conservation Focus – Focal Species: OLD GROWTH LODGEPOLE PINE – BLACK-BACKED WOODPECKER (*Picoides arcticus*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for black-backed woodpecker included all of the Northern Cascades, Southern Cascades, and Upper Klamath ERUs (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were moderate in the Northern Cascades ERU (48%), but increases have been extensive in the Upper Klamath (88%) and moderate in the Southern Cascades ERU (28%). Within the entire Interior Columbia Basin, source habitat in the northern portion of the basin are sparser and less-well distributed than historically (Wisdom et al. in press). This analysis does not include burned forest.

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - insufficient sample size for population trend analysis in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
 - foraging requires dead or dying trees and nesting requires trees with heartrot or deformed conditions (Marshall 1992)
- T central Oregon (Goggans et al. 1987):
 - all nests in lodgepole pine with heartrot (n = 35)
 - sizes of home ranges appeared to be related to the proportions of unlogged areas: i.e., the largest home range had the smallest proportion of unlogged habitat
 - selected for mature and overmature stands and against younger stands and logged areas
 - nest tree mean dbh 11 in

Conservation Issues:

- T reduction in mature and old-growth lodgepole pine trees due to a number of factors including timber harvest, insect outbreaks, fire suppression and overstocked stands, and conversion to other forest types
- T need relatively large blocks of habitat to maintain populations
- T salvage logging in decadent stands removes nest and foraging trees

Biological Objectives:

Habitat:

- Ø ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in Lodgepole Pine forest to maintain or provide the following conditions:**

- **large tracts (>1,000 ac) of lodgepole pine forest dominated by and managed for late successional conditions**

Population:

- û ***East-Slope Cascades:* Maintain current populations, and where appropriate initiate actions to expand density of breeding populations at these sites.**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The objective for tract size is based on Goggans et al. (1987).

Conservation Strategies:

- û In burns and bug killed forest, leave unsalvaged or if salvaging, maintain >40% as unsalvaged.
- û Exempt areas from commercial or salvage timber management, and manage these areas to retain late-successional characteristics as long as possible.

Species to Benefit: The primary species to benefit from conservation of old-growth lodgepole pine include mountain chickadee, yellow-rumped warbler, cassin's finch, pine siskin, and dusky flycatcher.

Information Needs:

1. Data are needed to compare habitat use and general ecology in insect killed versus burned forest.
2. Information needed on home range size, particularly relative to habitat quality and fragmentation.

Conservation Focus – Focal Species: WHITEBARK PINE – CLARK'S NUTCRACKER
(*Nucifraga columbiana*)

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999)
 - insufficient sample size for population trend analysis in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
 - dependent on pine cone seeds; will undergo extensive movements when seeds are unavailable

Conservation Issues:

- û declines in the cover type, especially early seral whitebark pine, from fire suppression and replacement by competitors (Keane 1995, Arno and Hoff 1989)
- û disease (white pine blister rust) and insect infestations (mountain pine beetle) can wipe out an area, including mature trees
- û lack of regeneration of young trees

Biological Objectives:

Habitat:

- û ***East-Slope Cascades: Where ecologically appropriate, initiate actions in Whitebark Pine habitats to maintain or provide the following conditions:***
 - o **>30% of the trees in late-successional stages with >10% cover in early-seral stages (seedlings and saplings)**

Population:

- û ***East-Slope Cascades: Maintain current populations, and where appropriate initiate actions to expand density of breeding populations at these sites.***

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and ecosystem processes. The objectives were based on professional judgement of several individuals.

Conservation Strategies:

- û Eliminate or restrict human access and livestock grazing in whitebark pine habitats, especially those that have already been degraded.

Species to Benefit: The primary species to benefit from conservation of whitebark pine habitats would be Steller's jay, common raven, mountain chickadee, red crossbill, pine siskin, pine grosbeak, red-breasted nuthatch, and cassin's finch.

Information Needs:

1. Data are needed on all aspects of Clark's nutcracker nesting ecology and habitat relationships, particularly their dependence on whitebark pine seeds.

Conservation Focus – Focal Species: WET/DRY MEADOWS – SANDHILL CRANE (*Grus canadensis*)

Populations:

- T Anecdotal:

- 1986 survey in Oregon enumerated 937 pairs and 606 non-breeding adults at 106 sites (Marshall et al. 1996)
 - 1999 survey in Washington found 17 pairs, 14 on Conboy National Wildlife Refuge and 3 elsewhere on private lands (J. Engler pers. comm.)
- T Breeding Bird Survey (Sauer et al. 1999):
- insufficient sample size for population trend analysis in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
- nests, roosts, and rears young in wet meadows; forages in dry meadows and wet meadows

Conservation Issues:

- T vulnerable because of limited populations in both states, particularly Washington, and because several populations are on private land
- T require large areas per nesting pair and are sensitive to human disturbance (Marshall et al. 1996)
- T livestock grazing may reduce habitat suitability if not managed properly and interfere with reproductive success (e.g., nest trampling, disturbance)
- T agricultural practices (e.g., timing of haying, chemical applications) may interfere with reproductive success including potential mortality of nestlings and colts
- T conifer invasion at edge of meadows, possibly due to lowered water table from grazing (Marshall et al. 1996)
- T human disturbance from active and passive recreation near nest sites

Biological Objectives:

Habitat:

- û ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in Wet/Dry Meadows to maintain or provide the following conditions:**
- **where both wet and dry meadow components are part of the meadow complex, tracts of suitable habitat >300 ac**
 - **where only wet meadow habitat (nesting) is present, tracts can be considerably smaller (e.g., >20 ac) if dry meadow habitat (foraging) is present within 0.6 km (0.3 mi)**
 - **manage hydrology where appropriate to include both wet and dry meadow habitat throughout the nesting season**

Population:

- û ***East-Slope Cascades:* Maintain current populations, and where appropriate initiate actions to expand density of breeding populations at these sites.**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The objectives were based on unpublished data and personal observations at Conboy National Wildlife Refuge (J. Engler pers. comm.).

Conservation Strategies:

- û Eliminate or restrict human access and livestock grazing in wet/dry meadows where cranes currently nest or where the habitat is suitable, especially those that have already been degraded.
- û Delay haying and other agricultural practices and restrict or eliminate human access where cranes are known to be nesting until after the nesting season (i.e., after 1 August or until after fledging).

Species to Benefit: The primary species to benefit from wet meadows include common snipe, Lincoln's sparrow, song sparrow, and common yellowthroat.

Information Needs:

1. Data are needed on all aspects of sandhill crane nesting ecology.
2. Information on habitat area requirements relative to the quality of the habitat.
3. What is the relationship between food resource utilization in wet versus dry meadows and at various elevations.

