3.6.5.1 Aquatic Habitat for High Priority Protection

The QHA analysis resulted in a list of priorities for habitat protection (Figure 28; Appendix 4, Table 32). The rankings are based on the greatest value gained by protecting a given reach. In other words, the highest ranked reach is the reach in the best overall condition resulting in the greatest benefit from protecting it. The South Fork Burnt River 2 was the reach with the highest protection ranking in the subbasin. It was followed by South Fork Burnt River 1, West Fork Camp Creek (Burnt R.), North Fork Burnt River 4 and Pritchard/Lawrence Creek to round out the top 5.

3.6.5.2 Aquatic Habitat to Reestablish Access

Several of the subbasin's reaches would benefit from reestablishment of access for fish. Notably, Clark's Creek, Burnt River 7, Auburn Creek, Big Creek, Camp Creek East Fork (Burnt R.), Burnt River 8, Job Creek, Middle Fork Burnt River, North Fork Burnt River 2 & 3 and Trout and Camp Creeks were rated at 25% of optimum or less and would benefit from efforts to reestablish access.

3.6.5.3 Aquatic Habitat for Restoration

The QHA analysis resulted in a list of priorities for habitat restoration (Figure 28; Appendix 4, Table 32). The rankings are based on the greatest habitat value gained by conducting restoration activities. Based on this ranking, the highest priority reach for habitat restoration in the subbasin is Clark's Creek. It was followed by Sisely and Jordan Creeks, North Fork Burnt River 3, Alder Creek 1, and Pritchard and Lawrence Creeks.

4. Inventory of Existing Activities (Private, Local, State, Federal)

4.1. Existing Legal Protection

Protected Areas

US Forest Service

· Monument Rock Wilderness Area. Some of the streams that form the headwaters of the South Fork Burnt River lie within the Monument Rock Wilderness Area. At the southernmost edge of the Blue Mountains, this 19,620-acre wilderness with its alpine, once glaciated ridges offers views across much of northeast Oregon. Elevations of the wilderness range from 5,200 to 7,800 feet. Most recreational use of the wilderness is during hunting seasons.

US Bureau of Land Management

· Oregon Trail Area of Critical Environmental Concern. Seven parcels of public lands with remnants of the Oregon National Historic Trail, encompassing approximately 1,495 acres, are designated and will be managed as an ACEC to preserve the unique historic resource and visual qualities of these areas. These lands are located within both the Burnt and Powder River subbasins.

· Unity Reservoir Bald Eagle Nest Habitat Area of Critical Environmental Concern. Approximately 360 acres of BLM managed lands on the North Fork of the Burnt River will be managed to protect habitat consistent with the Endangered Species Act and Pacific States Bald Eagle Management Plan.

4.2. Existing Plans

➲ *US Forest Service and Bureau of Land Management*

The U.S. Forest Service is required to manage habitat to maintain viable populations of anadromous fish and other native and desirable non-native vertebrate species. A **Land and Resource Management Plan** (Forest Plan) was developed for the Wallowa-Whitman National Forest (USDA 1990). This Forest Plan guides all natural resource management activities, establishes forest-wide multiple-use goals and objectives, and establishes management standards and guidelines for the Wallowa Whitman National Forest. The forest plan is currently under revision.

The Bureau of Land Management, in accordance with the Federal Land Policy and Management Act of 1976, is required to manage public lands to protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values. A **Resource Management Plan** was developed for the Vale District Office, Baker Resource Area (USDI 1989). Both the USFS and BLM are required by the Clean Water Act to ensure that activities on administered lands comply with requirements concerning the discharge or run-off of pollutants.

In the Columbia River Basin, the Forest Service and the Bureau of Land Management manage salmonid habitat under the direction of **PACFISH** (USDA and USDI 1994) and **INFISH** (Inland Native Fish Strategy; USDA 1995). These interim management strategies aim to protect areas that contribute to salmonid recovery and improve riparian habitat and water quality throughout the Basin, including the Burnt River subbasin. These strategies have also facilitated the ability of the federal land managers to meet requirements of the ESA and avoid jeopardy. PACFISH guidelines are used in areas east of the Cascade Crest for anadromous fish. INFISH is for the protection of habitat and populations of listed resident fishes outside anadromous fish habitat.

The **Interior Columbia Basin Ecosystem Management Project** (ICBEMP) is a regional-scale land-use plan that covers 63 million acres of federal lands in Oregon, Washington, Idaho, and Montana http://www.icbemp.gov/.

The Bureau of Land Management is developing the **Northeastern Oregon Assembled Land Exchange** (NOALE) for the retention, exchange, and disposal of public land (USDI 1998). The goal of the exchange is to enable the BLM to more effectively meet ecosystem management objectives, to consolidate BLM managed lands for more effective and efficient resource protection, enhancement, and use; and to ensure that retained lands have sufficient public benefit to merit the costs of management (Land Exchange Act).

➲ *US Fish and Wildlife Service*

The U.S. Fish and Wildlife Service administers the Endangered Species Act (ESA) for resident fish and wildlife. This act provides for the development of **Recovery Plans** and directs enforcement of federal protection laws.

The USFWS also administers the **Lower Snake River Fish and Wildlife Compensation Plan (LSRCP)** authorized by the Water Resources Development Act of 1976 (Public Law 94-587). The goal of the LSRCP is to mitigate and compensate for fish and wildlife resource losses caused by construction and operation of the four lower Snake River dams and navigation lock projects (FWS 1998).

➲ *NOAA Fisheries*

The National Oceanic and Atmospheric Administration administers the **ESA** as it pertains to anadromous fish only. NOAA Fisheries has jurisdiction over actions pertaining to Snake River spring and fall Chinook salmon and Snake River Basin Steelhead where they occur in the subbasin.

➲ *Environmental Protection Agency*

The U.S. Environmental Protection Agency is responsible for implementing and administering the **Clean Water Act** (CWA). Accelerated and strengthened efforts to achieve clean water and aquatic habitats was the intent of the Clean Water Initiative (1998), the core of which is the **Clean Water Action Plan (CWAP)**, a federal partnership to promote and enhance locally based watershed improvements (the Unified Federal Policy for Ensuring a Watershed Approach to Federal Land and Resource Management). Restoration strategies called **Total Maximum Daily Loads (TMDL)** are being developed for the Columbia River mainstem and tributaries (including the Burnt River subbasin), based on court orders and negotiated agreements through CWA litigation. EPA serves an oversight and advisory role in development of TMDLs.

➲ *Senate Bill 1010*

Senate Bill 1010 gives the Oregon Department of Agriculture (ODA) management authority to develop Water Quality Management plans for agricultural lands where such actions are required by state or federal law, such as TMDL requirements. The **Water Quality Management Plan** should be crafted in such a way to assist landowners in the local area in prevention and control of water pollution resulting from agricultural activities.

➲ *Oregon Plan*

Passed into law in 1997 by Executive Order, the **Oregon Plan for Salmon and Watersheds** (http://www.oregon-plan.org/) and the **Steelhead Supplement to the Oregon Plan** outlines a statewide approach to ESA concerns based on watershed restoration and ecosystem management to protect and improve salmon and steelhead habitat in Oregon.

➲ *Oregon Department of Fish and Wildlife*

Oregon Department of Fish and Wildlife is responsible for protecting and enhancing Oregon fish and wildlife and their habitats for present and future generations. Management of the fish and wildlife and their habitats in the Burnt River Subbasin is guided by ODFW policies and federal and state legislation. Direction for ODFW fish and wildlife management and habitat protection is based on the amendments and statutes passed by the Oregon Legislature. For example, **Oregon Administrative Rule (OAR) 635 Division 07 – Fish Management and Hatchery Operation** sets forth policies on general fish management goals, the **Natural Production Policy**, the **Wild Fish Management Policy**, and other fish management policies and **OAR 635 Division 008 – Department of Wildlife Lands** sets forth management goals for each State Wildlife Area. Another pertinent ODFW policy is the **Oregon Guidelines for Timing of In-Water Work** to **Protect Fish and Wildlife Resources** (ODFW 1997b). In addition to the OAR's, ODFW has developed a variety of species-specific management plans. http://www.dfw.state.or.us/

- Mule Deer Management Plan (2003)
- Elk Management Plan (2003)
- Bighorn Sheep and Rocky Mountain Goat Management Plan (2003)
- Cougar Management Plan (1993)
- Black Bear Management Plan (1987)
- Migratory Game Bird Program Strategic Management Plan (1993)
- Oregon Wildlife Diversity Plan (1999)
- Oregon's Trout Plan
- Warmwater Fish Plan

- Comprehensive Plan for Production and Management of Oregon's Anadromous Salmon and Trout, Part III: Steelhead Plan
- Native Fish Conservation Policy

➲ *Oregon Department of Agriculture*

The Department of Agriculture has developed the **Oregon Noxious Weed Strategic Plan** to assist in controlling the spread of noxious weeds on public and private land.

➲ *Oregon Department of Forestry*

The Oregon Department of Forestry enforces the **Oregon Forest Practices Act** (OAR 629-Division 600 to 680 and ORS 527) regulating commercial timber production and harvest on state and private lands. The OFPA contains guidelines to protect fish bearing streams during logging and other forest management activities, which address stream buffers, riparian management, and road maintenance.

➲ *County Governments*

County Commissioners have established **Comprehensive Plans** for land use within each county in Oregon. The Plan is designed to establish certain regulatory control over specific activities to 1) ensure open space, 2) protect scenic, historic, and natural resources for future generations, and 3) promote healthy and visually attractive environments in harmony with the natural landscape. Big game winter range and certain sensitive species sites are offered some protection by county plans. Some counties also assist with funding of county watershed activities in collaboration with OWEB.

➲ *Powder Basin Watershed Council*

Under House Bill 2215 and its successor, HB 3441, the State of Oregon has authorized the formation of watershed councils in an attempt to include local knowledge and cooperation in addressing Oregon's environmental issues. Baker County has convened and legally recognizes this Council as empowered to shoulder the responsibility of retaining, restoring and enhancing the health of its watersheds. The Council's mission is to: Analyze watershed conditions, develop short and long-range plans and projects to protect or improve watershed conditions, educate the people in the community about the watershed conditions and function, enlist the people in the community to participate in the projects, develop peer and/or legislative partnerships when needed to achieve results and remain in compliance with legislative and legal requirements.

4.3. Existing Management Programs

➲ *Bonneville Power Administration*

The Bonneville Power Administration has mitigation responsibility for fish and wildlife restoration under the **Fish and Wildlife Program** of the Northwest Power and Conservation Council as related to hydropower development. It is also accountable and responsible for mitigation related to federal Biological Opinions and Assessments for recovery of threatened, endangered, and sensitive species. The recently released FCRPS Biological Opinion calls for the BPA to expand habitat protection measures on non-federal lands. BPA plans to rely on the Council's program as its primary implementation tool for the FCRPS BiOp off-site mitigation requirements.

➲ *U.S.D.A. Natural Resources Conservation Service*

Within the U.S. Department of Agriculture (USDA), the Natural Resources Conservation Service (NRCS) oversees the implementation of conservation programs to help solve natural resource concerns. The **Environmental Quality Incentives Program** (EQIP), established in the 1996 Farm Bill, provides a voluntary conservation program for farmers and ranchers who face serious threats to soil, water, and related natural resources. The **Conservation Reserve Program** (CRP) puts sensitive croplands under permanent vegetative cover. The **Conservation Reserve**

Enhancement Program (CREP) helps to establish forested riparian buffers. The **Wetlands Reserve Program** (WRP) helps with wetland restoration efforts. The NRCS assists landowners to develop farm conservation plans and provides engineering and other support for habitat protection and restoration (PL 566). Additional programs administered by the NRCS include the **Grassland Reserve Program**, **Wildlife Habitat Incentives Program**, **Conservation Security Program, Forest Land Enhancement Program** and **Farm and Ranch Lands Protection Program**.

