

CONSERVATION STRATEGY FOR LANDBIRDS IN THE COLUMBIA PLATEAU OF EASTERN OREGON AND WASHINGTON

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Prepared by:

Bob Altman
American Bird Conservancy
311 NE Mistletoe
Corvallis, OR 97330

Aaron Holmes
Point Reyes Bird Observatory
4990 Shoreline Highway
Stinson Beach, CA 94970

Prepared for:

Oregon-Washington Partners In Flight

EXECUTIVE SUMMARY

This document has been prepared to stimulate and support an active approach to conservation of landbirds in the Columbia Plateau 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

The vegetation of the Columbia Plateau has changed dramatically in the last 150 years since European settlement of the region. 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. In the Columbia Plateau Breeding Bird Survey Physiographic Region, 16 species have significant recent (1980-1998) and/or long-term (1966-1998) declining population trends. Several other species which lack sufficient BBS data are considered by many to be declining (e.g., bobolink, Lewis' woodpecker). Additionally, species such as sage grouse, sharp-tailed grouse, and upland sandpiper have been extirpated as breeding species from parts of the Columbia Plateau, and yellow-billed cuckoo has likely been extirpated as a breeding species from the entire 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 Columbia Plateau, 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 two priority habitats are:

- shrub-steppe
- riparian

Our strategy for achieving functioning ecosystems for landbirds within shrub-steppe and riparian habitats 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 Columbia Plateau:

<u>Habitat</u>	<u>Habitat Attribute</u>	<u>Focal Species</u>
Steppe	native bunchgrass cover	grasshopper sparrow*
Steppe-Shrubland	interspersed tall shrubs-openings	loggerhead shrike*
Steppe-Shrubland	burrows	burrowing owl
Steppe-Shrubland	deciduous shrubs and trees	sharp-tailed grouse
Sagebrush	large areas - diverse understory	sage grouse
Sagebrush	large contiguous patches	sage sparrow

Sagebrush	sagebrush cover	Brewer's sparrow*
Sagebrush	sagebrush height	sage thrasher
Shrublands	ecotone edges	lark sparrow
Shrublands	sparsely vegetated desert scrub	black-throated sparrow*
Juniper - Steppe	scattered mature trees	ferruginous hawk
Riparian Woodland	large snags (cottonwood)	Lewis' woodpecker
Riparian Woodland	large canopy trees (cottonwood)	Bullock's oriole
Riparian Woodland	subcanopy foliage	yellow warbler
Riparian Woodland	dense shrub layer	yellow-breasted chat
Riparian Woodland	large, structurally diverse patches	yellow-billed cuckoo
Riparian Shrub	dense shrub patches	willow fly catcher
Riparian Shrub	shrub-herbaceous interspersion	lazuli bunting
Aspen	large trees/snags with regeneration	red-naped sapsucker
Agricultural Fields	mesic conditions	bobolink
Juniper Woodland	mature trees with regeneration	gray fly catcher
Cliffs and Rimrock	undeveloped foraging areas	prairie falcon
Mountain Mahogany	large trees with regeneration	Virginia's warbler

* Significantly declining population trends in the Columbia Plateau 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 E 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 (see Appendix D for a summary).

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.

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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

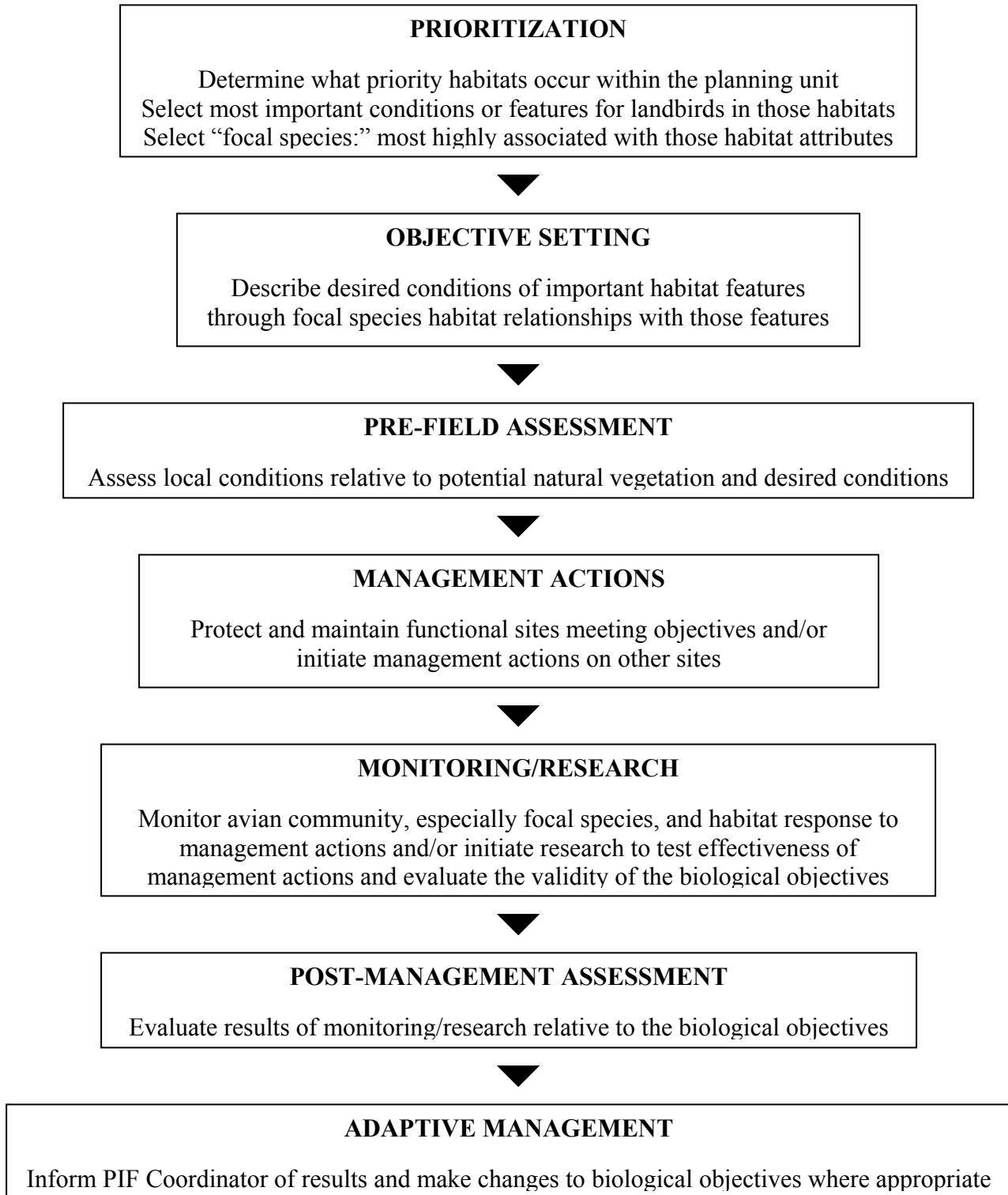
The primary goal of PIF Landbird Conservation Planning is to ensure long-term maintenance of healthy populations of native landbirds. This document is intended to facilitate that goal by stimulating an active approach to landbird conservation. An overview of the process and recommended actions is presented 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 Columbia Plateau 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. The plan has benefitted from extensive discussions and integration with other state PIF plans, especially Idaho (S. Ritter pers. comm.). 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 most comprehensive land management plan for the region, 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 ICBEMP, but also with other ongoing and future conservation planning in the Columbia Plateau to provide functioning ecosystems for the region's diverse array of landbird species.

CHAPTER 2. THE PLANNING UNIT

A. Scope

The Columbia Plateau Landbird Conservation Planning Unit (Figure 2) includes mostly low elevation, non-conifer forest cover types in eastern Oregon and Washington. Habitat types emphasized in this document are shrub-steppe and riparian, but conservation issues and strategies are also described for juniper, mountain mahogany, aspen, and cliff and rimrock habitats. The planning unit encompasses several ecoregions including the Owyhee Uplands, Basin and Range (Great Basin), and High Lava Plains in Oregon, the Palouse Prairie in Washington, and the Columbia Basin in Washington and Oregon (Franklin and Dyrness 1973). Geographic boundaries are not rigorously defined but dependent on the presence of our priority habitats (see Chapter 5). For the purposes of consistency with the ICBEMP, we use the boundaries of their Northern Great Basin and Owyhee Uplands Ecological Reporting Units (ERUs) (Wisdom et al. in press) for our subprovinces of the same name. However, we separate their Columbia Plateau ERU into 3 subprovinces - Columbia Basin in Oregon and Washington, High Lava Plains in Oregon, and Palouse Prairie in Washington. We also extend a narrow portion of the Columbia Basin subprovince up the Okanogan Valley to the Canadian border into what is part of the ICBEMP Northern Glaciated Mountains ERU (Figure 2).

This conservation strategy does not include conifer forests and associated habitats in the Cascade, Blue, Ochoco, Okanogan, Selkirk, and Klamath Mountain Ranges. These areas are covered in two other PIF bird conservation plans; *Conservation strategy for landbirds in the Central Rocky Mountains of eastern Oregon and Washington* and *Conservation strategy for landbirds in the East-slope Cascades of eastern Oregon and Washington*. These can be viewed and downloaded from the Oregon Washington PIF web page at www.gorge.net/natres/pif.html.

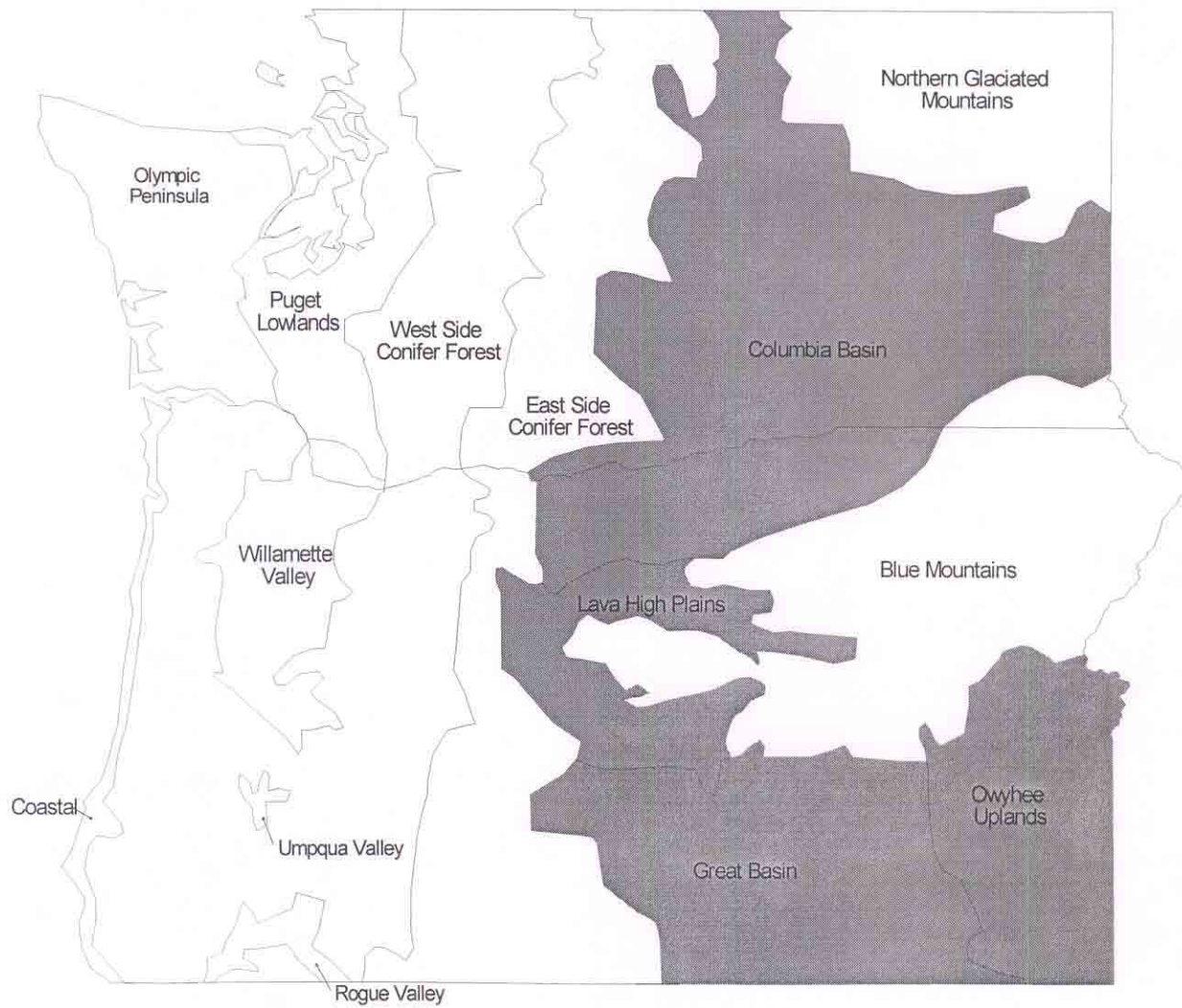
B. Physical Features

The Columbia Plateau is a vast landscape of arid and semi-arid habitats that begins in the rainshadow of the Cascade Mountains and extends east to cover most of the non-forested portions of eastern Oregon and Washington. The region is characterized by a relatively uniform underlying geology dominated by thick flows of basalt lava that are punctuated in localized areas by volcanic ashflows and deposits of volcanic tuffs and rhyolite. The uniform bedrock of the Columbia Plateau has been faulted and uplifted, cut by rivers and eroded by wind, water, and glaciers to produce a diverse landscape that contains considerable topographic relief. Present within the landscape are desert mountain ranges, low rolling hills, riverine valleys, broad basins containing permanent lakes and seasonal playas, sand dunes, plateaus, and expansive plains. Many of the current features present in the region date only from the Pleistocene epoch or one

million years before present. This is a relatively new landscape that is continuing to change and be altered by natural processes.

In this arid landscape, riparian and wetland habitats have special importance and provide significant distinction to the region. The planning unit contains two very different types of river systems, one

Figure 2. Location of the Columbia Plateau Landbird Conservation Planning Region



which has direct connections to the Pacific Ocean and in many instances still supports anadromous fish populations, and the other which contains only internally drained streams and is one of the defining characteristics of the hydrographic Great Basin. Throughout the region, rivers flow through varied terrains including glacially-carved gorges, river-carved canyons, and broad valleys which adds considerable diversity to the riparian habitats present. As elsewhere, river basins act to divide the landscape into large geographic divisions, which also act to segment wildlife populations and species distributions.

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 including Daubenmire (1970), Franklin and Dyrness (1973), Dobler et al. (1996), Quigley and Arbelbide (1997), and Paige and Ritter (1999).

1. Pre-European Settlement

The landscape at the time of European settlement was dominated by shrub-steppe vegetation communities (Daubenmire 1970), dissected by riparian corridors, pockets of wetlands, and grasslands, in particular the Palouse Prairie. The most prominent habitat in the shrub-steppe was sagebrush shrublands. Intermixed in the sagebrush habitat were western juniper woodlands (typically confined to ridges and rocky soil habitats) and montane shrublands which transitioned to extensive aspen forests found on the highest mountain ranges in the region. In the Great Basin ecoregion, internally drained basins containing alkaline soils were dominated by salt desert scrub vegetation. These habitats were relatively barren when compared to the more lush sagebrush/bunchgrass habitats. Specialized habitats defined by unique soils, hydrology or the combination of soils and vegetation occurred in localized areas throughout the planning unit. The dominant ecological process that affected vegetation across the region was wildfire ignited by lightning as well as some Native American ignitions. Irregular and spotty wildfires created a landscape that was a patchwork of stand ages in shrub-steppe that was interspersed with grasslands and other small, unique communities (Paige and Ritter 1999).

Shrub-steppe communities were mostly codominated by shrubs and perennial bunchgrasses with a microbial crust of lichens and mosses on the surface of the soil. Dominant shrubs were sagebrush of several species and subspecies—Basin, Wyoming, and Mountain big sagebrush; low sagebrush; and early, rigid, threetip and black sagebrush (Table 1). Bitterbrush also was important in many shrub-steppe communities. Bunchgrasses were largely dominated by four species—bluebunch wheatgrass, Idaho fescue, needle and thread grass, and Sandberg's bluegrass. Soils, climate and topography acted to separate out distinct plant communities that paired sagebrush species with specific bunchgrasses across the landscape.

Riparian vegetation is quite restricted in the arid intermountain west, but is nonetheless fairly diverse. It is characterized by a mosaic of plant communities occurring at irregular intervals along streams and dominated singularly or in some combination by grass-forbs, shrub thickets, and mature forests with tall deciduous trees. Common shrubs in riparian zones included several species of willows, red-osier dogwood, hackberry, mountain alder, Wood's rose, snowberry, and currant (Table 1). Herbaceous understories were very diverse, but typically included several species of sedges along with many dicot species. In presettlement times, riparian habitats were found at all elevations and on all stream gradients; they were the lifeblood for most wildlife species with upwards to 80% of all wildlife species dependent upon these areas at some time in their lifecycle (Thomas et al. 1979). Many riparian habitats were maintained by beaver activity which was prominent throughout the west. Beaver-dammed streams created pools that harbored fish and other species; their dams also reduced flooding and diversified and broadened the riparian habitat. The other important ecological process which affected riparian areas was natural flooding that redistributed sediments and established new sites for riparian vegetation to become established.

Table 1. Native vegetation characteristic of the Columbia Plateau Landbird Conservation Planning Region.

Habitat	Tree Species	Common Shrubs	Common Herbaceous Plants
Sagebrush		big sagebrush, low sagebrush, bitterbrush	bluebunch wheatgrass, needle-and-thread grass, Idaho fescue, Sandberg's bluegrass, bottlebrush squirreltail, Indian ricegrass
Riparian	cottonwood, tree willow, aspen, water birch	snowberry, wild rose, red-osier dogwood, hackberry, mountain alder, willow, currant	northern bedstraw, fescue, sticky geranium, water leaf, parsnip, sedges, rushes, managrass, tufted hairgrass
Juniper	western juniper	big sagebrush, low sagebrush	bluebunch wheatgrass, needle-and-thread grass, Idaho fescue, bottlebrush squirreltail
Salt Desert Scrub		greasewood, shadscale, winterfat, budsage, spiny hopsage	Indian ricegrass, needle-and-thread, bottlebrush squirreltail

Western juniper woodlands were relatively restricted in their distribution in the Columbia Plateau. They occurred mainly on ridges where fire was infrequent but their associated understories of sagebrush and bunchgrasses were almost as diverse as the shrub-dominated communities so common across the landscape. Within the shrub-steppe landscape there also were alkaline basins, many of which contained large lakes during wetter pluvial times, where extensive salt desert scrub communities occur. This characteristic Great Basin vegetation contained numerous shrubs in the shadscale group including greasewood which has a very wide ecological amplitude, being equally at home in seasonally flooded playas and on dunes or dry hillsides. Salt desert scrub communities were surprisingly diverse from a floristic standpoint and provided habitat for many wildlife species.

2. Current Vegetation

Vegetative natural communities in the Columbia Plateau have undergone changes with the advent of European settlement in the last 150 years. Native shrub-steppe communities have been diminished both in extent and condition. The principle factors were livestock overgrazing, invasion and dominance of non-native plants, and extensive conversion to agriculture (Wisdom et al. in press). Other contributing factors included development, sagebrush eradication programs, and changes in fire regimes (Paige and Ritter 1999). In eastern Washington, nearly 60% of the native shrub-steppe has been converted to agriculture (Dobler et al. 1996). Even in extant shrub-steppe, what appears to be a natural landscape dominated by an “ocean of sagebrush” is actually a considerably altered ecosystem that compositionally and functionally differs from prior conditions. These changes have had effects on wildlife species with many bird species continuing to decline long after the worst of the impacts to habitats have ceased.

Grassland ecosystems that were prominent in the Columbia Basin portion of the planning unit have suffered the greatest losses of any habitats in the Columbia Plateau (Oregon GAP 1999). The Palouse Prairie has been identified as the most endangered ecosystem in the United States (Noss et al. 199?). Land conversion and livestock grazing coupled with the rapid spread of cheatgrass and a resulting change in the natural fire regime has effectively altered much of the grassland habitats. The second-most set of impacted ecosystems in the region are the valley bottomlands that originally were a mix of riparian vegetation, Basin wildrye meadows, and rich sagebrush steppe. Land conversion, grazing and hydrologic alteration has effectively removed much of the native vegetation from these bottomlands, and so altered the streams that most are no longer in proper functional condition.

While these losses are significant, perhaps of even more concern are changes that have occurred throughout the mostly sagebrush dominated ecosystem of the shrub-steppe. Grazing, exotic species and altered fire regimes have impacted this ecosystem to the effect that it is difficult to find stands which are still in relatively natural condition. The greatest changes are the reduction of bunchgrass cover in the understory and an increase in sagebrush cover. Soil compaction is also a significant factor in heavily grazed lands affecting water percolation, runoff and soil nutrient content. Western juniper woodlands have greatly expanded their range, now occupying much more of the sagebrush ecosystem than in pre-European settlement times. The reasons for the expansion are complex and include interactions between climate change and changing land use, but fire suppression and grazing have played a prominent role in this dramatic shift in structure and dominant vegetation. Losses have been less dramatic and extensive in salt desert scrub ecosystems and in montane shrublands and aspen forests where grazing, mining and altered hydrology have been the primary threats.

Riparian areas have been extensively impacted within the Columbia Plateau such that undisturbed riparian systems are rare (Knutson and Naef 1997). Impacts have been greatest at low elevations and in valleys where agricultural conversion, altered stream channel morphology, and water withdrawal have played significant roles in changing the character of streams and associated riparian areas. Losses in lower elevations include large areas once dominated by cottonwoods that contributed considerable structure to riparian habitats. In higher elevations, stream degradation occurred with the trapping of beaver in the early 1800's, which began the gradual unraveling of stream function that was greatly accelerated with the introduction of livestock grazing. Woody vegetation has been extensively suppressed by grazing in some areas, many of which continue to be grazed. Herbaceous vegetation has also been highly altered with the introduction of Kentucky bluegrass that has spread to many riparian areas, forming a sod at the exclusion of other herbaceous species. The implications of riparian area degradation and alteration are wide ranging for bird populations which utilize these habitats for nesting, foraging and resting. Secondary effects which have impacted insect fauna have reduced or altered potential foods for birds as well.

D. Land Uses

Post-European settlement land uses were primarily open-range grazing by livestock and agriculture, which began with land clearing in the late 1800s. Both continue to be the dominant land uses, particularly since damming of the Columbia River in the 1930s provided irrigation water to areas previously unsuitable for agriculture. Grazing continues to varying degrees, particularly on large tracts of federal lands (Quigley and Arbelbide 1997) in the Northern Great Basin, High Lava Plains and Owyhee Uplands subprovinces.

Within the ERUs of the ICBEMP, the greatest conversion to agriculture has been the Columbia Plateau (our Columbia Basin and High Lava Plains), where nearly half of the land base has been converted to agriculture (Wisdom et al. in press). Agriculture now occupies over 10% of the Owyhee Uplands ERU, but the Northern Great Basin ERU remains relatively free of agriculture conversions.

What is deceiving about this relatively low percentage of land conversion in the Owyhees and Great Basin is that the conversions have been concentrated in low elevation valleys and have significantly impacted valley bottom grasslands, shrublands, and cottonwood dominated riparian areas.

Agricultural land uses include dry land wheat farms and hybrid poplar wood fiber farms in the Columbia Basin, intensive irrigated agricultural row crop production in the Columbia Basin and the High Lava Plains, and irrigated agriculture associated with livestock production (alfalfa and hay) in all subprovinces. Grazing occurs across the planning unit but is more prominent in the Northern Great Basin and the Owyhee Uplands where it is the dominant land use on private and public lands.

In addition to grazing and agriculture, there has been patchy, permanent losses of shrub-steppe habitat due to urban and rural residential growth. These losses are most obvious in central Oregon near the Bend-Redmond area, and in southeastern Washington in the Tri-cities area.

E. 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 and fragmentation resulting from conversion to agriculture; and habitat degradation and alteration from livestock grazing, invasion of exotic vegetation, and alteration of historic fire regimes. Conversion of shrub-steppe lands to agriculture adversely affects landbirds in two ways: 1) native habitat is in most instances permanently lost, and 2) remaining shrub-steppe is isolated and embedded in a highly fragmented landscape of multiple land uses, particularly agriculture. Fragmentation resulting from agricultural development or large fires fueled by cheatgrass can have several negative effects on landbirds. These include: 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 of shrub-steppe has likely altered the dynamics of dispersal and immigration necessary for maintenance of some populations at a regional scale. In a recent analysis of neotropical migratory birds within the Interior Columbia Basin, most species identified as being of “high management concern” were shrub-steppe species (Saab and Rich 1997).

Approximately 6 million hectares of shrub-steppe have been converted to wheat fields, row crops, and orchards in the interior Columbia Basin (Quigley and Arbelbide 1997). In Washington over 50% of historic shrub-steppe has been converted to agriculture (Dobler et al. 1996).

The legacy of livestock grazing in the Columbia Plateau has had widespread and severe impacts on vegetation structure and composition. One of the most severe impacts in shrub-steppe has been the increased spread of exotic plants. Riparian habitats are known to be detrimentally affected by most grazing practices tested to date (Saab et al. 1995).

Other conservation issues affecting landbird populations and their habitats in the Columbia Plateau include:

- water management – stream channelization, dams, diversions, and irrigation;
- changes in hydrology resulting in increased salinity (plants not adapted to high levels of salinity);
- urban development;
- exotic plant seedings such as conversion of native shrub-steppe habitats to crested wheatgrass seedings (Reynolds and Trost (1980);
- cats (feral and domestic); and
- resource competition from aggressive non-native competitors (e.g., starlings for cavities).