Conservation Focus – Focal Species: LARGE ASPEN TREES AND SNAGS WITH REGENERATION – RED-NAPED SAPSUCKER (*Sphyrapicus nuchalis*)

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999)
 - insufficient sample size for population trend analysis in the Cascade Mountains BBS Physiographic Region

Habitat Relationships:

- T Anecdotal:
 - large dead and decaying trees in mature aspen and coniferous forest mixed with aspen
- T Hart Mountain Refuge, southeastern Oregon (Dobkin et al. 1995):
 - characteristics of nest sites:
 - mean nest tree height 14.6 m
 - mean nest tree dbh 27.4 cm
 - mean canopy cover 76%
 - mean distance to edge 19.8 m

Conservation Issues:

- T lack of recruitment of young aspen due to livestock grazing and fire suppression
- T reduced presence of large aspen trees and snags due to limited replacement
- T encroachment of conifer trees into aspen stands
- T competition for nest cavities with European starling

Biological Objectives:

Habitat:

- û ***East-Slope Cascades:* Where ecologically appropriate, initiate actions in aspen habitat to maintain or provide the following conditions:**
 - o >10% cover of saplings in the understory to provide adequate representation of younger seral stages for replacement
 - o >4 trees and >4 snags/ha (1.5/ac) >12 m (39 ft) in height and 24 cm (10 in) dbh
 - o mean canopy cover 40-80%; either clumped with patches and openings or relatively evenly distributed
- û ***East-Slope Cascades:* Where ecologically appropriate at the landscape level, initiate actions in aspen habitat to maintain or provide some areas with natural (e.g., fire) or mechanical disturbance regimes to ensure proper successional development.**

Population:

- û ***East-Slope Cascades:* Maintain existing populations within aspen stands and where appropriate, initiate actions to increase density of nesting pairs.**

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. Biological objectives for canopy cover, sapling cover, and size and abundance of trees and snags were based on Dobkin et al. (1995) and professional judgement.

Conservation Strategies:

- û Assess the potential for use of fire in restoration of aspen stands.
- û Manual treatment (thinning) may be needed in many areas prior to introducing fire.
- û Maintain all snags and initiate active snag creation (e.g., fungal inoculation, topping) where snags are limiting and restoration leading to recruitment of saplings is underway.
- û Eliminate or modify grazing to ensure succession and recruitment of young aspen.

- Ø Where starling competition for nest cavities is significant, starling control measures may be necessary.

Species to Benefit: The primary species to benefit from large aspen trees and snags include house wren, mountain bluebird, Williamson's sapsucker, tree swallow, northern pygmy owl, western screech owl, and northern flicker.

Information Needs:

1. Data are needed on all aspects of red-naped sapsucker nesting ecology.
2. What are the conditions associated with successful use of prescribed fire to restore aspen stands?

Conservation Focus – Focal Species: SUBALPINE FOREST – BLUE GROUSE (*Dendragapus obscurus*)

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - Cascade Mountains BBS Physiographic Region: significant (p<.05) long-term (1968-1998) declining trend of 3.8%/year, and significant (P<.05) short-term (1980-1998) declining trend of 4.6%/year

Habitat Relationships:

- T Anecdotal:
- T HSI Model (Schroeder 1984):
 - optimal habitats contain of mix of tree, shrub, and herbaceous vegetation
 - maximum suitability occurs when trees, used primarily by territorial males, are well interspersed with the more open habitats used by hens and broods

Conservation Issues:

- T fire reduces or eliminates habitat in the understory and/or overstory
- T winter recreation increases likelihood of to wintering birds at a time when energy expenditures can be a limiting factor
- T grazing reduces understory structure and herbaceous vegetation important for hen and brood cover and food
- T road building can remove understory shrub and herbaceous habitats

Biological Objectives:

Habitat:

- Ø ***East-Slope Cascades: Where ecologically appropriate, initiate actions in Subalpine Forest to maintain or provide the following conditions:***

- patches of subalpine forest with multi-layered structure
- coniferous or aspen tree cover 15-55 %
- shrub cover 10-40 % and mean height >40 cm (16 in)
- herbaceous cover 35-80% and mean height 15-56 cm (6-22 in)

Population:

- û Cascade Mountains BBS Region: Reverse declining BBS trends to achieve stable populations (non-significant trends of <2%/year) or increasing populations in the next 10 years (by 2010).

Assumptions/Rationale: "Ecologically appropriate" refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The habitat objectives were slight modifications from Schroeder (1984).

Monitoring BBS trends provides a coarse means of assessing progress of conservation actions relative to populations with a known baseline. The objective for reversing declining trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through stable or increased abundance of olive-sided fly catcher on randomly located BBS routes. This is not intended to replace monitoring that should occur to track progress at specific locations where conservation actions occur.

Conservation Strategies:

- û Eliminate or restrict livestock grazing that inhibits growth and recruitment of understory vegetation.
- û Restrict or prohibit road building in high quality blue grouse habitat.

Species to Benefit: The primary species to benefit from subalpine forest include hermit thrush, chestnut-backed chickadee, varied thrush, white-crowned sparrow, olive-sided fly catcher, golden-crowned kinglet, and Clark's nutcracker.

Information Needs:

1. Data are needed on all aspects of blue grouse nesting ecology and habitat relationships.

CHAPTER 7. STRATEGY OVERVIEW AND SYNTHESIS

Our goal for the ecosystem-driven landbird conservation strategy described in this document is to provide habitat to maintain healthy populations of focal species and other landbirds. To meet this goal, conservation actions must be:

- designed to meet habitat requirements of multiple species,
- implemented at several geographic and ecological scales, and
- coordinated among various landowners and land management agencies.

All of this will require careful consideration of implementation options to maximize conservation efforts and to integrate the diverse values and goals of land owners and land managers with that of bird conservation. Additionally, contributing partners must be committed to obtaining information needs as described previously to enhance and refine the conservation strategy over time.

Implementation of ecosystem management as described in this document can be achieved through integration of management actions for groups of focal species at various geographic scales (e.g., regional, sub-regional, watershed, management units). The biological objectives described earlier are intended to be the foundation for developing these comprehensive, integrated strategies. To facilitate that process, we have prioritized where management is most appropriate for each focal species and associated habitat feature (Appendix C).

Biological objectives for one focal species or habitat condition can be in direct conflict with those for another. Indeed, actions designed to manage for one species are often detrimental to other species; i.e., there may be "winners" and "losers" for any management action. For example, the objective to provide a dense canopy in Mixed Conifer is in direct contrast with the edges and openings desired by olive-sided flycatcher. Thus, management actions must be employed in an integrated complementary design across the landscape. Depending upon the scale of the habitat management block, there also needs to be guidelines on the proportion and spatial distribution of the area desired in a particular condition or containing particular habitat attributes.