- *Oregon State Police*

  The Fish and Wildlife Division of the Oregon State Police (OSP) is responsible for enforcement of fish and wildlife regulations in the State of Oregon. **The Coordinated Enforcement Program** (CEP) promotes effective enforcement by coordinating enforcement priorities and plans by and between OSP officers and ODFW biologists.

- *Blue Mountains Elk Initiative*

  The **Blue Mountains Elk Initiative** is a federal, private, state and tribal partnership to improve elk habitat in the Blue Mountains of Oregon and Washington. The mission of the Initiative is to more effectively manage elk and elk habitat in the Blue Mountains with an emphasis on working closely with landowners to alleviate damage, using more than 90 percent of funding for on-the-ground projects and obtaining consensus on elk management from all partners and interested groups.

- *Baker County*

  OWEB provides funding for locally administered **Small Grants Program** from the watershed improvement fund.

- *Baker County Noxious Weeds*

  The **Baker County Noxious Weed Cost Share Program** provides assistance in control of specified weeds and it funded by a county weed levy.

- *Oregon Department of Agriculture*

  The **Weed Board Grants Program** is tied to Oregon Lottery funds.

- *Bureau of Land Management*

  Taylor Grazing Act **Rangeland Improvement Program** funds are administered by the BLM and funded from grazing fees.

4.4. Existing Restoration and Conservation Projects

Much of the Burnt River subbasin is in private ownership. Therefore, much of the conservation and restoration activity undertaken in the subbasin is done on private land and with private funding. There is no central clearinghouse for information on these activities and there is little willingness among landowners to discuss activities on their land with representatives of a government agency. A request from the subbasin planning lead entity, the Baker County Association of Soil and Water Conservation Districts, to government agencies and private landowners for information on projects undertaken in the last five years went unanswered. Therefore, no list of existing projects is presented at this time.

4.5. Gap Assessment of Existing Protections, Plans, Programs and Projects

Without a centralized list of the projects under way and/or completed in the subbasin, an assessment of gaps in those projects and programs is problematic. Nevertheless, the aquatic and terrestrial assessments generally validate the direction of recent conservation and restoration activities in the subbasin and emphasize the need to continue these activities on a larger scale.

Much of the conservation and restoration work undertaken recently in the subbasin has been on private land. These projects are approached opportunistically, that is when funding and landowner willingness permit. Private landowners have participated in habitat restoration for a variety of reasons: a desire to improve habitat, fear of future regulation, testimonials from other

participating landowners, cost share opportunity, etc. Although there may have been higher priority actions, or higher priority reaches in which to pursue conservation and/or restoration, those actions or areas may have been inaccessible due to lack of landowner participation and/or funding.

We believe there are sufficient protective mechanisms, laws, management plans and programs to provide the framework for habitat protection and restoration in the subbasin. Additionally projects over the last decade have generally targeted the same limiting factors as have been identified in this assessment. The QHA model may assist subbasin planners to more precisely target restoration work to stream reaches, watersheds and fish populations where the work will be the most beneficial to aquatic habitats and fish populations.

5. Management Plan

5.1. Vision for the Subbasin

Our Vision:

The Vision for the Burnt River subbasin is to work through a collaborative process to achieve a healthy and sustainable ecosystem with diverse and abundant aquatic and terrestrial species and their habitats which also supports the social, cultural and economic well-being of the local communities within the subbasin for the benefit of present and future generations.

Goal:

Implementation of a partnership-driven Management Plan that protects and enhances the natural ecological functions, habitats and biological diversity while sustaining the economic and social vitality of the communities in the region.

5.2 Biological Objectives

Objectives:

1. Promote watershed and community health through innovation and cooperation by engaging all stakeholders through an open, assessable and collaborative process.

2. Maintain or improve watershed conditions for water quality and quantity by assessing water supply and use, and developing strategies for meeting current and future both in-stream and out-of-stream objectives..

3. Maintain or improve fish and wildlife habitats to support recovering populations of threatened or endangered species, diverse populations of native species and sustainable populations of recreationally valued species.

4. Use credible scientific information to understand, protect and improve the most critical aspects of a healthy watershed.

Guiding Principles:

1. Promote healthy ecosystems within the context of a natural resource based economy.

2. Encourage collaborative means to develop projects within small watershed areas (micro-watershed projects) and partnerships between private landowners and public agencies on mixed ownerships. This method will allow stakeholders and agencies to work together for the benefit of the watershed and create win-win situations.

3. Use methods that result in self-sustaining restoration compared to methods that require continued maintenance or periodic reestablishment.

4. Balance the use of passive and active restoration projects. Passive restoration aims at addressing the activities that are causing degradation or preventing recovery. Active restoration is used where past activities prevent natural processes (or cause slow recovery) from being effective.

5. Emphasize strategies aimed at restoring watershed processes and functions over treatment of conditions. Priority will be given to projects that benefit a number of factors.

6. Use principles of adaptive management to learn from experience compared to using inflexible standards and guides for restoration projects.

5.3. Prioritized Strategies

Generic aquatic and terrestrial strategies are listed below. The list is organized by general purpose and type of action or project. When combined with the spatial extent of limiting factors in the subbasin and in watersheds as summarized above in Section 3.5, this list constitutes the Aquatic and Terrestrial Strategies. Site-level projects can then be proposed to carry out the Burnt Subbasin Plan Strategies, and meet the needs of the NWPPC Columbia Fish and Wildlife Program.

The term “Improve” is being used to describe an action that will be set forth by standards of the agencies or landowners on a site specific basis and to a point ecologically, environmentally and economically practical and feasible.

5.3.1. Aquatic Species

1) Purpose: Improve Riparian and Wetland Habitats
    a. Proper grazing management
    b. Establish buffers and riparian fencing
    c. Reestablish wetlands
    d. Seeding and planting vegetation
    e. Conservation Easements
2) Purpose: Improve Stream Channel Processes
    a. Develop off-channel habitat
    b. Remove/modify levies, berms, or dikes where appropriate
3) Purpose: Reduce Water Pollution
    a. Irrigation and water management
    b. Pesticide management
    c. Nutrient management
    d. Sewage and stormwater

4) Purpose: Reduce Upland Erosion and Sedimentation
    a. Agricultural lands – irrigated cropland, pasture and rangeland
    b. Forest management
5) Purpose: Improve In-stream channel habitat
    a. Large woody debris, boulder placement
    b. Bank stabilization
6) Purpose: Improve habitat connectivity and fish passage
    a. Fish passage at dams and irrigation water diversion structures
    b. Barriers at roads (culverts)
    c. Barriers created by dewatered reaches
    d. Approved fish screens
7) Purpose: Minimize detrimental effects of exotic species
    a. Education and enforcement to prevent illegal introductions
    b. Exotic species management

5.3.2. Terrestrial Species

1) Purpose: Achieve healthy forest ecosystem function and processes
    a. Prescribed fire
    b. Selective thinning and fuels reduction
    c. Road management and off-road travel
2) Purpose: Improve riparian habitat function
    a. Develop site-specific grazing management prescriptions
    b. Provide water developments in adjacent upland areas to encourage cattle/wildlife use of non-riparian habitats
    c. Pasture and exclosure fencing
    d. Encourage a diversity of shrub species
    e. Identify areas with impaired function and prescribe restoration techniques that will restore hydrologic and ecologic functioning
3) Improve Sage-brush steppe habitats
    a. Control Juniper encroachment
    b. Sage-brush control in appropriate areas
    c. Encourage reestablishment of native vegetation
    d. Noxious weed control

5.4 Consistency with ESA/CWA Requirements

These areas are addressed throughout the document.

5.5 Research, Monitoring and Evaluation

The focus of our Monitoring and Evaluation program below is on the strategy level, not on the project level. It is not intended to be 'field ready', rather it is a first step in program development. Current or on-going projects frequently incorporate the Monitoring and Evaluation needs identified in this section.

A list of short-term indicators to measure the successful implementation of strategies that achieve desired objectives, and the expected long-term biological outcome, are provided to guide monitoring in the Burnt River subbasin (Table 26, Table 27).

Table 26. Indicators and expected biological outcome used to evaluate success of implemented strategies in achieving AQUATIC objectives in the Burnt subbasin.

Objective	Strategy	Short-term Indicators to measure success	Long-term Biological Outcome
Maintain and increase bull trout abundance (greater that or equal to 500 adults) within each of the local population watersheds as identified by US Fish and Wildlife	Maintain existing local population levels by protecting or improving existing water temperature, stream flows, habitat quality and invasion from non-native species	Non-declining trends in water temperature, flow, habitat quality, passage	Non-declining population trends
	Increase populations to at least 500 adults within each defined watershed	Increased population	Increased population
	By 2020, assess and implement activities which will maintain or improve habitat within each defined watershed	Improved habitat	Expanded abundance
Ensure continued existence of redband trout populations at or near current levels	Expedite analysis of archived data and encourage additional genetic sampling	Genetic baseline and/or profiles of redband trout	Long-term population viability
	Improve degraded habitat to promote natural distribution of native resident fish	Improved habitat	Expanded abundance
Improve flow in limited reaches and spring complexes	Assessments for designation of adequate flow requirements where appropriate	Number of adequate flow designations	Improved populations, viability, distribution and abundance of aquatic species
	Continue and expand efforts aimed at increasing base flows and improve flow timing through riparian and wetland enhancements. Implement forest and agricultural Best Management Practices (BMP)	Increase base flows. Hydrograph improvements. Number of forest and agricultural BMPs implemented and acreage affected	Improved population and abundance of aquatic species

Reduce water temperatures to levels meeting applicable water quality standards for life stage specific needs of aquatic focal species	Improve riparian and wetland areas to restore hydrologic function and where impairment has impacted temperatures	Hydrograph improvement, increased flows, decreased stream temperatures	Improved population and abundance of aquatic species
	Promote efforts aimed at increasing streamside shading	Increased shading, increased miles of streams meeting shade and temperature criteria	Improved population and abundance of aquatic species
Reduce instream sedimentation to levels that meet applicable water quality standards and measures and establish and upward trend in the number of stream miles meeting such criteria	Reduce sediment inputs by cooperatively implementing practices that address problems from logging, mining, agriculture and other historic and current sediment-producing activities	Embeddedness	Improved population and abundance of aquatic species
By 2015, develop a nutrient allocation plan for the subbasin which investigates the potential benefits to fish and wildlife of nutrient additions or reductions	Target nutrient additions or reduction efforts accordingly to benefit aquatic and terrestrial species		
Reduce number of artificially blocked streams	Modify or remove, if possible, known barriers limiting aquatic species	Decreased number of barriers	Expanded population and diversity of species
	Modify or remove, if possible, human-caused barriers	Decreased number of barriers	Expanded population and diversity of species
Improve aquatic habitat diversity and complexity in tributary and mainstem where focal species populations are limited	Continue aquatic habitat improvement efforts consistent with existing federal, state and local habitat improvement plans and guidelines	Upward trend in habitat conditions including: Embeddedness/fines, temperature, riparian condition, high/low flows, bank stability, structure density/distribution, water quality	Improved population and abundance of aquatic species
	Address priority problems with protection and	Improved riparian condition, decreased temperature, decreased	Improved population and abundance of aquatic species

	restoration activities designed to promote development of more complex and diverse habitats through improved watershed condition and function. This will involve coordination of activities aimed at individual components such as temperature and sedimentation	embeddedness/fines, increased base flow	
	Improve ecosystem functions – identify and rehabilitate upland, riparian and wetland areas	Improved riparian condition, decreased temperature, decreased embeddedness/fines, increased base flow	Improved population and abundance of aquatic species

Table 27. Indicators and expected biological outcome used to evaluated success of implemented strategies in achieving terrestrial objectives in the Burnt subbasin.