F. Conservation Opportunities

Despite extensive habitat losses and conversions from original plant communities, opportunities exist for restoration and enhancement of habitats to provide quality landbird habitat. Several large tracts of shrub-steppe in eastern Washington and much of eastern Oregon 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.

Restoration of shrub-steppe is still very much a fledgling field, and complete restoration of degraded or converted shrub-steppe may not be feasible. Conservation efforts must therefore concentrate on existing shrub-steppe that can be permanently protected and managed through easement, acquisition, or land trusts. Agricultural conversion has been concentrated in shrub-steppe areas of arable, deep soil communities, which support greater abundance of some shrub-steppe passerines than other soil types (Vander Haegen et al. in press). Because of this, it would be appropriate to focus conservation efforts in deep soil communities. Conservation also may be appropriate on some agricultural lands (e.g., grasshopper sparrows on CRP). Several government outreach and incentive programs, many of which resulted from the 1996 Farm Bill, provide opportunities to accomplish this (see Chapter 9). In riparian habitat, the complete removal of livestock has been shown to have measurable positive effects on riparian obligate bird species within several years (Krueper 1993).

G. Subprovinces

The Columbia Plateau Landbird Conservation Planning Region is a large area (Figure 2). 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:

- Columbia Basin
- High Lava Plains
- Basin and Range (Great Basin)
- Owyhee Uplands
- Palouse Prairie

CHAPTER 3. AVIFAUNA

A. Scope

This conservation strategy addresses the conservation of breeding landbirds and their habitats in the Columbia Plateau of eastern Oregon and Washington. Clearly, factors operating outside the nesting season may be adversely affecting populations of birds breeding in the Columbia Plateau. 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 129 native landbird species to be highly associated breeding species in all or parts of the Columbia Plateau (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 Columbia Plateau. 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. Shrub-Steppe

We considered approximately 56 native landbird species to be highly associated breeding species in shrub-steppe habitats (Appendix A). Although shrub-steppe habitat supports relatively few species of landbirds (Rotenberry and Wiens 1978, Wiens et al. 1986), several species are dependent upon this vegetation type such that they are found nowhere else in Oregon and Washington. These include the shrub-steppe obligates: sage grouse, sage sparrow, sage thrasher, and Brewer’s sparrow, and other non-obligate species

such as burrowing owl, Swainson's hawk, ferruginous hawk, loggerhead shrike, long-billed curlew, sharp-tailed grouse, upland sandpiper, and black-throated sparrow.

2. Riparian

We considered approximately 97 native landbird species to be highly associated breeding species in riparian habitats (Appendix A). In contrast to shrub-steppe, riparian habitat typically supports the greatest diversity of landbird species. As with shrub-steppe, there are several species dependent on this habitat type in the Columbia Plateau (e.g., western wood-pewee, Bullock's oriole, willow flycatcher, yellow-breasted chat, yellow-billed cuckoo, yellow warbler). However, most of these species also occur in riparian habitat elsewhere in Oregon and Washington.

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. These data are presented with 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 - Columbia Plateau. This BBS physiographic region also includes areas outside of Oregon and Washington - southern Idaho, and extreme northwestern Nevada. BBS trend estimates for species primarily associated with shrub-steppe and riparian habitats in the Columbia Plateau are presented in Appendix A for the 30-year period (1968-1998) and the most recent period (1980-1998).

Of the 16 species with significantly declining trends in the Columbia Plateau, six could be considered exclusively or primarily associated with shrub-steppe, four with open or agricultural lands, five with riparian/wetland habitat, and one with forest habitat (Table 2). Additionally, some species that lack sufficient BBS data are considered by many to be declining in the Columbia Plateau (e.g., sage grouse, sharp-tailed grouse, Lewis' woodpecker) 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 some local and regional extirpations of breeding populations such as sage grouse in much of eastern Washington, and sharp-tailed grouse throughout Oregon. One species, yellow-billed cuckoo, may have been completely extirpated as a breeding species from the region.

In contrast to declining species, 20 species have significantly increasing trends (Table 2). Only four of these species would be considered primarily associated with shrub-steppe, and four with riparian habitat. Most of the remainder are open country/agriculture or generalist species and five are forest species.

Table 2. Native landbird species with significantly declining or increasing population trends in the Columbia Plateau BBS Physiographic Region (from Sauer et al. 1999).

SIGNIFICANTLY DECLINING TRENDS ^a		SIGNIFICANTLY INCREASING TRENDS ^a	
<p style="text-align: center;">Shrub-Steppe</p> <p>Horned lark (L,R) Western meadowlark (L,R) Grasshopper sparrow (L) Brewer's sparrow (L,R) Black-throated sparrow (L) Loggerhead shrike (L)</p> <p style="text-align: center;">Agriculture/Open</p> <p>Killdeer (L, R) Mourning dove (L,R) American kestrel (R) Brewer's blackbird (L,R)</p>	<p style="text-align: center;">Riparian/Wetland</p> <p>Wilson's phalarope (R) Spotted sandpiper (L) American coot (R) Sandhill crane (R) Northern pintail (L,R)</p> <p style="text-align: center;">Forest/Juniper</p> <p>Chipping sparrow (L,R)</p>	<p style="text-align: center;">Shrub-Steppe</p> <p>Long-billed curlew (L) Ferruginous hawk (L) Burrowing owl (L,R) Sage thrasher (L)</p> <p style="text-align: center;">Agriculture/Open</p> <p>Red-tailed hawk (L, R) Black-billed magpie (R) American crow (L,R) Common raven (R) Cliff swallow (L) Violet-green swallow (R) Say's phoebe (L,R)</p>	<p style="text-align: center;">Riparian/Wetland</p> <p>House wren (L,R) Marsh wren (R) Spotted towhee (L) Black-headed grosbeak (L,R)</p> <p style="text-align: center;">Forest/Juniper</p> <p>Western wood-pewee (L,R) Mountain bluebird (L,R) American robin (L,R) Cassin's finch (R) Gray flycatcher (R)</p>

^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 over some period of time. A list of BBS routes and their location is presented in Table 3.

Table 3. Breeding Bird Survey routes in the Columbia Plateau Landbird Conservation Planning Region.^a

Region	Route Numbers
Columbia Basin - OR	4, 5, 44, 45, 46, 105, 204, 205
Columbia Basin - WA	5, 6, 14, 15, 16, 20, 21, 22, 26, 30, 37, 38, 39, 44, 45, 46, 50, 56, 57, 62, 63, 64, 65, 75, 76, 81, 83, 145, 164, 900, 901
Palouse Prairie	58
High Lava Plains	11, 36, 53, 211, 239, 240, 246
Northern Great Basin	21, 22, 23, 30, 31, 55, 61, 62, 155, 221, 222, 223, 230, 231, 254, 255
Owyhee Uplands	24, 32, 56, 63, 64, 164, 224, 232, 242, 249, 256

^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 Columbia Plateau 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, the emphasis is on single-species conservation, 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 typically high-scoring PIF 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-scoring priority PIF species, but that we felt was important for birds in a functioning ecosystem of that habitat type. In some instances, extirpated or nearly extirpated species (e.g., yellow-billed cuckoo, sage grouse) are included as priority species if we felt they could potentially be reestablished and/or were highly indicative of some desirable habitat condition.

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 Columbia Plateau 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 **not regulatory, nor do they represent the policies of any agency or organization.** Our biological objectives are intended to stimulate conservation action, and 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,
- 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 conservation 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 (VanHorne 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. However, it should not be inferred 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 this 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 land management, threats and 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 Columbia Plateau 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, 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 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 shrub-steppe or riparian 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 ICBEMP conservation assessment process (Saab and Rich 1997);
- high total or AI (Area Importance) + PT (Population Trend) scores in the PIF National Database for the Columbia Plateau physiographic province (Appendix A);
- species for which the Columbia Plateau physiographic Region has a high national responsibility (i.e., high percent population scores) (Appendix A); and

- professional knowledge on species of local interest.

Two landbird species considered high priority species in Columbia Plateau by several federal and state agencies, sage grouse and sharp-tailed grouse, also are included in this conservation strategy. Currently, several government agencies and other organizations are working specifically on conservation of these species. Although we established coarse-scale objectives for both sage and sharp-tailed grouse, we refer the reader to much more detailed conservation objectives and management strategies already developed for these species (see Chapter 6 species accounts for references). Conservation objectives for these species in this document are intended to be integrated with those other directives for conservation. This should be especially applied where BCAs have been designated. It is hoped that agencies and organizations attempting to implement landbird conservation or grouse conservation will fully avail themselves of the management strategies for both efforts.

B. Priorities

Two habitat types were selected as priority habitats: shrub-steppe and riparian. Additionally, several unique habitats such as aspen stands, mesic agricultural fields, juniper woodland, mountain mahogany, and cliffs and rimrock 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 guidelines may help when considering the applicability of our objectives. We use the term shrub-steppe as encompassing both grasslands (steppe) and shrublands dominated by sagebrush or other shrub species. Our definition of riparian is the vegetative structure (primarily shrubs and trees, but also the herbaceous ground cover) influenced by the hydrology of the aquatic system. We do not emphasize herbaceous dominated wetlands for reasons described above.

1. Shrub-Steppe

We delineated five habitat types for landbirds within the broad definition of shrub-steppe (Table 5). However, much of our emphasis is on sagebrush habitats, particularly big sagebrush communities. Among shrub-steppe habitat types, big sagebrush has several obligate or near-obligate species, and probably has been adversely impacted more than the other types. Other forms of sagebrush such as low sage, are of less value to birds, and less threatened than big sagebrush (Paige and Ritter 1999).

Landbird conservation in shrub-steppe habitats emphasizes maintaining healthy ecosystems through representative focal species for several habitat conditions in five habitat types (Table 4). In Steppe and Steppe-Shrubland, the conditions include native bunchgrass cover, interspersions of tall shrubs and

openings, and the presence of burrows. In Sagebrush, the overall desired condition is expansive areas of high quality sagebrush with a diverse understory of native grasses and forbs. More specific desired conditions include large unfragmented patches of sagebrush, and desirable conditions of sagebrush cover and height. In Shrublands, conditions of concern are ecotonal edge habitats between shrubs, trees, and herbaceous openings; and upland, sparsely vegetated desert scrub habitats. In Juniper-Steppe, the desired condition is the presence of scattered mature juniper trees (i.e., savanna).

Table 4. Priority habitat features and associated focal species for conservation in shrub-steppe habitats of the Columbia Plateau Landbird Conservation Planning Region.

Habitat	Habitat Feature/ Conservation Focus	Focal Species by Subprovince	
		Columbia Basin/ Palouse	High Lava Plains/ Basin- Range/Owyhee
<u>Steppe</u>	native bunchgrass cover	grasshopper sparrow	grasshopper sparrow
<u>Steppe-Shrubland</u>	interspersed tall shrubs and openings	loggerhead shrike	loggerhead shrike
	burrows	burrowing owl	burrowing owl
	deciduous trees and shrubs	sharp-tailed grouse	sharp-tailed grouse
<u>Sagebrush</u>	large areas of sagebrush with diverse understory of native grasses and forbs	sage grouse	sage grouse
	large unfragmented patches	sage sparrow	sage sparrow
	sagebrush cover	Brewer's sparrow	Brewer's sparrow
	sagebrush height	sage thrasher	sage thrasher
<u>Shrublands</u>	ecotonal edges of herb, shrub and tree habitats	lark sparrow	lark sparrow
	upland, sparsely vegetated desert scrub	black-throated sparrow (CB only)	black-throated sparrow (BR and OW only)
<u>Juniper-Steppe</u>	scattered mature juniper trees (savanna)	feruginous hawk	feruginous hawk

na = not applicable

2. Riparian

Landbird conservation in riparian habitats emphasizes maintaining healthy ecosystems through representative focal species for two riparian types, Woodland and Shrub, and several conditions (features) within each type (Table 5). In Woodland, these conditions include the presence of snags, large canopy trees, subcanopy foliage, a dense shrub understory, and large, structurally diverse patches of habitat. In Shrub, which can be an early successional or permanent condition depending upon hydrology, habitat conditions include shrub density and shrub-herbaceous interspersed.

Table 5. Priority habitat features and associated focal species for conservation in riparian habitats in the Columbia Plateau Landbird Conservation Planning Region.

Habitat	Conservation Focus	Focal Species by Subprovince	
		Columbia Basin/ Palouse	High Lava Plains/ Basin- Range/Owyhee
<u>Woodland</u>	large snags (cottonwood)	Lewis' woodpecker	Lewis' woodpecker
	large canopy trees	Bullock's oriole	Bullock's oriole
	subcanopy foliage	yellow warbler	yellow warbler
	dense shrub layer	yellow-breasted chat	yellow-breasted chat
	large, structurally diverse patches	yellow-billed cuckoo	yellow-billed cuckoo
<u>Shrub</u>	shrub density	willow flycatcher	willow flycatcher
	shrub-herbaceous interspersions	lazuli bunting	lazuli bunting

3. Unique Habitats

Landbird conservation is also directed toward several unique habitats in the Columbia Plateau (Table 6). In Aspen, the conservation emphasis is the presence of large trees and snags with some regeneration. In Agricultural Fields, the emphasis is for mesic conditions. In Juniper Woodland, the emphasis is mature juniper trees with some regeneration. In Cliffs and Rimrock, the emphasis is protected (undeveloped) foraging areas. In Mountain Mahogany, the emphasis is large diameter trees with some regeneration.

Table 6. Priority habitat features and associated landbirds species for conservation in unique habitats of the Columbia Plateau Landbird Conservation Planning Region.

Habitat	Habitat Feature/ Conservation Focus	Focal Species by Subprovince	
		Columbia Basin/ Palouse	High Lava Plains/ Great Basin/Owyhee
<u>Aspen</u>	large trees and snags with regeneration	na	red-naped sapsucker
<u>Agricultural Fields</u>	mesic conditions	bobolink	bobolink (GB and OW only)
<u>Juniper Woodland</u>	mature juniper with regeneration	na	gray flycatcher
<u>Cliffs and Rimrock</u>	undeveloped foraging areas	prairie falcon	prairie falcon
<u>Mountain Mahogany</u>	large diameter trees with regeneration	na	Virginia's warbler

CHAPTER 6. LANDBIRD CONSERVATION

Because of the diversity of landbird species and habitats in the Columbia Plateau, 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 Columbia Plateau begins with the maintenance and restoration of properly functioning shrub-steppe and riparian 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 these systems, 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 several important habitat features or conditions, 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 given 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 eastern Oregon and Washington and southern Idaho because habitat types and management are unique relative to other areas. When little data were available from this region, occasional references were used from elsewhere in western North America.

A. Shrub-steppe

Shrub-steppe is the dominant habitat within the planning unit. The steppe component is scattered in small patches, except historically was dominated by the relatively large Palouse Prairie in eastern Washington. Shrub-steppe is a relatively xeric habitat that is dominated by shrubs, especially sagebrush, or co-dominated by shrubs and perennial bunchgrasses. The most common shrub species in the Columbia Plateau is big sagebrush, and several sagebrush obligate bird species are closely associated with big sagebrush. Other types of sagebrush and other shrubs can be locally dominant. Generally, the species of sagebrush or shrub is less important to landbirds than its height, foliage density, cover, and distribution across the landscape (Paige and Ritter 1999). In a shrub-steppe understory, one or more perennial bunchgrass species are usually dominant. Additionally, a wide array of forbs are important herbaceous components, although cover of those species today has been greatly diminished by a long-term history of livestock grazing and invasive competitors. A summary of the habitat features important to shrub-steppe landbirds is presented in Appendix C.

The implementation strategy for conservation of shrub-steppe birds uses a habitat “block” approach in which the emphasis is on maintaining large patches of quality habitat to support bird populations, especially area-sensitive species such as sage grouse and sage sparrow. To facilitate this approach, Shrub-steppe Bird Conservation Areas (SSBCAs) were designated (Appendix B) to take advantage of existing areas (large or small) where habitat conditions are or could be suitable, and where ownership and/or management are potentially compatible with landbird conservation (e.g., Hanford Reservation, sage grouse management areas, TNC preserves, wilderness areas). Depending on ecological potential and management focus, conservation actions within SSBCAs may emphasize management to maintain or provide a mosaic of conditions for multiple priority species or management actions directed towards one or a few species.

1. Conservation Issues (Shrub-Steppe):

- T there are a substantial number of obligate and semi-obligate landbird species, thus threats to the habitat jeopardize the persistence of these species
- T extensive permanent habitat conversions of shrub-steppe (e.g., approximately 60% of shrub-steppe in Washington [Dobler et al. 1996]) to other uses (e.g., agriculture, urbanization)
- T fragmentation of remaining tracts of moderate to good quality shrub-steppe habitat
- T habitat degradation from intensive grazing and invasion of exotics, particularly annual grasses such as cheatgrass and woody vegetation such as Russian olive
- T loss and degradation of properly functioning shrub-steppe ecosystems where there is encroachment of urban and residential development
- T most of the remaining shrub-steppe in Washington is in private ownership (57% [M. Vander Haegen pers. comm.])

- T best sites for healthy sagebrush communities (deep soils, relatively mesic conditions) are also best for agricultural productivity; thus, past losses and potential future losses are great
- T loss of big sagebrush communities to brush control
- T loss and reduction of cryptogamic crusts, which help maintain ecological integrity of shrub-steppe communities
- T conversion of Conservation Reserve Program (CRP) lands back to cropland
- T hostile landscapes, particularly those in proximity to agricultural and residential areas may have high density of nest parasites (brown-headed cowbird) and domestic predators (cats), and may be subject to high levels of human disturbance
- T agricultural practices that cause direct or indirect mortality and/or reduce bird productivity
- T fire management, either suppression or over-use
- T invasion and seeding of crested wheatgrass which reduces habitat availability

2. Biological Objectives (Shrub-Steppe):

- < **Institutionalize a policy of “no net loss” of shrub-steppe habitat (i.e., discourage loss and conversion of habitat, but when unavoidable, mitigate with equal or greater restoration efforts).**
- < **Maintain existing areas of moderate to high quality shrub-steppe vegetation, and actively manage to promote their sustainability.**
- < **Initiate actions to enhance size and connectivity of existing quality shrub-steppe patches (i.e., reduce fragmentation).**
- < **Initiate actions to avoid or minimize further degradation of shrub-steppe habitat (e.g., reduce, eliminate or better manage livestock grazing).**
- < **Initiate actions to improve quality of degraded shrub-steppe habitat through appropriate management (see Conservation Strategies throughout the plan).**
- < **Maintain cryptogamic crusts where they occur, and seek ecologically appropriate sites for restoration to ensure proper functioning native plant communities.**
- < **Maintain sites dominated by native vegetation and initiate actions to prevent infestations of exotic vegetation.**
- < **Encourage restoration of agricultural lands to native cover types through acquisition, easement, or incentive programs.**
- < **Increase habitat for grassland-associated species by managing non-native grasslands (e.g. agricultural lands, inactive grasslands such as CRP and fallow fields) as suitable habitat where biologically appropriate (i.e., where viable landbird populations can be maintained).**
- < **Where ecologically appropriate in large patches of sagebrush habitat (e.g., watershed, Shrub-Steppe Bird Conservation Area, sage grouse management unit, etc.), initiate actions to maintain or provide:**

- >50% of the landscape in a mid- to late-seral stage with canopy cover >15%
 - at least one contiguous tract >400 ha (1,000 ac) with high quality conditions (see sage grouse and sage sparrow species accounts)
 - <10% of the landscape as hostile habitat (e.g., developed areas with human habitation, intensively managed agricultural lands)
- < **In conjunction with conservation efforts described in the Idaho Landbird Conservation Plan (Ritter 2000) and the Nevada Landbird Conservation Plan (Neel 1999), reverse declining population trends in the Columbia Plateau BBS Region for six shrub-steppe species (see Table 2) to achieve stable populations (non-significant trends of <2%/year) or increasing populations within the next 10 years (by 2010); while maintaining stable or increasing populations for other shrub-steppe 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. 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).

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 reversing declining BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through increased abundance of declining species on randomly located BBS routes. The objective to reverse declining population trends also assumes that conservation actions on the breeding grounds will positively affect landbird populations. This may not be the case for migratory birds subject to adverse impacts during migration and/or on the wintering grounds. When conservation actions do not result in a positive population response by a species, efforts should be made to assess the appropriateness of the conservation actions and/or the likelihood of factors outside of the breeding grounds negatively affecting populations.

3. Conservation Strategies (Shrub-Steppe):

These general recommendations are presented to support conservation of landbirds in shrub-steppe habitats. Additional management recommendations for landbirds in shrub-steppe habitats are included in Paige and Ritter (1999). Specific recommendations as described below for priority focal species should supercede those presented here if there is a direct conflict between recommendations.

- *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.
 - Study the role of fire, mowing, and other management treatments to maintain/improve habitat quality.
- *Research Coordination:*
 - Coordinate research activities between government and private lands, particularly on large tracts of shrub-steppe habitat in an agricultural matrix such as Yakima Training Center, Hanford Reservation, and Boardman Bombing Range.
- *Conservation Areas:*
 - Seek to expand shrub-steppe focal species distribution and abundance throughout the Columbia Plateau by establishing Shrub-Steppe Bird Conservation Areas (SSBCAs) and promoting their proper management (see Appendix B).
- *Acquisition/Restoration:*
 - Support partnerships that seek to acquire/restore native shrub-steppe habitat (e.g., TNC, State, BLM and private partnerships in the Moses Coulee/Beezley Hills area, Douglas County, Washington).
 - Develop conservation agreements with private landowners to enhance the quality of shrub-steppe habitat.
 - Seek to maximize contiguous area of shrub-steppe and thus minimize fragmentation. The larger the area, the greater the likelihood of maintaining populations of area-sensitive and large territory species such as sage sparrow and sage grouse.
 - Develop a shrub-steppe “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 native species and local seed sources in restoration.
 - Restore areas that were seeded in crested wheatgrass.
- *Timing of Activities:*
 - In agricultural lands, minimize or avoid field operations and recreational activities (e.g., ATV riding adjacent to fields) during the breeding season (April 15 - July 15).
- *Mowing/Harvesting/Burning:* Mowing/haying affects grassland birds directly and indirectly. It may reduce height and cover of herbaceous vegetation, destroy active nests, kill nestlings and fledglings, cause nest abandonment, and increase nest exposure and predation levels (Bollinger et al. 1990). Studies on grasshopper sparrow have indicated higher densities and nest success in areas not mowed until after July 15 (Shugaart and James 1973, Warner 1992).

- Delay mowing, haying, or harvesting of grass-dominated fields as long as possible, preferably until after July 15.
 - Space mowing or haying frequency as widely as possible to increase the probability of successful nesting
 - In areas with high cheatgrass fuel loads (primarily parts of the Columbia Basin subprovince), fire suppression should be considered when fire threatens large patches of sagebrush (Holmes and Geupel 1998).
- *Tilling*: Tilling (disking, planting, cultivation) of agricultural fields may destroy active nests and cause mortality to nestlings or fledglings, particularly if the initial tilling is in May and birds have already initiated nesting in the residue of the field from the previous year. Minimum or no tilling will also increase foraging opportunities by providing habitat for insect prey.
- Where possible, use no-till practices or conduct tilling prior to April 15 or after July 15.
- *Grazing*: Poorly managed grazing may negatively affect habitat by altering species composition, reducing residual vegetation, inhibiting vegetation recruitment, and increasing encroachment of noxious weeds. Grazing may not adversely impact vegetation if relatively light pressure is rotated between pastures and deferred on an annual and seasonal basis.
- Implement grazing practices that are consistent with growth of native plants and forbs. This may include increasing rest cycles in rest-rotation systems, and/or deferring grazing until bunchgrasses have begun to cure.
 - Manage livestock numbers or time on rangeland to maintain the ecological integrity of the plant community through fencing exclusions or time management.
 - Exclude livestock grazing from relatively pristine areas.
- *Insecticides/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.
- Minimize or discontinue use of pesticides wherever possible.
 - Practice procedures in Integrated Pest Management (described in ORS 634.122) for reduced destruction of non-target insects.
 - Encourage biological controls rather than chemical controls wherever possible.
 - Treatments should be followed by restoration activities.
 - Limit the application of herbicides to invasive non-native species, and use in conjunction with habitat enhancement projects which include long-term solutions to control future infestations.
- *Uncultivated Areas*: Uncultivated areas (e.g., inter-agriculture circles) provide habitat diversity within large expanses of cultivation. Some species may use uncultivated areas as refugia or as nesting habitat (A. Holmes unpubl. data).
- Provide uncultivated herbaceous areas within or adjacent to cultivated fields to provide habitat diversity and potential nesting habitat for some landbirds.

- Avoid spraying or mowing uncultivated herbaceous vegetation within or adjacent to cultivated fields (e.g., fence rows, roadsides, and untillable land such as rocky soils).
- Establish healthy stands of desirable native vegetation adjacent to irrigated fields to avoid the spread of noxious weeds.
- *Prioritization*: All actions to acquire, maintain, enhance, or subsidize lands for bird conservation should consider the following factors:
 - proximity to large contiguous tracts of good quality shrub-steppe
 - proximity to populations of target priority/focal species
 - proximity to a designated SSBCA
 - sites free of or most resistant to cheatgrass invasion or dominance (i.e., higher moisture regime, >30 cm [12 in]/year)
 - benefit to multiple shrub-steppe 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
- *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 shrub-steppe bird habitat.
 - Increase the amount of land under incentives programs for wildlife habitat, targeting land within or adjacent to SSBCAs.
 - Support existing programs and develop new economic incentive programs to solicit conservation and management agreements with private landowners to certify their land as a SSBCA.
- *Education/Outreach*:
 - Develop brochures or other educational materials for private landowners describing shrub-steppe values and management strategies to incorporate with farming practices that will maintain forage value and provide habitat for landbirds and other wildlife.
 - Develop criteria to be incorporated into NRCS scorecards for their incentive programs to maximize benefits to landbirds.
 - Support cooperative extension research, education, and workshops that demonstrate and promote the economic benefit of sustainable grazing and farming practices and also benefit landbirds.