With the exception of vast expanses of public lands, it is impractical to attempt conservation for the entire landbird community on any one piece of property. At these smaller scales, management decisions should be based on how a parcel of land can contribute to conservation by emphasizing the most appropriate habitat conditions and focal species based on site-specific factors unique to that area. At larger scales, some biological objectives can be achieved simultaneously across a landscape through a combination of management actions. For example,

combining low intensity and rotational grazing will create conditions that meet the biological objectives of several focal species??.

It also will be important to consider where habitat conservation networks are necessary to conserve landbird populations. This is likely to include a coordinated network of several land uses to connect areas of suitable habitat for area-sensitive species such as sage sparrow and sage grouse.

A. Prioritization

The strategy emphasizes conservation efforts in areas where each species' abundance is greatest and presumably habitat is most suitable. To facilitate this, decisions on appropriate management actions need to be prioritized through several scales. These include, in order of size, a geographic scale (physiographic province), a plant community scale (habitat type), a vegetative condition scale (habitat condition), and a site-specific scale (micro-habitat features).

B. Future Versions

This document is the first version of what is intended to be a "working document" with continual revisions and expansions as new information becomes available. Future versions will likely include an expansion of the number of species addressed and additional habitat and population objectives. As additional species are added and biological objectives are revised and updated, a more complete ecosystem management plan will be continually formulated. Ultimately, we envision a regional landscape where integrated conservation for multiple species is being implemented as part of ecosystem management.

CHAPTER 8. MONITORING/RESEARCH

When conservation actions are undertaken as described in this document, monitoring and/or research programs should be designed and implemented to:

- test the effectiveness of management actions,
- evaluate assumptions built into biological objectives, and
- direct adaptive management to achieve desired results.

Monitoring will be essential to evaluate the success of actions implemented. In conjunction with research, monitoring also will be important for providing data to revise and update biological objectives. Research is particularly essential since most biological objectives are based on limited data and assumptions.

A. Integration

The strategy offers numerous opportunities for integration of monitoring and research activities. In addition to the need for validation of the biological objectives, two recurrent themes for research integration with the strategy are:

- species or community reproductive success under various environmental conditions, and
- landscape assessments of species habitat needs.

Data are especially needed on reproductive success of focal and other species to provide the best measure of population health, and determine where source and sink habitats are occurring. Examples of studies which have used reproductive data to identify suitable nesting habitat are McCoy et al. (1999) and Altman (in prep).

B. Methods

The Handbook of Field Methods for Monitoring Landbirds (Ralph et al. 1993) has done much to promote the standardization of monitoring methods, allowing for comparisons across space and time. The handbook is available from the Pacific Southwest Research Station (PO Box 245, Berkeley, CA 9470, 510-559-6300). In addition, The U.S. Fish and Wildlife Service recently published a Statistical Guide to Data Analysis of Avian Monitoring Programs (Nur et al. 1999), which is available from the authors, and should be considered essential to anyone designing a monitoring program.

Nest-finding for many ground, shrub, and riparian canopy nesting species (e.g., western meadowlark, willow flycatcher, warbling vireo, respectively) can be problematic due to their secretive behavior, dense undergrowth, or high canopy. However, there are several alternatives not detailed in the aforementioned publications for assessing reproductive success for species in which nest-finding and/or monitoring is difficult. One is an observational approach that uses breeding behaviors indicative of various stages in the reproductive cycle to categorize nesting status (Vickery et al. 1992), similar to that used in Breeding Bird Atlases. The highest level of reproductive behavior observed is ranked, and this reproductive index can then be used as a measure of fitness. It can also be used for species that are rare or where there are concerns about nest disturbance during breeding. Another alternative is use of song types to indicate mated status of singing males. This doesn't indicate nest success, but it can indicate pairing success and distinguish habitats of nesting birds from habitats supporting non-nesting adults or floaters in the population. Another alternative is use of constant-effort mist-netting to calculate indices of productivity through determination of adults in breeding condition and ratios of young/adult captures. This method may only be appropriate for ground and shrub associated species that are most likely to be captured in mist-nets, and for some species does not necessarily track local productivity (Silkey et al. 1999).

Owing to environmental heterogeneity, indicators often vary more among monitoring sites than within monitoring sites over time. For this reason, permanent plots (as opposed to plots that shift annually) are a valuable way to control for among-site variability (Gibbs et al. 1999). The establishment of multiple, long-term monitoring programs is an integral part of this strategy.

C. Implementation

Suggestions for general research topics that have been identified as important to effective conservation planning were presented in the Information Needs section of each species/habitat attribute sections that described biological objectives. Additionally, the following topics are common themes of research needs to support landbird conservation in the East-Slope Cascades:

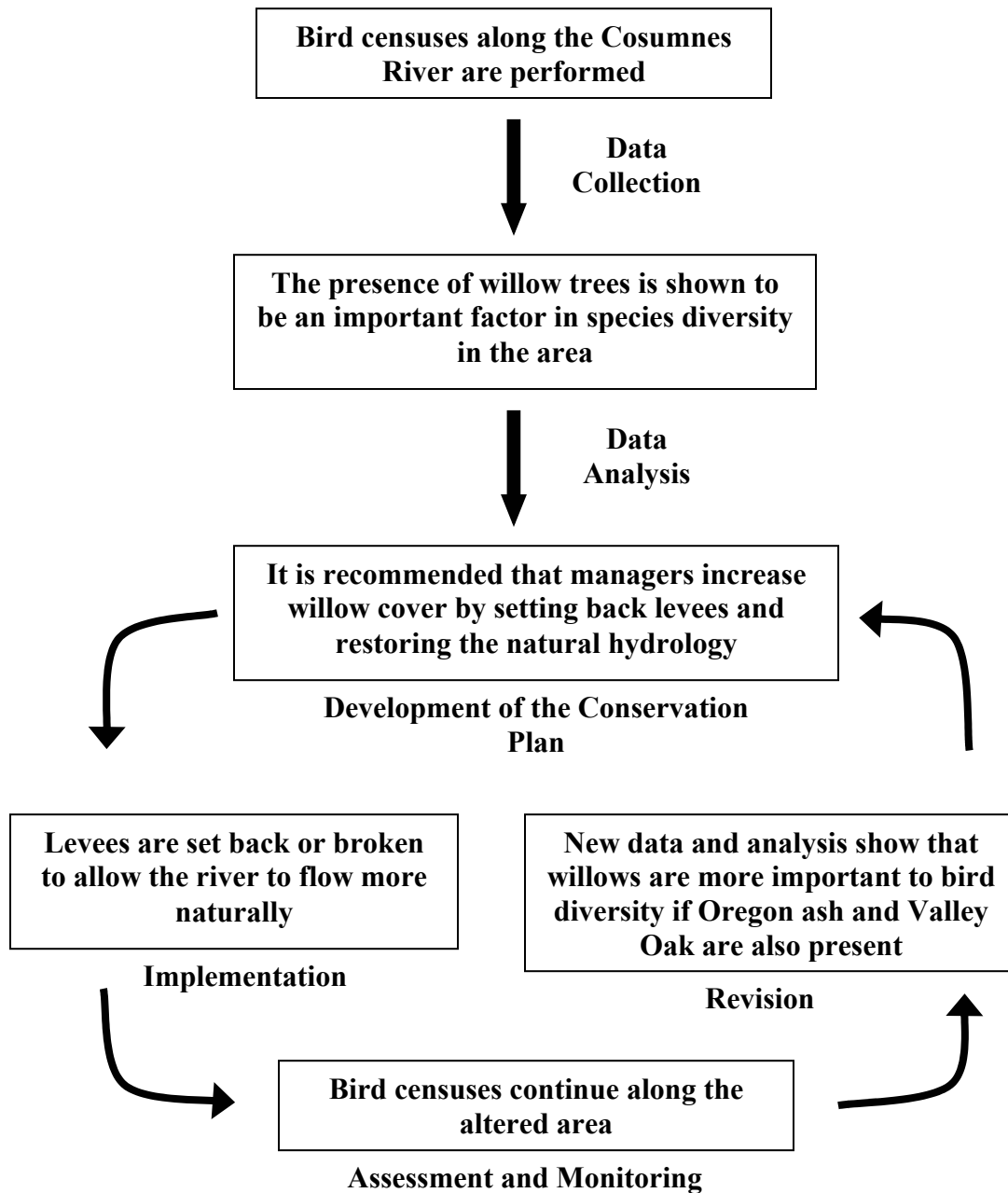
- Nesting success and area requirements of species in unmanaged and managed habitats.
- Parameters (e.g., extent, type, distribution) associated with successful nesting of species.
- Area requirements and landscape patterns for populations of several species considered area sensitive (e.g., white-headed woodpecker).
- Effects of predation and parasitism in ponderosa pine and oak habitats relative to adjacent land uses.