Objective	Strategy	Short-term Indicators to measure success of Strategy	Long-term Biological Outcome
Protect and improve existing quality, quantity and diversity of native plant communities providing habitat to native wildlife species by preventing the introduction of noxious weeds and invasive exotic plants into native habitats	Prevent noxious weed infestations by minimizing ground-disturbing activities in habitats highly susceptible to weed invasion through local cooperation and revegetation following disturbance	Reduction in the number of new infestations, decreasing number of acres that need to be treated each year. Reduction of acreage of incidents of invasive noxious plant infestations related to fire impacts.	Native plant communities without invasive noxious plant problems
	Prevent dispersal by encouraging the use of weed-free seeds and feeds. Limit the transportation of weed seeds and other propagules from vehicles and livestock	Programs implemented and policies enacted, such as establishment of weed-free regulations, posting of signs regarding weed-free seed use and others	Fewer opportunities for introductions

	Minimize establishment of new invaders by supporting early detection and eradication programs	Reduction in the number of new infestations, decreasing number of acres that need to be treated each year.	Native plant communities without invasive noxious plant problems
Reduce the extent and density of established noxious weeds and restore native habitats	Treat weed infestations using the area and species identified and prioritized by Baker County Weed Board	Number of infested acres treated. Number of infestations treated	Reduced number of infestations. Reduced acreage of infestations
	Control or mitigate for the adverse impact of invasive vegetation in reservoir drawdown zones	Number of infested acres in drawdown (net reduction in infestation)	Reduced acreage of infestations
	Reestablish native plant communities after successful weed eradication efforts	Acres of restored native habitat	Increase in native plant communities without invasive noxious weed problems
	Encourage BMP and land use that will decrease the likelihood of invasion. Use the most effective and environmentally appropriate biological, mechanical or chemical treatments for control	Implementation rates of BMPs	Native plant communities without invasive noxious weeds problems and more environmentally sound
Manage forest and shrub-steppe habitats that would allow ecosystem processes and succession	Increase fire suppression efforts in shrub-steppe to limit the size and intensity of wildfires to mimic the historic fire regime	Number of acres burned and long-term alterations to vegetative structure	Reduced risk of high intensity fires Reduction in coverage of non-native annuals
	Rehabilitate burned area following methods to increase seed germination success. Emphasize use of native shrub, grass and forb species in rehabilitation seed mixture, when possible	Number of acres successfully treated and restored to native sagebrush habitat	Increased shrub-steppe and forest habitat Improved shrub-steppe and forest habitat quality and quantity

	Avoid damage, maintain and improve existing native species during rehabilitation efforts		Habitat fore perennial native species are not damaged in the long-term by rehabilitation efforts
Reduce the negative impacts of livestock grazing on the fish, wildlife and plant populations in the subbasin. Protect and improve riparian, wet meadow and native upland habitats	Reduce or eliminate grazing impacts by encouraging establishment of riparian pasture systems, exclusion fences (passable to wildlife), off-site watering areas, riparian conservation easements or consider retirement of grazing permits in priority areas. Adjust seasonal timing of livestock grazing to minimize soil compaction, erosion, noxious weed propagation and conflicts with wildlife	Update allotments management plans and adhere to standards and guidelines Number of acres exhibiting a change in the condition of the vegetation (e.g. from poor to fair, or fair to good range condition) Number of cooperators participating in conservation practices	Increased number of livestock operations compatible with resource objectives
	Identify concentrated feeding areas negatively impacting water quality and design management actions to minimize sediment inputs to streams	Number of concentrated feeding operations in existence with adequate safeguards to reduce water quality impacts Management actions taken to reduce impacts that result in measurable changes on the ground that improve water quality conditions	Improved water quality
Reduce conflicts between livestock and native wildlife and plant populations	Protect important plant populations by developing grazing management plans to limit adverse impacts to rare or culturally important plant populations	Updates to allotment management plans on public lands	Maintenance or restoration of rare or culturally important plant populations
	Prevent seed dispersal by minimizing the	Special use permits on federal lands	Fewer opportunities for introduction

	potential for livestock to spread noxious weeds through weed-free hay programs, quarantine requirements and other actions	incorporate weed-free information	
	Alter grazing management to minimize livestock and native species conflicts	Updates to allotment management plans	Improved quality
Protect mature pine/fir trees and stand habitats	Maintain existing stands and individual trees and encourage the planting of ponderosa pine in existing state, federal and private reforestation efforts	Acres of existing ponderosa pine communities that are protected	Increase in number of protected acres of ponderosa pine communities
	Continue existing, and develop new, programs that work to improve low elevation pine/fir forests	Increase in acreage of low elevation pine/fir forests	Improved habitat quality
Protect existing shrub-steppe habitats from additional fragmentation and degradation. Prevent the additional loss of shrub-steppe habitats Restore areas important for focal species	Protect existing important habitats (particularly big game winter range and rare plant habitat) from conversion	Increase number of acres of winter range Increase in number of protected areas	Increased winter range available to big game
	Restore fragmented and degraded sagebrush habitats	Number of acres of restored shrub-steppe habitat	Increase in number of acres of functioning quality shrub-steppe habitat
	On private lands, when possible, assist private landowners in restoring native vegetation	Number of landowners participating in agricultural land programs	Increase in the number of protected acres of shrub-steppe habitat
Protect, enhance or restore wetlands and spring habitats or create new wetlands to mitigate for permanently lost wetlands	Protect wetland and springs habitats through public education, promotion of BMPs, promotion of alternative grazing strategies and the installation of alternative forms of water for livestock	Decreasing trend in number of acres of wetland habitat lost	Increase in number of protected acres of wetland habitat

	Restore wetland habitats by improving wetland function and quality	Number of acres of restored wetland habitat	Number of acres of restored wetland habitat
	Create and/or establish wetlands where it will help mitigate the impacts of point sources of pollution	Number of acres of restored wetland habitat	Number of acres of restored wetland habitat
	Where priority wetlands and springs exist on private land, collaborate with private landowners, communicate and cooperate with landowners to protect or improve wetland and spring habitats	Number of acres of restored wetland habitat	Number of acres of restored wetland habitat
	Continue effective activities, and develop new activities, that work to protect and restore wet meadow, wetland and spring habitats	Number of acres of restored wetland habitat	Number of acres of restored wetland habitat
Protect, enhance or restore riparian habitats	Restore prioritized degraded riparian areas in coordination with existing plans and programs addressing riparian habitats, when possible	Number of acres of restored habitat	Increase in number of acres of functioning quality riparian habitat
	Protect riparian communities through conservation easements, land exchanges, promotion of BMPs, land stewardship, promotion of alternative grazing strategies and the installation of alternative forms of water for livestock	Decreasing trend in number of acres of riparian habitat lost	Increase in the number of protected acres of riparian habitat
	Minimize road and other land use impacts	Miles of roads in riparian areas	Improved water quality

	in riparian areas		
	Protect and restore riparian communities in agricultural lands through increased enrollment by landowners in the Conservation Reserve Program (CRP), conservation easements and other agricultural land programs	Number of landowners participating in agricultural land programs	Increase in the number of protected acres of riparian habitat
	Increase stewardship and public knowledge by increasing understanding of the importance of riparian habitat through education programs for the general public, irrigation districts, water users, land owners and land managers	Decreasing trend in number of acres of riparian habitat lost	Increase in number of acres of functioning quality riparian habitat

6. Appendices

6.1 Appendix 1: References

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6.2 Appendix 2: Species Tables

Appendix Table 1. Fish Species Known to Occur in the Burnt Rive Subbasin

Species	Origin	Distribution
Redband trout (*Oncorhynchus mykiss gibbsi*)	N	Widespread
Rainbow trout (*Oncorhychus mykiss*)	I	Widespread
White sturgeon (*Acipenser transmontanus*)	N	Rare at mouth of Burnt R.
Mountain whitefish (*Prosopium williamsoni*)	N	Mainstem
Brook trout (*Salvelinus fontinalis*)	I	Widespread
Mottled sculpin (*Cottus bairdi*)	N	mainstem and tributaries
Slimy sculpin (*Cottus cognatus*)	N	mainstem and tributaries
Torrent sculpin (*Cottus rhotheus*)	N	mainstem and tributaries
Shorthead sculpin (*Cottus confuses*)	N	mainstem and tributaries
Piaiute sculpin (*Cottus beldingi*)	N	mainstem and tributaries
Carp (*Cyprinus carpio*)	I	Low Gradient Streams
Northern pikeminnow (*Ptychocheilus oregonensis*)	N	Mainstem
Chiselmouth (*Acrocheilus alutaceus*)	N	Widespread
Peamouth (*Mylocheilus caurinus*)	N	Widespread
Longnose dace (*Rhinichthys cataractae dulcis*)	N	Widespread
Speckled dace (*Rhinichthys osculus*)	N	Widespread
Redside shiner (*Richardsonius balteatus balteatus*)	N	Widespread
Largescale sucker (*Catostomus macrocheilus*)	N	Widespread
Mountain sucker (*Catostomus platyrhynchus*)	N	Widespread
Bridgelip sucker (*Catostomus columbianus*)	N	Widespread
Black crappie (*Poxomis nigromaculatus*)	I	Lakes, Ponds, Low Gradient
White crappie (*Poxomis annularis*)	I	Lakes, Ponds, Low Gradient
Largemouth bass (*Micropterus salmoides*)	I	Lakes, Ponds, Low Gradient
Smallmouth bass (*Micropterus dolomieui*)	I	Lakes, Ponds, Low Gradient
Bluegill (*Lepomis macrochirus*)	I	Lakes, Ponds, Low Gradient
Pumpkinseed (*Lepomis gibbosus*)	I	Lakes, Ponds, Low Gradient
Warmouth (*Lepomis gulosis*)	I	Lakes, Ponds, Low Gradient
Yellow perch (*Perca flavescens*)	I	Lakes, Ponds, Low Gradient
Channel catfish (*Ictalurus punctatus*)	I	Lakes, Ponds, Low Gradient
Flathead catfish (*Pylodictis olivaris*)	I	Lakes, Ponds, Low Gradient
Brown bullhead (*Ameiurus nebulosus*)	I	Lakes, Ponds, Low Gradient