-

B. Steppe (Grasslands)

Conservation Focus: Native Bunchgrass Cover

Focal Species: Grasshopper Sparrow (*Ammodramus savannarum*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for grasshopper sparrow within our planning unit occurred primarily along the eastern portions of the Columbia Plateau ERU and the northern portion of the Owyhee Uplands ERU with a small amount in the northern portion of the Great Basin (Wisdom et al. in press). Within this core of historical habitat, the current amount of source habitat has been reduced dramatically from historical levels by 91% in the Columbia Plateau and 85% in the Owyhee Uplands. Within the entire Interior Columbia Basin, overall decline in source habitats for this species (71%) was third greatest among 91 species of vertebrates analyzed (Wisdom et al. in press).

Populations:

T Anecdotal:

- may have expanded range in eastern Washington from historical occurrence only in southeastern corner of the state (Jewett et al. 1953)

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau Region: non-significant long-term (1966-1998) declining trend of 0.5%/year, and non-significant short-term (1980-1998) increasing trend of 1.1%/year

Habitat Relationships:

T Anecdotal:

- native bunchgrass with low shrub cover and agricultural grasslands (e.g., hayfields, pastures, CRP) with intermediate grass height
- present in most CRP lands older than five years in southeastern Washington (M. Denny pers. comm.)
- semi-colonial nester

T Morrow County, Columbia Basin, Oregon (Janes 1983):

- occupied relatively undisturbed native bunchgrass communities dominated by *Agropyron spicatum* and/or *Festuca idahoensis*, particularly north-facing slopes containing the lupine *Lupinus leucophilus*

T Boardman Bombing Range, Columbia Basin, Oregon (Holmes and Geupel 1998):

- most abundant species in moderately grazed and ungrazed bunchgrass habitat type; no significant difference between the two
- perennial bunchgrass cover strongest predictor of its presence
- abundance positively associated with bunchgrass cover, and total herbaceous cover
- abundance negatively associated with shrub cover and density, sagebrush cover and density, open ground, and number of sagebrush stems >2.5 cm
- proportional nest success 62% (n=37), Mayfield estimates 46%; 36 of 37 nests at base of perennial bunchgrass

T Columbia Basin, Washington, 1988-1990 (Dobler et al. 1996):

- only occurred in loamy 6-9" and sandy 6-9" range condition sites, and most abundant in the former
- no significant relationship with vegetation type (i.e., shrubs, perennial grasses, or annual grasses)

T Columbia Basin, Washington 1991-1993 (Vander Haegen et al. 2000):

- only significant relationship was with percent cover perennial grass
- more abundant in loamy soil type than sandy or shallow soils, but not significantly different
- similar abundance in good, fair, and poor range class conditions

Conservation Issues:

These are specific to grasshopper sparrow; see page 25-26 for general Conservation Issues in shrub-steppe.

T conversion of bunchgrass habitat to agriculture

T alteration of bunchgrass habitat from intensive grazing and exotic grass and forb invasions (Quigley et al. 1996)

T vulnerable because of high use of agricultural habitats (e.g., CRP) which are unreliable from year to year

T shrub encroachment on grasslands from overgrazing and fire suppression

T early season mowing of hay fields and similar agricultural lands may result in nesting failure and reduced productivity

T may be area-sensitive (Herkert 1994); large tracts of habitat more likely to support populations

Biological Objectives:

Habitat:

< ***Columbia Plateau:*** Where ecologically appropriate, initiate actions in native grasslands to maintain or provide the following conditions:

- native bunchgrass cover >15% and comprising >60% of the total grass cover
- tall bunchgrass (i.e., >25 cm [10 in] tall)
- native shrub cover < 10%

< ***Columbia Plateau:*** Manage non-native and agricultural grasslands (e.g., CRP) as potential habitat within the following conditions:

- grass-forb cover >90%
- shrub cover <10%
- variable grass heights between 6-18 in (15-46 cm)

< ***Columbia Plateau:*** Where ecologically appropriate at the landscape level, provide conditions described above in patches >40 ha (100 ac) or multiple smaller patches >8 ha (20 ac) within a mosaic of suitable grassland conditions.

Population:

< ***Columbia Plateau 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 objective for native bunchgrass and shrub cover in steppe grasslands was based on Holmes and Geupel (1998). The objective for bunchgrass height was subjectively developed based on the collective experience of several individuals. The objectives for agricultural grasslands were from westside

habitats (Altman 1999). A diverse community of native bunchgrasses and forbs provides nesting cover and insect and seed food resources. Blocks of habitat >100 acres can provide for at least 20 pairs, which may be necessary to maintain a small population for this potentially area-sensitive species (see Conservation Issues) even if area is not linked with other grasshopper sparrow populations.

Despite relatively stable trends, grasshopper sparrow use of agricultural grasslands makes it vulnerable when changes in agricultural practices occur. 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 increased abundance of grasshopper sparrow on randomly located BBS routes.

Conservation Strategies:

These are specific to grasshopper sparrow; see pages 27-30 for general Conservation Strategies in shrub-steppe.

- A high priority area for grassland and grasshopper sparrow conservation is the Palouse Prairie.
- Revegetate whenever possible to native bunchgrass cover.
- Eliminate, defer, or actively manage grazing intensity to maintain appropriate grass cover; this may include fall and winter grazing (but not spring and summer), and/or rotational systems where some fields not grazed at all.
- High priority areas for conservation are the Columbia Basin and Great Basin subprovinces
- Avoid placing agricultural grass fields adjacent to or near native bunchgrass habitat where birds may be pulled into agricultural fields that potentially function as population sinks.
- Seek to provide the largest tracts of suitable habitat possible.
- Delay mowing of suitable habitat until after July 15.
- Where treatments are occurring in grasslands (e.g., burning, mowing, chemical applications) leave adjacent untreated areas to maintain a population of associated birds until treated areas become suitable habitat again.

Species to Benefit: The primary species to benefit from native bunchgrass cover would be other grassland species such as long-billed curlew, western meadowlark, savannah sparrow, vesper sparrow, horned lark, burrowing owl, northern harrier, and short-eared owl.

Information Needs:

1. Data are needed on all aspects of nesting ecology, particularly the relationship between grazing and productivity.
2. Data are needed on whether cowbirds are impacting productivity and, if so, in what landscape and land use context.
3. Is grasshopper sparrow area-sensitive in native habitats? If so, what are the conditions under which productive populations can be maintained?

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C. Steppe-Shrubland

Conservation Focus: Interspersion Tall Shrubs and Openings

Focal Species: Loggerhead Shrike (*Lanius ludovicianus*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for loggerhead shrike included all three ERUs within our planning unit (i.e., Columbia Plateau, Northern Great Basin, and Owyhee Uplands) (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats occurred in the Columbia Plateau (25%), and Owyhee Uplands (13%), and an increase occurred in the Great Basin (11%). However, declines in big sagebrush (e.g., 50% in Columbia Plateau ERU), which likely is higher quality habitat, are masked by an increase in juniper sagebrush (>50% in Columbia Plateau ERU), which may be reduced quality habitat. Within the entire Interior Columbia Basin, overall decline in source habitats for this species was 20%, fueled largely by over 57% of watersheds showing declines in source habitats in the Upper Snake River ERU (Idaho) (Wisdom et al. in press).

Populations:

T Anecdotal:

- noticeable declines in the Lower Columbia Basin; very low recruitment into populations throughout southeastern Washington (M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau Region: highly significant ($p < 0.01$) long-term (1966-1998) declining trend of 2.7%/year, and non-significant short-term (1980-1998) declining trend of 1.8%/year

Habitat Relationships:

T Anecdotal:

- open habitat with interspersion of tall woody shrubs (e.g., sagebrush, bitterbrush) or trees (e.g., juniper) for nesting and open ground for foraging
- salt scrub and black greasewood communities in Great Basin (G. Ivey pers. comm.)
- nests in juniper trees on Cedar Mountain, Malheur County (M. Denny pers. comm.)

T Columbia Basin, Washington, 1988-1990 (Dobler et al. 1996):

- abundance positively associated with density of big sagebrush

T Columbia Basin, Washington, 1993-1994 (McConnaughey and Dobler 1994):

- optimal habitat (i.e., where highest densities occurred) was community of big sagebrush-hopsage-Sandberg bluegrass on Hanford Energy Reservation
- T Columbia Basin, Washington 1991-1993 (Vander Haegen et al. 2000):
 - abundance significantly higher with sandy soil types over loamy and shallow soils
 - abundance not significantly greater in any of the three classes of range condition (good, fair, poor)
- T Boardman Bombing Range, Columbia Basin, Oregon, (Holmes and Geupel 1998):
 - nests (n=156) predominantly in sagebrush (91.6%, n=143) with others in Russian thistle (2.6%, n=4), juniper (2.6%, n=4), ornamental shrubs (1.9%, n=3), and others (1.2 %)
 - proportional nest success 45% (n=152); Mayfield estimates 36% (n=146)
- T Hanford Energy Reservation, Columbia Basin, Washington (Poole 1992):
 - selected tall, dense live shrubs for roosts, slightly shorter live shrubs for nests, and dead shrubs for perches
 - optimal habitat late-seral big sagebrush or antelope bitterbrush within a mosaic of openings and patches of tall shrubs
 - mean nest shrub height 178.5 cm and mean sagebrush nest shrub height 164.4 cm
 - nest areas

mean shrub cover tall species	6%
mean sagebrush cover	9%
mean shrub height	121 cm
mean sagebrush height	115 cm
annual grass cover	13%
bare ground	40%
- T Yakima Training Center, Columbia Basin, Washington (Leu 1995):
 - tallest shrubs important as fledgling roost sites, nest shrubs also tall (>1 m), above mean shrub height but below tall shrub height
 - foraging success decreased with increasing amount of cheatgrass cover
- T Northern Great Basin, southeastern Oregon, 1977-1979 (Wiens and Rotenberry 1981):
 - abundance significant positive association with rock cover (p<0.001)
 - abundance significant positive association with hopsage cover (p<.01), budsage cover (p<.05), and cottonthorn cover (p<.001)
- T Southwestern Idaho (Woods and Cade 1996):
 - nests in shrubs 3 to 6 ft tall (1 to 2 m)
 - nests found in sagebrush (60%), bitterbrush (20%), and greasewood (12%)
- T Crooked River National Grasslands, High Lava Plains, 1997-1999 (R. Gerhardt unpubl. data):
 - nests (n=91) 78% in juniper, 12% in bitterbrush, 10% in sagebrush
 - mean nest height (n=91) 118 cm (range 20-290 cm)
 - proportional nest success (n=83) 67%
 - mean 4.8 young/successful nest; 3.2 young/nest attempt
 - density 3.4 breeding pairs/sq km (8.5/sq mi)

Conservation Issues:

- These are specific to loggerhead shrike; see page 25-26 for general Conservation Issues in shrub-steppe.
- T habitat loss from conversion to agriculture
 - T habitat loss from frequent fires in cheatgrass dominated sites
 - T long-term heavy grazing may ultimately reduce prey habitat and degrade the vegetation structure for nesting and roosting
 - T foraging sites, particularly for young birds, need to have open ground (bare and/or cryptogamic crusts) or little vegetative cover (Leu 1995); invasion of exotic annual grasses, particularly cheatgrass, has been detrimental

T may suffer sublethal effects (e.g., reduced reproductive output) from certain insecticides (Anderson and Duzan 1978, Yosef 1996)

T use of insecticides (e.g., for grasshopper control) may reduce prey base (Yosef 1996)

Biological Objectives:

Habitat:

< ***Columbia Plateau:* Where ecologically appropriate, initiate actions in steppe-shrubland habitat to maintain or provide the following conditions:**

- late-seral big sagebrush or bitterbrush with patches of tall shrubs (mean height of shrubs >1 m [39 in])
- <15% tall shrub cover (non-rabbitbrush)
- herbaceous cover <20% and dominated by native species
- mean open ground cover (includes bare and/or cryptogamic crusts) >30%

Population:

< ***Columbia Plateau BBS Region:* In conjunction with conservation efforts described in the Idaho Landbird Conservation Plan (Ritter 2000) and Nevada Bird Conservation Plan (Neel 1999), reverse long-term declining 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. Objectives for shrub height were based on Poole (1992), Leu (1995), and Woods and Cade (1996). The other objectives were based on Poole (1992). The objectives are most likely to be achieved in a big sagebrush site with deep soils and a more mesic moisture regime, i.e., where growing conditions are more suitable for tall shrubs (>1 m).

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 to reverse declining BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through increased abundance of loggerhead shrike on randomly located BBS routes.

Conservation Strategies:

These are specific to loggerhead shrike; see pages 27-30 for general Conservation Strategies in shrub-steppe.

- Maintain sites with patches of tall shrubs and patches of open ground.
- Avoid insecticide spraying during the breeding season in shrike nesting habitat.

- Light to moderate grazing may provide open foraging habitat, but sustained grazing will reduce habitat suitability.
- Where habitat degradation is extensive and cheatgrass cover is dominant, light grazing may provide open foraging habitat and reduce fuel loads at risk from fire, which would severely reduce sagebrush cover (Holmes and Geupel 1998).

Species to Benefit: The primary species to benefit from an interspersion of tall shrubs and openings in steppe-shrubland are sage thrasher, ferruginous hawk, lark sparrow, American kestrel, burrowing owl (edges and openings), and mourning dove.

Information Needs:

1. Nesting studies similar to that of Poole (1992), Holmes and Geupel (1998), and Woods and Cade (1996) in other shrub-steppe communities throughout the High Lava Plains, Basin and Range, and Owyhee Uplands.
2. Data are especially needed on post-fledging and over-winter survivorship to assess if a relationship exists between these factors and population declines.

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Conservation Focus: Burrows

Focal Species: Burrowing Owl (*Athene cunicularia*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for burrowing owl occurred throughout all three ERUs within our planning unit (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were most evident for the Columbia Plateau; over 72% of the watersheds had moderate or strongly declining trends, and source habitat has been reduced from historical levels by 52%. Relatively stable trends are apparent for source habitats in the Great Basin and Owyhee Uplands (4% and 11% declines, respectively). Within the entire Interior Columbia Basin, over 54% of the watersheds show moderate or strongly declining trends in source habitats (Wisdom et al. in press).

Populations:

- T Anecdotal:
 - Walla Walla County, Washington populations at an all-time recent low (M. Denny pers. comm.)
- T Breeding Bird Survey (Sauer et al. 1999):
 - Columbia Plateau Region: significant ($p < 0.05$) long-term (1966-1998) increasing trend of 16.1%/year, and non-significant short-term (1980-1998) increasing trend of 19.0%/year

Habitat Relationships:

- T Anecdotal:

- open, treeless cover types with moderate herbaceous cover and minimal shrub cover; dependent on burrows and natural cavities in rocky areas for nests sites (Rich 1986); thus linked to burrowing species such as ground squirrels, badgers, and coyotes

T Columbia Basin, Oregon (Green and Anthony 1989):

- nest areas had higher perches, less shrub cover, and less ground cover than that around potential nest sites (unused burrows)

• nest areas	mean % grass cover	mean % bare ground
cheatgrass	28	55
snakeweed	36	49
bitterbrush	-	49

T Throughout the west, a summary of grazing studies shows mixed responses to grazing in sagebrush and grassland habitats (Saab et al. 1995); will use well-grazed, early successional grasslands that emulate prairie dog towns (MacCracken et al. 1985).

Conservation Issues:

These are specific to burrowing owl; see page 25-26 for general Conservation Issues in shrub-steppe.

T control programs and recreational shooting of burrow providers such as ground squirrels, marmots, and badgers have reduced nest site availability

T dependent upon badgers for burrows in the Columbia Basin subprovince (Green and Anthony 1989); also Columbia ground squirrel (M. Denny pers. comm.)

T conversion of grasslands and shrublands to agriculture has reduced habitat availability

T impacts of agricultural chemical spraying in rangelands may lead to direct mortality (Marti and Marks 1989)

T foraging use of agriculture fields increases vulnerability to chemical contamination when foraging occurs immediately after spraying has occurred (T. Rich pers. comm.)

T human disturbances (e.g., ATV use) near nesting pairs (Green and Anthony 1989)

T domestic predators (cats and dogs)

T vehicle collisions with owls

T recreational shooting of owls

T loss of habitat and burrows has resulted in increased use of highway right-of-ways and ditch banks where they are more vulnerable to highway mortality and increased levels of predation and disturbance

T destruction of burrows through livestock trampling in sandy soils (A. Holmes unpubl. data)

Biological Objectives:

Habitat:

< ***Columbia Plateau:* Where ecologically appropriate, initiate actions in steppe-shrubland habitat to maintain or provide the following conditions:**

- healthy populations of burrow providers (e.g., badgers, ground squirrels)
- mean open ground cover (includes bare and/or cryptogamic crust) >40%
- mean native grass cover <40% and <40 cm (16 in) tall

- a 200 m (660 ft) buffer zone around nest burrows where pesticide applications, rodent control, and other human disturbances are prohibited

Population:

- < ***Columbia Plateau 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. Objectives for grass and open ground cover are based on Green and Anthony (1989).

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 increased abundance of burrowing owl on randomly located BBS routes.

Conservation Strategies:

These are specific to burrowing owl; see page 27-30 for general Conservation Strategies in shrub-steppe.

- Eliminate or discourage burrowing mammal control programs and recreational shooting within nesting habitat.
- Provide artificial burrows where burrowing mammal control programs must occur (Trulio 1995) or where burrows are naturally limited.
- Reduce or eliminate pesticide application programs near burrowing owl populations, especially in the Columbia Basin subprovince.
- Reduce grazing intensity and duration in sandy soils where burrowing owls occur.

Species to Benefit: The primary species to benefit from burrows are those that use as a prey base the species which create the burrows (e.g., ground squirrels) such as ferruginous hawk, Swainson’s hawk, golden eagle, and prairie falcon. Other species to benefit from open ground cover and limited or short grass cover include horned lark and long-billed curlew.

Information Needs:

1. Nesting studies similar to that of Green and Anthony (1989) elsewhere in the Columbia Basin, WA and throughout the High Lava Plains, Basin and Range, and Owyhee Uplands.

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Conservation Focus: Deciduous Trees and Shrubs

Focal Species: Sharp-tailed Grouse (*Tympanuchus phasianellus*)

According to the ICBEMP terrestrial vertebrate habitat analysis, historical source habitats for sharp-tailed grouse occurred throughout all of the three ERUs within our planning unit (Wisdom et al. in press). Declines in source habitats were high in the Columbia Plateau (62%), moderate in the Owyhee Uplands (24%), and relatively low in the Northern Great Basin (3%). However, declines in big sagebrush (e.g., 50% in Columbia Plateau ERU), which is likely higher quality habitat, are masked by an increase in juniper sagebrush (>50% in Columbia Plateau ERU), which is likely reduced quality habitat. Within the entire Interior Columbia Basin, over 60% of watersheds show moderately or strongly declining trends in source habitats for this species (Wisdom et al. in press).

NOTE: Only an abbreviated species account (i.e., biological objectives only) is presented because of the extensive information on this species in other sources (e.g., Meints et al. 1992, Saab and Marks 1992, Weddell 1992, Giesen and Connelly 1993, Washington Department of Fish and Wildlife 1995a, Connelly et al. 1998, McDonald 1998, Ulliman et al. 1998, Wisdom et al. in press). The following objectives are provided for coarse-level management of sagebrush habitat suitable for sharp-tailed grouse (M. Schroeder pers. comm.) and several other sagebrush obligate species. Please review the aforementioned sources for more specific recommendations for sharp-tailed grouse management.

Biological Objectives:

Habitat:

- < ***Columbia Plateau:* Where ecologically appropriate, initiate actions in steppe-shrublands to maintain or provide the following conditions:**
 - mean canopy cover 15-35% >15 cm above ground
 - mean native forb cover >10%
 - mean cover of exotic grasses and forbs <5%

-

D. Sagebrush

The conservation strategy for sagebrush uses sage grouse and sage sparrow as “umbrella” species for describing coarse-level desired habitat conditions and extent of the habitat. The umbrella species concept was used because limited structural layering in sagebrush habitat results in many similarities among bird species-habitat relationships. Thus, managing for one species (i.e., sage grouse or sage sparrow) will meet many of the habitat requirements for many other species. Sage grouse and sage sparrow were selected because they:

- historically occurred throughout sagebrush habitat in the planning unit, but now have restricted distributions, especially sage grouse;
- have relatively large area-requirements, thus there is the potential for establishing relatively large populations of most other focal species within the conservation framework for these species; and
- encompass a range of habitat conditions that overlap with most other priority sagebrush species.

Both species were used because current sage grouse distribution and potential for expansion does not include large areas of the planning unit; thus sage sparrow, also associated with large patches of high quality habitat, is a more appropriate focal species in those areas. We assumed a corresponding benefit to many species that are less area-sensitive than sage grouse and sage sparrow, but have similar habitat relationships, including other focal species. However, many sagebrush birds also partition themselves across the landscape based on relationships with other macro- and microhabitat features. Where specific habitat conditions are necessary for other focal species, these are described in each focal species account. This approach, using sage grouse and sage sparrow habitat and area-relationships as the default condition, with incorporation of management objectives for other species where ecologically appropriate and desirable, most approximates ecosystem management, and is most likely to achieve functional diversity for landbirds within the shrub-steppe ecosystem. This approach also has been used in other landbird conservation planning efforts such as sagebrush in Idaho (T. Rich and S. Ritter pers. comm.).

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Conservation Focus: Expansive Areas of High Quality Sagebrush Habitat with a Diverse Understory of Native Grasses and Forbs
Focal Species: Sage Grouse (*Centrocercus urophasianus*)

According to the ICBEMP terrestrial vertebrate habitat analysis, historical source habitats for sage grouse occurred throughout all of the three ERUs within our planning unit (Wisdom et al. in press). Declines in source habitats were moderately high in the Columbia Plateau (46%), but relatively low in the Owyhee Uplands (13%) and Northern Great Basin (7%). However, declines in big sagebrush (e.g., 50% in Columbia Plateau ERU), which is likely higher quality habitat, are masked by an increase in juniper sagebrush (>50% in Columbia Plateau ERU), which is likely reduced quality habitat. Within the entire Interior Columbia Basin, over 48% of watersheds show moderately or strongly declining trends in source habitats for this species (Wisdom et al. in press).

NOTE: Only an abbreviated species account (i.e., biological objectives only) is presented because of the extensive information on this species in other sources (e.g., Connelly 1982, Hanf et al. 1994, Washington Department of Fish and Wildlife 1995b, Idaho Department of Fish and Game 1997, Wisdom et al. in press). The following objectives are provided for coarse-level management of sagebrush habitat suitable for sage grouse (M. Schroeder pers. comm.) and several other sagebrush obligate species. Please review the aforementioned sources for more specific recommendations for sage grouse management.

Biological Objectives:

Habitat:

- < ***Columbia Plateau:* Where ecologically appropriate, initiate actions to maintain or provide the following conditions:**
 - mean sagebrush cover 10-30%
 - mean native forb cover >10%
 - mean native bunchgrass cover >10%
 - mean cover of exotic grasses and forbs <10%
 - mean open ground cover (includes bare and/or cryptogamic crust) >10%
- < ***Columbia Plateau:* Where ecologically appropriate at the landscape level, provide suitable habitat conditions as described above in patches >167 ha (400 ac).**

-

Conservation Focus: Large Patches of Contiguous Sagebrush **Focal Species: Sage Sparrow (*Amphispiza belli*)**

According to the ICBEMP terrestrial vertebrate habitat analysis, historical source habitats for sage sparrow occurred throughout most of the three ERUs within our planning unit (Wisdom et al. in press). Declines in source habitats were moderately high in the Columbia Plateau (40%), but relatively low in the Owyhee Uplands (13%) and Northern Great Basin (7%). However, declines in big sagebrush (e.g., 50% in Columbia Plateau ERU), which is likely higher quality habitat, are masked by an increase in juniper sagebrush (>50% in Columbia Plateau ERU), which is likely reduced quality habitat. Within the entire Interior Columbia Basin, over 48% of watersheds show moderately or strongly declining trends in source habitats for this species (Wisdom et al. in press).