- Effects of grazing on avian population health and viability.
- Effects of timing of prescribed fire (e.g, spring versus fall) on avian abundance and productivity in ponderosa pine.
- Large, multi-species studies on effects of fragmentation on bird populations.
- Species fitness measures (reproduction and survival) should be incorporated, whenever feasible, in future studies.
- Effects of logging on avian abundance and productivity in mixed conifer forest.

D. Adaptive Management

The direct outgrowth of monitoring and research conducted as part of this strategy should be adaptive management. Monitoring and research are part of the adaptive management loop that provides a framework to increase our knowledge base and revise biological objectives with updated information. One simple example of an adaptive management feedback loop, adapted from ongoing monitoring by the Point Reyes Bird Observatory, is illustrated in Figure 3.

Figure 3. Example of an adaptive management feedback loop using monitoring to define and modify management prescriptions



CHAPTER 9. IMPLEMENTATION

A. Key Partners

Implementation of landbird conservation will require a broad range of partnerships, an extensive amount of cooperation, and considerable financial resources. Participation will be necessary from federal and state natural resource agencies, agricultural organizations, academia, private environmental organizations, and particularly private landowners.

Conservation of landbirds will require not only strategies and management actions by land managers, but also increased public awareness, commitment, and political support. This means information must be communicated to the public about the benefits of conservation.

One successful framework for bringing together diverse interests and groups is that of the Joint Venture. The United States Department of Agriculture maintains service centers throughout the region that house both NRCS and Conservation District personnel who can work with private landowners to accomplish common goals.

B. Interface with Other Planning/Conservation Efforts

This conservation strategy has broad applicability to many other conservation planning efforts taking place in the region. Information supplied in this document should be integrated into existing habitat restoration programs and used in the development of site-specific conservation plans such as State and private Habitat Conservation Plans, agency and inter-agency Management Plans, and local land-use planning strategies. These include, among others, the Interior Columbia Basin Ecosystem Management Project, BLM and FS land use plans, State grouse and other game plans, and various anadromous fish plans. Areas designated for conservation or management in other conservation plans (e.g. TNC Ecoregion Plans) may provide for conservation as directed in this document. These areas should be evaluated a priori to ascertain their role in conservation as directed in this document.

There are several programs administered by the USDA that provide resources, financial and otherwise, for individual land owners wishing to manage for wildlife. Several of these are outlined in the following section.

C. Opportunities for Participation

Opportunities for participation in landbird conservation as described in this document are numerous. This could occur at any level from a small landowner providing habitat for one species to detailed, complex multi-agency/organization multi-species conservation within large scale management units. Below we list some resources available to individual land-owners who would like to improve wildlife habitat on their property.

1. Resources for individual landowners

There are numerous voluntary programs sponsored under the 1996 Farm bill that provide financial and technical assistance to landowners wishing to establish or improve fish and wildlife habitat. The U.S. Department of Agriculture (USDA) administers these programs through the Farm Services Agency (FSA), and they are implemented by the National Resources Conservation Service (NRCS). Brief descriptions of several USDA programs, as well as other sources of financial assistance are listed below.

- Wildlife Habitat Incentives Program (WHIP) provides technical assistance and pays up to 75% of the cost for wildlife habitat development. Cost-share agreements are for a minimum of 10 years. The program objectives are to connect upper and lower watershed habitats, enhance native plant communities, improve salmon habitat, increase biodiversity, and improve habitat for threatened and endangered species.
- The Conservation Reserve Program (CRP) provides technical assistance, cost-share, and rental payments to prevent soil erosion, improve water quality, and enhance wildlife habitat. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as native grasses, wildlife plantings, or riparian buffers. Farmers receive an annual rental payment for the term of the contract, and cost sharing is provided for vegetative improvements. Contracts can be for 10 years or more.
- The Environmental Quality Incentives Program (EQIP) offers farmers and ranchers technical support, cost-share payments, and incentive payments for ranchers and farmers who face serious threats to soil, water, and related natural resources. Contracts are for 5-10 years and are based on a conservation plan to improve environmental quality. Persons engaged in livestock or agricultural production with less than 1,000 head of cattle are eligible.
- Conservation Farm Option (CFO) is a USDA pilot program for among others, producers of wheat and grain feeds. The programs scope is non-restrictive as to what measures may be included in the conservation plan, so long as they provide environmental benefits. The program is limited to landowners who have contract

acreage enrolled in the Agricultural Market Transition Act program, i.e. production flexibility contracts.