Appendix Table 2. Wildlife Species in the Burnt River Subbasin

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Amphibians			
Tiger Salamander	*Ambystoma tigrinum*	occurs	breeds
Long-toed Salamander	*Ambystoma macrodactylum*	occurs	breeds
Western Red-backed Salamander	*Plethodon vehiculum*	occurs	breeds
Tailed Frog	*Ascaphus truei*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Great Basin Spadefoot	*Scaphiopus intermontanus*	occurs	breeds
Western Toad	*Bufo boreas*	occurs	breeds
Woodhouse's Toad	*Bufo woodhousii*	occurs	breeds
Pacific Chorus (Tree) Frog	*Pseudacris regilla*	occurs	breeds
Red-legged Frog	*Rana aurora*	occurs	breeds
Oregon Spotted Frog	*Rana pretiosa*	occurs	breeds
Columbia Spotted Frog	*Rana luteiventris*	occurs	breeds
Northern Leopard Frog	*Rana pipiens*	occurs	breeds
Bullfrog	*Rana catesbeiana*	non-native	breeds
Total Amphibians:	**13**		
Birds			
Common Loon	*Gavia immer*	occurs	non-breeder
Pied-billed Grebe	*Podilymbus podiceps*	occurs	breeds
Horned Grebe	*Podiceps auritus*	occurs	breeds
Red-necked Grebe	*Podiceps grisegena*	occurs	breeds
Eared Grebe	*Podiceps nigricollis*	occurs	breeds
Western Grebe	*Aechmophorus occidentalis*	occurs	breeds
Clark's Grebe	*Aechmophorus clarkii*	occurs	breeds
American White Pelican	*Pelecanus erythrorhynchos*	occurs	breeds
Double-crested Cormorant	*Phalacrocorax auritus*	occurs	breeds
American Bittern	*Botaurus lentiginosus*	occurs	breeds
Least Bittern	*Ixobrychus exilis*	occurs	breeds
Great Blue Heron	*Ardea herodias*	occurs	breeds
Great Egret	*Ardea alba*	occurs	breeds
Snowy Egret	*Egretta thula*	occurs	breeds
Cattle Egret	*Bubulcus ibis*	occurs	breeds
Green Heron	*Butorides virescens*	occurs	breeds
Black-crowned Night-heron	*Nycticorax nycticorax*	occurs	breeds
White-faced Ibis	*Plegadis chihi*	occurs	breeds
Turkey Vulture	*Cathartes aura*	occurs	breeds
Greater White-fronted Goose	*Anser albifrons*	occurs	non-breeder
Snow Goose	*Chen Ccaerulescens*	occurs	non-breeder
Ross's Goose	*Chen rossii*	occurs	non-breeder
Canada Goose	*Branta canadensis*	occurs	breeds
Trumpeter Swan	*Cygnus buccinator*	occurs	breeds
Tundra Swan	*Cygnus columbianus*	occurs	non-breeder
Wood Duck	*Aix sponsa*	occurs	breeds
Gadwall	*Anas strepera*	occurs	breeds
Eurasian Wigeon	*Anas penelope*	occurs	non-breeder
American Wigeon	*Anas americana*	occurs	breeds
Mallard	*Anas platyrhynchos*	occurs	breeds
Blue-winged Teal	*Anas discors*	occurs	breeds
Cinnamon Teal	*Anas cyanoptera*	occurs	breeds
Northern Shoveler	*Anas clypeata*	occurs	breeds
Northern Pintail	*Anas acuta*	occurs	breeds
Green-winged Teal	*Anas crecca*	occurs	breeds
Canvasback	*Aythya valisineria*	occurs	breeds
Redhead	*Aythya americana*	occurs	breeds
Ring-necked Duck	*Aythya collaris*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Greater Scaup	*Aythya marila*	occurs	non-breeder
Lesser Scaup	*Aythya affinis*	occurs	breeds
Harlequin Duck	*Histrionicus histrionicus*	occurs	breeds
Surf Scoter	*Melanitta perspicillata*	occurs	non-breeder
Bufflehead	*Bucephala albeola*	occurs	breeds
Common Goldeneye	*Bucephala clangula*	occurs	non-breeder
Barrow's Goldeneye	*Bucephala islandica*	occurs	breeds
Hooded Merganser	*Lophodytes cucullatus*	occurs	breeds
Common Merganser	*Mergus merganser*	occurs	breeds
Red-breasted Merganser	*Mergus serrator*	occurs	non-breeder
Ruddy Duck	*Oxyura jamaicensis*	occurs	breeds
Osprey	*Pandion haliaetus*	occurs	breeds
White-tailed Kite	*Elanus leucurus*	occurs	breeds
Bald Eagle	*Haliaeetus leucocephalus*	occurs	breeds
Northern Harrier	*Circus cyaneus*	occurs	breeds
Sharp-shinned Hawk	*Accipiter striatus*	occurs	breeds
Cooper's Hawk	*Accipiter cooperii*	occurs	breeds
Northern Goshawk	*Accipiter gentilis*	occurs	breeds
Red-shouldered Hawk	*Buteo lineatus*	occurs	breeds
Swainson's Hawk	*Buteo swainsoni*	occurs	breeds
Red-tailed Hawk	*Buteo jamaicensis*	occurs	breeds
Ferruginous Hawk	*Buteo regalis*	occurs	breeds
Rough-legged Hawk	*Buteo lagopus*	occurs	non-breeder
Golden Eagle	*Aquila chrysaetos*	occurs	breeds
American Kestrel	*Falco sparverius*	occurs	breeds
Merlin	*Falco columbarius*	occurs	bred historically
Gyrfalcon	*Falco rusticolus*	occurs	non-breeder
Peregrine Falcon	*Falco peregrinus*	occurs	breeds
Prairie Falcon	*Falco mexicanus*	occurs	breeds
Chukar	*Alectoris chukar*	non-native	breeds
Gray Partridge	*Perdix perdix*	non-native	breeds
Ring-necked Pheasant	*Phasianus colchicus*	non-native	breeds
Ruffed Grouse	*Bonasa umbellus*	occurs	breeds
Sage Grouse	*Centrocercus urophasianus*	occurs	breeds
Spruce Grouse	*Falcipennis canadensis*	occurs	breeds
Blue Grouse	*Dendragapus obscurus*	occurs	breeds
Sharp-tailed Grouse	*Tympanuchus phasianellus*	reintroduced	breeds
Wild Turkey	*Meleagris gallopavo*	non-native	breeds
Mountain Quail	*Oreortyx pictus*	occurs	breeds
California Quail	*Callipepla californica*	occurs	breeds
Northern Bobwhite	*Colinus virginianus*	non-native	breeds
Virginia Rail	*Rallus limicola*	occurs	breeds
Sora	*Porzana carolina*	occurs	breeds
American Coot	*Fulica americana*	occurs	breeds
Sandhill Crane	*Grus canadensis*	occurs	breeds
Black-bellied Plover	*Pluvialis squatarola*	occurs	non-breeder
American Golden-Plover	*Pluvialis dominica*	occurs	non-breeder
Pacific Golden-Plover	*Pluvialis fulva*	occurs	non-breeder
Snowy Plover	*Charadrius alexandrinus*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Semipalmated Plover	*Charadrius semipalmatus*	occurs	non-breeder
Killdeer	*Charadrius vociferus*	occurs	breeds
Black-necked Stilt	*Himantopus mexicanus*	occurs	breeds
American Avocet	*Recurvirostra americana*	occurs	breeds
Greater Yellowlegs	*Tringa melanoleuca*	occurs	non-breeder
Lesser Yellowlegs	*Tringa flavipes*	occurs	non-breeder
Solitary Sandpiper	*Tringa solitaria*	occurs	non-breeder
Willet	*Catoptrophorus semipalmatus*	occurs	breeds
Spotted Sandpiper	*Actitis macularia*	occurs	breeds
Upland Sandpiper	*Bartramia longicauda*	occurs	breeds
Whimbrel	*Numenius phaeopus*	occurs	non-breeder
Long-billed Curlew	*Numenius americanus*	occurs	breeds
Marbled Godwit	*Limosa fedoa*	occurs	non-breeder
Red Knot	*Calidris canutus*	occurs	non-breeder
Sanderling	*Calidris alba*	occurs	non-breeder
Semipalmated Sandpiper	*Calidris pusilla*	occurs	non-breeder
Western Sandpiper	*Calidris mauri*	occurs	non-breeder
Least Sandpiper	*Calidris minutilla*	occurs	non-breeder
Baird's Sandpiper	*Calidris bairdii*	occurs	non-breeder
Pectoral Sandpiper	*Calidris melanotos*	occurs	non-breeder
Dunlin	*Calidris alpina*	occurs	non-breeder
Stilt Sandpiper	*Calidris himantopus*	occurs	non-breeder
Short-billed Dowitcher	*Limnodromus griseus*	occurs	non-breeder
Long-billed Dowitcher	*Limnodromus scolopaceus*	occurs	non-breeder
Common Snipe	*Gallinago gallinago*	occurs	breeds
Wilson's Phalarope	*Phalaropus tricolor*	occurs	breeds
Red-necked Phalarope	*Phalaropus lobatus*	occurs	non-breeder
Franklin's Gull	*Larus pipixcan*	occurs	breeds
Bonaparte's Gull	*Larus philadelphia*	occurs	non-breeder
Mew Gull	*Larus canus*	occurs	non-breeder
Ring-billed Gull	*Larus delawarensis*	occurs	breeds
California Gull	*Larus californicus*	occurs	breeds
Herring Gull	*Larus argentatus*	occurs	non-breeder
Caspian Tern	*Sterna caspia*	occurs	breeds
Common Tern	*Sterna hirundo*	occurs	non-breeder
Forster's Tern	*Sterna forsteri*	occurs	breeds
Black Tern	*Chlidonias niger*	occurs	breeds
Rock Dove	*Columba livia*	non-native	breeds
Band-tailed Pigeon	*Columba fasciata*	occurs	breeds
Mourning Dove	*Zenaida macroura*	occurs	breeds
Yellow-billed Cuckoo	*Coccyzus americanus*	occurs	breeds
Barn Owl	*Tyto alba*	occurs	breeds
Flammulated Owl	*Otus flammeolus*	occurs	breeds
Western Screech-owl	*Otus kennicottii*	occurs	breeds
Great Horned Owl	*Bubo virginianus*	occurs	breeds
Snowy Owl	*Nyctea scandiaca*	occurs	non-breeder
Northern Pygmy-owl	*Glaucidium gnoma*	occurs	breeds
Burrowing Owl	*Athene cunicularia*	occurs	breeds
Barred Owl	*Strix varia*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Great Gray Owl	*Strix nebulosa*	occurs	breeds
Long-eared Owl	*Asio otus*	occurs	breeds
Short-eared Owl	*Asio flammeus*	occurs	breeds
Boreal Owl	*Aegolius funereus*	occurs	breeds
Northern Saw-whet Owl	*Aegolius acadicus*	occurs	breeds
Common Nighthawk	*Chordeiles minor*	occurs	breeds
Common Poorwill	*Phalaenoptilus nuttallii*	occurs	breeds
Black Swift	*Cypseloides niger*	occurs	breeds
Vaux's Swift	*Chaetura vauxi*	occurs	breeds
White-throated Swift	*Aeronautes saxatalis*	occurs	breeds
Black-chinned Hummingbird	*Archilochus alexandri*	occurs	breeds
Calliope Hummingbird	*Stellula calliope*	occurs	breeds
Broad-tailed Hummingbird	*Selasphorus platycercus*	occurs	breeds
Rufous Hummingbird	*Selasphorus rufus*	occurs	breeds
Belted Kingfisher	*Ceryle alcyon*	occurs	breeds
Lewis's Woodpecker	*Melanerpes lewis*	occurs	breeds
Williamson's Sapsucker	*Sphyrapicus thyroideus*	occurs	breeds
Red-naped Sapsucker	*Sphyrapicus nuchalis*	occurs	breeds
Red-breasted Sapsucker	*Sphyrapicus ruber*	occurs	breeds
Downy Woodpecker	*Picoides pubescens*	occurs	breeds
Hairy Woodpecker	*Picoides villosus*	occurs	breeds
White-headed Woodpecker	*Picoides albolarvatus*	occurs	breeds
Three-toed Woodpecker	*Picoides tridactylus*	occurs	breeds
Black-backed Woodpecker	*Picoides arcticus*	occurs	breeds
Northern Flicker	*Colaptes auratus*	occurs	breeds
Pileated Woodpecker	*Dryocopus pileatus*	occurs	breeds
Olive-sided Flycatcher	*Contopus cooperi*	occurs	breeds
Western Wood-pewee	*Contopus sordidulus*	occurs	breeds
Willow Flycatcher	*Empidonax traillii*	occurs	breeds
Least Flycatcher	*Empidonax minimus*	occurs	non-breeder
Hammond's Flycatcher	*Empidonax hammondii*	occurs	breeds
Gray Flycatcher	*Empidonax wrightii*	occurs	breeds
Dusky Flycatcher	*Empidonax oberholseri*	occurs	breeds
Pacific-slope Flycatcher	*Empidonax difficilis*	occurs	breeds
Cordilleran Flycatcher	*Empidonax occidentalis*	occurs	breeds
Black Phoebe	*Sayornis nigricans*	occurs	breeds
Say's Phoebe	*Sayornis saya*	occurs	breeds
Ash-throated Flycatcher	*Myiarchus cinerascens*	occurs	breeds
Western Kingbird	*Tyrannus verticalis*	occurs	breeds
Eastern Kingbird	*Tyrannus tyrannus*	occurs	breeds
Loggerhead Shrike	*Lanius ludovicianus*	occurs	breeds
Northern Shrike	*Lanius excubitor*	occurs	non-breeder
Cassin's Vireo	*Vireo cassinii*	occurs	breeds
Hutton's Vireo	*Vireo huttoni*	occurs	breeds
Warbling Vireo	*Vireo gilvus*	occurs	breeds
Red-eyed Vireo	*Vireo olivaceus*	occurs	breeds
Gray Jay	*Perisoreus canadensis*	occurs	breeds
Steller's Jay	*Cyanocitta stelleri*	occurs	breeds