Populations:

T Anecdotal:

T Densities:

- in sagebrush habitat on the Yakima Training Center, ranged from 33-90 birds/km² (Shapiro and Associates)
- in sagebrush habitat on Hanford Reservation, ranged from 0.23-21.03 birds/km² (Schuler et al. 1993)

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau Region: non-significant long-term (1966-1998) declining trend of 0.7%/year, and non-significant short-term (1980-1998) increasing trend of 2.9%/year

Habitat Relationships:

T Anecdotal:

- sagebrush obligate associated with sagebrush shrublands dominated by big sagebrush with perennial bunchgrasses (Paige and Ritter 1999)
- area-limited and nest primarily in large blocks of shrub-steppe in Columbia Basin of eastern Washington (M. Vander Haegen pers. comm.)
- source habitats in the Interior Columbia Basin include two structural stages of low sagebrush, big sagebrush, and mountain big sagebrush; the open canopy, low-medium shrub stage, and the closed canopy, low-medium shrub stage; the closed herbaceous structural stage of big sagebrush; juniper sagebrush, and salt desert shrub (Wisdom et al. in press)

T Boardman Bombing Range, Columbia Basin, Oregon (Holmes and Geupel 1998):

- abundance positively correlated with shrub cover, shrub density, and number of large (>2.5 cm) sagebrush stems; strongest association with shrub cover
- abundance negatively correlated with ground cover variables such as total grass cover; strongest negative association with total green ground cover; negatively associated with cheatgrass cover
- census points:

	high abundance	low abundance	absent
mean % cover litter	10.8	21.6	32.9
- proportional nest success 33% (n=12)

T Yakima Training Center, Columbia Basin, Washington (Shapiro and Associates 1996):

- abundance significantly greater in upland sagebrush habitats than in drainages
- 15 of 17 nests located in or beneath big sage in upland sage habitat (none in drainages); remaining two in spiny hopsage
- nest sites positively associated with big sage cover, perennial grass cover, and bluebunch wheatgrass cover
- mean shrub height 85 cm; mean canopy cover of nest shrubs 55%

T Columbia Basin, Washington, 1988-1990 (Dobler et al. 1996):

- abundance negatively correlated with grass cover, total green ground cover, and litter cover; strongest negative association with total green ground cover; negative relationship with cover of annual grass
- abundance positively associated with big sagebrush

T Hanford Reservation, Columbia Basin, Washington (Schuler et al. 1993):

- only species with highly significant ($p < 0.001$) relationship to shrub cover, especially sagebrush cover
- strong affinity for big sagebrush, moderate affinity for spiny hopsage, low affinity for cheatgrass

T Northern Great Basin, southeastern Oregon (Wiens and Rotenberry 1981):

- significant ($p < 0.05$) negative association with shrub species diversity
- significant ($p < .001$) positive association with sagebrush cover
- significant negative associated with cotton thorn cover ($p < .05$) and greasewood cover ($p < .001$)

T Columbia Basin, Washington 1991-1993 (Vander Haegen et al. 2000):

- significantly more abundant in loamy soil types than sandy or shallow types
- abundance significantly associated with sites with higher percent shrub cover and landscapes with a greater amount of shrub-steppe (n=38)
- absent on patches of sagebrush smaller than 130 ha (325 ac) (M. Vander Haegen unpubl. data)
- rate of cowbird parasitism only 4% (n=244) in Columbia Basin of eastern Washington (Vander Haegen and Walker 1999)
- Mayfield estimate of nest success 32% (n=367) (M. Vander Haegen unpubl. data)

T Snake River Birds of Prey National Conservation Area, southwestern Idaho (Knick and Rotenberry 1995):

- probability of presence increased with increasing spatial similarity of sites, shrub patch size, and sagebrush or shad-scale cover
- landscape features more important in predicting presence than cover values of individual shrub species, and sagebrush more important than shad-scale

- more abundant in large tracts of shrub-steppe
- T Idaho National Engineering Lab (Petersen and Best 1985):
 - strong preference for large, living shrubs
 - mean height of sagebrush nest shrubs 66 cm (n=135), rarely nested in shrubs <40 cm, never in shrubs >100 cm, but mostly in shrubs 50-100 cm, particularly 50-70 cm
 - nearly all nests located in shrubs with >75% live foliage branches
- T mean sage height in Idaho 67 cm (Rich 1980)

Conservation Issues:

These are specific to sage sparrow; see page 25-26 for general Conservation Issues in shrub-steppe.

- T sensitive to fragmentation (Knick and Rotenberry 1995); nest only in relatively large blocks of shrub-steppe (Vander Haegen et al. 2000)
- T affinity for loamy soil communities which have dense shrub layer, particularly big sagebrush (Vander Haegen et al. 2000)
- T patchy interspersion of clumped sagebrush with small openings preferred over contiguous dense sagebrush (Peterson and Best 1985, Weins et al. 1986)
- T needs tall sagebrush with high shrub cover, low grass and litter cover (Knick and Rotenberry 1995, Dobler et al. 1996)
- T most studies report a negative association with densely growing annuals such as cheatgrass (Dobler et al. 1996, Shapiro and Associates 1996, Holmes and Geupel 1998); thus actions needed to minimize or eliminate cover of annual grasses, and provide mix of open ground and perennial grasses (Shapiro and Associates 1996)
- T vulnerable to cowbird parasitism where habitat alteration provides habitat for cowbirds (Rich 1978)
- T nests early so abundance not well reflected by BBS

Biological Objectives:

Habitat:

- < ***Columbia Plateau:* Where ecologically appropriate, initiate actions to maintain or provide a sagebrush dominated canopy with the following conditions:**
 - mean sagebrush cover 10-25%
 - mean sagebrush heights >50 cm (20 in)
 - high foliage density in sagebrush shrubs
 - mean native herbaceous cover >10% with <10% cover of non-native annual grasses
 - mean open ground cover (includes bare and/or cryptogamic crust) >10%
- < ***Columbia Plateau:* Where ecologically appropriate at the landscape level, provide suitable habitat conditions described above in patches >1,000 ha (400 ac).**

Population:

< ***Columbia Plateau 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 objective for sagebrush height was based on Rich (1980), Reynolds (1981), Peterson and Best (1985) and Shapiro and Associates (1996). The objectives for sagebrush, litter, open ground, and herbaceous cover were based on Petersen and Best (1995). A diverse community of native bunchgrasses and forbs provides nesting cover and insect and seed food resources. The objective for contiguous blocks of habitat >1,000 ha (400 ac) is based on modeling of species-area relationships in the Columbia Basin of eastern Washington which indicates that sage sparrow is most likely to occur on tracts of this size (M. Vander Haegen pers. comm.).

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 increased abundance of sage sparrow on randomly located BBS routes.

Conservation Strategies:

These are specific to sage sparrow; see pages 27-30 for general Conservation Strategies in shrub-steppe.

- Maintain or restore large patches of sagebrush habitat.
- Maintain >50% of annual vegetative herbaceous growth of perennial bunchgrasses to persist throughout the following season (Saab 1995).
- On grazed lands use a rest-rotation or deferred-management scheme.
- Fire suppression should occur where there is the potential loss of sagebrush.

Species to Benefit: The primary species to benefit from large contiguous patches of sagebrush include other sagebrush obligates such as Brewer’ sparrow, sage thrasher, and sage grouse (where they occur), and species highly associated with sagebrush such as loggerhead shrike, lark sparrow, vesper sparrow, and western meadowlark.

Information Needs:

1. Data are needed on all aspects of sage sparrow nesting ecology, especially area-requirements to maintain source populations.

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Conservation Focus: Sagebrush Cover

Focal Species: Brewer's Sparrow (*Spizella breweri*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for Brewer's sparrow occurred throughout most of the three ERUs within our planning unit (Wisdom et al. in press). Declines in source habitats were moderately high in the Columbia Plateau (39%), but relatively low in the Owyhee Uplands (14%) and Northern Great Basin (5%). However, declines in big sagebrush (e.g., 50% in Columbia Plateau ERU), which is likely higher quality habitat, are masked by an increase in juniper sagebrush (>50% in Columbia Plateau ERU), which is likely reduced quality habitat. Within the entire Interior Columbia Basin, over 48% of watersheds show moderately or strongly declining trends in source habitats for this species (Wisdom et al. in press).

Populations:

T Anecdotal:

- dense breeding species throughout central and southern Malheur County, Oregon up to 2,135 m (7,000 ft) (M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau Region: highly significant ($p < 0.01$) long-term (1966-1998) declining trend of 4.8%/year, and significant ($p < 0.10$) short-term (1980-1998) declining trend of 3.4%/year

T Densities

- Northern Great Basin, southeastern Oregon (Weins and Rotenberry 1981, Rotenberry and Weins 1989): 150-300 birds/km² (390-780/mi²), but can exceed 500/km² (1,295/mi²)

Habitat Relationships:

T Anecdotal:

- sagebrush obligate where sagebrush cover is abundant
- source habitats considered in the Interior Columbia Basin include two structural stages of big sagebrush and mountain big sagebrush; open canopy, low-medium shrub, and closed canopy, low-medium shrub; the closed herbaceous structural stage of big sagebrush; juniper sagebrush; and mountain mahogany (Wisdom et al. in press)

T Columbia Basin, Washington, 1988-1990 (Dobler et al. 1996):

- abundance positively associated with big sagebrush
- abundance increased with increasing cover of big sagebrush up to 10%; then abundance steady between 10-20% cover of big sagebrush
- no association with annual grass cover

T Columbia Basin, Washington 1991-1993 (Vander Haegen et al. 2000):

- significantly more abundant in loamy soil types than sandy or shallow types
- highest abundance in fair range condition sites (not significant)
- abundance significantly associated with sites with higher percent shrub cover (n=66 sites)
- rate of cowbird parasitism only 5% (n=281) (Vander Haegen and Walker 1999)
- Mayfield estimates of nest success 39% (n=495) (M. Vander Haegen unpubl. data): evidence for lower reproductive success in fragmented landscapes (M. Vander Haegen pers. comm.)

T Snake River Birds of Prey National Conservation Area, southwestern Idaho (Knick and Rotenberry 1995):

- probability of presence increased with increasing values of shrub cover and shrub patch size; shrub cover most important determinant of occupancy

T Northern Great Basin, southeastern Oregon, 1977-1979 (Wiens and Rotenberry 1981):

- significant ($p < 0.001$) negative association with shrub species diversity

- significant ($p < 0.05$) negative association with rock cover
 - significant ($p < .01$) negative association with hopsage cover
 - significant ($p < .05$) negative association with budsage cover
- T South Okanogan, Canada (Sarell and McGuinness 1996):
- 55% of breeding territories in areas of fair range condition, 31% in good, and 14% in poor
 - 48% of detections in 10-30% sagebrush cover, 32% in <10% cover, and 20% in >30% cover
 - mean sagebrush height 110 cm (range 64-170 cm, $n=25$)
- T Idaho National Engineering Lab, southeastern Idaho:
- mean sagebrush height 69 cm ($n=58$); 93% of nest shrubs >50cm tall (Peterson and Best 1985)
 - mean sagebrush height 65 cm ($n=7$) (Reynolds 1981)
 - mean sagebrush height in Idaho 67 cm (Rich 1980)
- T Central Montana (Feist 1968):
- mean sagebrush height 47 cm (18.5 in) (range 30-64, $n=27$)

Conservation Issues:

These are specific to Brewer's sparrow; see page 25-26 for general Conservation Issues in shrub-steppe.

T removal of sagebrush below 10% cover adversely affects populations, although species is persistent where incomplete loss of sagebrush creates patchy islands of habitat (Peterson and Best 1987); thus not as sensitive to fragmentation as sage sparrow (i.e., will occur in smaller patches but most abundant in larger patches) (Knick and Rotenberry 1995), but sensitive to cover of sagebrush (i.e., will use small patches of sagebrush if cover and height are adequate)

T vulnerable to cowbird parasitism where habitat alteration provides habitat for cowbirds (Rich 1978)

T vulnerable to trampling of nests by cattle

T needs tall sagebrush with high shrub cover, low grass and litter cover; thus continuous cheatgrass cover detrimental

T patchy interspersion of clumped sagebrush with small openings preferred over contiguous dense sagebrush, which probably provides too much cover

Biological Objectives:

Habitat:

< ***Columbia Plateau:* Where ecologically appropriate, initiate actions in sagebrush habitat to maintain or provide the following conditions:**

- mean cover sagebrush 10-30% and in patches rather than evenly distributed
- mean height sagebrush >60 cm (24 in)
- high foliage density in sagebrush shrubs
- mean native herbaceous cover >10% with <10% cover of non-native annual grasses
- mean open ground cover (includes bare and/or cryptogamic crust) >20%

- < ***Columbia Plateau:*** Where ecologically appropriate at the landscape level, provide suitable habitat conditions described above in patches >8 ha (20 ac)

Population:

- < ***Columbia Plateau BBS Region:*** In conjunction with conservation efforts in the Idaho Landbird Conservation Plan (Ritter 2000) and Nevada Bird Conservation Plan (Neel 1999), reverse long-term declining 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. In this case, ideal sites would have loamy soils, <30% slope, and <30% rock cover. The objectives for cover of sagebrush, open ground, rock surface, and percent slope are based on Short (1984; with pers. comm. from T. Rich). The objective for sagebrush height is based on Rich (1980), Reynolds (1981), and Petersen and Best 1985). Blocks of habitat >8 ha (20 ac) can provide for several pairs, which may be sufficient to maintain a small population even if area is not linked with other Brewer’s sparrow populations.

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 reversing declining BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through increased abundance of Brewer’s sparrow on randomly located BBS routes.

Conservation Strategies:

These are specific to Brewer’s sparrow; see pages 27-30 for general Conservation Strategies in shrub-steppe.

- Maintain conditions in areas relatively free from cheatgrass by minimizing soil disturbance from grazing
- Fire suppression should occur where there is the potential loss of sagebrush.

Species to Benefit: The primary species to benefit from extensive sagebrush cover include sagebrush obligates sage sparrow, sage thrasher, and sage grouse (where they occur), and species highly associated with sagebrush such as loggerhead shrike, lark sparrow, and western meadowlark.

Information Needs:

1. Data are needed on all aspects of Brewer’s sparrow nesting ecology, particularly relationship to livestock grazing and pesticide use.

2. An assessment of factors contributing to poor nest success (Rich 1980, Reynolds 1981).
3. An assessment of the viability of small populations in fragments of habitat versus those in large contiguous blocks.
4. What role, if any, does cryptogamic crust provide?

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Conservation Focus: Sagebrush Height

Focal Species: Sage Thrasher (*Oreoscoptes montanus*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for sage thrasher occurred throughout most of the three ERUs within our planning unit (Wisdom et al. in press). Declines in source habitats were moderately high in the Columbia Plateau (40%), but relatively low in the Owyhee Uplands (15%) and Northern Great Basin (5%). However, declines in big sagebrush (e.g., 50% in Columbia Plateau ERU), which is likely higher quality habitat, are masked by an increase in juniper sagebrush (>50% in Columbia Plateau ERU), which is likely reduced quality habitat. Within the entire Interior Columbia Basin, over 48% of watersheds show moderately or strongly declining trends in source habitats for this species (Wisdom et al. in press).

Populations:

T Anecdotal:

- present only as a migrant in southeastern Washington (Walla Walla, Columbia, and Garfield Counties) (M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau Region: non-significant long-term (1966-1998) increasing trend of 1.1%/year, and non-significant short-term (1980-1998) increasing trend of 0.1%/year

T Densities:

- within sagebrush habitat on the Yakima Training Center (>600m elevation) ranged from 17-31 birds/km² (Shapiro and Associates)
- Hanford Reservation 0.17-0.23 birds/km² (Schuler et al. 1993)

Habitat Relationships:

T Anecdotal:

- sagebrush obligate; almost always associated with sagebrush shrubland communities dominated by big sagebrush
- for nests, prefers tallest, densest clump of shrubs available surrounded by little bare ground (Paige and Ritter 1999)
- abundant in northern Malheur County, OR in mix of bitterbrush and sage (M. Denny pers. comm.)
- source habitats considered in the Interior Columbia Basin include two structural stages of big sagebrush and mountain big sagebrush; open canopy, low-medium shrub, and closed canopy, low-medium shrub; the closed herbaceous structural stage of big sagebrush; and juniper sagebrush (Wisdom et al. in press)

T Columbia Basin, Washington, 1988-1990 (Dobler et al. 1996):

- abundance negatively correlated with annual grass cover ($p < 0.001$), and perennial grass cover ($p < 0.05$)
- abundance significantly ($p < 0.001$) associated with big sagebrush cover

- most abundant where sagebrush cover was mean of 11.3% (this approximates presumed historical cover); cover above or below this level reduced abundance; cover <3% and >19% poorest
- T Columbia Basin, Washington 1991-1993 (Vander Haegen et al. 2000):
 - abundance significantly higher in shallow and loamy sandy soil types than sandy soils
 - abundance significantly greater in good and fair range condition classes than in poor sites
 - abundance significantly positively associated with sites with higher percent shrub cover (n=37 sites)
 - abundance negatively associated with increasing proportion of shrub-steppe in the landscape (n=37 sites)
 - 95 nests monitored with no cowbird parasitism (Vander Haegen and Walker 1999)
 - Mayfield estimate of nest success 38% (n=128) (M. Vander Haegen pers. comm.); evidence for lower reproductive success in fragmented landscapes (M. Vander Haegen unpubl. data.)
- T Yakima Training Center, Columbia Basin, Washington (Shapiro and Associates 1996):
 - abundance significantly greater in high elevation (600-1,100 m) than low elevation (<600 m) sagebrush habitats
 - nest sites positively associated with big sage height and cover, and overall shrub and litter cover
 - nest sites negatively associated with bare ground cover
 - nest shrubs were significantly taller and had greater canopy cover than random shrubs
 - nest shrubs 76-240 cm tall (mean =118 cm, n=38); 88% in or under shrubs >90 cm tall
 - mean nest shrub canopy cover 74%; nearly all nest shrubs were living; all nests (n=38) located in or beneath big sage
- T Boardman Bombing Range, Columbia Basin, Oregon (Holmes and Geupel 1998):
 - detections were few and inconsistently timed, likely due to low elevation
- T Northern Great Basin, southeastern Oregon, 1977-1979 (Wiens and Rotenberry 1981):
 - significant (p<0.05) positive association with several “shrubbiness” measures
 - significant (p<0.05) positive association with several measures of vertical heterogeneity
 - significant (p<.01) negative association with hopsage cover
 - significant (p<.05) negative association with budsage cover
- T Snake River Birds of Prey National Conservation Area, southwestern Idaho (Knick and Rotenberry 1995):
 - probability of presence increased with increasing spatial similarity of sites within 1km, and local cover of sagebrush
 - will use discontinuous, patchy habitats in a matrix of other habitat types, but probability of habitat occupancy increases with patch size
 - mean sagebrush height 83.6 cm (n=114) in Idaho (Rich 1980)
 - mean sagebrush height 89 cm (n=19) in southeastern Idaho at Idaho National Engineering Lab (Reynolds 1981)

Conservation Issues:

- These are specific to sage thrasher; see page 25-26 for general Conservation Issues in shrub-steppe.
- T significantly less abundant on poor condition sites suggesting an affinity for less disturbed communities (Vander Hagen et al. 2000)
 - T elevation may optimize conservation with emphasis on higher sites (e.g., > 600m); this may be due to increased moisture and growth at higher elevations (Shapiro and Associates 1996)
 - T fragmentation: not area-limited in eastern Washington, exhibited positive relationship with fragmentation; will nest in small (<10ha) shrub-steppe fragments in an agricultural matrix and not impacted by cowbird parasitism (Vander Haegen and Walker 1999; Vander Haegen et al. 2000); however, in Idaho shrub-steppe where fragmentation due to fire and cheatgrass invasion, negatively associated with fragmentation (Knick and Rotenberry 1995)
 - T reject cowbird eggs (Rich and Rothstein 1985)

Biological Objectives:

Habitat:

- < ***Columbia Plateau:*** Where ecologically appropriate, initiate actions in sagebrush habitat to maintain or provide the following conditions:
 - mean cover of big sagebrush 5-20%, clumped rather than dispersed
 - mean height of sagebrush >80 cm (31 in) with patches of taller shrubs
 - high foliage density in taller sagebrush shrubs
 - mean native herbaceous cover 5-20% with <10% cover of non-native annual grasses
 - <10% cover of other shrubs such as spiny hopsage, budsage
- < ***Columbia Plateau:*** Where ecologically appropriate at the landscape level, maintain patches of suitable habitat >16 ha (40 ac) to enhance likelihood of small populations.

Population:

- < ***Columbia Plateau 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. Particularly appropriate sites might be those with shallow and loamy sandy soil types (Vander Haegen et al. 2000). The objective for sagebrush height is based on Rich (1980), Reynolds (1981), and Shapiro and Associates (1996). The objective for sagebrush cover is based on Dobler et al. (1996). A diverse community of native bunchgrasses and forbs provides nesting cover and insect and seed food resources. Blocks of habitat >16 ha (40 ac) may be sufficient to maintain a small population even if area is not linked with other sage thrasher populations.

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 increased abundance of sage thrasher on randomly located BBS routes.

Conservation Strategies:

These are specific to sage thrasher; see page 27-30 for general Conservation Strategies in shrub-steppe.

- Fire suppression should occur where there is the potential loss of sagebrush.
- Maintain >50% of annual vegetative herbaceous growth of perennial bunchgrasses to persist throughout the following season (Saab 1995).
- On grazed lands use a rest-rotation or deferred-management scheme.

Species to Benefit: The primary species to benefit from tall sagebrush are other sagebrush obligates such as sage sparrow, Brewer's sparrow, and sage grouse (where they occur), and species highly associated with sagebrush such as loggerhead shrike, and lark sparrow.

Information Needs:

1. Data are needed on all aspects of sage thrasher nesting ecology, particularly their response to livestock grazing
2. Assess the viability of small populations in fragments of habitat versus those in large contiguous blocks.
3. Assess the response (both numerically and in terms of productivity) to various levels of grazing.

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E. Shrublands

Conservation Focus: Ecotonal Edges of Herbaceous, Shrub, and Tree Habitats

Focal Species: Lark Sparrow (*Chondestes grammacus*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for lark sparrow occurred throughout all three ERUs within our planning unit (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were most evident for the Columbia Plateau; over 72% of the watersheds had moderate or strongly declining trends, and source habitat has been reduced from historical levels by 49%. Relatively stable trends are apparent for source habitats in the Great Basin and Owyhee Uplands (1% and 16% declines, respectively). Within the entire Interior Columbia Basin, over 54% of the watersheds show moderate or strongly declining trends in source habitats (Wisdom et al. in press).

Populations:

T Anecdotal:

- only small populations in southeast Washington; east of the Columbia River and south of the Snake River (M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999)

- Columbia Plateau Region: significant ($p < .01$) long-term (1966-1998) declining trend of 2.5%/year, and significant ($p < .01$) short-term (1980-1998) declining trend of 5.1%/year

Habitat Relationships:

T Anecdotal:

- structurally open habitats or ecotones; grass-herbaceous ground covering containing or adjoining scattered shrubs and/or trees; shows affinity to shrub-steppe with 1-2 meter vertical structure adjoining woodlands and/or grasslands; in some areas may be a good indicator of disturbed or successional habitats (Martin and Parrish 2000)
- dry, sparsely vegetated slopes in southeast Oregon (M. Denny pers. comm.)

T Columbia Basin, Washington:

- Mayfield estimate of nest success 27% (n=35) (M. Vander Haegen pers. comm.); evidence for lower reproductive success in fragmented landscapes (M. Vander Haegen unpubl. data)

T Columbia Basin, Oregon (Holmes and Geupel 1999):

- associated primarily with bitterbrush and sagebrush cover types; uncommon in rabbitbrush dominated areas
- more abundant in grazed sagebrush than ungrazed
- positively associated with bare ground and sagebrush cover ($p < .05$); negatively associated with grass cover ($p < .01$)
- proportional nest success 32% (n=19); Mayfield estimate of nest success 30% (n=18); 10% cowbird parasitism

T Arizona (Bock and Webb 1984):

- more abundant in grazed habitats
- generally observed in grass cover <15cm high, areas of bare ground, and in large areas with <3% shrub cover (but generally near shrubs)

Conservation Issues:

These are specific to lark sparrow; see page 25-26 for general Conservation Issues in shrub-steppe.

T degradation of habitat through exotic weed invasions

T long-term fire suppression in some locations alters the patterns of natural plant succession allowing communities to grow to dense stands, thereby reducing edge habitat preferred by lark sparrows (Martin and Parrish 2000)

T while some fire may help maintain edges used by lark sparrows, they will abandon nesting grounds where fire reduces shrub structure and area becomes dominated by dense exotic weeds (Martin and Parrish 2000)

T susceptible to cowbird parasitism, which is of special concern given affinity for grazed/disturbed habitat

Biological Objectives:

Habitat:

< ***Columbia Plateau:*** Where ecologically appropriate, initiate actions in shrubland habitat to maintain or provide the following conditions:

- edge habitat within a mosaic of growth forms (i.e., open wooded, grassland, and/or shrub-steppe) where no growth form exceeds 50% of the cover of the area
- mean open ground cover (includes bare and/or cryptogamic crust) >20%

Population:

< ***Columbia Plateau BBS Region:*** In conjunction with conservation efforts in the Idaho Landbird Conservation Plan (Ritter 2000) and the Nevada Bird Conservation Plan (Neel 1999), reverse long-term declining 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. 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 reversing declining BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through increased abundance of lark sparrow on randomly located BBS routes.

Conservation Strategies:

These are specific to lark sparrow; see pages 27-30 for general Conservation Strategies in shrub-steppe.

- To prevent degradation of shrub-steppe through invasion of cheatgrass and other annuals, eliminate or minimize grazing induced soil disturbance on sites where native herbaceous vegetation still dominates.
- Use exotic weed control and replant with native perennials to restore degraded habitat.

Species to Benefit: The primary species to benefit from ecotonal habitats in shrublands such as patches of sagebrush embedded in areas of primarily grassland include loggerhead shrike and burrowing owl.

Information Needs:

1. Data are needed on all aspects of lark sparrow nesting ecology and habitat relationships in shrub-steppe.
2. Studies addressing impacts of cowbird parasitism in the context of landscape characteristics and grazing.
3. Information on over-wintering survival and winter habitat needs.

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Conservation Focus: Upland, Sparsely Vegetated Desert Scrub

Focal Species: Black-Throated Sparrow (*Amphispiza bilineata*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for black-throated sparrow were localized within the three ERUs within our planning unit, mostly in the southern portion of the Owyhee Uplands and Northern Great Basin ERUs, and in an area of the Columbia Plateau ERU in south-central Washington (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were most evident for the Columbia Plateau; source habitat has been reduced from historical levels by 43%. Relatively stable trends are apparent for source habitats in the

Great Basin and Owyhee Uplands (6% and 14% declines, respectively). Within the entire Interior Columbia Basin, over 33% of the watersheds show moderate or strongly declining trends in source habitats (Wisdom et al. in press).

Populations:

T Anecdotal:

- small population breeds in the central Columbia Basin in Yakima, Kittitas, and Franklin Counties along the Columbia River between Priest Rapids and Vantage, Washington (M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999)

- Columbia Plateau Region: significant ($p < .10$) long-term (1966-1998) declining trend of 7.8%/year, and non-significant short-term (1980-1998) declining trend of 5.2%/year

Habitat Relationships:

T Anecdotal:

- dry rocky sites, often upland slopes with sparse vegetative cover, usually any type of low-growing shrub (Liverman 1983)
- salt desert scrub (G. Ivey pers. comm.)
- in southeast Washington found on steep slopes with hop sage and buckwheat (M. Denny pers. comm.)
- source habitats include big sagebrush and salt desert scrub (Wisdom et al. in press)

T Positive numerical response to moderate livestock grazing (Saab et al. 1995).