- The Conservation Reserve Enhancement Program (CREP) is a joint agreement between participatory states and the USDA that focuses on long-term, voluntary protection of environmentally sensitive cropland through filter strips, forested riparian areas, establishment or restoration of wetlands, and ground cover for threatened wildlife species. Agreements were signed in Oregon and Washington in October 1998 that provide 250 million dollars per state. The project areas include private agricultural lands along all streams in Oregon and Washington that provide current or historical habitat for 19 species of salmon and trout listed under the Act. In each state up to 40, 325 ha (100,000 ac) of private cropland and grazing land will be eligible for inclusion in this program. Up to 38,300 ha (95,000 ac) will be planted to riparian buffers and up to 2,015 ha (5,000 ac) of wetlands will be restored. A total of up to 4,000 miles of important freshwater streams will be enhanced or restored under this program. While this program is designed to create and improve habitat for fish, riparian birds will benefit tremendously from restoration efforts.
- Wildlife Habitat Conservation and Management Program is administered by the Oregon Department of Fish and Wildlife and provides a property tax incentive to encourage landowners to protect and enhance wildlife habitat on private land. Property enrolled is assessed for farm use, even if the property is not farmed. Only property zoned for exclusive farm use or mixed farm and forest use is eligible. County participation is voluntary and not all counties allow this program. Currently, Marion, Polk, and Deschutes counties use this tax incentive program.
- The National Fish and Wildlife Foundation maintains several initiatives that help private landowners manage for fish and wildlife by providing matching funds. The Pacific Northwest Region is administered under the direction of Jerry Clark, 1120 Connecticut Avenue, NW, Suite 900, Washington, D.C. 20036.

2. Bird-Friendly Agriculture

Written primarily for orchards, this white paper is available through the Point Reyes Bird Observatory (4990 Shoreline Hwy. Stinson Beach, CA 94970, www.prbo.org)

3. Bird Friendly Backyards

Especially in suburban areas, even small residential landowners can provide habitat for birds. Concepts of backyard habitat have traditionally focused on bird feeders, nectar providing plants

and nest boxes. More recently information about planting design have been incorporated with an eye towards providing quality nesting or wintering habitat. Several organizations that provide information and assistance can be accessed via the world wide web.

The National Wildlife Federation Backyard Wildlife Habitat Program: www.nfwf.org/habitats

The Point Reyes Bird Observatory has an informational brochure on landscaping for birds (4990 Shoreline Hwy. Stinson Beach, CA, www.prbo.org)

CHAPTER 10. OUTREACH

In order for bird conservation to be successful, the message must reach a broad audience outside of the scientific and land management community including educators, government officials, planners, private landowners, school children, and the general public. Efforts to monitor and draw conclusions about wildlife populations and make recommendations on how to meet biological objectives will prove in vain without the support of affected local communities. The best way to gain this support is to ensure that information from research and management programs is shared in a manner that provides the opportunity for interested people to become involved at all levels of the conservation effort.

A. Public and Agency Outreach

Outreach may be accomplished in many ways including newspaper articles, radio/TV features, workshops, conferences to convey technical assistance concerning best management practices, bird festivals, demonstration sites, volunteer restoration and monitoring programs, and school activities. As emphasized throughout this document, this will be most effective if it is coordinated with partners, especially public outreach personnel affiliated with the agencies and non-governmental organizations within PIF.

B. Conservation Education

Creating an understanding of the issues results in the public support needed to further conservation goals for birds. Educational programs tend to be most engaging and therefore most effective if they involve hands-on, participatory activities. There are numerous resources available for educators. The Point Reyes Bird Observatory has prepared teacher resource packets for various ages. These are available for no charge through the Point Reyes Bird Observatory (www.prbo.org).

C. Key Concepts about Bird Conservation

The following is a list of key concepts for bird conservation that should be communicated through education and outreach programs. These concepts are important to include in any program concerning conservation, and they are indispensable in programs focusing on birds. Productivity (the number birds produced per adult each year) directly affects whether or not the population increases or decreases. Productivity may be the single most important factor influencing population health. Productivity is influenced by a number of factors such as habitat quality, predation, parasitism, nest site availability, and food availability.

Birds nest everywhere from directly on the ground to the tops of trees, but generally most birds nest within five meters of the ground. Different species nest in different areas. To help protect birds while they are nesting it is important to consider that habitat needs for different species vary. This means leaving herbaceous areas for ground nesters; shrubs and plants for open cup nesters; dead trees and snags for cavity nesters (birds that nest in holes in trees); and trees for canopy nesters (birds that build their nests in the tops of trees).

Birds nest during the spring and early summer of each year and raise their young in a rather short period: peak breeding season covers about three months; most eggs are incubated approximately 2 weeks; young develop from hatchling to fledgling in as little as 10 days. Nestling birds are particularly sensitive to changes in the environment and thus are sensitive indicators of ecosystem health. Mowing or clearing vegetation during breeding season may remove potential nest sites, directly destroy nests, expose nests to predators, and decrease food sources such as insects. Smart predators, such as cats, crows and jays, can decimate breeding populations by learning to find and prey on nests.

The understory (weedy and shrubby growth underneath trees) is crucial to birds when nesting. A healthy and diverse understory with lots of ground cover offers many well-concealed nest sites. Not only does the understory provide a site for ground and open cup nesters to build their nests, but it is also the area where many birds find food for their young. Manicured parks and mowed lawns provide poor nesting conditions for all but a few bird species.

Plants and vegetation native to the area provide birds with the natural habitats with which they have evolved. Introduced species may not provide the same nutrition. They are also more invasive and can quickly take over an area as the dominant plant type reducing the diversity of vegetation that is important to bird populations.

Interactions with predators are a natural and essential part of an ecosystem. However, introduced non-native predators or increased numbers of natural predators can severely affect the health and persistence of bird populations. Feeding wildlife, especially foxes, raccoons, and skunks, should be discouraged. Feeders that are frequented by jays and crows and cowbirds should not be maintained during the breeding season (most songbirds feed their young insects). The domestic cat is also having a severe impact on bird populations. Pet cats as well as feral cat populations (groups of cats that have escaped from their owners that are now living "wild") are responsible for an estimated 4.4 million birds killed each day by cats (Stallcup 1991). Well fed outdoor house cats are better hunters and feral cat populations supplemented by food in parks and other areas are subsidized predators. It is not true that a well-fed cat will not hunt. Generally, the healthier the cat the better the hunter.

Natural processes, such as flood and fire, are integral components of a healthy ecosystem. They provide the natural disturbance needed in an area to keep the diversity of the plant community high, which is of utmost importance to many birds.

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Appendix A. Considerations for prioritizing conservation of breeding native landbird species highly associated with ponderosa pine, mixed conifer, oak-pine, and unique habitats in the East-Slope Cascades Landbird Conservation Planning Region.