Western Scrub-Jay	*Aphelocoma californica*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Pinyon Jay	*Gymnorhinus cyanocephalus*	occurs	breeds
Clark's Nutcracker	*Nucifraga columbiana*	occurs	breeds
Black-billed Magpie	*Pica pica*	occurs	breeds
American Crow	*Corvus brachyrhynchos*	occurs	breeds
Common Raven	*Corvus corax*	occurs	breeds
Horned Lark	*Eremophila alpestris*	occurs	breeds
Purple Martin	*Progne subis*	occurs	breeds
Tree Swallow	*Tachycineta bicolor*	occurs	breeds
Violet-green Swallow	*Tachycineta thalassina*	occurs	breeds
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	occurs	breeds
Bank Swallow	*Riparia riparia*	occurs	breeds
Cliff Swallow	*Petrochelidon pyrrhonota*	occurs	breeds
Barn Swallow	*Hirundo rustica*	occurs	breeds
Black-capped Chickadee	*Poecile atricapillus*	occurs	breeds
Mountain Chickadee	*Poecile gambeli*	occurs	breeds
Chestnut-backed Chickadee	*Poecile rufescens*	occurs	breeds
Oak Titmouse	*Baeolophus inornatus*	occurs	breeds
Juniper Titmouse	*Baeolophus griseus*	occurs	breeds
Bushtit	*Psaltriparus minimus*	occurs	breeds
Red-breasted Nuthatch	*Sitta canadensis*	occurs	breeds
White-breasted Nuthatch	*Sitta carolinensis*	occurs	breeds
Pygmy Nuthatch	*Sitta pygmaea*	occurs	breeds
Brown Creeper	*Certhia americana*	occurs	breeds
Rock Wren	*Salpinctes obsoletus*	occurs	breeds
Canyon Wren	*Catherpes mexicanus*	occurs	breeds
Bewick's Wren	*Thryomanes bewickii*	occurs	breeds
House Wren	*Troglodytes aedon*	occurs	breeds
Winter Wren	*Troglodytes troglodytes*	occurs	breeds
Marsh Wren	*Cistothorus palustris*	occurs	breeds
American Dipper	*Cinclus mexicanus*	occurs	breeds
Golden-crowned Kinglet	*Regulus satrapa*	occurs	breeds
Ruby-crowned Kinglet	*Regulus calendula*	occurs	breeds
Blue-gray Gnatcatcher	*Polioptila caerulea*	occurs	breeds
Western Bluebird	*Sialia mexicana*	occurs	breeds
Mountain Bluebird	*Sialia currucoides*	occurs	breeds
Townsend's Solitaire	*Myadestes townsendi*	occurs	breeds
Veery	*Catharus fuscescens*	occurs	breeds
Swainson's Thrush	*Catharus ustulatus*	occurs	breeds
Hermit Thrush	*Catharus guttatus*	occurs	breeds
American Robin	*Turdus migratorius*	occurs	breeds
Varied Thrush	*Ixoreus naevius*	occurs	breeds
Gray Catbird	*Dumetella carolinensis*	occurs	breeds
Northern Mockingbird	*Mimus polyglottos*	occurs	non-breeder
Sage Thrasher	*Oreoscoptes montanus*	occurs	breeds
European Starling	*Sturnus vulgaris*	non-native	breeds
American Pipit	*Anthus rubescens*	occurs	breeds
Bohemian Waxwing	*Bombycilla garrulus*	occurs	non-breeder
Cedar Waxwing	*Bombycilla cedrorum*	occurs	breeds
Orange-crowned Warbler	*Vermivora celata*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Nashville Warbler	*Vermivora ruficapilla*	occurs	breeds
Yellow Warbler	*Dendroica petechia*	occurs	breeds
Yellow-rumped Warbler	*Dendroica coronata*	occurs	breeds
Black-throated Gray Warbler	*Dendroica nigrescens*	occurs	breeds
Townsend's Warbler	*Dendroica townsendi*	occurs	breeds
Hermit Warbler	*Dendroica occidentalis*	occurs	breeds
American Redstart	*Setophaga ruticilla*	occurs	breeds
Northern Waterthrush	*Seiurus noveboracensis*	occurs	breeds
Macgillivray's Warbler	*Oporornis tolmiei*	occurs	breeds
Common Yellowthroat	*Geothlypis trichas*	occurs	breeds
Wilson's Warbler	*Wilsonia pusilla*	occurs	breeds
Yellow-breasted Chat	*Icteria virens*	occurs	breeds
Western Tanager	*Piranga ludoviciana*	occurs	breeds
Green-tailed Towhee	*Pipilo chlorurus*	occurs	breeds
Spotted Towhee	*Pipilo maculatus*	occurs	breeds
American Tree Sparrow	*Spizella arborea*	occurs	non-breeder
Chipping Sparrow	*Spizella passerina*	occurs	breeds
Clay-colored Sparrow	*Spizella pallida*	occurs	non-breeder
Brewer's Sparrow	*Spizella breweri*	occurs	breeds
Vesper Sparrow	*Pooecetes gramineus*	occurs	breeds
Lark Sparrow	*Chondestes grammacus*	occurs	breeds
Black-throated Sparrow	*Amphispiza bilineata*	occurs	breeds
Sage Sparrow	*Amphispiza belli*	occurs	breeds
Savannah Sparrow	*Passerculus sandwichensis*	occurs	breeds
Grasshopper Sparrow	*Ammodramus savannarum*	occurs	breeds
Fox Sparrow	*Passerella iliaca*	occurs	breeds
Song Sparrow	*Melospiza melodia*	occurs	breeds
Lincoln's Sparrow	*Melospiza lincolnii*	occurs	breeds
Swamp Sparrow	*Melospiza georgiana*	occurs	non-breeder
White-throated Sparrow	*Zonotrichia albicollis*	occurs	non-breeder
Harris's Sparrow	*Zonotrichia querula*	occurs	non-breeder
White-crowned Sparrow	*Zonotrichia leucophrys*	occurs	breeds
Golden-crowned Sparrow	*Zonotrichia atricapilla*	occurs	non-breeder
Dark-eyed Junco	*Junco hyemalis*	occurs	breeds
Lapland Longspur	*Calcarius lapponicus*	occurs	non-breeder
Snow Bunting	*Plectrophenax nivalis*	occurs	non-breeder
Black-headed Grosbeak	*Pheucticus melanocephalus*	occurs	breeds
Lazuli Bunting	*Passerina amoena*	occurs	breeds
Bobolink	*Dolichonyx oryzivorus*	occurs	breeds
Red-winged Blackbird	*Agelaius phoeniceus*	occurs	breeds
Tricolored Blackbird	*Agelaius tricolor*	occurs	breeds
Western Meadowlark	*Sturnella neglecta*	occurs	breeds
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	occurs	breeds
Brewer's Blackbird	*Euphagus cyanocephalus*	occurs	breeds
Brown-headed Cowbird	*Molothrus ater*	occurs	breeds
Bullock's Oriole	*Icterus bullockii*	occurs	breeds
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*	occurs	breeds
Black Rosy-finch	*Leucosticte atrata*	occurs	breeds
Pine Grosbeak	*Pinicola enucleator*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Purple Finch	*Carpodacus purpureus*	occurs	breeds
Cassin's Finch	*Carpodacus cassinii*	occurs	breeds
House Finch	*Carpodacus mexicanus*	occurs	breeds
Red Crossbill	*Loxia curvirostra*	occurs	breeds
White-winged Crossbill	*Loxia leucoptera*	occurs	non-breeder
Common Redpoll	*Carduelis flammea*	occurs	non-breeder
Pine Siskin	*Carduelis pinus*	occurs	breeds
Lesser Goldfinch	*Carduelis psaltria*	occurs	breeds
American Goldfinch	*Carduelis tristis*	occurs	breeds
Evening Grosbeak	*Coccothraustes vespertinus*	occurs	breeds
House Sparrow	*Passer domesticus*	non-native	breeds
Total Birds:	**294**		
Mammals			
Virginia Opossum	*Didelphis virginiana*	non-native	breeds
Preble's Shrew	*Sorex preblei*	occurs	breeds
Vagrant Shrew	*Sorex vagrans*	occurs	breeds
Montane Shrew	*Sorex monticolus*	occurs	breeds
Water Shrew	*Sorex palustris*	occurs	breeds
Merriam's Shrew	*Sorex merriami*	occurs	breeds
Coast Mole	*Scapanus orarius*	occurs	breeds
California Myotis	*Myotis californicus*	occurs	breeds
Western Small-footed Myotis	*Myotis ciliolabrum*	occurs	breeds
Yuma Myotis	*Myotis yumanensis*	occurs	breeds
Little Brown Myotis	*Myotis lucifugus*	occurs	breeds
Long-legged Myotis	*Myotis volans*	occurs	breeds
Fringed Myotis	*Myotis thysanodes*	occurs	breeds
Long-eared Myotis	*Myotis evotis*	occurs	breeds
Silver-haired Bat	*Lasionycteris noctivagans*	occurs	breeds
Western Pipistrelle	*Pipistrellus hesperus*	occurs	breeds
Big Brown Bat	*Eptesicus fuscus*	occurs	breeds
Hoary Bat	*Lasiurus cinereus*	occurs	non-breeder
Spotted Bat	*Euderma maculatum*	accidental	non-breeder
Townsend's Big-eared Bat	*Corynorhinus townsendii*	occurs	breeds
Pallid Bat	*Antrozous pallidus*	occurs	breeds
American Pika	*Ochotona princeps*	occurs	breeds
Pygmy Rabbit	*Brachylagus idahoensis*	occurs	breeds
Nuttall's (Mountain) Cottontail	*Sylvilagus nuttallii*	occurs	breeds
Snowshoe Hare	*Lepus americanus*	occurs	breeds
White-tailed Jackrabbit	*Lepus townsendii*	occurs	breeds
Black-tailed Jackrabbit	*Lepus californicus*	occurs	breeds
Least Chipmunk	*Tamias minimus*	occurs	breeds
Yellow-pine Chipmunk	*Tamias amoenus*	occurs	breeds
Yellow-bellied Marmot	*Marmota flaviventris*	occurs	breeds
White-tailed Antelope Squirrel	*Ammospermophilus leucurus*	occurs	breeds
Townsend's Ground Squirrel	*Spermophilus townsendii*	occurs	breeds
Merriam's Ground Squirrel	*Spermophilus canus*	occurs	breeds
Piute Ground Squirrel	*Spermophilus mollis*	occurs	breeds
Belding's Ground Squirrel	*Spermophilus beldingi*	occurs	breeds
Columbian Ground Squirrel	*Spermophilus columbianus*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
Golden-mantled Ground Squirrel	*Spermophilus lateralis*	occurs	breeds
Eastern Gray Squirrel	*Sciurus carolinensis*	non-native	breeds
Eastern Fox Squirrel	*Sciurus niger*	non-native	breeds
Red Squirrel	*Tamiasciurus hudsonicus*	occurs	breeds
Douglas' Squirrel	*Tamiasciurus douglasii*	occurs	breeds
Northern Flying Squirrel	*Glaucomys sabrinus*	occurs	breeds
Northern Pocket Gopher	*Thomomys talpoides*	occurs	breeds
Botta's (Pistol River) Pocket Gopher	*Thomomys bottae*	occurs	breeds
Townsend's Pocket Gopher	*Thomomys townsendii*	occurs	breeds
Great Basin Pocket Mouse	*Perognathus parvus*	occurs	breeds
Little Pocket Mouse	*Perognathus longimembris*	occurs	breeds
Dark Kangaroo Mouse	*Microdipodops megacephalus*	occurs	breeds
Ord's Kangaroo Rat	*Dipodomys ordii*	occurs	breeds
Chisel-toothed Kangaroo Rat	*Dipodomys microps*	occurs	breeds
American Beaver	*Castor canadensis*	occurs	breeds
Western Harvest Mouse	*Reithrodontomys megalotis*	occurs	breeds
Deer Mouse	*Peromyscus maniculatus*	occurs	breeds
Canyon Mouse	*Peromyscus crinitus*	occurs	breeds
Pinon Mouse	*Peromyscus truei*	occurs	breeds
Northern Grasshopper Mouse	*Onychomys leucogaster*	occurs	breeds
Desert Woodrat	*Neotoma lepida*	occurs	breeds
Bushy-tailed Woodrat	*Neotoma cinerea*	occurs	breeds
Southern Red-backed Vole	*Clethrionomys gapperi*	occurs	breeds
Heather Vole	*Phenacomys intermedius*	occurs	breeds
Montane Vole	*Microtus montanus*	occurs	breeds
Long-tailed Vole	*Microtus longicaudus*	occurs	breeds
Water Vole	*Microtus richardsoni*	occurs	breeds
Sagebrush Vole	*Lemmiscus curtatus*	occurs	breeds
Muskrat	*Ondatra zibethicus*	occurs	breeds
Black Rat	*Rattus rattus*	non-native	breeds
Norway Rat	*Rattus norvegicus*	non-native	breeds
House Mouse	*Mus musculus*	non-native	breeds
Western Jumping Mouse	*Zapus princeps*	occurs	breeds
Common Porcupine	*Erethizon dorsatum*	occurs	breeds
Coyote	*Canis latrans*	occurs	breeds
Gray Wolf	*Canis lupus*	extirpated	bred-historically
Red Fox	*Vulpes vulpes*	occurs	breeds
Kit Fox	*Vulpes velox*	occurs	breeds
Gray Fox	*Urocyon cinereoargenteus*	occurs	breeds
Black Bear	*Ursus americanus*	occurs	breeds
Grizzly Bear	*Ursus arctos*	extirpated	bred-historically
Raccoon	*Procyon lotor*	occurs	breeds
American Marten	*Martes americana*	occurs	breeds
Fisher	*Martes pennanti*	occurs	breeds
Ermine	*Mustela erminea*	occurs	breeds
Long-tailed Weasel	*Mustela frenata*	occurs	breeds
Mink	*Mustela vison*	occurs	breeds
Wolverine	*Gulo gulo*	occurs	breeds