Conservation Issues:

These are specific to black-throated sparrow; see page 25-26 for general Conservation Issues in shrub-steppe.

T degradation of desert shrub habitat from exotic weed invasions

T invasion and seeding of crested wheatgrass reduces habitat suitability

Biological Objectives:

Habitat:

< ***Great Basin: Where ecologically appropriate, initiate actions in desert scrub habitat to maintain or provide the following conditions:***

- shrub cover <20%
- herbaceous cover <25% with <15 % in non-native annual grass cover
- mean open ground cover (includes bare and/or cryptogamic crusts) >40%

Population:

< ***Columbia Plateau BBS Region: In conjunction with conservation efforts in the Idaho Landbird Conservation Plan (Ritter 2000) and Nevada Bird Conservation Plan (Neel 1999), reverse long-term declining 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. This typically includes dry rocky hillside slopes with sparse vegetative cover and scattered low-growing shrubs.

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 reversing declining BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through increased abundance of black-throated sparrow on randomly located BBS routes.

Conservation Strategies:

These are specific to black-throated sparrow; see pages 27-30 for general Conservation Strategies in shrub-steppe.

- Use exotic weed control and shrub planting where ecologically appropriate to restore habitat.

Species to Benefit: The primary species to benefit in upland desert scrub habitats would be lark sparrow, prairie falcon, and rock wren (Liverman 1983). Others to benefit to a lesser degree would include horned lark, mourning dove, common nighthawk, common poorwill, and loggerhead shrike.

Information Needs:

1. Data are needed on all aspects of black-throated sparrow nesting ecology and habitat relationships.

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F. Juniper-Sage/Steppe

Conservation Focus: Scattered Mature Juniper Trees (Savanna)

Focal Species: Ferruginous Hawk (*Buteo regalis*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for ferruginous hawk occurred throughout all three ERUs within our planning unit (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats were most evident for the Columbia Plateau; over 72% of the watersheds had moderate or strongly declining trends, and source habitat has been reduced from historical levels by 53%. Relatively stable trends are apparent for source habitats in the Great Basin and Owyhee Uplands (4% and 8% declines, respectively). Within the entire Interior Columbia Basin, over 54% of the watersheds show moderate or strongly declining trends in source habitats (Wisdom et al. in press).

Populations:

T Anecdotal:

T Breeding Bird Survey (Sauer et al. 1999)

- Columbia Plateau Region: highly significant ($p < .01$) long-term (1966-1998) increasing trend of 6.0%/year, and non-significant short-term (1980-1998) increasing trend of 1.0%/year

T Apparently were more abundant in the early 1900s in Oregon (Gabrielson and Jewett 1940, Marshall et al. 1996).

T Abundance during nesting season significantly increased 1975-1993 in Harney County, Oregon (Keister and Ivey 1994).

Habitat Relationships:

T Anecdotal:

- optimal habitat is extreme ungrazed or lightly grazed prairie or sagebrush shrublands with nesting sites that command a view (Gilmer and Stewart 1983)
- open, arid grasslands and shrublands with suitable nest sites in scattered juniper trees, rocky outcrops, and cliffs (Atkinson 1995)
- abundance in Harney County highest during years of high jackrabbit abundance (Keister and Ivey 1994)

T HSI Model (Jasikoff (1982):

- availability of trees or large shrubs (>1m tall) most important factor for nesting
- areas with rolling terrain provide optimum ground nest sites, if trees are not available as nest sites
- prey availability is determined by the abundance and accessibility of prey, which is determined by the height and density of vegetation (i.e., a mix of heights and densities optimizes prey abundance and minimizes hunting interference)

Conservation Issues:

These are specific to ferruginous hawk; see page 25-26 for general Conservation Issues in shrub-steppe.

T conversion of native grassland to agricultural land

T extreme sensitivity to human disturbance during nesting season (Jasikoff 1982, Olendorff 1993, and many others)

T breeding density and productivity tracks the abundance of its major prey (Bechard and Schmutz 1995); thus can experience wide fluctuations in populations associated with cyclic prey species

T prey populations (e.g., ground squirrels and jackrabbits) have declined for a number of reasons including control programs and recreational shooting, and invasions of exotic plants which have degraded habitat for some prey species (Atkinson 1995); although gophers in alfalfa fields are being used as alternative prey (G. Ivey pers. comm.)

T habitat loss of grasslands to sagebrush from overgrazing

T conversion of juniper savanna to juniper woodland through fire suppression

T loss of isolated mature juniper trees from cutting to open grazing areas and trampling of roots by cattle seeking shade

T loss of adult birds from secondary poisoning of prey species

Biological Objectives:

Habitat:

- < ***Columbia Plateau:*** Where ecologically appropriate, initiate actions in juniper-steppe to maintain or provide the following conditions:
 - isolated, mature juniper trees with a density of >1/1.6 km (1 mi)
 - native perennial grasses and other herbaceous and low shrub cover between 15-60 cm (6-24 in) that supports populations of ground squirrels and jackrabbits
 - a buffer zone of 1 km (0.6 mi) around nest sites where pesticide applications, rodent control, recreational activities, and other human disturbances are prohibited
- < ***Columbia Plateau:*** Where cropland occurs within otherwise suitable nesting habitat (i.e., ground cover and nesting substrates as described above), maintain <75% of the area in cropland and maintain crop field sizes <16 ha (40 ac) for optimal prey abundance and to increase edge and interspersed of habitats.

Population:

- < ***Columbia Plateau 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 objectives for tree density and vegetation height are from Jasikoff (1982). The objective for maintaining rodent populations assumes that providing nesting habitat structures alone will not ensure populations. The objective for cropland size (Jasikoff 1982) assumes that adequate cover for prey species that forage in croplands is reduced as fields get larger and distance to cover gets greater. Thus, prey species abundance also gets smaller in larger fields. The limiting objective for percent of the area in cropland allows for diversification of habitats and potential prey. The objective for buffer zones is from Suter and Jones (1981).

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 increased abundance of ferruginous hawk on randomly located BBS routes.

Conservation Strategies:

These are specific to ferruginous hawk; see pages 27-30 for general Conservation Strategies in shrub-steppe.

- Retain and protect isolated mature and old-growth juniper trees when they occur within areas that otherwise meet habitat suitability for ferruginous hawk.

- Protect isolated mature juniper trees in suitable ferruginous hawk habitat from degradation by animals seeking shade and rubbing posts by constructing fenced enclosures (Jasikoff 1982).
- Eliminate or discourage mammal control programs and recreational shooting within suitable nesting habitat for ferruginous hawk.
- Where opportunities occur and it is ecologically appropriate (i.e., where fire suppression has changed historic juniper savanna to juniper woodland), initiate actions (i.e., mechanical clearing) to reestablish juniper savanna and sustain it (i.e., fire).
- Where nesting structures have been lost or otherwise made unavailable, impacts can be mitigated with the use of artificial nesting structures.

Species to Benefit: The primary species to benefit from scattered juniper trees in steppe shrublands include Swainson's hawk, American kestrel, red-tailed hawk, mourning dove, loggerhead shrike, ash-throated flycatcher, gray flycatcher, and western kingbird.

Information Needs:

1. Data are needed on relationship of prey species with ferruginous hawk nesting densities and success in native and non-native landscapes.

-

G. Riparian

1. Conservation Issues (Riparian):

T habitat loss due to numerous factors such as riverine recreational developments, inundation from impoundments, cutting and spraying for eased access to water courses, gravel mining, etc.
 T habitat alteration from 1) hydrological diversions and control of natural flooding regimes (e.g., dams) resulting in reduced stream flows and reduction of overall area of riparian habitat, loss of vertical stratification in riparian vegetation, and lack of recruitment of young cottonwoods, ash, willows, etc., and 2) stream bank stabilization which narrows stream channel, reduces the flood zone, and reduces extent of riparian vegetation

T habitat degradation from livestock overgrazing which can widen channels, raise water temperatures, reduce understory cover, etc.

T habitat degradation from conversion of native riparian shrub and herbaceous vegetation to invasive exotics such as reed canary grass, purple loosestrife, perennial pepperweed, salt cedar, indigo bush, and Russian olive

T fragmentation and loss of large tracts necessary for area-sensitive species such as yellow-billed cuckoo

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 cavity-nesting species such as Lewis' woodpecker, downy woodpecker, and tree swallow, even when outcome of the competition is successful for these species

T recreational disturbances (e.g., ORVs), particularly during nesting season, and particularly in high-use recreation areas

2. Biological Objectives (Riparian):

- < **Institutionalize a policy of “no net loss” of riparian habitat (i.e., discourage loss and conversion of habitat, but when unavoidable, mitigate with equal or greater restoration efforts).**
- < **Maintain existing areas of moderate to high quality riparian habitat comprised of native species in naturally occurring diversity.**
- < **Actively manage to sustain quality riparian habitat and to prevent invasions of exotic vegetation.**
- < **Initiate actions to increase high quality riparian habitat through restoration of degraded riparian habitat (see Conservation Strategies below).**
- < **Maintain all tracts of contiguous cottonwood gallery forest >50 acres, regardless of understory composition.**
- < **Maintain multiple vegetation layers and all age classes (e.g., seedlings, saplings, mature, and decadent plants) in riparian woodlands.**
- < **Initiate actions to increase size (width and length) and connectivity of existing riparian patches (i.e., reduce fragmentation) through restoration and acquisition efforts.**
- < **Reduce the presence of Russian olive trees where native vegetation (e.g., willows) is ecologically appropriate through a long-term restoration strategy that considers timing of actions (outside breeding season) and the need to maintain some areas of existing habitat until native vegetation can provide suitable habitat.**
- < **At the landscape level, seek to maintain or restore >30% of the historical extent of each riparian system to conditions that support healthy (source) populations of appropriate 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., flooding) and some restoration activities that result in short-term “loss” are not considered here.

3. Conservation Strategies (Riparian):

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

◦ *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.

◦ *Research Coordination:*

- Coordinate research activities between government and private lands.

◦ *Conservation Areas:*

- Seek to expand riparian focal species distribution and abundance throughout the Columbia Plateau by establishing Riparian Bird Conservation Areas (RBCAs) and promoting their proper management (see Appendix B).

◦ *Acquisition/Restoration:*

- Support partnerships that seek to acquire/restore riparian habitat (e.g., TNC, State, BLM and private partnerships in the Moses Coulee/Beezley Hills area, Douglas County, Washington).
- Develop conservation agreements with private landowners to enhance the quality of riparian habitat.
- Seek to maximize contiguous area of riparian habitat, and thus minimize fragmentation. The larger the area, the greater the likelihood of maintaining populations of area-sensitive and large territory species such as yellow-billed cuckoo.
- Develop a riparian “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 native species and local seed sources in restoration.

◦ *Management:*

- Leave upland buffer zones of uncultivated and unharvested areas adjacent to riparian habitats to protect the stream and increase habitat for area-sensitive bird species.

◦ *Hydrology:*

- Restore natural hydrological regimes where possible or initiate actions to mimic natural flood events (e.g., dam releases to flood according to natural hydrologic periods).

- Avoid or prohibit stream and bank channelization projects that result in the destruction of floodplain vegetation.
- Where restoration of natural hydrologic regimes is not possible, establish horticultural restoration projects (plantings) of multiple species of shrubs and trees to mimic natural plant diversity and structure.
- Discourage cowbird use with habitat modifications - e.g., higher grass heights.
- Conduct removal of exotic species (e.g., Russian olive, reed canary grass) at appropriate times (i.e., outside breeding season).
- *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.
 - Limit the application of fertilizers, pesticides and herbicides in the riparian zone to invasive non-native species (e.g., reed canary grass) in conjunction with habitat enhancement projects which include long-term solutions such as planting trees and shrubs to eventually shade-out future infestations.
- *Grazing:*
 - Complete removal (i.e., exclusion) of livestock grazing in the riparian zone is the best option for maintaining riparian health.
 - Where complete livestock removal is not implemented, limit grazing intensity to levels that maintain the integrity of native species composition and health; this level may vary from site to site.
 - Where complete livestock removal is not implemented, fall short-term light to moderate grazing (<30% use) is better than summer-season long and summer-short-term, and may be most compatible with maintaining willow-dominated riparian habitat - thus, grazing should occur during vegetation dormancy (fall, winter, early spring) and not during breeding season April 15 - August 1.
 - Permanently exclude livestock grazing from riparian areas that have low recovery potential, are already badly degraded, or are critically important to bird populations. Consider retirement of grazing allotments when they come up for renewal, especially where habitat degradation is occurring and/or where cowbirds are common.
- *Recreation:*

- Minimize timing and extent of human recreation in important riparian bird habitat during the nesting season.
- *Prioritization*: In general, the highest priority for restoration is to expand habitat and riparian 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 RBCA
 - benefit to multiple riparian 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, intact or manageable hydrology).
- *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 shrub-steppe bird habitat.
 - Increase the amount of land under incentives programs for wildlife habitat, targeting land within or adjacent to RBCAs.
 - Support existing programs and develop new economic incentive programs to solicit conservation and management agreements with private landowners to certify their land as a RBCA.
- *Education/Outreach*:
 - Develop brochures or other educational materials for private landowners describing riparian values and management strategies to provide habitat for landbirds and other wildlife.
 - Develop criteria to be incorporated into NRCS scorecards for their incentive programs to maximize benefits to landbirds.

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H. Riparian Woodland

Conservation Focus: Large Snags (Cottonwood) in Riparian Woodland

Focal Species: Lewis' Woodpecker (*Melanerpes lewis*)

According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for Lewis' woodpecker occurred in most watersheds of the three ERUs within our planning unit (Wisdom et al. in press). Within this core of historical habitat, declines in source habitats has been strongly reduced from historical levels, including 97% in the Columbia Plateau and 95% in the Owyhee Uplands. Within the entire Interior Columbia Basin, overall decline in source habitats for this species was the greatest among 91 species of vertebrates analyzed (Wisdom et al. in press).

Populations:

- T Anecdotal:
 - largely extirpated from the lower Columbia Basin (M. Denny pers. comm.)
- T Breeding Bird Survey (Sauer et al. 1999):
 - insufficient sample size for trends in the Columbia Plateau 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):
 - mean nest tree height in oaks 32 ft (range 10-50)
 - mean dbh nest tree 22 in (range 13-39)
 - canopy cover around oak nest trees mostly <30%
- T HSI Model optimum habitat (range wide) (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 55-56 for general Conservation Issues in riparian habitat.

- T currently low breeding populations in riparian cottonwood throughout the Columbia Plateau
- T habitat suitability highly dependent upon food supply (i.e., insect abundance in riparian habitat) (Bock 1970)
- T grazing in riparian areas may eliminate brushy undergrowth, important for insect productivity
- T management practices may eliminate snags that are important for nest cavities

T salvage of snags and scarred trees in burns up slope from riparian areas may reduce suitability of riparian habitat

T competition from starlings has eliminated populations

Biological Objectives:

Habitat:

- ***Columbia Plateau:* Where ecologically appropriate, initiate actions in riparian woodland to maintain or provide the following conditions:**
 - >2 snags/ha (0.8/ac) >16 in (41 cm) dbh
 - >2 trees/ha (0.8/ac) >21in (53 cm) dbh; especially cottonwood trees
 - tree canopy cover 10-40%
 - shrub cover 30-80%
- ***Columbia Plateau:* Where cornfields occur within 1.6 km (1 mi) of suitable riparian habitat, and Lewis' woodpecker's are known or suspected to winter, leave corn unharvested through winter, or if harvested, leave stubble through winter.**

Population:

- ***Columbia Plateau:* Maintain existing populations and initiate actions to establish several pairs (i.e., >5 pairs) in at least 2 new locations in riparian woodland in each subprovince in the next 25 years (by 2025).**

Assumptions/Rationale: “Ecologically appropriate” refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. Biological objectives for snags, trees, canopy cover, and shrub cover are slightly modified from Galen (1989) and Sousa (1983). The objective regarding cornfields is to provide a suitable winter mast source, essential for year-round presence of Lewis' woodpeckers.

Existing reproductively viable populations can function as sources for individuals to recruit into new areas. The initial riparian woodland sites targeted for population expansion should have mature cottonwood trees or young trees that can mature in the next 25 years, and be ecologically appropriate to manage for canopy and shrub cover conditions. Snag creation may be necessary where the other conditions are available but snags are the limiting factor.

Conservation Strategies:

These are specific to Lewis' woodpecker; see pages 57-59 for general Conservation Strategies in riparian habitat.

- Eliminate or minimize pesticide spraying within territories of nesting pairs, which may reduce insect prey base.
- Retain fire-burned trees when they occur in proximity to suitable riparian habitat.

- Retain standing dead or diseased trees where they occur.
- Where snags are a limiting factor, initiate appropriate snag creation activities (e.g., fungal inoculations, girdling, topping) to provide nest cavity sites.
- Use underburning or other techniques to promote a shrubby understory for insect production.
- Avoid or minimize brush control of the riparian understory.
- Eliminate or manage livestock grazing in the riparian zone to ensure succession and recruitment of young cottonwoods.

Species to Benefit: The principal species to benefit from cottonwood snags in riparian woodland include cavity-associated species such as ash-throated flycatcher, tree swallow, downy woodpecker, house wren, and northern flicker.

Information Needs:

1. Data are needed on all aspects of Lewis' woodpecker nesting ecology in riparian woodlands.

-

Conservation Focus: Large Canopy Trees in Riparian Woodland

Focal Species: Bullock's Oriole (*Icterus galbula*)

Populations:

T Anecdotal:

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau Region: non-significant long-term (1966-1998) increasing trend of 0.7%/year, and non-significant short-term (1980-1998) increasing trend of 0.6%/year

Habitat Relationships:

T Anecdotal:

- nests in locust and Russian olive trees in the Columbia Basin of southeast Washington (M. Denny pers. comm.)

T Riparian habitats near Portland (Poracsky et al. 1992):

- most numerous in association with the presence of human disturbance and altered stream corridors

T Cottonwood riparian forest, South Fork Snake River in Idaho (Saab 1999):

- significant positive relationships with simple landscapes of cottonwood forest and agriculture, and smaller patch sizes and increasing edge habitat

Conservation Issues:

These are specific to Bullock's oriole; see pages 55-56 for general Conservation Issues in riparian habitat.

- T reduction in cottonwood gallery forest due to number of factors such as harvest, altered hydrological regimes, lack of recruitment, etc.

T poor recruitment of young cottonwoods due to factors such as overgrazing and suppression from aggressive non-native plants

Biological Objectives:

Habitat:

- ***Columbia Plateau:* Where ecologically appropriate, initiate actions in riparian woodland to maintain or provide the following conditions:**
 - mean canopy tree height >35 ft
 - canopy closure 30-60%
 - young (recruitment) sapling trees >10% cover in the understory

Population:

- ***Columbia Plateau 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 objective for tree height is based on Schaefer (1976). The objective for canopy closure was subjectively determined based on the collective experience of several people, as well as the knowledge that Bullock’s oriole prefers a somewhat open canopy. The objective for sapling trees is based on the need for recruitment trees to maintain suitability of the habitat over time. It is assumed that if large canopy trees, especially cottonwood, are available for nesting and cover, food resources are not limiting.

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 Bullock’s oriole on randomly located BBS routes.

Conservation Strategies:

These are specific to Bullock’s oriole; see pages 57-59 for general Conservation Strategies in riparian habitat.

- Optimal sites for conservation would be where cottonwood gallery trees are ecologically appropriate as the climax successional stage such as low gradient, broad floodplain systems.
- Retain all large cottonwood trees.
- Use mechanical or other means to remove invasive plants in the understory that inhibit growth and development of young (recruitment) trees.

Species to Benefit: The primary species to benefit from large canopy trees, especially cottonwood, in riparian deciduous woodland include red-eyed vireo, yellow warbler, cedar waxwing, black-headed grosbeak, and western wood-pewee. Others to benefit to a lesser degree include Cordilleran fly catcher, brown creeper, purple finch, and house finch.

Information Needs:

1. Data are needed on all aspects of Bullock’s oriole nesting ecology and habitat relationships.
2. Does patch size or other landscape characteristics affect abundance or reproductive success?
3. What are the thresholds of canopy cover that determine abundance and reproductive success?

-

Conservation Focus: Subcanopy Foliage in Riparian Woodland
Focal Species: Yellow Warbler

Populations:

- T Anecdotal:
- T Breeding Bird Survey (Sauer et al. 1999):
 - Columbia Plateau Region: non-significant long-term (1966-1998) increasing trend of 2.4%/year, and non-significant short-term (1980-1998) increasing trend of 1.0%/year

Habitat Relationships:

- T Anecdotal:
 - riparian obligate or near-obligate in either shrub or woodlands
 - mostly occur above 300 m (900 ft) and below 1,460 m (4,800 ft) in Columbia Basin of southeast Washington (M. Denny pers. comm.)
- T Bear and Silvies valleys, southeastern Oregon (Sanders 1995):
 - depend upon riparian shrubs for nesting habitat
 - willow volume most important variable; not detected where willow volume < 1,187m³/ha and greatly reduced in abundance where willow volume < 5,000m³/ha
 - most abundant in continuous willow, low numbers in discontinuous willow, and absent from herbaceous community
- T Blitzen River, southeastern Oregon (Taylor 1984):
 - abundance positively correlated with willow shrub volume and negatively correlated with grazing

	shrub volume (m ³ /ac)				
	100	300	600	900	1500
birds/100m	0.1	0.3	0.6	0.9	1.5
- T Malheur National Wildlife Refuge, northern Great Basin (Radke 1984):
 - nest sites occurred more in isolated patches or small areas of willows adjacent to open habitats or large, dense thickets (i.e., scattered cover) rather than in the dense thickets themselves
 - nest success 44% (n = 27), however, cowbird eggs and young removed; cowbird parasitism 33% (n = 9)
- T Riparian habitats near Portland (Poracsky et al. 1992):
 - abundance positively related to the presence of human disturbance and altered stream corridors and wetlands
- T Cottonwood riparian forest along the Snake River in Idaho (Saab 1999):

- significant positive relationships with agricultural landscapes versus natural landscapes; increasing distance to nearest cottonwood patch neighbor versus close cottonwood neighbors; and a dense shrub layer versus an open subcanopy
- among all riparian species, the most significant positive relationships with increasing landscape heterogeneity with rivers and wetlands versus relatively simple landscapes; and decreasing patch size with increasing edge (edge associate), including residential areas

Conservation Issues:

These are specific to yellow warbler; see page 55-56 for general Conservation Issues in riparian habitat.

- T extensive grazing in riparian zone reduces understory structure
- T primary host species for brown-headed cowbird
- T channelization for flood control and agriculture reduces the extent of the riparian zone

Biological Objectives:

Habitat:

- ***Columbia Plateau:* Where ecologically appropriate, initiate actions in riparian shrub habitat to maintain or provide the following conditions:**
 - **>70% cover in the shrub and subcanopy layer with subcanopy layer contributing >40% of the total**
 - **>70% of the cover in the shrub and subcanopy layer comprised of native species**
- ***Columbia Plateau:* At the landscape level, provide aforementioned habitat conditions within sites that contain:**
 - **high degree of deciduous riparian heterogeneity within or among wetland, shrub, and woodland patches**
 - **<10% hostile habitat (agricultural lands with moderate to heavy grazing pressure or other areas supporting cowbird populations)**

Population:

- ***Columbia Plateau BBS Region:* Maintain stable or increasing population trends over the next 10 years (by 2010).**
- ***Columbia Plateau:* 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. Maintaining >70% cover will ensure some large continuous patches; it may also allow for some herbaceous vegetation to support other species. The objectives for cover were modified from Schroeder (1982). This species is highly susceptible to cowbird parasitism, therefore it is appropriate to maintain cowbird parasitism at low levels (<10%). Even if habitat is highly suitable for yellow warbler, cowbird parasitism can be a principal factor affecting productivity. Additionally,

reduced suitability of habitat in the landscape for cowbirds without habitat conditions suitable for yellow warbler is ineffective. Thus, conservation requires habitat management for both yellow warbler and brown-headed cowbird.

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 yellow warbler on randomly located BBS routes.

Conservation Strategies:

These are specific to yellow warbler; see pages 57-59 for general Conservation Strategies in riparian habitat.

- Target areas for conservation can include residential or urban areas that provide suitable habitat if it can be documented that levels of predation from domestic or human associated predators are not excessive.
- Eliminate or manage livestock grazing in riparian areas to ensure complete development of all vegetation layers.
- Eliminate willow cutting and herbicide spraying in riparian zone (Taylor and Littlefield 1986).
- Manage at the landscape level to discourage cowbird use of riparian areas (i.e., discourage short-grass areas, maintain taller grass heights).

Species to Benefit: The primary species to benefit from subcanopy foliage in riparian deciduous woodland include warbling vireo, black-headed grosbeak, and to a lesser extent Swainson's thrush and Wilson's warbler.

Information Needs:

1. Data are needed on all aspects of yellow warbler nesting ecology, especially the impact of cowbird parasitism in different landscapes.

-

Conservation Focus: Dense Shrub Understory in Riparian Woodland **Focal Species: Yellow-breasted Chat (*Icteria virens*)**

Populations:

T Anecdotal:

- populations mostly isolated and disjunct throughout the northern Great Basin (M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau: non-significant long-term (1966-1998) increasing trend of 2.0%/year, and non-significant short-term (1980-1998) increasing trend of 0.9%/year

Habitat Relationships:

T Anecdotal:

- nests mostly in rose, elderberry, and hawthorn in Columbia Basin (M. Denny pers. comm.)

T Cottonwood riparian forest, South Fork Snake River, Idaho (Saab 1999):

- among all riparian species, the most significant positive relationship with increasing residential areas and high edge contrast; nearest cottonwood patch neighbor versus distant cottonwoods; increasing shrub cover and density versus an open subcanopy; and increasing herbaceous ground cover versus more litter ground cover

T Willamette Valley (B. Altman unpubl. data):

- mean cover territories herb shrub tree
 yellow-breasted chat (n=?)