Species	PIF 67 ^a Score ^b	AI ^c	PT ^d	% Pop PIF 67 ^e	BBS Trend 67L ^f	BBS Trend 67S ^f	ICB Mgt Index ^g	OR Mgt Index ^h	WA Mgt Index	Habitats ⁱ			
										PP	MC	OP	UN
Turkey vulture	11	2	2				5	7	3	x	x	x	
Sharp-shinned hawk	16	3	3				6.6	3	6	x	x	x	
Cooper's hawk	16	3	3				6	4.4	6	x	x	x	
Northern goshawk	19	4	3				7.4	5.6	11	x	X	x	
Red-tailed hawk	12	4	1		-2.0	-0.9	4.3	3	5	x		x	
Golden eagle	17	4	2	5.1			5.2	3	8	x		x	
American kestrel	14	3	4				5.1	11	3	x	x	x	
Peregrine falcon	19	3	3				7.4	7	6	x	x	x	
Spruce grouse	17	3	3										
Blue grouse	22	3	4	11.2	-3.8***	-4.6***				x	X	x	
White-tailed ptarmigan	20	3	3										x
Ruffed grouse	17	2	3								x	x	
Mountain quail	23	3	3	7.9						x	x	x	
California quail	19	3	1	4.9						x		x	
Mourning dove	10	3	2				9.3	7	4.7	x		x	
Flammulated owl	22	3	3				10	10	13	X	x	X	
Western screech owl	19	4	3							x	x	x	
Great-horned owl	12	3	2							x	x	x	
Barred owl	15	3	3								X		
Spotted owl	25	4	3								X		
Great gray owl	18	3	3							x	x	X	
Northern pygmy owl	17	3	3							x	X	x	
Boreal owl											x		

Species	PIF 67 ^a Score ^b	AI ^c	PT ^d	% Pop PIF 67 ^e	BBS Trend 67L ^f	BBS Trend 67S ^f	ICB Mgt Index ^g	OR Mgt Index ^h	WA Mgt Index	Habitats ⁱ			
										PP	MC	OP	UN
Northern saw-whet owl	16	4	3							x	X	X	
Long-eared owl	16	3	3				6	6	5	x	x	x	
Common poorwill	18	2	3				7.6	7	7.4	x	x	x	
Common nighthawk	14	3	2		2.7	-1.3	6	5	5.3	x	x	x	
Black swift	25	5	3	28.1			10	10	10				x
Vaux's swift	23	5	3	21.8	-1.9	-7.6***	9.1	12.3	12	x	x	x	
Black-chinned hummingbird							7.4	9.5	9	x		x	
Calliope hummingbird	23	5	3	8.3			8.1	8	8			x	
Rufous hummingbird	24	4	5	10.0	-3.0****	-5.6****	7.6	10.8	12	x	x	x	
Lewis' woodpecker	24	5	3	27.3			11.7	11	9	X	x	X	
Acom woodpecker	16	3	3	5.8						x		X	
Red-naped sapsucker	21	3	3	2.0			8.4	11	7		x	x	
Williamson's sapsucker	23	5	3	16.8			10.8	17	13	x	x	x	
Downy woodpecker	12	2	2									x	
Hairy woodpecker	16	5	2		-0.5	0.6				x	x	x	
White-headed woodpecker	24	3	3	7.5						X		x	
Three-toed woodpecker	19	3	3							x	x	x	
Black-backed woodpecker	23	5	3	16.8						x	x	x	
Northern flicker	14	5	2	6.2	1.9*	2.1	5	4.2	5	x	x	x	
Pileated woodpecker	16	3	4		-2.4	2.0				x	x	x	
Olive-sided flycatcher	22	5	5		-3.0****	-2.9**	10.5	10	7	x	X	x	
Western wood-pewee	19	5	4	8.1	-3.7**	-2.1	6.1	7	5	x	x	X	
Hammond's flycatcher	21	5	1	5.6	5.6**	6.0***	9.4	9	8	x	x	x	
Dusky flycatcher	22	5	3	10.0	1.1	-2.4	8.5	6	7	x	x	x	
Gray flycatcher	21	3	3				8	11	11	x		x	
Cordilleran flycatcher	20	3	3	10.8	-1.2	-1.6	9	15	6	x	x	x	

Species	PIF 67 ^a Score ^b	AI ^c	PT ^d	% Pop PIF 67 ^e	BBS Trend 67L ^f	BBS Trend 67S ^f	ICB Mgt Index ^g	OR Mgt Index ^h	WA Mgt Index	Habitats ⁱ			
										PP	MC	OP	UN
Say's phoebe	17	3	3				6.1	9	9			x	
Ash-throated flycatcher	17	3	3				9.6	5	8			x	
Western kingbird							8.8	10	9	x		x	
Eastern kingbird	15	3	3				6.4	6	9			x	
Tree swallow	14	3	2		-1.4	1.1	4.7	4.5	6				x
Violet-green swallow	16	4	1		3.6	2.5	6.5	9	7	x	x	x	
Barn swallow	14	3	5		-0.7	-3.5****	4.5	7	9				x
Cliff swallow	10	3	1				5.1	5	5				x
American pipit	14	3	3				7	8.5	12				x
Cedar waxwing	14	3	3		-2.7**	-3.4	5.5	4	5				x
Rock wren							8.4	14	10	x	x	x	
Winter wren	14	4	1		2.0****	0.9					x		
House wren	11	3	2		7.7***	7.5**	3.8	3	2	x	x	x	
Townsend's solitaire	18	5	1		2.6	1.9	7.1	5	5	X	x	x	
Western bluebird	18	2	3				7.2	7	6.6	x	x	X	
Mountain bluebird	17	3	3				6.4	5	5	x	x	x	
Varied thrush	19	4	2		0.4	-2.8****		13			X	x	
Swainson's thrush	16	4	2		-0.1	0.0	7.4	8	6		x		
Hermit thrush	16	4	2		-0.8	2.6	5.5	5	5		x		
American robin	10	4	1		1.4***	0.6	8.5	3	4	x	x	x	
Blue-gray gnatcatcher	14	2	3				8	11				x	
Golden-crowned kinglet	21	5	5	7.1	-2.8*	-5.2**	8.5		12		X	x	
Ruby-crowned kinglet	15	2	4				7	11	7	x	x	x	
Bushtit													x
Black-capped chickadee	14	3	3		1.7	0.8							x
Mountain chickadee	19	5	4	15.6	-2.9	-2.0				x	x	x	