Common Name	Scientific Name	OR Occurrence	OR Breeding Status
American Badger	*Taxidea taxus*	occurs	breeds
Western Spotted Skunk	*Spilogale gracilis*	occurs	breeds
Striped Skunk	*Mephitis mephitis*	occurs	breeds
Northern River Otter	*Lutra canadensis*	occurs	breeds
Mountain Lion	*Puma concolor*	occurs	breeds
Lynx	*Lynx canadensis*	occurs	breeds
Bobcat	*Lynx rufus*	occurs	breeds
Feral Horse	*Equus caballus*	non-native	breeds
Rocky Mountain Elk	*Cervus elaphus nelsoni*	occurs	breeds
Black-tailed Deer (westside)	*Odocoileus hemionus columbianus*	occurs	breeds
White-tailed Deer (eastside)	*Odocoileus virginianus ochrourus*	occurs	breeds
Moose	*Alces alces*	accidental	non-breeder
Pronghorn Antelope	*Antilocapra americana*	occurs	breeds
Mountain Goat	*Oreamnos americanus*	reintroduced	breeds
Bighorn Sheep	*Ovis canadensis*	occurs	breeds
Total Mammals:	**99**		
Reptiles			
Painted Turtle	*Chrysemys picta*	occurs	breeds
Western Pond Turtle	*Clemmys marmorata*	occurs	breeds
Southern Alligator Lizard	*Elgaria multicarinata*	occurs	breeds
Mojave Black-collared Lizard	*Crotaphytus bicinctores*	occurs	breeds
Long-nosed Leopard Lizard	*Gambelia wislizenii*	occurs	breeds
Short-horned Lizard	*Phrynosoma douglassii*	occurs	breeds
Desert Horned Lizard	*Phrynosoma platyrhinos*	occurs	breeds
Sagebrush Lizard	*Sceloporus graciosus*	occurs	breeds
Western Fence Lizard	*Sceloporus occidentalis*	occurs	breeds
Side-blotched Lizard	*Uta stansburiana*	occurs	breeds
Western Skink	*Eumeces skiltonianus*	occurs	breeds
Western Whiptail	*Cnemidophorus tigris*	occurs	breeds
Rubber Boa	*Charina bottae*	occurs	breeds
Racer	*Coluber constrictor*	occurs	breeds
Ringneck Snake	*Diadophis punctatus*	occurs	breeds
Night Snake	*Hypsiglena torquata*	occurs	breeds
Common Kingsnake	*Lampropeltis getula*	occurs	breeds
California Mountain Kingsnake	*Lampropeltis zonata*	occurs	breeds
Striped Whipsnake	*Masticophis taeniatus*	occurs	breeds
Gopher Snake	*Pituophis catenifer*	occurs	breeds
Western Ground Snake	*Sonora semiannulata*	occurs	breeds
Western Terrestrial Garter Snake	*Thamnophis elegans*	occurs	breeds
Common Garter Snake	*Thamnophis sirtalis*	occurs	breeds
Western Rattlesnake	*Crotalus viridis*	occurs	breeds
Total Reptiles:	**24**		
Total Species:	**430**		

Appendix Table 3. Terrestrial Focal Species Selection Matrix for the Burnt River Subbasin indicating species with any state or federal special status, critical functional link and/or functional specialization with additional annotations for number of KEFs, habitat associations, Partners in Flight species (PIF) and Habitat Evaluation Procedure species (HEP). Focal Species selected are highlighted.

Common Name	Oregon Federal Status[1]	Oregon State Status[2]	Functional Specialist	Critical Functional Link Species	# of KEFs	# of Habitats Closely Associated With	# of Habitats in Decline or Threatened	Oregon Game Species	Oregon PIF Priority & Focal Species	HEP Species
Long-toed Salamander				Yes	1	2	0			
Great Basin Spadefoot				Yes		2	0			
Western Toad		SV				2	0			
Woodhouse's Toad		SPN				2	0			
Columbia Spotted Frog	C	SUS				2	0			
Northern Leopard Frog		SC				2	0			
Western Pond Turtle		SC	Yes			2	0			
Mojave Black-collared Lizard		SV				0	0			
Desert Horned Lizard		SV				0	0			
Sagebrush Lizard		SV				0	0			
Ringneck Snake			Yes			0	0			
Western Ground Snake		SPN				0	0			
Western Rattlesnake		SV				0	0			
Horned Grebe		SPN				2	0			
American White Pelican		SV				1	0			
Double-crested Cormorant				Yes		1	0			
Great Blue Heron				Yes	3	3	0			
Snowy Egret		SV				2	0			
Turkey Vulture			Yes			0	0			
Canada Goose				Yes	1	3	0	Game Bird		

Common Name	Oregon Federal Status[1]	Oregon State Status[2]	Functional Specialist	Critical Functional Link Species	# of KEFs	# of Habitats Closely Associated With	# of Habitats in Decline or Threatened	Oregon Game Species	Oregon PIF Priority & Focal Species	HEP Species
Redhead				Yes	1	2	0	Game Bird		
Greater Scaup				Yes	1	1	0	Game Bird		
Bufflehead		SUS				3	0	Game Bird		
Barrow's Goldeneye		SUS				3	0	Game Bird		
Osprey			Yes			1	0			
Bald Eagle	LT	LT				0	0			
Northern Goshawk		SC				3	2			
Swainson's Hawk		SV				3	2		PIF	
Ferruginous Hawk		SC				2	2		PIF	
Merlin			Yes			0	0			
Gyrfalcon			Yes			0	0			
Peregrine Falcon		LE	Yes			0	0			
Sage Grouse		SV				2	2	Game Bird		
Spruce Grouse		SUS				0	0	Game Bird		
Mountain Quail		SUS				0	0	Game Bird		
Sandhill Crane		SV				2	0			
Upland Sandpiper		SC				1	1			
Long-billed Curlew		SV				3	2			
Franklin's Gull		SPN				1	0			
Mew Gull				Yes	2	1	0			

Common Name	Oregon Federal Status[1]	Oregon State Status[2]	Functional Specialist	Critical Functional Link Species	# of KEFs	# of Habitats Closely Associated With	# of Habitats in Decline or Threatened	Oregon Game Species	Oregon PIF Priority & Focal Species	HEP Species
Black Tern				Yes	1	1	0			
Great Horned Owl				Yes		0	0			
Northern Pygmy-owl		SC	Yes			1	0			
Burrowing Owl		SC				2	2		PIF	
Great Gray Owl		SV				2	2		PIF	
Boreal Owl		SUS	Yes			0	0			
Common Nighthawk		SC	Yes			0	0			
Common Poorwill			Yes			0	0		PIF	
Black Swift		SPN	Yes			0	0		PIF	
Vaux's Swift			Yes			1	0		PIF	
White-throated Swift			Yes			0	0		PIF	
Black-chinned Hummingbird				Yes	1	0	0			
Rufous Hummingbird				Yes	2	0	0		PIF	
Lewis's Woodpecker		SC				0	0		PIF	
Williamson's Sapsucker		SUS		Yes	1	0	0		PIF	
White-headed Woodpecker		SC				1	1		PIF	
Three-toed Woodpecker		SC				1	1			
Black-backed Woodpecker		SC				1	1		PIF	
Pileated Woodpecker		SV				0	0		PIF	
Olive-sided Flycatcher		SV	Yes			2	0		PIF	
Western Wood-pewee			Yes			0	0		PIF	
Willow Flycatcher		SV/US				0	0		PIF	
Loggerhead Shrike		SV				3	1		PIF	
American Crow				Yes	2	2	0			
Horned Lark	FC	SC		Yes		1	1		PIF	
Bank Swallow		SUS				1	0		PIF	
Pygmy Nuthatch		SV				1	1			

Common Name	Oregon Federal Status[1]	Oregon State Status[2]	Functional Specialist	Critical Functional Link Species	# of KEFs	# of Habitats Closely Associated With	# of Habitats in Decline or Threatened	Oregon Game Species	Oregon PIF Priority & Focal Species	HEP Species
Brown Creeper			Yes			0	0		PIF	
Rock Wren			Yes			0	0			
Canyon Wren			Yes			0	0			
Winter Wren			Yes			0	0		PIF	
American Dipper						1	0		PIF	
Western Bluebird		SV				1	1		PIF	
Yellow-breasted Chat		SC				0	0		PIF	
Spotted Towhee				Yes		0	0			
Vesper Sparrow		SC				3	2		PIF	
Black-throated Sparrow		SPN				0	0		PIF	
Sage Sparrow		SC				1	1		PIF	
Grasshopper Sparrow		SV/PN				2	1		PIF	
Bobolink		SV				1	0			
Western Meadowlark		SC				3	2		PIF	
Brown-headed Cowbird				Yes	1	0	0			
Black Rosy-finch		SPN				1	0			
House Finch				Yes	3	2	0			
Virginia Opossum				Yes	1	2	0			
Preble's Shrew			Yes			0	0			
Western Small-footed Myotis		SUS				4	2			
Long-legged Myotis		SUS				3	1			
Fringed Myotis		SV				0	0			
Long-eared Myotis		SUS	Yes			0	0			
Silver-haired Bat		SUS				2	1			
Western Pipistrelle			Yes			3	2			
Big Brown Bat				Yes	1	5	1			
Townsend's Big-eared Bat		SC				1	0			