Conservation Issues:

These are specific to yellow-breasted chat; see pages 55-56 for general Conservation Issues in riparian habitat.

T extensive grazing in riparian zone reduces understory structure

T primary host species for brown-headed cowbird

Biological Objectives:

Habitat:

- ***Columbia Plateau:*** Where ecologically appropriate, initiate actions in riparian woodland to maintain or provide the following conditions:
 - patchy shrub layer (i.e. woody vegetation 1-4 m [3-12 ft] tall) with cover 30-80% throughout territory and several scattered herbaceous openings
 - canopy tree (i.e., woody vegetation >4 m [12 ft] tall) cover <20%
- ***Columbia Plateau:*** At the landscape-level, provide the aforementioned habitat conditions at sites that are:
 - >1 km (0.6 mi) from urban/residential areas
 - >5 km (3 mi) from high-use cowbird areas (e.g., feed lots, stables)

Population:

- ***Columbia Plateau BBS Region:*** Maintain stable or increasing population trends over the next 10 years (by 2010).
- ***Columbia Plateau:*** Maintain cowbird parasitism rates below 10% within specific areas.

Assumptions/Rationale: “Ecologically appropriate” refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The objectives for shrub and tree cover are based on one field season of data in the Willamette Valley (B.

Altman unpubl. data). The landscape-level objectives are provided to minimize the negative impact of predation from feral and other predators associated with human habitation (e.g., cats, scrub jays), and parasitism from brown-headed cowbirds. They were subjectively derived based on the opinions of several people. This species is highly susceptible to cowbird parasitism, therefore, it is appropriate to maintain cowbird parasitism at low levels (<10%).

Monitoring of 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 reversing declining BBS trends assumes that actions to improve habitat will occur throughout the planning area, and the success of those actions will be reflected through increased abundance of willow flycatcher on randomly located BBS routes.

Conservation Strategies:

These are specific to yellow-breasted chat; see pages 57-59 for general Conservation Strategies in riparian habitat.

- Create riparian habitat with dense shrub layer and increase width of existing riparian zones through alteration of hydrological regimes, plantings, etc.
- Discourage channelization of streams, creeks, rivers, which reduces extent of floodplain riparian habitat.
- Eliminate willow cutting and herbicide spraying in riparian zone (Taylor and Littlefield 1986).
- Reduce potential impacts of cowbird parasitism by discouraging activities and management that results in attracting cowbirds (e.g., aggregations of livestock).

Species to Benefit: The primary species to benefit from a dense shrub layer in floodplain riparian habitat are song sparrow, common yellowthroat, yellow warbler, willow flycatcher, and spotted towhee.

Information Needs:

1. Data are needed on all aspects of nesting ecology and habitat relationships.
2. Can riparian shrub habitat within an agricultural landscape (i.e., a landscape with suitable cowbird habitat) support viable populations? If so, what habitat or anthropogenic factors are important?

-

Conservation Focus: Large Patches of Structurally Diverse Riparian Woodland
Focal Species: Yellow-Billed Cuckoo (*Coccyzus americanus*)

Populations:

T Anecdotal:

- last confirmed breeding in Washington was in the 1930s; in Oregon, the 1940s (Littlefield 1988)

T Too rare for Breeding Bird Survey trend estimates.

Habitat Relationships:

T Anecdotal:

- large riparian deciduous forest tracts that are structural diverse and dominated by a tall overstory of cottonwood and an understory or midstory of willow
- Oregon: the few records indicate it prefers dense cottonwoods and willows along major watercourses (Gilligan et al. 1994)
- most nests in California in willows, most foraging in cottonwood (Laymon and Halterman 1985)

T California (Gaines 1974, Laymon and Halterman 1987):

- minimum tract size of 16.8 ha with at least 3 ha of closed-canopy broadleaf forest
- minimum width of riparian habitat, 100m
- optimal habitat >80 ha and >579 m (1,900 ft) wide

T South Fork Kern River, California (Laymon et al. 1997):

- best nesting habitat is large sites with high canopy cover and foliage volume and moderately large and tall trees
- mean canopy cover: <40% unsuitable; 40-65% marginal to suitable; >65% optimal
- mean canopy height: optimal 7-10 m (23-33 ft); suitable 4-7 m (13-23 ft) and 10-15 m (33-49 ft)

T California (Laymon and Halterman 1989, Halterman 1991):

- territory size 8-40 ha (20-100 ac)
- canopy cover at nest 74%
- patch size most important variable in determining occupancy of site
 - 20-40 ha = 9% occupied (n = 21)
 - 40-80 ha = 59% occupied (n = 11)
 - >80 ha = 100% occupied (n = 7)

T Habitat model, California (Gaines and Laymon 1984, Laymon and Halterman 1989):

- willow-cottonwood habitat in the following size and width:
 - optimal = >80 ha (200 ac) in extent and wider than 600 m (1,950 ft)
 - suitable = 41-80 ha (100-200 ac) in extent and wider than 200 m (650 ft)
 - marginal = 20-40 ha (50-100 ac) in extent and 100-200 m (325-600 ft) wide

Conservation Issues:

These are specific to yellow-billed cuckoo; see pages 55-56 for general Conservation Issues in riparian habitat.

T livestock overgrazing in riparian zones has degraded understory vegetation and inhibited tree and shrub reproduction

T requires relatively large areas of structurally diverse riparian habitat

T susceptible to human disturbance during the nesting season

T pesticides reduce the presence and abundance of insect prey; cuckoo presence and abundance often correlated with caterpillar infestations

Biological Objectives:

Habitat:

- < ***Columbia Plateau:*** Where ecologically appropriate, initiate actions in deciduous riparian woodland to maintain or provide the following conditions:
 - structurally diverse habitat that includes at least three distinct vegetative layers (i.e., canopy, subcanopy, and understory) with >20% cover in each layer; or juxtaposition of early successional (e.g., willow) with mature forest (e.g., cottonwood)
 - mature canopy layer dominated by cottonwood with >50% canopy closure and >6 ha (15 ac)
 - habitat patches (includes cottonwood canopy and adjacent riparian shrub if appropriate) >40 ha (100 ac) in size or >0.8 km (0.5 mi) of riparian corridor
 - width of riparian woodland and shrub vegetation zone >100 m (330 ft)
- < ***Columbia Plateau:*** Where ecologically appropriate, initiate actions in deciduous riparian woodland to maintain or provide >50% of the riparian corridor in suitable habitat at the following locations in Oregon (Littlefield 1988):
 - Owyhee River from Hwy 201 to Snake River
 - South Fork of John Day River between Prairie City and Mt Vernon (Grant Co.)
 - Canyon Creek (Grant Co.)
 - Umatilla River - Yoakum to Nolin and Mission to Gibbon
 - Pikes Creek, southwest of Alvord Ranch headquarters (Harney Co.)
 - Upper Blitzen Valley, Malheur NWR (G. Ivey pers. comm.)
 - Cow Creek, 5.2 miles south along Bonita Road (M. Denny pers. comm.)

Population:

- < ***Columbia Plateau:*** Establish a breeding population (>10 pairs) of yellow-billed cuckoos along the Owyhee River in the next 25 years (by 2025), and two other populations in the Columbia Plateau in the next 35 years (by 2035).

Assumptions/Rationale: “Ecologically appropriate” refers to the potential vegetation of the site, considering hydrology, soils, topography, and natural ecosystem processes. The objective for patch size assumes the need for patches that can support a few pairs, rather than just one pair. The objective for riparian zone width was based on work in California that indicated cuckoos rarely occurred in areas <90 meters wide (Gaines and Laymon 1984).

The sites indicated for conservation represent known areas of potential habitat. Other sites (see Information Needs) should be added to this list as they are identified. Some suitable habitat remains along major river systems in the Columbia Plateau, and restoration efforts could increase availability of habitat. Species protection and habitat restoration efforts elsewhere in the west may increase population levels to a point that encourages dispersal of birds.

Conservation Strategies:

These are specific to yellow-billed cuckoo; see pages 57-59 for general Conservation Strategies in riparian habitat.

- Sites considered for yellow-billed cuckoo conservation should not be near urban or high human-use areas.
- Consider reintroductions of the species within appropriate locations if natural recolonization does not occur in the next 15-20 years.
- Maintain existing large tracts of riparian woodland and shrub and seek to restore adjacent areas to enhance size of tract.
- Where large tracts (e.g., >50 acres) of riparian woodland occur, eliminate livestock grazing from within the riparian zone to maintain structural diversity in the understory.
- Initiate actions to remove invasive exotic species that dominate understory and inhibit structural diversity and layering of understory and subcanopy vegetation.
- Avoid activities in the riparian zone that alter natural plant succession such as channelization or bank stabilization.
- Prohibit insecticide application between June 15 and August 15 in riparian zone and agricultural areas adjacent to suitable riparian woodland if these areas have been identified as potential for restoration of yellow-billed cuckoo populations.

Species to Benefit: The primary species to benefit from large patches of structurally diverse riparian woodland include red-eyed vireo, Bullock's oriole, yellow warbler, veery, and black-headed grosbeak.

Information Needs:

1. A thorough inventory of potential habitat along all major river corridors in the Columbia Plateau (e.g., Columbia River, Owyhee River, John Day River) for nesting birds.

-

I. Riparian Shrub

Conservation Focus: Shrub Density in Riparian Shrub Habitat

Focal Species: Willow Flycatcher (*Empidonax trailii*)

Populations:

T Anecdotal:

- currently, very disjunct populations throughout desert riparian, mostly above 305 m (1,000 ft) in Columbia Plateau (M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999)

- insufficient sample size for trend analysis in the Columbia Plateau Region

Habitat Relationships:

T Anecdotal:

- riparian shrub obligate where dense patches of shrubs are interspersed with openings

T Blitzen River, southeastern Oregon (Taylor 1984):

- occurred almost exclusively at sites with most shrub volume; absent from most transects with reduced shrub volume
- most abundant on sites with least amount of grazing pressure

T Bear and Silvies valleys, southeastern Oregon (Sanders and Edge 1998):

- most abundant in continuous mesic shrub association (versus discontinuous mesic shrub and herbaceous xeric shrub)
- most abundant where willow volume >5,000 m³/ha and absent when willow volume <1,187 m³/ha

Conservation Issues:

These are specific to willow flycatcher; see pages 55-56 for general Conservation Issues in riparian habitat.

- T loss and degradation of riparian shrub habitat from altered hydrological regimes
- T excessive and/or improper grazing resulting in poor recruitment of shrub layer vegetation
- T nest disturbance and/or destruction from grazing animals
- T frequent host species for brown-headed cowbird

Biological Objectives:

Habitat:

- < ***Columbia Plateau:* Where ecologically appropriate, initiate actions in riparian habitat to maintain or provide the following conditions:**
 - dense patches of native vegetation in the shrub layer >10 m sq in size and interspersed with openings of herbaceous vegetation
 - shrub layer cover 40-80% across the area of suitable habitat
 - shrub layer height >1 m (3 ft) high
 - tree cover <30%
- < ***Columbia Plateau:* Provide site conditions as described above:**
 - in areas of suitable habitat >2 ha (5 ac), but preferably in patches >8 ha (20 ac)
 - within a landscape matrix with <10% hostile habitat (agricultural lands with moderate to heavy grazing pressure or other areas supporting cowbird populations).
- < ***Columbia Plateau:* At the landscape-level, provide the aforementioned habitat conditions at sites that are:**
 - >1 km (0.6 mi) from urban/residential areas
 - >5 km (3 mi) from high-use cowbird areas

Population:

- < ***Columbia Plateau BBS Region: 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).***
- < ***Columbia Plateau: 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. This species is highly susceptible to cowbird parasitism, therefore it is appropriate to maintain cowbird parasitism at low levels (<10%). Even if habitat is highly suitable for willow fly catcher, cowbird parasitism can be a principal factor affecting productivity. Conversely, reduced suitability of habitat in the landscape for cowbirds without habitat conditions suitable for willow flycatcher is ineffective. Thus, conservation requires both habitat and cowbird management. Biological objectives for shrub patch size, cover, and height were based on multiple sources including Taylor (1984), Sanders and Edge (1998), and Altman (unpubl. data).

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 willow fly catcher on randomly located BBS routes.

Conservation Strategies:

These are specific to willow fly catcher; see pages 57-59 for general Conservation Strategies in riparian habitat.

- Create riparian shrub habitat and increase width of riparian zone by planting willows and other riparian shrubs in areas with adequate hydrology.
- Discourage channelization of streams, creeks, and rivers which reduces the extent of riparian floodplain and shrub habitat.
- Reduce potential impacts of cowbird parasitism by discouraging activities and management that results in attracting cowbirds near riparian areas (e.g., aggregations of livestock).
- Eliminate willow cutting and herbicide spraying in riparian zone (Taylor and Littlefield 1986).
- Where herbicide control of riparian exotic shrubs and trees (e.g., Russian olive) is occurring within known nesting habitat, consider the following actions:
 - conduct treatment outside the breeding season,

- treat patches on a staggered rotation to allow some habitat to remain for breeding; treat remaining patches when treated patches approach habitat suitability,
 - let treated areas decompose naturally without mechanical assistance to maintain structure and allow for continued use, and
 - use mechanical removal in smaller areas of treated patches to assist in recolonization by desired species through planting/seedings.
- Eliminate or reduce cattle grazing in riparian zones within appropriate timing and duration guidelines (see Conservation Strategies).

Species to Benefit: The primary species to benefit from a dense shrub layer in riparian shrub habitat include yellow warbler, yellow-breasted chat, song sparrow, and spotted towhee.

Information Needs:

1. Data are needed on all aspects of willow flycatcher nesting ecology and habitat relationships.
2. Are landscape components or adjacent land-uses significant to nesting success?
3. In agricultural landscapes, are cowbirds a factor in productivity?

-

Conservation Focus: Shrub-Herbaceous Interspersion in Riparian Shrub Habitat
Focal Species: Lazuli Bunting (*Passerina amoena*)

According to the ICBEMP terrestrial vertebrate habitat analysis, historical source habitats for lazuli bunting were broadly distributed throughout the three ERUs in our planning unit, but usually contained <25% of the ERU as source habitat (Wisdom et al. in press). Within the entire Interior Columbia Basin, the trend in source habitats from historical to current periods was negative to strongly negative for nearly 60% of the watersheds. All the ERUs within our planning unit had negative to strongly negative trends in source habitats.

Populations:

- T Anecdotal:
- not a breeder at low elevations in desert riparian, mainly breeds above 335 m (1,100 ft) (M. Denny pers. comm.)
- T Breeding Bird Survey (Sauer et al. 1999)
- Columbia Plateau Region: non-significant long-term (1966-1998) increasing trend of 5.2%/year, and non-significant short-term (1980-1998) increasing trend of 7.6%/year

Habitat Relationships:

- T Anecdotal:
- in northern Great Basin, isolated pairs nesting in healthy riparian corridors with dense rose, willow, and cottonwood (M. Denny pers. comm.)

Conservation Issues:

These are specific to lazuli bunting; see pages 55-56 for general Conservation Issues in riparian habitat.

- T habitat loss from altered hydrological regimes
- T habitat degradation from over grazing
- T frequent host species for brown-headed cowbird

Biological Objectives:

Habitat:

- < ***Columbia Plateau:* Where ecologically appropriate, initiate actions in riparian habitat to maintain or provide the following conditions:**
 - interspersed of shrub patches and herbaceous openings where neither is <25% or >70% of the cover of the area

Population:

- < ***Columbia Plateau BBS Region:* Maintain stable or increasing population trends over the next 10 years (by 2010).**
- < ***Columbia Plateau:* 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. Biological objectives for shrub and herbaceous cover were subjectively derived based on the opinions of several people. 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 lazuli bunting on randomly located BBS routes.

Conservation Strategies:

These are specific to lazuli bunting; see pages 57-59 for general Conservation Strategies in riparian habitat.

- o Eliminate livestock grazing in riparian zones or effectively manage grazing outside of the breeding season only.
- o Prohibit brush removal within 30 m (100 ft) of the riparian zone.

- Reduce potential impacts of cowbird parasitism by discouraging activities and management that results in attracting cowbirds near riparian areas (e.g., aggregations of livestock).
- Where herbicide control of riparian exotic shrubs and trees (e.g., Russian olive) is occurring within known nesting habitat, consider the following actions:
 - conduct treatment outside the breeding season,
 - treat patches on a staggered rotation to allow some habitat to remain for breeding; treat remaining patches when treated patches approach habitat suitability,
 - let treated areas decompose naturally without mechanical assistance to maintain structure and allow for continued use, and
 - use mechanical removal in smaller areas of treated patches to assist in recolonization by desired species through planting/seedings.

Species to Benefit: The primary species to benefit from the interspersed of shrub and herbaceous layers in riparian shrub include mourning dove, eastern kingbird, house wren, and song sparrow.

Information Needs:

1. Data are needed on all aspects of lazuli bunting nesting ecology and habitat relationships.
2. Can riparian shrub habitat within an agricultural landscape (i.e., a landscape with suitable cowbird habitat) support reproductively viable populations? If so, what habitat or anthropogenic factors are important?

-

J. Unique Habitats

Conservation Focus: Large Aspen Trees and Snags with Regeneration

Focal Species: Red-naped Sapsucker (*Sphyrapicus nuchalsi*)

Populations:

- T Anecdotal:
 - rare migrant, not present as a breeding species in Columbia Basin (M. Denny pers. comm.)
- T Breeding Bird Survey (Sauer et al. 1999)
 - insufficient sample size for trend analysis in the Columbia Plateau 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:

- < ***Columbia Plateau:*** Where ecologically appropriate, initiate actions in aspen habitat to maintain or provide the following conditions:
 - >10% cover of saplings in the understory to provide adequate representation of younger seral stages for replacement
 - >4 trees and >4 snags/ha (1.5/ac) >12 m (39 ft) in height and 24 cm (10 in) dbh
 - mean canopy cover 40-80%; either clumped with patches and openings or relatively evenly distributed
- < ***Columbia Plateau:*** 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:

- < ***Columbia Plateau BBS Region:*** 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:

- Assess the potential for use of fire in restoration of aspen stands.
- Manual treatment (thinning) may be needed in many areas prior to introducing fire.
- 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.
- Eliminate or modify grazing to ensure succession and recruitment of young aspen.

- 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, 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: Annual Herbaceous Growth in Mesic Agricultural Fields
Focal Species: Bobolink (*Dolichonyx oryzivorus*)

Populations:

T Anecdotal:

- largest breeding population in Oregon, Malheur NWR, believed stable (Marshall et al. 1996)
- probably <1,000 breeding individuals in Oregon (Marshall et al. 1996); <300 in Washington (<100 at Toppenish and <200 in the Okanogan River Valley; M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999)

- population in Columbia Plateau too small for BBS analysis

Habitat Relationships:

T Anecdotal:

- wet meadows, irrigated agriculture herbaceous fields (e.g., hayfields, grain fields), and emergent wetlands (Marshall et al. 1996, Smith et al. 1997)
- focus on broad-leaf forbs for nesting cover (e.g., clover, false lupine, potentilla) which also produce caterpillars for feeding) (G. Ivey pers. comm.)
- nests on ground; polygynous
- presence or adjacency of water/riparian habitat may be important (Marshall et al. 1996, Smith et al. 1997)

T Malheur National Wildlife Refuge, Great Basin, Oregon (Wittenberger 1978):

- dependent upon annual growth of vegetation
- actions that remove residue of previous years growth (e.g., grazing, mowing, burning, flooding) beneficial by stimulating new growth

Conservation Issues:

T vulnerable because of limited populations in both states, particularly Washington

T vulnerable because of dependence upon agricultural habitats which are unreliable from year to year

T colonization of new areas problematic due to high site-fidelity

T agricultural practices (e.g., timing of mowing/harvesting, chemical applications) may interfere with reproductive success

T many populations on private land

T requires mesic (wet) conditions; dry upland conditions in herbaceous agricultural fields not suitable habitat

Biological Objectives:

Habitat:

- < ***Columbia Plateau:*** Where appropriate to maintain or attempt to expand local colonies (i.e., in proximity to existing colonies), initiate actions in agricultural herbaceous fields to maintain or provide the following conditions:
 - mesic conditions with an herbaceous mix of broad-leaf forbs such as clover, alfalfa, false lupine, and potentilla
- < ***Columbia Plateau:*** Where appropriate, initiate actions to provide habitat in proximity to existing colonies such that suitable habitat is doubled in extent in areas of existing colonies.

Population:

- < ***Great Basin:*** Maintain existing populations and initiate actions to double the population on both private lands and Malheur National Wildlife Refuge, OR in the next 10 years (by 2010).
- < ***Columbia Basin:*** Maintain existing populations and initiate actions to double the population near Toppenish National Wildlife Refuge, WA in the next 10 years (by 2010).

Assumptions/Rationale: Appropriate areas to expand colonies are potential habitat in proximity to existing colonies because high site-fidelity and existing small populations preclude the likelihood of establishment of colonies at other locations.

Conservation Strategies:

- Optimal sites for conservation would include seasonally flooded meadows with or without adjacent or interspersed riparian shrub (e.g., willow) habitat.
- Coordinate conservation efforts with private landowners or those that lease agricultural lands on refuges where bobolinks occur; this may include conservation easements or agreements, practicing favorable management practices, or providing economic incentives.
- Avoid mowing or harvesting in known colony sites until after July 15.
- Remove residue of herbaceous growth in nesting habitat prior to nesting season through burning, mowing, grazing etc.
- Plant false lupine.
- Develop partnerships with private land owners through NRCS or NAWCA projects.

Species to Benefit: The primary species to benefit would be grassland associates that tolerate mesic conditions such as savannah sparrow, common snipe, Wilson's phalarope, long-billed curlew, short-eared owl, sora, common yellowthroat, and northern harrier.

Information Needs:

1. Establish annual monitoring of populations at all known breeding sites.
2. Inventory all potential habitat in proximity to known populations.
3. Is there any impact of cowbird parasitism on populations?
4. Where Russian olive is encroaching in riparian habitat adjacent to colonies, is there increased predation from corvids attracted to the Russian olive?

-

Conservation Focus: Mature Juniper Woodland with Regeneration
Focal Species: Gray Flycatcher (*Empidonax wrightii*)

Populations:

T Anecdotal:

- not present as a breeding species in Columbia Basin of southeast Washington except on Hanford Reservation and Waluke Slope, Columbia NWR (M. Denny pers. comm.)

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau Region: non-significant long-term (1966-1998) increasing trend of 9.3%/year, and highly-significant ($p < .01$) short-term (1980-1998) increasing trend of 15.4%/year

Habitat Relationships:

T Anecdotal:

- principally associated with juniper woodlands (Ryser 1985), but also nests in mature big sagebrush, and open woodlands of juniper and mountain mahogany
- throughout the west, mixed responses to grazing in sagebrush habitats--a positive response in shadscale/Indian ricegrass and Nevada bluegrass/sedge, but a negative response in big sagebrush/bluebunch wheatgrass (Saab et al. 1995)

Conservation Issues:

T decline in mature and old-growth juniper

T juniper is being targeted for burning/fuels reduction, so conservation areas have to be selective (i.e., within the historical range of where juniper woodland occurred and where populations of gray flycatcher currently exist)

T pesticide use may be limiting insect prey populations

T frequent host species for brown-headed cowbird

Biological Objectives:

Habitat:

- < ***Columbia Plateau:* Where ecologically appropriate within the historical range of juniper woodland, initiate actions to maintain or provide the following conditions:**
 - **mature and old-growth juniper trees with 5 trees/ha (2/ac) >53 cm (21 in) dbh**
 - **>10% cover of saplings in the understory to provide for replacement trees**

Population:

- < ***Columbia Plateau BBS Region:* Maintain stable or increasing population trends over the next 10 years (by 2010).**
- < ***Columbia Plateau:* 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 objective for juniper tree size was subjectively determined based on the collective experience of several individuals. 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 increased abundance of gray flycatcher on randomly located BBS routes.

Conservation Strategies:

- Retain and protect mature and old-growth juniper trees where populations of gray flycatcher occur within the historical range of this habitat type.

Species to Benefit: The primary species to benefit from mature juniper trees in juniper woodlands would be Pinyon jay, chipping sparrow, ash-throated flycatcher, juniper titmouse, black-throated gray warbler, and Townsend’s solitaire and American robin in winter.

Information Needs:

1. Data are needed on all aspects of gray flycatcher nesting ecology and habitat relationships.

-

Conservation Focus: Undeveloped Foraging Areas near Cliffs and Rimrock
Focal Species: Prairie Falcon (*Falco mexicanus*)

Populations:

T Anecdotal:

T Breeding Bird Survey (Sauer et al. 1999):

- Columbia Plateau Region, non-significant long-term (1966-1998) declining trend of 2.8%/year, and non-significant short-term (1980-1998) increasing trend of 4.6%/year

Habitat Relationships:

T Anecdotal:

- arid, open habitats including grassland and sagebrush shrublands where cliff nest sites and a prey base of small mammals are present
- present as a breeding species in most desert canyons with flowing open water in Harney and Malheur Counties, Oregon (M. Denny pers. comm.)
- winters in agricultural areas in Columbia Basin (M. Denny pers. comm.)

T Idaho (Reynolds and Trost 1981):

- negative response to moderate grazing in big sagebrush/bluebunch wheatgrass

Conservation Issues:

T conversion of native grasslands and shrub-steppe to agriculture has affected prey populations

T agricultural pesticide use may be adversely affecting prey populations

T mining and other human disturbances may affect nesting and productivity

T increased recreational use near nest sites, especially rock climbing

T encroachment of woody vegetation on cliffs where fire suppression has occurred

T habitat alteration in foraging areas and disruption of falcon hunting may affect prey base and reproduction

Biological Objectives:

Habitat:

< ***Columbia Plateau:* Where ecologically appropriate, initiate actions to maintain or provide the following conditions:**

- large areas of undeveloped native shrub-steppe habitat with healthy prey populations (i.e., small mammals, birds, reptiles) adjacent to potential cliff nest sites

Population:

< ***Columbia Plateau 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.