Species	PIF 67 ^a Score ^b	AI ^c	PT ^d	% Pop PIF 67 ^e	BBS Trend 67L ^f	BBS Trend 67S ^f	ICB Mgt Index ^g	OR Mgt Index ^h	WA Mgt Index	Habitats ⁱ			
										PP	MC	OP	UN
Boreal chickadee	14	2	3								x		
Chestnut-backed chickadee	20	4	2	10.0	0.0	1.7					x		
Oak titmouse	24	3	2									x	
Pygmy nuthatch	18	2	2							X			
Red-breasted nuthatch	15	5	2	10.0	-1.0	-0.9				x	x	x	
White-breasted nuthatch	15	3	3							X		X	
Brown creeper	19	4	5	8.8	-5.6***	3.1	6.5			x	X	x	
Fox sparrow	17	3	5		-1.6**	-3.9**	6.1	4	5	x	x	X	
Song sparrow	11	3	2		0.7*	0.6	9.6	7.5			x		
Lincoln's sparrow	14	2	3				8	12	8				x
White-crowned sparrow	12	3	2		2.0*	4.8***	7.9	11	4	x	x	x	
Dark-eyed junco	13	4	2	11.6	-0.6*	-0.7	5.4	7	4.1	x	x	x	
Savannah sparrow	15	3	5				9.4	5	6				x
Chipping sparrow	17	4	5		-4.3***	-1.2	8.3	8.2	9	X	x	x	
Brewer's sparrow	20	3	4	1.8			18	16	14	x		x	
Lark sparrow	17	2	4				11.3	8.5	9	x		x	
Spotted towhee	15	3	1	5.0	3.6**	3.2	5.1		3	x	x	x	
Green-tailed towhee				6.8			8.7	10	11	x	X	x	
California towhee	20	3	3	5.8									x
Black-headed grosbeak	19	4	1	6.6	4.8***	4.7**	5.7	5.2	8				x
Lazuli bunting	20	5	2	6.8	2.1	6.9*	7.6	9	6	x		x	
Western tanager	19	5	2	12.8	-0.5	1.3	7.6	9	7	x	X	X	
Orange-crowned warbler	13	2	3		-6.6	1.5	8	13	9	x	x	x	
Nashville warbler	19	4	3	25.3	0.1	1.4	7.6	5	8	x	x	x	
Yellow warbler	15	3	4		-0.9	1.6	16	12	11				x
Black-throated gray warbler	22	4	2	10.1	-0.1	2.4	9.8	9	8	x	x	x	

Species	PIF 67 ^a Score ^b	AI ^c	PT ^d	% Pop PIF 67 ^e	BBS Trend 67L ^f	BBS Trend 67S ^f	ICB Mgt Index ^g	OR Mgt Index ^h	WA Mgt Index	Habitats ⁱ			
										PP	MC	OP	UN
Townsend's warbler	21	5	2	10.9	-0.3	2.8	8.5	12	11		X		
Yellow-rumped warbler	13	4	2	9.1	-0.2	-0.5	6.6	4.6	6	x	x	x	
MacGillivray's warbler	20	5	2	5.8	-1.0	0.0	8.1	6	9	x	x	x	
Wilson's warbler	16	3	3		-0.7	-0.5	8.5	10	11	x	x		
Cassin's vireo	20	3	1		4.1	11.8***	7.9	5	10	x	x	X	
Warbling vireo	16	4	1		5.0****	7.1****	6.4	10	3	x	x	x	
Brewer's blackbird	15	4	4	6.1			11.5	6.6	7			x	
Brown-headed cowbird	13	3	5		-2.9***	-1.1	5.4	3	3	x	x	x	
Pine siskin	13	4	3		-1.6	-5.2**	10.1			x	x	x	
American goldfinch	12	3	2				9.1	7	3.3	x	x	x	
Lesser goldfinch	16	3	3	6.9			7.6					x	
Purple finch	20	4	5		-4.7	-3.6	4	5.3		x	x	x	
Cassin's finch	19	5	2	11.1			8.1	8	8	x	x	x	
Red crossbill	18	5	3	10.6	-0.6	4.8	6.9	9		x	x	x	
White-winged crossbill	15	2	3								x		
Evening grosbeak	16	5	3		0.4	-4.8**				x	x	x	
Pinyon jay	18	3	3							x		x	
Steller's jay	17	5	2	11.3	0.2	0.6				x	x	x	
Western scrub jay	16	2	2									x	
Gray jay	14	3	2		-0.5	-1.2				x	x	x	
Black-billed magpie	16	4	2									x	
Clark's nutcracker	18	3	4							x	x	x	
American crow	11	3	3		-2.9	0.8				x	x	x	
Common raven	10	3	1		3.2****	2.0**				x	x	x	

Species and habitat associations are from the Species-Habitat Project (Johnson and O'Neill, in prep). The list includes only breeding species closely associated (i.e., dependent) or associated (high degree of use) with our priority habitats. Species that irregularly breed in the priority habitats were not included.

^a PIF 67 is a Partners in Flight Planning Region based on the Breeding Bird Survey Physiographic Strata 67 - Cascade Mountains. Within that area, this list includes primarily landbirds associated with ponderosa pine, mixed conifer, oak-pine, and oak woodland habitats. Shaded cells indicate values that suggest some conservation concern.

^b Priority scores were generated by the Colorado Bird Observatory (1/28/98) and include quantitative and qualitative factors such as population trend, breeding distribution, and threats on wintering grounds. 67 = Cascade Mountains. Only priority scores >20 are shaded.

^c AI = Importance of Area; scores were generated by the Rocky Mountain Bird Observatory (1/28/98) and modified by local expert opinion. 67 = Cascade Mountains. This score uses BBS data to evaluate the abundance of a species within a physiographic area relative to its abundance throughout its range. It attempts to identify areas of high importance to a species, and is used to indicate the responsibility of those areas to that species conservation. Only scores of 5 (highest importance) are shaded; these indicate the species reaches its maximum abundance in this physiographic province.

^d PT = Population Trend; PT uses BBS data to rate the magnitude and direction of the BBS population trend, 1 = significant increase, 2 = stable, no trend, or possible increase, 3 = no data, insufficient data, or trend unknown, 4 = possible decrease, 5 = significant decrease.

^e Rosenberg and Wells (in press); percent of population within physiographic area calculated from percent of species range within the physiographic area weighted by BBS relative abundance; 67 = Cascade Mountains; only percent population amounts >10 percent are shaded.

^f Sauer et al. (1999); **** P<.01, *** P<.05, ** P<.10, * P<.20; Blank cells indicate no BBS trend is available for that species. This is most often due to inadequate sample sizes for analysis. 89L = long term, 1966-1998; 89S = short term 1980-1998; trends only presented for species that occurred on >14 routes.

^g Management Index scores were generated by Saab and Rich (1997).

^h Management index scores were generated by OR/WA PIF, and include many of the same factors as the Colorado Bird Observatory process and other quantitative and qualitative factors such as habitat specialization, threats to habitat, and evidence of decline. Scores for resident birds were not included in this process. Only management index scores 10 are shaded.

ⁱ PP = ponderosa pine; MC = mixed conifer; OK = oak-pine woodland; UN = unique; x = species associated with this habitat, but not necessarily most abundant in this habitat; X = closely associated with this habitat, and reaches its greatest abundance in this habitat (from Johnson and O'Neill in press).

Appendix B. Bird Conservation Areas in the East-Slope Cascades Landbird Conservation Planning Region.

The following areas have been identified as potential Bird Conservation Areas (BCAs). The list is not intended to be a complete or final list of the best sites for landbird conservation, but does represent some examples of areas we feel would benefit from immediate consideration for incorporation of landbird conservation actions as described in this document. See Chapter 4 for a discussion of the purpose and potential value of BCAs.