Common Name	Oregon Federal Status[1]	Oregon State Status[2]	Functional Specialist	Critical Functional Link Species	# of KEFs	# of Habitats Closely Associated With	# of Habitats in Decline or Threatened	Oregon Game Species	Oregon PIF Priority & Focal Species	HEP Species
Pallid Bat		SV				3	1			
American Pika				Yes	1	1	0			
Pygmy Rabbit		SV				1	1			
Nuttall's (Mountain) Cottontail				Yes		3	2			
Snowshoe Hare				Yes	1	3	1			
White-tailed Jackrabbit		SUS				1	1			
White-tailed Antelope Squirrel		SUS				1	1			
Golden-mantled Ground Squirrel				Yes	2	4	1			
Eastern Gray Squirrel						1	0			
Red Squirrel				Yes	1	2	1			
Douglas' Squirrel						0	0			
Northern Flying Squirrel						2	0			
Northern Pocket Gopher				Yes	1	5	3			
American Beaver				Yes	4	2	0	Game Mammal		
Deer Mouse				Yes	3	9	3			
Bushy-tailed Woodrat				Yes	1	6	1			
Montane Vole				Yes	1	3	1			
Sagebrush Vole				Yes		1	1			
Common Porcupine				Yes		4	2			
Kit Fox		LT				1	1			
Black Bear				Yes	6	0	0	Game Mammal		
Raccoon				Yes	2	3	0	Game Mammal		

Common Name	Oregon Federal Status[1]	Oregon State Status[2]	Functional Specialist	Critical Functional Link Species	# of KEFs	# of Habitats Closely Associated With	# of Habitats in Decline or Threatened	Oregon Game Species	Oregon PIF Priority & Focal Species	HEP Species
American Marten		SV				3	1	Game Mammal		
Mink				Yes	1	2	0	Game Mammal		
Mountain Lion				Yes		0	0	Game Mammal		
Lynx	LT		Yes			2	1			
Feral Horse				Yes		0	0			
Rocky Mountain Elk				Yes	2	0	0	Game Mammal		
Mule Deer						0	0	Game Mammal		
White-tailed Deer						0	0			
Pronghorn Antelope						2	2	Game Mammal		
Mountain Goat						1	0	Game Mammal		
Rocky Mountain Bighorn Sheep						1	0	Game Mammal		

[1] Federal Status: C = Candidate; LT = Listed Threatened; LE = Listed Endangered

[2] State Status OR: SV = Sensitive-Vulnerable; SC = Sensitive-Critical; SUS = Sensitive-Unclear Status; SPN = Sensitive-Peripheral or Naturally Rare; LE = Listed Endangered; LT = Listed Threatened

6.3 Appendix 3: Comprehensive Species Accounts

6.3.1 Ruffed Grouse

Ruffed Grouse (*Bonasa umbellus*). Keith Paul, USFWS, La Grande, Oregon.

Introduction

The ruffed grouse (RG) is distributed throughout deciduous and coniferous forest of North America but is most abundant in early-successional forests dominated by aspens and poplars (*Populus spp.*) (Rusch et al 2000). The distinctive RG is found singly in woods (Sibley 2000).

The RG is named for a series of black iridescent feathers on the sides of the neck called the ruff, which is erected by males to form an umbel-shaped ring around the neck during courtship displays (Pelren 2003). Both sexes are mottled in rich brown, black, and white (Pelren 2003). Two color morphs occur, with some intermediates (Pelren 2003, Rusch et al. 2000). Gray birds have tails barred with alternating banks of black and gray, whereas red birds have tails banded with black and rust (Pelren 2003, Rusch et al. 2000). Most RG in western Oregon are red, while most in eastern Oregon are gray although both morphs can exist in mixed broods on both sides of the state (Pelren 2003).

The male RG's display consists of a series of accelerating, muffed thumps, produced by beating wings rapidly while standing, that sound like a distant motor starting. This low-pitched "drumming" is often felt rather than heard. Both sexes give clucking notes and higher squeal when alarmed (Sibley 2000).

Life History, Key Environmental Correlates, and Habitat Requirements
Life History

Diet

RG are omnivorous. Their diet in spring consists primarily of leaves, buds, and flowers of grasses and forbs (Pelren 2003, Csuti et al. 1997, Rusch et al. 2000). Microarthropods increase in the diet during summer, and berries and other fruits such as salal, hawthorn, and blackberry become common in the diet as they ripen (Durbin 1979, Pelren 2003). During the winter RG mainly consume buds, seeds, twigs and catkins of deciduous trees (Pelren 2003, Csuti et al. 1997, Rusch et al. 2000). Aspen are a major winter food in Oregon, but where aspen is limited RG may also feed on alder, willow, birch, dogwood, hawthorn, and others (Pelren 2003). Ferns and other ground-level evergreen plants are also utilized during winter (Durbin 1979). Newly hatched young are feed primarily insects and spiders (Csuti et al. 1997).

Reproduction

In Oregon, breeding at lower elevations can begin in April, and young are fledged by late August (Csuti et al. 1997). Males exhibit territorial behavior throughout the year, but typically in early March territoriality increases and peaks in late March or April, then declines in May (Johnsgard 1983). During this period, male RG select a log, which is used for visual strutting displays and drumming (Pelren 2003). A single drumming log is often used throughout the life of a RG, and many have been used by numerous successive generations (Pelren 2003). Visual displays may include upright strutting, a "bowing" movement, and a rush sequence (Hjorth 1970). Sullivan (1992) described an observation of a display in the Wallowa Mountains as "rattlesnake" behavior due to the rattle-like sound of the tail following the rush sequence (Pelren 2003).

RG are polygamous. After copulation, the female seeks a nest site (Pelren 2003), typically at the base of a tree, stump, or boulder (Rusch et al. 2000). Nests can also be found in deadfalls and brushpiles, in the base of hollowed, partially opened stump, or at the base of multiple-stem shrubs; sometimes nest may be by itself without any object nearby (Johnsgard and Maxson 1989, Rusch et al. 2000). RG prefer nest sites in hardwood stands and stands that are fairly open at ground level (Johnsgard and Maxson 1989). Nests are rarely found in dense vegetation. Some nests are found in wet and brushy habitat (Maxson 1977, Rusch et al. 2000). Nests are shallow depressions lined with feathers (Pelren 2003).

Eggs are laid at a rate of two per three days with an average clutch size of 11. Incubation begins after the last egg is laid and usually lasts 23-24 days. Chicks usually hatch in early to mid-June, and gain flight in approximately two weeks. During the summer RG, and particularly broods, frequent habitat with dense invertebrate populations, such as logging roads or other disturbed locations with herbaceous growth (Pelren 2003).

Breeding Territory/Home Range

On average, male RG defend a territory of 10-30 acres in the breeding season (Csuti et al. 1997). Available literature shows that home range of both female and male RG vary significantly by region and by habitat type. Females tend to have a smaller home range when they have eggs or chicks.

Survivorship

Average annual survival rates of adult males rangewide is about 34% but varies by age class, region, habitat, and phase of population cycle (Rusch et al. 2000). A study conducted in the Appalachians by Haulton (1999), showed that survival was lowest in the first week after hatching with a high incidence of total brood loss (38%). Survival was 13.5% five weeks after hatching and 7% ten weeks after hatching.

Mortality

RG are rarely found dead from exposure, disease, or starvation (Rusch et al. 2000). Predation, including hunting by humans, is the largest source of mortality (Rusch et al. 2000). In Wisconsin, out of 563 radio-tagged grouse, 29.8% were killed by hunters, 46.2% were killed by hawks and owls, and 20.4% were killed by small mammals (Rusch et al. 2000).

Habitat Requirements

RG are closely associated with dense deciduous or deciduous/evergreen forest, represented primarily by alder-dominated stands in western Oregon and stands containing alders, quaking aspens, hawthorns, and other small trees and shrubs in eastern Oregon (Durbin 1979, Pelren 2003). In the relatively dry habitat of the Blue and Wallowa Mountains, RG frequently congregate along stream

corridors and drainages that afford dense vegetation and a diversity of berries, catkins and other food sources (Pelren 2003).

Spring habitat for males include their "drumming" log or elevated surface, frequently located in mid-successional deciduous stands, often with conifer and dense understory components (Johnsgard 1983, Pelren 2003).

Nesting habitat is often found in mid-aged deciduous or mixed deciduous-conifer habitat (Johnsgard 1983).

Population and Distribution

Distribution

In the western United States, the RG is a resident of the coastal and Cascade mountains of western Washington, Oregon, and northwest California, and the Rocky Mountains of eastern Washington and Oregon, northern Idaho, western Montana, and Wyoming, and northeast Utah (Pelren 2003). There are small populations in northeast Nevada and western North Dakota and South Dakota (Pelren 2003).

In Oregon, RG are a common resident throughout most forested regions of the state (Durbin 1979). *Bonasa umbellus affinis* occupies most forests at low to moderate elevations east of the Cascade crest (Browning 2002, Pelren 2003), primarily the east slope of the Cascades and the Blue Mountains, but also forested extensions into the lowlands (Pelren 2003). The RG is not known to inhabit the riparian or aspen stands of southeast Oregon desert regions (Pelren 2003).

Population

Historic

There is no historic population data for RG.

Current Population and Status

The population status in Oregon appears favorable (Pelren 2003) and the range remains consistent with that noted by Gabrielson and Jewett (1940). Population density data is unavailable for Oregon. Oregon Department of Fish and Wildlife (ODFW) hunter surveys indicated harvest from 1979-1996 range from an estimated 23,983 in 1985 to 74,290 in 1992 (Pelren 2003). Intensive hunter harvest data in Wallowa County suggest relatively stable populations (Pelren 2003). Populations in some states exhibit 10-year cycles of alternating abundance and relative scarcity (Johnsgard 1983); insufficient data exist on cyclic fluctuations in Oregon (Pelren 2003).

Factors Affecting Population Status

Timber harvest can actually help improve RG habitat by creating a mosaic of young timber stands favorable for the species (Pelren 2003). In the relatively dry Blue and Wallowa Mountains, streamside buffer zones facilitate dense stands of hawthorn and other food-producing shrubs ideals for the species (Pelren 2003). Currently, the outlook for RG in Oregon is positive (Pelren 2003).

References

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6.3.2 Blue Grouse

Blue Grouse (*Dendragapus obscurus*) Keith Paul, USFWS

Introduction

The blue grouse is found singly in mature pine or fir forests, generally in open woods or clearings. It is larger and more wary than the spruce grouse (*Falcipennis Canadensis*). The two populations of grouse integrate broadly where ranges meet.

The blue grouse is the largest of Oregon's three forest grouse. This grouse is known for its distinctive hooting call emitted by courting males in the spring and its extravagant courtship display. The hooting is created by air expelled from large yellow air sacs located on the sides of their throat (ODFW 2004).

Blue grouse can attain high population densities and are still distributed throughout most of their historic range. Occupation of relatively inaccessible montane forests during much of the year contributes to a healthy current status in most areas (Zwicklel 1992).

Description, Life History, and Habitat Requirements

Description

The blue grouse is a heavy-bodied grouse with moderately long, rounded wings and a moderately long unspecialized tail (Zwickel 1992). In the Pacific range, the male averages darker overall, tail is slightly rounded or wedge-shaped, and tail feathers are round tipped with narrow, light gray tips. In display, Pacific range males show warty, bright yellow air sacs on their neck with a less extensive white-feathered border (Sibley 2000). Males are predominantly dull gray, while females are mottled brown (Pelren 2003).

Life History

Diet

During the summer, blue grouse eat the leaves and flowers of herbs, leaves, flowers, and berries of shrubs, conifer needles and invertebrates (Zwickel 1992, Csuti 1997, Pelren 2003). Arthropods compose virtually 100% of the diet of the precocial chicks, but the young birds also begin to eat vegetation in late summer and fall (Pelren 2003). In early fall in eastern Oregon, blue grouse diet increasingly include conifer seeds, western larch needles and the berries of deciduous shrubs (Pelren 2003). Mike Denny reported that huckleberries are a common food source July-September in the Blue Mountains (Pelren 2003). Crawford et al. (1986a) found early fall diets of blue grouse in northeastern Oregon were composed of over 50 plant and animal species, but primarily contained short-horned grasshoppers, prickly lettuce, yellow salsify, wild buckwheat, and snowberry (Pelren 2003). During the winter months blue grouse generally rely heavily on needles, seeds, and buds of conifers, including firs, pine, hemlock, and larch (Csuti 1997, Zwickel 1992, Pelren 2003). In eastern Oregon, needles from Douglas-fir and needles and buds from ponderosa pine composed the majority of the diet during the winter (Pelren 2003).