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 increased abundance of prairie falcon on randomly located BBS routes.

Conservation Strategies:

- Where woody encroachment is reducing the openness of cliffs, use manual removal and/or fire after the nesting season to maintain open character preferred by falcons.
- Prohibit construction activities such as blasting and operation of heavy equipment within 100 m of nest sites during the breeding season (Holthuijzen et al. 1990).
- Prohibit recreational activities within 500 m of nest sites during the breeding season (Holthuijzen et al. 1990).

Species to Benefit: The primary species to benefit from undeveloped foraging habitat include most of the steppe and open steppe-shrubland species including grasshopper sparrow, burrowing owl, loggerhead shrike, lark sparrow, black-throated sparrow, horned lark, and vesper sparrow. Ferruginous hawk and Swainson’s hawk would benefit from the habitat provided for potential prey species.

Information Needs:

1. Data are needed on relationship of prey species with prairie falcon nesting densities and success in native and non-native landscapes.

-

Conservation Focus: Old-Growth and Regenerating Mountain Mahogany

Focal Species: Virginia’s warbler (*Vermivora virginiae*)

NOTE: The extent of Mountain Mahogany in the Columbia Plateau is extremely limited, and the population of Virginia’s warbler that occurs in the Columbia Plateau is minimal and peripheral to this species range. Additionally, we know nothing about the habitat relationships of Virginia’s warbler with Mountain Mahogany, so setting biological objectives is problematic. However, there are concerns with the loss of old-growth mahogany and recruitment of young mahogany, so we wanted to acknowledge this issue. At this time, we do not have any objectives to recommend other than to suggest monitoring

and research on Mountain Mahogany and Virginia's warbler to determine the issues and appropriate conservation strategies.

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 D).

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. 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). Information on prioritization for the first two scales is presented in Appendix D, and for the latter two scales in species accounts and Appendix E.

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 (2000).

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 (Nur and Geupel 1993).

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 shrub-steppe and riparian habitats of the Columbia Plateau:

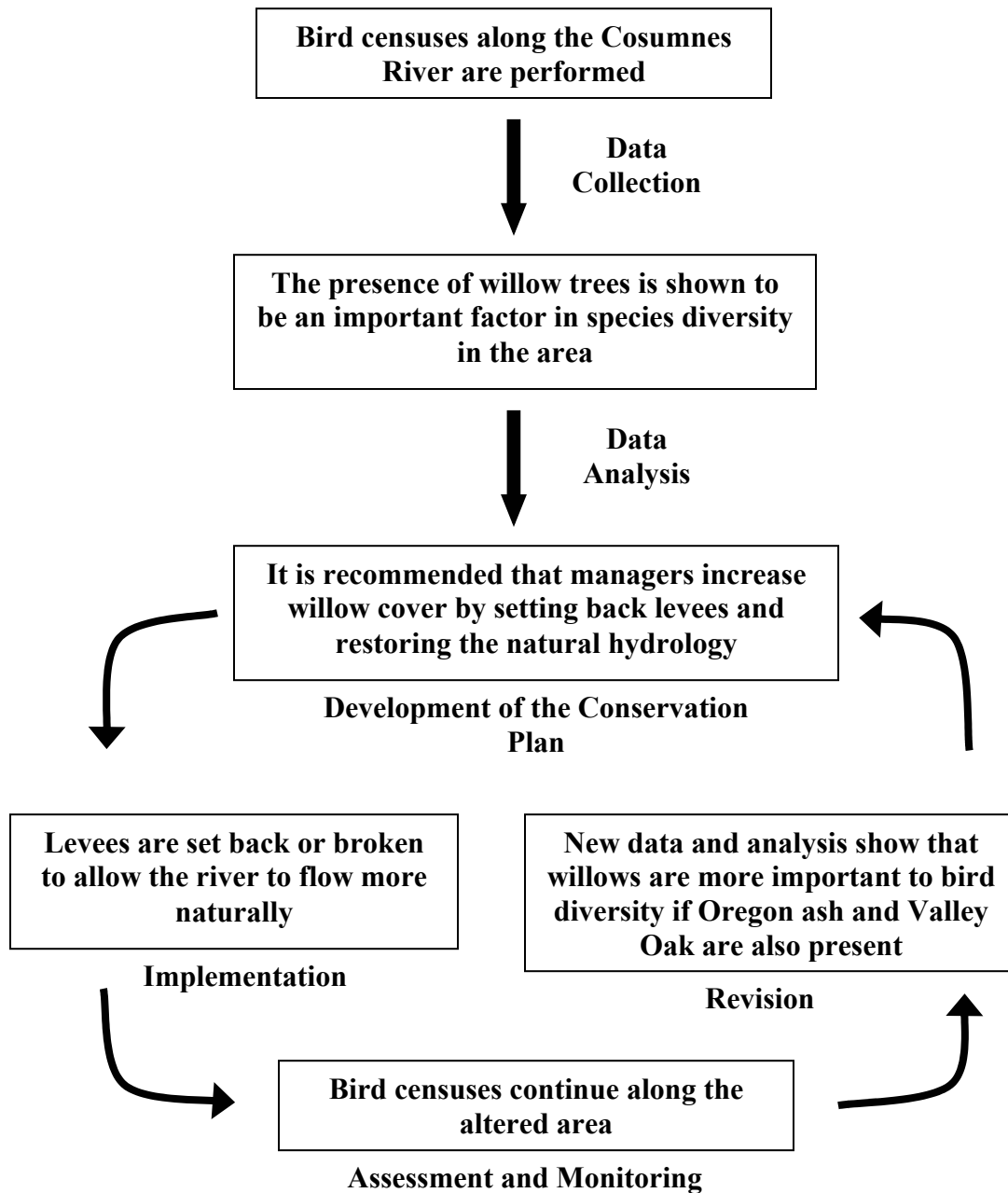
- Nesting success and area requirements of species in unmanaged and managed habitats.
- Parameters (e.g., extent, type, distribution) associated with successful nesting of species associated with deciduous riparian vegetation.
- Area requirements and landscape patterns for populations of several species considered area sensitive (e.g., sage sparrow, sage grouse).
- Effects of predation and parasitism in riparian woodland and shrub habitats relative to adjacent land uses.
- The role of cryptogamic crusts in the ecology of shrub-steppe landbirds, particularly those species that forage on the ground.

- Effects of shelterbelts on bird populations. Do they provide habitat for nest predators and parasites that reduce bird productivity, or do they provide habitat for species that have lost this type of habitat elsewhere (e.g., Bullock's oriole)?
- 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.
- Examine functionality of using Sage Grouse as an umbrella species for the remaining sagebrush obligates

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. One successful framework for bringing together diverse interests and groups is that of the Joint Venture.

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. 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, Bureau of Land Management and Forest Service land use plans, State grouse and other game plans, and various anadromous fish plans. Areas designated for conservation or management in other conservation 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 (e.g.,

Columbia Basin). 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). The USDA maintains service centers that house offices of the NRCS, FSA, and local Conservation Districts under one roof. In Washington, service centers are located in Okanogan, Waterville, Ellensburg, Ephrata, Yakima, Prosser, Walla Walla, and Colfax. In Oregon, service centers are located in Heppner, Condon, Redmond, Lakeview, Hines, and Ontario. Contact information for these offices is listed under the government listing section of local phone books. 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. For some species, 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 1-2 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 (herbaceous 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 structure and/or 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.

CHAPTER 11. LITERATURE CITED

- Altman, B. 1999. Status and conservation of grassland birds in the Willamette Valley. Unpubl. rept submitted to Oregon Dept. of Fish and Wildlife, Corvallis.
- Altman, B. 2000. Nest success and habitat relationships of the olive-sided flycatcher in western Oregon. Unpubl. rept. submitted to USFWS, Oregon State Office, USFS, Mt. Hood National Forest, and Bureau of Land Management, Portland.
- Andelman, S.J. and A. Stock. 1994. Management, research, and monitoring priorities for conservation of neotropical migratory landbirds that breed in Oregon state. Wash. Nat. Heritage Prog., Wash. Dept. Nat. Resources, Olympia.
- Anderson, W.L. and R.E. Duzan 1978. DDE Residues and eggshell thinning in Loggerhead Shrikes. Wilson Bull. 90(2):215-220.
- Atkinson, E.C. 1995. Ferruginous hawks in Montana with special emphasis placed on delineation of suitable habitats for surveys generated through a statewide GIS. J. Raptor Res. 29(1):52. 1995. Abstract only.
- Bechard M.J., and J.K. Schmutz. 1995. Ferruginous hawk (*Buteo Regalis*). In The Birds of North America, No. 172 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.
- Block, W.M., D.M. Finch, and L.A. Brennan. 1995. Single-species versus multiple-species approaches for management. Pp. 461-476 in T.E. Martin and D.M. Finch (eds.) Ecology and management of neotropical migratory birds. Oxford Univ. Press, New York.
- Bock, C.E. 1970. The ecology and behavior of the Lewis' woodpecker (*Asyndesmus lewis*). Univ. Calif. Publ. Zool. 91. 100 pp.
- Bollinger, E.K., P.B. Bollinger, and T.A. Gavin. Effects of hay-cropping on eastern populations of the bobolink. Wildl. Soc. Bull 18(2):142-150.
- Connelly, J.W. Jr. 1982. An ecological study of sage grouse in southeastern Idaho. PhD, Wash. State Univ., Pullman. 84 pp.
- Connelly, J. W., M. W. Gratson and K. P. Reese. 1998. Sharp-tailed Grouse (*Tympanuchus phasianellus*). In The Birds of North America, No. 354 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.
- Daubenmire, R. 1970. Steppe vegetation of Washington. Wash. Agricult. Exper. Stat. Tech. Bull. 62. Wash. State Univ., Pullman.
- Dobler, F. C., J. Eby, C. Perry, S. Richardson, and M. Vander Haegen. 1996. Status of Washington's shrub-steppe ecosystem: extent, ownership, and wildlife/vegetation relationships. Research Report. Wash. Dept. Fish and Wildl., Olympia.
- Feist, F.G. 1968. Breeding-bird populations on sagebrush-grassland habitat in central Montana. Audubon Field Notes 22:691-695.
- Franklin, J.F. and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. USDA For. Serv. Gen. Tech. Rept. PNW-8. 417 pp.

- Gabrielson, I.N., and S.G. Jewett. 1940. Birds of Oregon. Oreg. State Monog. No. 2. Oreg. State College. Corvallis.
- Gaines, D. and S. Laymon. 1984. Decline, status, and preservation of the yellow-billed cuckoo in California. *Western Birds* 15(2):49-80.
- Galen, C. 1989. A preliminary assessment of the status of the Lewis' woodpecker in Wasco County, Oregon. Oreg. Dept. Fish and Wildl., Nongame Wildl. Prog. Tech. Rep. 88-3-01. 23 pp.
- Gibbs, J.P., Snell, H.L. and C.E. Causton. 1999. Effective monitoring for adaptive wildlife management: Lessons from the Galapagos islands. *J. of Wildl. Manage.* 63(4):1055-1065.
- Giesen, K. M. and J. W. Connelly. 1993. Guidelines for management of Columbian sharp-tailed grouse habitats. *Wildl. Soc. Bull.* 21:325-333.
- Gilmer, D.S. and R.E. Stewart. 1983. Ferruginous hawk populations and habitat use in North Dakota. *J. of Wildl. Manage.* 46:146-157.
- Green, G.A., and R.G. Anthony. 1989. Nesting success and habitat relationships of burrowing owls in the Columbia Basin, Oregon. *Condor* 91(2):347-354.
- Halterman, M.D. 1991. Distribution and habitat use of the yellow-billed cuckoo (*Coccyzus americanus occidentalis*) on the Sacramento River, California, 1987-1990. M.S. Thesis, Calif State Univ., Chico.
- Hanf, J.M., P.A. Schmidt, and E.B. Groshens. 1994. Sage grouse in the high desert of central Oregon: results of a study, 1988-1993. USDI. Bureau of Land Manage., Prineville. BLM/OR/WA/PT-95/002-4120.7. 57 pp.
- Herkert, J.A. 1994. The effects of habitat fragmentation on midwestern grassland bird communities. *Ecol. Appl.* 4(3):461-471.
- Holmes, A.L. and G.R. Geupel. 1998. Avian population studies at Naval Weapons System Training Facility Boardman, Oregon. Unpubl. rept. submitted to the Dept. of Navy and Oreg. Dept. Fish and Wildl. Point Reyes Bird Observatory, Stinson Beach, CA.
- Holthuijzen, A.M.A., W.G. Eastland, A.R. Ansell, M.N. Kochert, R.D. Williams, and L.S. Young. 1990. Effects of blasting on behavior and productivity of nesting prairie falcons. *Wildl. Soc. Bull.* 18:270-281.
- Idaho Department of Fish and Game. 1997. Idaho sage grouse management plan. Boise. 34 pp.
- Janes, S.W. 1983. Status, distribution, and habitat selection of the grasshopper sparrow in Morrow County, Oregon. *Murrelet* 64(2):51-54.
- Jasikoff, T.M. 1982. Habitat Suitability Index (HIS) Models: Ferruginous Hawk. U.S. Fish and Wildlife Service unpublished report.
- Jewett, S.G., W.P. Taylor, W.T. Shaw, and J.W. Aldrich. 1953. Birds of Washington State. Univ. Wash. Press, Seattle.
- Keister, G. and G. Ivey. 1994. Analysis of raptor surveys in northern Harney County. Oreg. Dept. Fish and Wildl., Nongame Wildl. Prog. Tech. Rept. 94-5-02. 11 pp plus app.
- Knick, S.T., and J.T. Rotenberry. 1995. Landscape characteristics of fragmented shrubsteppe habitats and breeding passerine birds. *Conserv. Biol* 9(5):1059-1071.

- Knopf, F.L. 1996. Prairie legacies - birds. Pp 135-148 in F.B. Samson and F.L. Knopf (eds.) *Prairie conservation: preserving North America's most endangered ecosystem*. Island Press, Covelo, CA.
- Knutson, K.L. and V.L. Naef 1997. Management recommendations for Washington's priority habitats: riparian. Wash. Dept. Fish and Wildl., Olympia. 181 pp.
- Krueper, D.J. 1993. Effects of land use practices on western riparian systems. Pp 321-330 in D.M. Finch and P.W. Stangel (eds.) *Status and management of neotropical migratory bird*. USDA For. Serv. Gen. Tech. Rept. GTR-RM-229. Rocky Mountain Forest and Range Exper. Stat., Fort Collins, CO.
- Lambeck, R.J. 1997. Priority species: a multi-species umbrella for nature conservation. *Cons. Biol.* 11(4):849-856.
- Laymon, S.A. and M.D. Halterman. 1985. Yellow-billed Cuckoos in the Kern River Valley: 1985 population, habitat use, and management recommendations. Calif. Dept. Fish and Game, Nongame Bird and Mammal Section Rep. 85.06.
- Laymon, S.A. and M.D. Halterman. 1989. A proposed habitat management plan for Yellow-billed Cuckoos in California. USDA For. Serv. Gen. Tech. Rep. PSW-110. Pp 272-277.
- Laymon, S.A., P.L. Williams, and M.D. Halterman. 1997. Breeding status of the Yellow-billed Cuckoo in the South Fork Kern River Valley, Kern County, California: Summary report 1985-1996. Administrative Rep. USDA For. Serv., Sequoia National Forest, Cannell Meadow Ranger District, Challenge Cost-Share Grant #92-5-13.
- Leu, M. 1995. The feeding ecology and the selection of nest shrubs and fledgling roost sites by loggerhead shrikes (*Lanius ludovicianus*) in the shrub-steppe habitat. M.S. Thesis, Univ. Wash., Seattle.
- Littlefield, C. 1988. Status of the California yellow-billed cuckoo in Klamath County and eastern Oregon. Oreg. Dept. Fish and Wildl., Nongame Wildl. Prog. Tech. Rep. 89-5-01. 34 pp.
- Liverman, M.C. 1983. Status of the black-throated sparrow (*Amphispiza bilineata deserticola*) in the Harney County Basin, Harney County, Oregon. Oreg. Dept. Fish and Wildl., Nongame Wildl. Prog. Tech. Rep. 82-5-02.
- Marshall, D.B., M. Chilcote, and H. Weeks. 1996. *Species at Risk: sensitive, threatened, and endangered vertebrates of Oregon*. Oregon Dept. Fish and Wildl., Portland. Second edition.
- Martin, J.W., and J.R. Parrish. 2000. Lark Sparrow (*Chondestes grammacus*). In *The Birds of North America*, No. --- (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
- MacCracken J.G., Uresk, D.W. and M. Richard. 1985. Vegetation and soils of Burrowing Owl nest sites in Conata Basin, South Dakota. *Condor* 87(1):152-154.
- McConnaughey, J. and F.C. Dobler. 1994. Project shrike: abundance and perch use of loggerhead shrike in eastern Washington, 1994. Unpubl. rept., Wash. Dept. Fish and Wildl., Ephrata. 59 pp.
- McCoy, T.D., M.R. Ryan, E.W. Kurzejeski, L.W. Burger. 1999. Conservation Reserve Program: Source or sink habitat for grassland birds in Missouri. *J. of Wildl. Manage.* 63(2):530-538.
- McDonald, M.W. 1998. Ecology of the Columbian sharp-tailed grouse on eastern Washington. M.S. Thesis. Univ. Of Idaho, Moscow. 125 pp.
- Meints, D.R., J.W. Connelly, K.P. Reese [and others]. 1992. Habitat suitability index procedure for Columbian sharp-tailed grouse. Idaho For. Wildl. And Range Exper. Stat. Bull., Moscow. Univ. Idaho. 27 pp.

- Neel, L.A. 1999. Nevada Partners in Flight Bird Conservation Plan. March 19, 1999.
- Noss, R.F., E. T. Laroe III, and J.M. Scott. 1995. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation. USDI National Biological Service, Biological Report 28.
- Nur, N. and G.R. Geupel, 1993. Evaluation of mist-netting, nest-searching and other methods for monitoring demographic processes in landbird populations. *in* Status and Management of Neotropical Migratory Birds (1993), D.M. Finch and P.W. Stangel (Eds.). USDA Forest Service Gen. Tech. Rep. RM-229, Rocky Mountain Forest & Range Experiment Station, Fort Collins, CO.
- Nur, N., S.L. Jones, and G.R. Geupel. 1999. A statistical guide to data analysis of avian monitoring programs. USDI Fish and Wildl. Serv., BTP-R6001-1999, Washington, D.C.
- Olendorff R.R. 1993. Status, biology, and management of ferruginous hawks: a review. Raptor Research and Tech. Assist. Center Spec. Rep., USDI Bureau of Land Manage., Boise, ID. 84 pp.
- Paige, C., and S.A. Ritter. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Partners in Flight Western Working Group, Boise, ID.
- Petersen, K.L. and L.B. Best. 1985. Brewer's Sparrow nest-site characteristics in a sagebrush community. *J. Field Ornithol.* 56(1):23-27.
- Poole, L.D. 1992. Reproductive success and nesting habitat of Loggerhead Shrike in shrubsteppe communities. M.S. Thesis, Oreg. State Univ. 69 pp.
- Poracsky, J., L. Sharp, E. Lev, and M. Scott. 1992. Metropolitan greenspaces program data analysis, Part 1: Field-based biological data final report. Unpubl. rept. submitted to Metro, Portland.
- Quigley, T.M., and S.J. Arbelbide, tech. Eds. 1997. An assessment of ecosystem components in the interior Columbia basin and portions of the Klamath and Great Basins. USDA For. Serv. Gen. Tech. Rep. PNW-GTR-405. Portland, OR. 4 vol.
- Quigley, T.M., R.W. Haynes, and R.T. Graham (tech. eds.). 1996. Integrated scientific assessment for ecosystem management in the interior Columbia basin and portions of the Klamath and Great Basins. USDA For. Serv. Gen. Tech. Rept. PNW-GTR-382. Portland, OR. 303 pp.
- Radke, B.R. 1984. The nesting ecology of the yellow warbler on Malheur National Wildlife Refuge. File report, Malheur National Wildlife Refuge. 7 pp.
- Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. Desante. 1993. Field methods for monitoring landbirds. USDA For. Serv. Publ. PSW-GTR 144. Albany, CA.
- Reynolds, T.D. 1981. Nesting of the Sage Thrasher, Sage Sparrow, and Brewer's Sparrow in southeastern Idaho. *Condor* 83(1):61-64
- Reynolds, T.D. and C.H. Trost. 1980. The response of native vertebrate populations to crested wheatgrass planting and grazing by sheep. *J. Range Manage.* 33:122-125.
- Rich, T.D. 1978. Cowbird parasitism of sage and Brewer's sparrows. *Condor* 80:348.
- Rich, T. 1980. Nest placement in Sage Thrashers, Sage Sparrows and Brewer's Sparrows. *Wilson Bull.* 92(3):362-368

- Rich, T.D. and S.I. Rothstein. 1985. Sage Thrashers reject cowbird eggs. *Condor* 87(4):561-562
- Ritter, S. 2000. Idaho Bird Conservation Plan, Version 1.0. Idaho Partners in Flight.
- Robbins, C.S., D. Bystrak, and P.H. Geissler. 1986. The Breeding Bird Survey: its first 15 years, 1965-1979. USDI, Fish and Wildl. Serv. Res. Publ. 157.
- Saab, V.A. and J.S. Marks. 1992. Summer habitat use by Columbian sharp-tailed grouse in western Idaho. *Great Basin Nat.* 52(2):166-173.
- Saab, V.A., C.E. Bock, T.D. Rich, and D.S. Dobkin. 1995. Livestock grazing effects on migratory landbirds in western North America. Pp. 311-353 *in* T.E. Martin and D.M. Finch, editors. *Ecology and Management of Neotropical Migratory Birds: a synthesis and review of critical issues.* Oxford University Press, New York.
- Saab, V. 1999. Importance of spatial scale to habitat use by breeding birds in riparian forests: a hierarchical analysis. *Ecol. Appl.* 9(1):135-151.
- Saab, V.A., and T.D. Rich. 1997. Large-scale conservation assessment for Neotropical migratory land birds in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-399. Portland, OR.
- Sanders, T.A. 1995. Breeding bird community composition in relation to riparian vegetation structure in grazed habitats. M.S. Thesis. Oreg. State Univ., Corvallis. 84 pp.
- Sarell, M.J. and K.P. McGuinness. 1996. Status of the Brewer's sparrow in British Columbia. Ministry of Environ., Lands and Parks, Wildl. Branch, Victoria. Wildl. Working Rept. WR-77. 12 pp.
- Sauer, J.R., J.E. Hines, I. Thomas, J. Fallon, and G. Gough. 1999. The North American Breeding Bird Survey: results and analysis. Version 98.1. Patuxent Wildl. Res. Center, Laurel, MD.
- Schaefer, V.H. 1976. Geographic variation in the placement and structure of oriole nests. *Condor* 78(4):443-448.
- Schroeder, R.L. 1982. Habitat suitability index models: yellow warbler. USDI Fish Wildl. Serv. FWS/OBS-82/10.27. 7 pp.
- Schuler, C.A., Rickard, W.H., and G.A. Sargeant. 1993. Conservation of habitats for shrubsteppe birds. *Environ. Conserv.*; 20(1):5
- Shapiro and Associates Inc. 1996. Sage sparrow and sage thrasher study on the Yakima Training Center and expansion area, Yakima, Washington. Unpubl. rept. prepared for U.S. Army, Fort Lewis Public Works, Fort Lewis, WA. 63 pp plus appendices.
- Shugart, H.H. and D. James. 1973. Ecological succession of breeding bird populations in northwestern Arkansas. *Auk* 90:62-77.
- Smith, M.R., P.W. Mattocks, Jr., and K.M. Cassidy. 1997. Breeding birds of Washington State. Volume 4 in Washington State Gap Analysis - Final Rep. (K.M. Cassidy, C.E. Grue, M.R. Smith, and K.M. Dvornich, eds.). Seattle, Audubon Soc. Publ. In *Zoology* No 1, Seattle, WA. 538 pp.
- Sousa, P.J. 1983. Habitat Suitability Index Models: Lewis' Woodpecker. U.S. Fish Wildl. Serv. Biol. Serv. Program.
- Stallcup, R. Cats: A heavy toll on songbirds, a reversible catastrophe. 1991. *The Observer*, Number 91, Spring/Summer. Point Reyes Bird Observatory. Stinson Beach, CA.