Disclaimer:

There are no legal responsibilities for landowners within the BCAs to participate in bird conservation, nor is it implied that our bird conservation objectives should supercede those for other ongoing activities within BCA boundaries. However, it is strongly encouraged that landowners and land-managers attempt to incorporate bird conservation objectives where possible with other practices.

East-Slope Cascades Bird Conservation Areas (ECBCA):

- **North Cascades:**

1. Meeks Table RNA - Ponderosa Pine
2. Tieton Canyon - Oak Woodland, Oak-Pine; Wenatchee NF, Oak Creek WMA

- *Yakima Plateau:*

1. Yakima Indian Reservation - Oak Woodland, Oak-Pine, Ponderosa Pine.
2. Klickitat Wildlife Area (WDFW) - Oak Woodland, Oak-Pine; restoration, expansion
3. Upper Klickitat Drainage, Yakima Reservation - Ponderosa Pine
4. Gotchen and Bumping LSR - Late-successional Mixed Conifer (Columbia Foothills)
5. Conboy NWR -
6. Trout Lake Natural Area -

- *Columbia Foothills:*

1. White River Mgt Area (ODFW) - Oak Woodland, Oak-Pine; restoration. Expansion
2. Catherine and Major Creeks (USFS, private) - Oak Woodland, Oak-Pine
3. Warm Springs Indian Reservation - Oak Woodland, Oak-Pine, Ponderosa Pine
4. Rock Creek, Mt Hood NF - Ponderosa Pine
5. Mill Creek RNA - Pine-Oak, Oak Woodland
6. White River LSR - Mixed Conifer (Late-successional)
7. Badger Creek Wilderness Area

- Central Oregon:
 1. Yamsey Butte - Winema NF
 2. Crater Lake National Park - late-successional mixed conifer

- *Klamath Basin:*

1. Southern Klamath Lake, Howard Bay (private) - Oak-Pine, Oak Woodland
2. Klamath Canyon (BLM, private) - Oak-Pine, Oak Woodland
3. Buck Lake, south of Lake of the Woods (USFS, BLM, private) - Ponderosa Pine
4. South of Crystal Springs (private) - ??
5. Pelican Butte - Mixed Conifer, Whitebark Pine
6. Wildhorse Ridge - old pine forest next to Klamath marsh

Appendix C1. Habitat relationships and biological objectives for focal species in Ponderosa Pine habitats of the East-Slope Cascades Landbird Conservation Planning Region of eastern Oregon and Washington.

Conservation Focus	Focal Species	Key Habitat Relationships			
		Vegetative Composition ^a	Vegetation Structure	Patch size	Special Considerations
large patches of old forest with large trees and snags	white-headed woodpecker	ponderosa pine	>25 trees/ha (10/ac) >53 cm (21 in) dbh with >2 trees >79 cm (31 in) dbh; 10-40% canopy closure; >3.6 snags/ha (1.4/ac) >20 cm (8 in) dbh with >50% >64 cm (25 in)	>140 ha (350 ac) or >280 ha (700 ac)	large high-cut stumps; patch size smaller for old-growth forest
large trees	pygmy nuthatch	ponderosa pine	>25 trees/ha (10/ac) >53 cm (21 in) dbh with >2 trees >79 cm (31 in) dbh; >3.6 snags/ha (1.4/ac) >20 cm (8 in) dbh with >50% >64 cm (25 in)		large snags for nesting; large trees for foraging
open understory with regenerating pines	chipping sparrow	ponderosa pine, grand fir	10-30% canopy cover; 20-60% shrub cover with >20% sapling cover, especially pines		non-agriculture/grazing landscape due to cowbird parasitism
patches of burned old forest	Lewis' woodpecker	ponderosa pine	>2% of the landscape as post-fire old forest; >50% of post-fire landscape as unsalvaged; in salvage - retain all trees/snags >51 cm (20 in) dbh and >50% of those 30-51 cm (12-20 in); salvage <50% of dead and down; in old forest >13% shrub cover and ~ 59 snags/ha (24 ac) >23 cm (9 in)		soft snags for excavation; pesticide spraying may reduce insect prey base

^a preferred tree species

Appendix C2. Habitat relationships and biological objectives for focal species in Mixed Conifer(late- successional) habitats of the East-Slope Cascades Landbird Conservation Planning Region of eastern Oregon and Washington.

Conservation Focus	Focal Species	Key Habitat Relationships			
		Vegetative Composition ^a	Vegetation Structure	Patch size	Special Considerations
large snags	Williamson's sapsucker	grand fir, Douglas-fir, ponderosa pine	>2.5 snags/ha >30.5 cm dbh except ponderosa pine >46 cm dbh; canopy cover 25-70%		recruitment snags (live trees) with signs of defects (e.g., broken tops):
large trees	brown creeper	grand fir, Douglas-fir	>10 trees/ha >46 cm dbh with at least 2 > 60 cm dbh	>30 ha (75 ac)	furrowed bark of certain older trees (e.g., Douglas-fir) provides best foraging
multi-layered, dense canopy	hermit thrush	Douglas-fir, grand fir, ponderosa pine	patches of forest with multi-layered structure and a dense understory shrub layer		recreation, fire, and grazing all threats
interspersed grassy openings and dense thickets	flammulated owl	Douglas-fir, ponderosa pine	>10 snags/40 ha >30 cm dbh and 1.8 m tall; >20 trees/ha >21 in dbh; at least one dense brushy thicket and grassy opening		thicket patches for roosting; grassy openings for foraging
edge and openings created by wildfire	olive-sided flycatcher	grand fir, Douglas-fir	>2% of landscape as post-fire habitat; >40% post-fire habitat as unsalvaged; in salvage, retain trees/snags >51 cm dbh and >50% of those 30-51 cm		patches of mix of live and dead; pesticide spraying may reduce insect prey availability

^a Preferred species

Appendix C3. Habitat relationships and biological objectives for focal species in Oak-Pine Woodland habitats of the East-Slope Cascades Landbird Conservation Planning Region of eastern Oregon and Washington.

Conservation Focus	Focal Species	Key Habitat Relationships			
		Vegetative Composition ^a	Vegetation Structure	Patch size	Special Considerations
Early successional/dense understory with regeneration	Nashville warbler	Oregon white oak, ponderosa pine	>40% native shrub cover interspersed with grassy openings with scattered trees <30% canopy closure		fire and brush clearing detrimental
large oaks with cavities	ash-throated flycatcher	Oregon white oak	oaks with dbh >36 cm		competition for cavities with starling
large conifer trees and snags	Lewis' woodpecker	Oregon white oak, ponderosa pine	oak trees >10 m tall or 56 cm dbh; >2.5 ponderosa pine snags/ha >12 m tall and >76 cm dbh; >75% of snags with <50% bark remaining; canopy closure <40%		competition for cavities with starling

^a Preferred species