- Suter, G.W. and J.L. Jones. 1981. Criteria for Golden Eagle, Ferruginous Hawk and Prairie Falcon nest site protection. Raptor Res. 15(1):12-18.
- Taylor, D.M. 1984. The effects of cattle grazing and other factors on passerine birds nesting in willow riparian habitat. M.S. Thesis. Idaho State Univ., Boise. 45 pp.
- Thomas, J.W. (ed.). 1979. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. Agric. Handbook 553. Washington D.C., U.S. Dept. Agric., For. Serv.
- Ulliman, M.J., A. Sands, and T. Hemker. 1998. Conservation plan for the Columbian sharp-tailed grouse and its habitats in Idaho. Unpubl. rept. prepared for Idaho Conserv. Effort, Boise. 36 pp.
- Van Horne, B. 1983. Density as a misleading indicator of habitat quality. J. Wildl. Manage. 47:893-901.
- Vander Haegen, W. M., F. C. Dobler, and D. J. Pierce. *in press*. Shrubsteppe bird response to habitat and landscape variables in eastern Washington, USA. Conserv. Biol.
- , and B. Walker. 1999. Parasitism by brown-headed cowbirds in the shrub-steppe of eastern Washington. Stud. in Avian Biol. 18:34-40.
- Vickery, P.D., M.L. Hunter, Jr., and J.V. Wells. 1992. Use of a new reproductive index to evaluate relationship between habitat quality and breeding success. Auk 109(4):697-705.
- Warner, R.E. 1992. Nest ecology of grassland passerines on road rights-of-ways in central Illinois. Biol. Cons. 59:1-7.
- Washington Department of Fish and Wildlife. 1995a. Washington state recovery plan for the sharp-tailed grouse. Wild. Manage. Prog., Olympia. 99pp.
- Washington Department of Fish and Wildlife. 1995b. Washington state recovery plan for the sage grouse. Game Div., Olympia. 101 pp.
- Weddell, B.J. 1992. Biology and conservation of the sharp-tailed grouse, with special reference to the Columbian sharp-tailed grouse in Washington. Unpubl. rept. submitted to The Nature Conservancy, Seattle, WA. 46 pp.
- Wiens, J.A. and J.T. Rotenberry 1981. Habitat associations and community structure of birds in shrubsteppe environments. Ecolog. Monogr. 51:21-41.
- Wisdom, M. J., R. S. Holthausen, D. C. Lee, B. C. Wales, W. J. Murphy, M. R. Eames, C. D. Hargis, V. A. Saab, T. D. Rich, F. B. Samson, D. A. Newhouse and N. Warren. *in press*. Source habitats for terrestrial vertebrates of focus in the Interior Columbia Basin: Broad-scale trends and management implications. U.S. Dept. Agric., For. Serv., Pacific Northwest Res. Stat. Gen. Tech. Rep. PNW-GTR-xxx, Portland, OR.
- Wittenberger, J.F. 1978. The breeding biology of an isolated bobolink population in Oregon. Condor 80 (4): 355-371.
- Woods, C.P., and T.J. Cade. 1996. Nesting habits of the loggerhead shrike in sagebrush. Condor 98 (1):75-81.
- Yosef R. 1996. Loggerhead shrike (*Lanius ludovicianus*). No. 231 in A. Poole and F. Gill (eds.) The Birds of North America. Academy of Nat. Sci., Philadelphia, and Amer. Ornithol. Union, Wash., D.C.

Appendix A. Considerations for prioritizing conservation of breeding native landbird species highly associated with shrub-steppe, grassland, riparian, and juniper/mountain mahogany habitats in the Columbia Plateau Landbird Conservation Planning Region.

Species	PIF 89 ^a Score ^b	AI ^c	PT ^d	% Pop PIF 89 ^e	BBS Trend 89L ^f	BBS Trend 89S ^f	ICB Mgt Index ^g	OR Mgt Index ^h	WA Mgt Index	Habitats ⁱ			
										SS	GR	RP	JM
Great-blue heron	13	3	2		-1.8	-3.8						x	
Turkey vulture	12	2	3		0.2	1.2	5	7	3	x	x	x	x
Osprey	16	3	3				5	5	5			x	
Bald eagle	19	3	3									x	
Sharp-shinned hawk	15	2	3				6.6	3	6				x
Cooper's hawk	16	3	3				6	4.4	6			x	
Northern harrier	19	5	2	9.7	1.0	0.4	5.8	5	5	x	x		
Swainson's hawk	22	3	3	5.5	2.7	-0.8	7	6	7	X	X		x
Red-tailed hawk	13	5	1		4.0****	4.6****	4.3	3	5	x	x	x	x
Ferruginous hawk	21	4	1	10.5	5.8****	0.5	8.1	8	14	X	X		
Golden eagle	18	4	3	5.9	-2.8	-0.2	5.2	3	8	x	x	x	x
American kestrel	17	5	5	7.1	-0.7	-1.5**	5.1	11	3	x	x	x	x
Prairie falcon	23	5	3	21.9	-2.8	4.6	7.3	8	10	X	X		x
Peregrine falcon	18	2	3	<1			7.4	7	6	x	x	x	x

Ruffed grouse	17	2	3									X	
Sage grouse	25	3	3	13.6						X	X		
Sharp-tailed grouse	20	3	3							X	X	X	
Mountain quail	23	2	3	1.0								x	
California quail	20	3	2	23.6*	-2.2	-2.9				x	x	x	x
Sandhill crane	23	5	3		-4.3	-6.2*					x	x	
Upland sandpiper	19	2	3				10	12	18	x	X		
Killdeer	17	4	3		-5.1****	-6.0****	9.1	9	7.6	x	x	x	
Long-billed curlew	23	5	1	13.2	3.3***	3.2	9	8	15	x	X		
Rock dove	10	4	1		3.1**	0.2				x			
Mourning dove	14	3	5		-2.5****	-2.4****	9.3	7	4.7	x	x	X	x
Yellow-billed cuckoo	19	3	3				13					X	
Barn owl	17	3	3							x	x	x	
Western screech owl	19	4	3									X	x
Great-horned owl	12	3	2		-0.2	5.2				x	x	x	x
Northern pygmy owl	18	4	3									x	x
Northern saw-whet owl	16	4	3										x
Burrowing owl	15	2	1	3.8	9.0***	11.1*	7.8	8	12	X	X		
Long-eared owl	17	3	3				6	6	5	x	x	x	x
Short-eared owl	21	5	3	4.9	1.3	-0.3	5.8	5	4.6	x	X		

Common poorwill	21	3	3				7.6	7	7.4	x	x		x
Common nighthawk	14	3	2		-2.0	-1.9	6	5	5.3	x	x	x	x
Black swift	24	4	3	8.1			10	10	10			x	
White-throated swift	17	3	3	16.1			8.6	10	10	x	x	x	x
Black-chinned hummingbird	22	2	3	<1			7.4	9.5	9	x		x	
Calliope hummingbird	22	4	3	11.5			8.1	8	8			x	
Broad-tailed hummingbird	20	2	3				7.4	7		x		x	
Rufous hummingbird	20	2	3	3.2			7.6	10.8	12			x	
Belted kingfisher	16	2	3				8	10	6			X	
Lewis' woodpecker	24	5	3	22.4			11.7	11	9			x	
Red-naped sapsucker	20	2	3				8.4	11	7			X	
Downy woodpecker	13	2	3									x	
Hairy woodpecker	15	3	3									x	
Northern flicker	12	3	2		1.6	1.0	5	4.2	5			x	x
Pileated woodpecker	15	3	3									x	
Western wood-pewee	14	3	1		3.0*	3.5*	6.1	7	5			x	
Willow flycatcher	20	3	3				18	9	8			X	
Least flycatcher							13	13	8			x	
Dusky flycatcher	22	4	3	13.3			8.5	6	7			x	x
Cordilleran flycatcher	20	3	3				9	15	6			X	

Gray flycatcher	24	5	2	43.7*	5.7	10.0****	8	11	11	x			X
Ash-throated flycatcher	18	2	3				9.6	5	8				X
Say's phoebe	17	3	2		21.5*	8.3***	6.1	9	9	X	X	x	x
Western kingbird	18	4	2		1.2	1.0	8.8	10	9	x	X	x	X
Eastern kingbird	15	2	3		-1.1	-1.1	6.4	6	9	x	X	x	
Horned lark	14	4	5		-2.8***	-2.2***	10.1		7	x	X		
Tree swallow	14	3	2		8.1	6.2	4.7	4.5	6			X	
Violet-green swallow	17	3	3		2.4	10.8****	6.5	9	7			x	x
Northern rough-winged swallow	20	5	3		-1.0	-1.6	7.8	9	8	x	x	X	x
Bank swallow	16	4	2		5.7	4.7	8	9	8	x	x	X	x
Barn swallow	13	4	2		-0.6	-0.1	4.5	7	9	x	x	X	x
Cliff swallow	11	4	1		2.3*	2.0	5.1	5	5	x	x	X	x
Loggerhead shrike	19	2	5	3.5	-3.1****	-2.8	12.8		13	X	x		X
Cedar waxwing	14	2	3				5.5		5			X	x
American dipper	20	3	3									X	
Rock wren	19	5	3	19.4	-0.2	0.2	8.4	14	10	x	x		x
Canyon wren	17	3	3									x	x
House wren	10	2	1		5.0*	5.4**	3.8	3	2			x	
Sage thrasher	22	5	2	30.9	1.0**	0.4	11	12	15	X			
Gray catbird							12	13	15			X	

Townsend's solitaire	17	2	3				7.1	5	5				x
Western bluebird	19	3	3				7.2	7	6.6		x	x	x
Mountain bluebird	18	4	3		4.0****	4.3****	6.4	5	5	x	x	x	x
Veery	19	3	3				14	14	9			X	
Hermit thrush	15	2	3				5.5	5	5			x	x
American robin	10	3	2		1.2**	1.1*	8.5	3	4	x	x	x	x
Blue-gray gnatcatcher	16	3	3				8						x
Bushtit	16	2	3									x	x
Black-capped chickadee	13	2	3									x	
White-breasted nuthatch	15	3	3									x	
Brown creeper	17	3	3				6.5					x	
Juniper titmouse	20	2	3										X
Song sparrow	11	2	3		-0.5	1.5	9.6	7.5				x	
White-crowned sparrow	13	2	3				7.9	11	4			x	
Savannah sparrow	13	3	3		-0.9	-0.6	9.4	5	6	x	X	x	x
Grasshopper sparrow	18	3	2		-2.8*	1.0	7.4	8.5	11	x	X		
Brewers sparrow	24	5	5	24.3	-4.4****	-2.5**	18	16	14	X	x		x
Vesper sparrow	14	4	2		0.0	-0.7	6.8	7	10	X	X		x
Lark sparrow	19	2	5	3.0	-1.7	-2.3	11.3	8.5	9	X			x
Black-throated sparrow	21	3	4		-8.4**	-9.0	14	12	14	x			

Sage sparrow	25	5	3	26.8	2.3	5.6	10.8	13	15	X			
Chipping sparrow	16	3	5		-4.2*	-4.5**	8.3	8.2	9			x	x
Dark-eyed junco	11	2	2				5.4	7	4.1			x	x
Spotted towhee	16	2	2		9.8**	5.4	5.1		3			x	x
Green-tailed towhee	19	3	3		4.1	4.3	8.7	10		x	x		x
Black-headed grosbeak	17	2	1		4.5****	5.0***	5.7	5.2	8			x	
Lazuli bunting	19	4	1		2.3	3.0	7.6	9	6	x		X	x
Western tanager	17	2	3				7.6	9	7			x	
Orange-crowned warbler	14	2	3				8	13	9			x	x
Nashville warbler	20	3	3				7.6	5	8			x	x
Yellow warbler	15	3	3		2.2	1.0	16	12	11			X	
Black-throated gray warbler	21	2	3	3.5			9.8	9	8			x	X
Virginia's warbler	24	3	3	<1			10.9						x
American redstart	16	2	3				7.5	13	8			X	
Northern waterthrush	16	3	3				7.9	13	9			X	
Common yellowthroat	15	2	2				5.9	8	5			X	
MacGillivray's warbler	20	3	3				8.1	6	9			x	
Wilson's warbler	17	2	3				8.5	10	11			x	
Yellow-breasted chat	16	2	2		2.0	0.9	9	13	11			X	
Cassin's vireo	21	2	3				7.9	5	10			x	

Red-eyed vireo	16	2	3				13	13	8			X	
Warbling vireo	17	2	3				6.4	10	3			X	
Bullock's oriole	17	3	2		0.4	-0.1	7.6	6.5	7			X	
Western meadowlark	15	4	2		0.6*	-2.0****	10.8	11	8	X	X		x
Red-winged blackbird	13	3	4		-2.3	-1.2	8.5		4			x	
Brewer's blackbird	15	3	5		-1.7**	-3.3****	11.5	6.6	7	x	x	x	x
Brown-headed cowbird	10	3	2		1.1	2.0	5.4	3	3	x	x	x	x
Bobolink	19	1	3	<1			10	9	8		x	x	
American goldfinch	12	2	2		0.1	0.7	9.1	7	3.3			x	
Cassin's finch	17	3	2				8.1	8	8			x	x
House finch	9	2	2		2.5	2.1						x	x
Pinyon jay	18	2	3										X
Black-billed magpie	17	5	2	11.1	1.4	3.5****				x	x	X	x
American crow	9	3	1		6.0****	5.9***				x	x	x	x
Common raven	15	5	4		0.3	3.6**				x	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 89 is a Partners in Flight Planning Region based on the Breeding Bird Survey Physiographic Strata 89 - Columbia Plateau. Within that area, this list includes primarily landbirds associated with shrub-steppe, riparian, juniper, and mountain mahogany 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. 89=Columbia Plateau. Only priority scores >20 are shaded.
- ^c AI = Importance of Area; scores were generated by the Colorado Bird Observatory (1/28/98) and modified by local expert opinion. 89=Columbia Plateau. 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; 89=Columbia Plateau; 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 SS = shrub-steppe; GR = grasslands; RP = riparian; JM = juniper/mountain mahogany; 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.

Appendix B. Bird Conservation Areas in the Columbia Plateau 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. For most sites, we also provide some examples of high priority bird species that occur at the sites. 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.

Shrub-Steppe Bird Conservation Areas (SSBCA):

• *Palouse Prairie:*

1. Rose Creek Preserve
2. Turnbull National Wildlife Refuge - GRSP

• *Columbia Basin:*

1. Yakima Training Center - ALL spp..
2. Hanford Department of Energy Lands (includes Rattlesnake, Saddle Mt. ALE) - ALL spp.
3. Boardman Bombing Range and Boeing State Leased Lands - MOST spp.
4. Moses Coulee - SASP, BRSP, SATH
5. Beezley Hills - LOSH, SASP, BRSP, SATH
6. Potholes Region (includes Columbia NWR) - BUOW, LOSH, GRSP, BRSP, SASP
7. Quilomene and Clockum Wildlife Areas - SATH, SASP, BRSP, LOSH
8. Toppenish Ridge and Refuge - SATH, LOSH, SASP, GRSP, BOBO
9. Horse Heaven Hills - GRSP, LASP, SASP, FEHA, SWHA
10. Colville Reservation - SATH, GRSP
11. Lincoln County Scablands - MOST spp.
12. Yakima River Canyon - LT Murray Wildlife Area
13. Saddle Mountain - 20,000 acres?? SASP, LOSH, GRSP
14. Juniper Forest Management Area (includes Juniper Dunes Wilderness) - FEHA, SWHA, GRSP, BUOW, LOSH

• *High Lava Plains:*

1. Crooked River National Grasslands

2. Badlands Lava Beds (east of Bend to south of Redmond)
3. Island on Lake Billy Chinook
4. PGE lands west of Crooked River - Deschutes River

• *Great Basin:*

1. Foster Flat RNA - BLM
2. South Blitzen Valley - BOBO
3. Mud Lake - Harney Lake on Malheur NWR - BRSP, BOBO, BUOW, SASP, LOSH
4. Catlow Valley (Roaring Springs) - BOBO, BRSP
5. Steens Mountain - MOST spp.
6. Hart Mountain - MANY spp.
7. Silvies River Floodplain - BUOW, BOBO, LOSH
8. South of Fields - BUOW, BOBO, LOSH
9. Antelope Creek, Malheur County - GRFL
10. Alvord Desert - BTSP
11. North Winter Rim (Lake County near Summer Lake)
12. North Warner Mountains

• *Owyhee Uplands:*

1. Jordan Valley - BOBO
2. Cow Lakes
3. Battle Mountain, Malheur County
4. Oregon Canyon Mountains - ALL spp.
5. Sheephead Mountains, Malheur County
6. West Little Owyhee River drainage, Malheur County - MOST spp.

Riparian Bird Conservation Areas (RBCA)

Palouse Prairie:

1. Palouse River and Tributaries - LEWO

Columbia Basin:

1. Crab Creek Wildlife Area and Columbia NWR - ATFL, YBCH, LABU
2. Turnbull NWR (includes Fishtrap Management Area) - LEWO, WIFL, BUOR, RNSA
3. Toppenish Creek and Refuge - WIFL, YBCH, BOBO
4. Rock Creek (includes south of Turnbull) - YBCH, WIFL, LABU, BUOR
5. Potholes - YBCH
6. Confluence Camas and N. Fork John Day - USFS, BLM, State
7. Upper Crab - Wilson Creeks (Lincoln County) - YBCH, WIFL, LABU, BUOR
8. Lee Thomas-Dead Cow Meadow (East-slope Cascades??)
9. Upper Similkameen River south to Canadian border - LEWO, WIFL

10. Upper Methow River north of Winthrop and Twisp River between Twisp and the National Forest

11. Upper Okanogan River north of Tonasket - LEWO

High Lava Plains:

1. Deschutes River and tributaries
2. Crooked River and Trout Creek

Great Basin:

1. Malheur NWR (needs finer scale) - WIFL, YBCH
2. Steens Mt. And Pikes Peak - LEWO, YBCH, WIFL
3. Hart Mt. - Lewo
4. Fish Hole Lakes Basin

Owyhee Uplands:

1. Owyhee River - YBCU
2. Succor Creek
3. Oregon Canyon Mountains

Appendix C. Summary of habitat features important to shrub-steppe landbirds in the Columbia Plateau Landbird Conservation Planning Region. ^a

Focal Species Other Species	Habitat Condition											
	Native Perennial Grassland	Open Patchy Shrubs	Burrows	Large Patches Sage	Dense Sage Cover	Tall shrub	Native Herb Understory	Ecotone (herb,shrub tree)	Desert Scrub	Mature Juniper Trees	Bare ground	Grass Nest Cover
grasshopper sparrow	x	x										x
long-billed curlew	x	x									x	
short-eared owl	x	x										x
loggerhead shrike		x		x	x	x		x		x	x	
burrowing owl	x	x	x					x			x	
sharp-tailed grouse	x	x		x	x	x	x	x				x
vesper sparrow	x	x										x
western meadowlark	x	x										x
horned lark	x								x		x	x
sage sparrow				x	x	x					x	x
Brewer's sparrow		x		x	x	x					x	x
sage thrasher		x		x	x	x		x			x	x
sage grouse	x	x		x	x	x	x	x			x ^b	x
lark sparrow	x	x					x	x		x		x

green-tailed towhee		x		x	x	x		x				x
black-throated sparrow		x							x			
rufous hawk	x	x						x		x	x	
Swainson's hawk	x	x						x		x	x	

^a Modified from Paige and Ritter (1999).

^b Important for lek sites.

Appendix D. Prioritization of habitat types and physiographic subprovinces for conservation of focal species in shrub steppe habitats in the Columbia Plateau Landbird Conservation Planning Region.^a

Habitat Type	Focal Species Other Species	Habitat Type ^b					Physiographic Subprovinces ^c				
		ST	SS	SB	SH	JS	OU	GB	HP	CB	PP
<u>Grassland (Steppe)</u>	grasshopper sparrow	1	2	no	no	no	2	2	no	1	1
	long-billed curlew	1	1	no	no	no	1	1	2	1	1
	short-eared owl	1	1	no	no	no	1	1	no	1	1
<u>Grassland (Steppe) - Shrubland</u>	loggerhead shrike	no	1	2	2	1	1?	1	2	1	2
	burrowing owl	1	1	2?	2?	no	1?	1	2?	1	1
	sharp-tailed grouse	1	1	2	2	no	no	no	no	1	1
	vesper sparrow	1	1	2	2	1	1	1	1	1	1
	western meadowlark	2	1	1	2	2	1	1	1	1	1
	horned lark	1	1	2	2	no	1	1	2	1	1
<u>Sagebrush</u>	sage sparrow	no	2	1	2	2	1?	1	1	1	no
	sage grouse	no	2	1	2	2	1	1	1	1	no
	Brewer's sparrow	no	2	1	1?	2?	1	1	1?	1	2
	sage thrasher	no	1	1	1?	2	1	1	1	1	no
<u>Shrublands</u>	lark sparrow	no	1	2	1	1	1	1	2?	2	no
	black-throated sparrow	no	1	2	1	no	1	1	no	no?	no
	green-tailed towhee	no	2	1	1	2	1	1	1	no	no

<u>Juniper-Steppe</u>	ferruginous hawk	1	1	2	2	1	1	1	2	1	1
	Swainson's hawk	1	1	2	2	1	2	2	2	1	1

^a Priority importance is subjectively quantified to focus conservation efforts within core areas of a species breeding distribution; 1= highest priority for conservation; 2= lower priority for conservation; no= conservation not recommended. NOTE: These rankings are only applicable where suitable habitat occurs for that species in that subprovince (see text for descriptions of suitable habitat).

^b ST = Steppe; SS = Steppe-Shrublands; SB = Sagebrush; SH = Shrublands; JS = Juniper-Sage/Steppe.

^c Physiographic provinces are modified from Franklin and Dyrness (1973); OU= Owyhee Uplands; GB = Great Basin; HP = High Lava Plains; CB = Columbia Basin; PP = Palouse Prairie.

Appendix E1. Habitat relationships of focal species in shrub-steppe habitats of the Columbia Plateau Landbird Conservation Planning Region.

Conservation Focus	Focal Species	Key Habitat Relationships			
		Vegetative Composition ^a	Vegetation Structure ^b	Landscape/ Patch Size	Special Considerations
native bunchgrass cover	grasshopper sparrow	native bunchgrasses	bunchgrass cover >15% and >60% total grass cover; bunchgrass >25 cm tall; shrub cover <10%;	>40 ha (100 ac)	larger tracts better; exotic grass detrimental; vulnerable in agricultural habitats from mowing, spraying, etc.
interspersed tall shrubs and openings	loggerhead shrike	sagebrush, bitterbrush	patches shrubs >1 m tall; <15% tall shrub cover; shrub height >1 m; herb cover <20%; open ground >30%		prey base may be affected by pesticides; need low ground cover; invasion of exotic grasses detrimental
burrows	burrowing owl		open ground cover >40%; native grass cover <40% and <40 cm tall		dependent upon burrow providers (e.g., ground squirrels, badgers); sensitive to nest disturbances; 200 m buffer zone around nest burrow
deciduous trees and shrubs	sharp-tailed grouse		canopy cover 15-35% >15 cm above ground; forb cover >10%; non-native herbaceous cover <5%		
large areas; diverse herbaceous understory	sage grouse	big sagebrush	sagebrush cover 10-30%; forb cover >10%; bunchgrass cover >10%; open ground cover >10%; non-native herb cover <10%		area-sensitive
large, contiguous patches sagebrush	sage sparrow	big sagebrush	sagebrush cover 10-25%; sagebrush height >50 cm; herb cover >10%; open ground >10%	>1,000 ha (2,500 ac)	area-sensitive, needs large blocks; patchy sage preferred over contiguous dense sage; vulnerable to cowbirds

sagebrush cover	Brewer's sparrow	big sagebrush	sagebrush cover 10-30%; sagebrush height >60cm; herb cover >10%; open ground >20%; non-native herb cover <10%		not area-sensitive, but sensitive to sage cover; vulnerable to cowbirds
sagebrush height	sage thrasher	big sagebrush	sagebrush cover 5-20%; sagebrush height >80 cm; herb cover 5-20%; other shrub cover <10%; non-native herb cover <10%	>16 ha (40 ac)	not area-sensitive ; not impacted by cowbirds; high moisture sites with tall shrubs
ecotonal edges herbaceous, shrub, tree habitats	lark sparrow	bitterbrush, sagebrush	edge habitat with mosaic of growth forms where none exceeds 50% cover; open ground cover >20%		dry upland sites with minimal exotic weed cover; vulnerable to cowbird parasitism
sparsely vegetated desert scrub	black-throated sparrow	shadscale, spiny hopsage, budsage	shrub cover <20%; herbaceous cover <25%; open ground >40%; non-native herb cover <15%		dry upland sites with minimal exotic weed cover
scattered, mature juniper trees	ferruginous hawk	juniper	isolated, mature juniper trees >1/1.6 km; herbaceous-low shrub cover 15-60 cm tall		dependent upon prey (e.g., ground squirrels, jackrabbits); sensitive to human disturbance; 1 km buffer zone around nests

^a Preferred species.

^b Vegetative structure is a condensed version of the habitat objectives for each species. Refer to the text for more detailed description of habitat objectives.

Appendix E2. Habitat relationships of focal species in riparian habitats of the Columbia Plateau Landbird Conservation Planning Region.

Conservation Focus	Focal Species	Key Habitat Relationships			
		Vegetative Composition ^a	Vegetation Structure ^b	Landscape/Patch Size	Special Considerations
large snags	Lewis' woodpecker	cottonwood	>2 snags/ha >16 in dbh; >2 trees/ha >21 dbh; canopy cover 10-40%; shrub cover 30-80%		dependent on insect food supply; competition from starlings detrimental
large canopy trees	Bullock's oriole	cottonwood	canopy tree height >35 ft; canopy closure 30-60%; recruitment trees >10% cover		not area-sensitive; not landscape-sensitive; positive response to edge
subcanopy foliage	yellow warbler	willow, cottonwood,	>70% cover in shrub and subcanopy with subcanopy >40% of that; >70% cover native species		highly vulnerable to cowbird parasitism; grazing reduces understory structure
dense shrub layer	yellow-breasted chat	willow, snowberry, wild rose	shrubs layer 1-4 m tall; 30-80% shrub cover; scattered herbaceous openings; tree cover <20%		vulnerable to cowbird parasitism; grazing reduces understory structure
large, structurally diverse patches	yellow-billed cuckoo	cottonwood, willow	3 or more layers with >20% cover in each layer; canopy closure >50%; patches wider than 100 m and >40 ha	>40 ha	close to extirpated; area-sensitive; susceptible to human disturbance
shrubs density	willow flycatcher	willow	shrubs patches >10 m sq; shrub cover 40-80%; shrub height >1 m; tree cover <30%	>8 ha	highly vulnerable to cowbird parasitism; grazing reduces understory structure
shrubs-herbaceous interspersions	lazuli bunting	willow, snowberry, red-osier dogwood	interspersions shrubs and herbaceous where neither >70%		highly vulnerable to cowbird parasitism

^a Preferred species.

^b Vegetative structure is a condensed version of the habitat objectives for each species. Refer to the text for more detailed description of habitat objectives.