Reproduction

Blue grouse typically begin breeding in April, and young are fledged by September (Csuti et al. 1997). In eastern Oregon, male breeding behavior usually increases in March and peaks in April (Pelren 2003). Blue grouse are polygamous and will usually mate with several females. After copulation, females move to isolated locations to nest (Pelren 2003). The average number of eggs per clutch in northeast Oregon was 7.7, which represents the largest mean clutch size for any blue grouse population for which such data exists (Pelren and Crawford 1999). Egg laying occurs at the approximate rate of one egg every 1.5 days and when all eggs have been laid incubation begins and hatching occurs approximately 26 days later (Zwickel 1992). Hatch dates in northeast Oregon range from May 1 to July 8 (Crawford et al. 1986b), while mean hatch date was May 31 (Pelren and Crawford 1999). Chicks are precocial and gain rudimentary flight in approximately two weeks (Pelren 2003).

Females choose the nest site and the nest is almost always outside male territories (Zwickel 1992), perhaps to avoid repeated courtship advances. Nests are rarely within about 164 ft (50 m) of one another, suggesting spacing (Zwickel 1992). The nest is a scrape filled with grass and leaves, built in cover at the forest edge, and usually near water (Csuti et al. 1997). Pelren and Crawford (1999) observed the greatest nesting success among nests beneath logs (Pelren 2003).

Breeding Territory/Home Range

As cited in Zwickel (1992) in spring/summer, average size and range in size of territories of adult males: southeast Alberta averaged 1.48 ac (0.6 ha) (Boag1966); Montana averaged 1.98 ac (0.8 ha) (Martinka 1972); Colorado averaged 3.71 ac (1.5 ha) (Hoffman 1981); and coastal British Columbia averaged 5.19 ac (2.1 ha) (McNicholl 1978). Female home range size varies widely and seasonally among females (Bendell and Elliot 1967, Zwickel 1992).

Survivorship

The first year survival of blue grouse is low (Zwickel 1992). As few as 10% of the previous year's hatchlings are recruited; the highest rate of mortality is in the first two weeks of life (Zwickel and Bendell 1967). Maximum known longevity for adult male BG is ≥ 14 years, and for females ≥ 11 years (Zwickel et al. 1989).

Mortality

Most nest failures result from predation (Zwickel et al. 1988). Nest predation is carried out by both mammals and birds. Known adult predators include northern goshawk (*Accipiter gentiles*), red-tailed hawk (*Buteo jamaicensis*), prairie falcon (*Falco mexicanus*), great-horned owl (*Bubo virginianus*), and Canada lynx (*Lynx Canadensis*). Other birds and mammals are likely predators also.

Habitat Requirements

Breeding/Foraging

Blue grouse may occur in shrub/steppe and grassland communities out to 1.2+ mi (2+ km) from the forest edge; in or along edge of virtually all montane forest communities with relatively open tree canopies; and in alpine/subalpine ecotones (Zwickel 1992). They also use regenerating clearcuts and riparian habitats with dense deciduous cover (Pelren 2003). From south to north, they may occupy some of the hottest and most xeric to some of the coldest (but dry) montane habitats in North America (Zwickel 1992).

Nesting habitat ranges from nearly bare ground with no overhead cover to dense vegetation beneath full forest canopies (Zwickel 1992, Pelren and Crawford 1999, Pelren 2003). Individuals in northeast Oregon were found predominantly on the ground during summer (Popper et al 1996, Pelren 2003).

Migration

The distance between winter and spring range varies from none to several miles (kilometers) (Pelren 2003). While most upland game birds migrate down from higher elevations in the winter, blue grouse actually migrate up in elevation in the winter (ODFW 2004). An adult female in the Wallowa Mountains moved 7.5 mi (12 km) between winter and spring range (Pelren 1996, 2003). Elevational movements between winter and spring range have been documented in numerous studies (Zwickel 1992), and likely occur in response to spatially separated spring and winter habitats in some areas (Pelren 2003).

Wintering/Foraging

Winter range includes conifer forests from sea level to subalpine elevations (Pelren 2003). In eastern Oregon this species occurs principally in association with forests dominated by ponderosa pines (Pelren 1996, 2003). Commonly uses subalpine fir and witches brooms in dwarf-mistletoe-infested Douglas-firs for thermal protection while roosting in winter (Pelren 1996, 2003). Individuals may remain in the same tree continuously for several weeks. Both sexes and age groups in northeast Oregon selected open park-like stands of mature ponderosa pine and Douglas-fir rather than more heavily forested stands

(Pelren 1996, 2003). Blue grouse occasionally roost beneath the surface of snow in winter; this aids in Thermoregulation and/or predator-avoidance, and likely occurs in Oregon where snow depths are adequate (Pelren 2003).

Population and Distribution

Distribution

The blue grouse is a local short-distance migrant throughout the coniferous forests of the North American Cordillera (Zwickel 1992, Pelren 2003). Blue grouse are residents of the southeastern corner of the Northwest Territories, south Yukon, British Columbia, western Alberta, and the islands of Alaska's southeastern panhandle. The range extends south through the Coast Range, Cascades, and Olympic Mountains in Washington, the contiguous mountains of western and northeastern Oregon, and the Sierra Nevada mountains of Idaho, Montana, Wyoming, Utah, and Colorado, with fragmented populations in Arizona and New Mexico (Pelren 2003).

In Oregon, *Dendragapus obscurus fuliginosus* is a fairly common resident in coniferous forests from the Cascade crest to the coast, with broad areas of absence around low-elevation urban and unforested valley areas (Pelren 2003). *D. o. sierrae* is limited primarily to the east slope of the Cascades (Pelren 2003). *D. o. pallidus* occupies coniferous forests of the Blue and Wallowa Mountains (Johnsgard 1983b, Pelren 2003).

Population

Historic

Blue grouse still occupy most of their original range, though historical accounts suggest densities in some areas were greater than now (Zwickel 2003). There is has been a decrease in suitable habitat due to agricultural conversion.

Population

Historic

There is no historic population data for blue grouse.

Current Population and Status

According to Zwickel (1992), densities of adult male blue grouse in eastern Oregon and other interior populations have ranged from 5-50/mi² (2-19/km²). Oregon Department of Fish and Wildlife (ODFW) has been performing telemetry studies since the 1980's to better understand blue grouse populations and habitat needs (Pelren 2003). In eastern Oregon, harvest data from the late 1970's to the mid-1990's, indicate that the approximate number of hunters declined from 10,000 to 5,000, while the number of blue grouse harvested declined from 25,000 to under 15,000 (Pelren 2003). Oregon upland game bird harvest data (1993-2002) is shown below (Table 1). Despite intensive study of blue grouse over the last 40 years, ability to predict population levels and trends remain poor (Zwickel 1992).

Table 1. Source - ODFW Upland Game Bird Harvest 1993-2002.

Year	Blue Grouse	Year	Blue Grouse
1993	15,734	1998	28,664
1994	20,380	1999	38,405
1995[1]	22,895	2000	31,775
1996	33,120	2001	42,429
1997[1]	33,382	2002	42,301

[1] Concern for integrity of data collected in 1997. 1995 survey conducted by OSU.

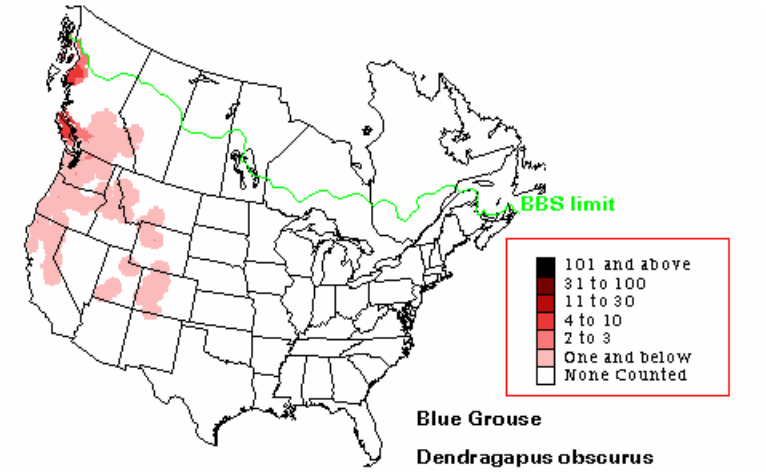

Figure 1. Blue Grouse breeding distribution from BBS data (1982-1996) (Sauer et al. 2001)

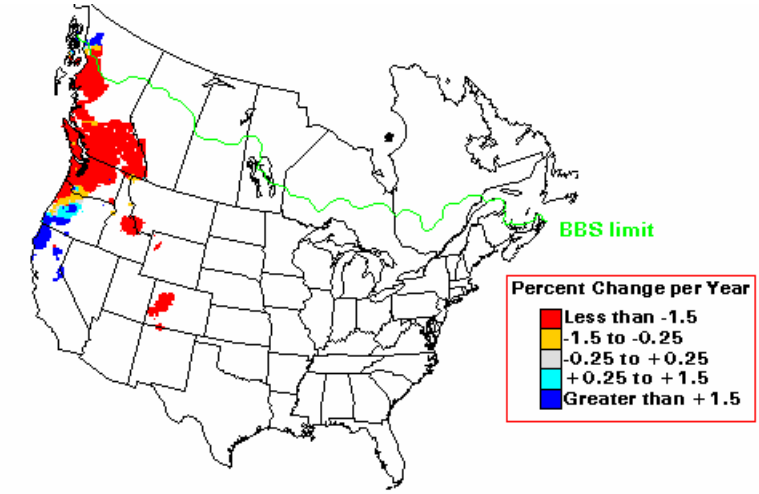

Figure 2. Blue Grouse trend from BBS data (1966-1996) (Sauer et al. 1996)

Factors Affecting Population Status

Local extirpations have occurred in areas taken over by agriculture and cities. Rugged mountainous habitat has helped to protect blue grouse, so the long-term outlook for many populations is good. However, logging, grazing of domestic livestock and urbanization remain threats (Zwickel 1992).

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6.3.3 White-headed Woodpecker

White-headed Woodpecker (*Picoides albolarvatus*). Paul Ashley and Stacey Stovall. 2004. Southeast Washington Subbasin Planning Ecoregion Wildlife Assessment.

Introduction

The white-headed woodpecker (*Picoides albolarvatus*) is a year round resident in the Ponderosa pine (*Pinus ponderosa*) forests found at the lower elevations (generally below 950m). White-headed woodpeckers are particularly vulnerable due to their highly specialized winter diet of ponderosa pine seeds and the lack of alternate, large cone producing, pine species.

Nesting and foraging requirements are the two critical habitat attributes limiting the population growth of this species of woodpecker. Both of these limiting factors are very closely linked to the habitat attributes contained within mature open stands of Ponderosa pine. Past land use practices, including logging and fire suppression, have resulted in significant changes to the forest structure within the Ponderosa pine ecosystem.

White-headed Woodpecker Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Diet

White-headed woodpeckers feed primarily on the seeds of large Ponderosa pines. This is makes the white-headed woodpecker quite different from other species of woodpeckers who feed primarily on wood boring insects (Blood 1997; Cannings 1987 and 1995). The existence of only one suitable large pine (ponderosa pine) is likely the key limiting factor to the white-headed woodpecker's distribution and abundance.

Other food sources include insects (on the ground as well as hawking), mullein seeds and suet feeders (Blood 1997; Joe *et al.* 1995). These secondary food sources are used throughout the spring and summer. By late summer, white-headed woodpeckers shift to their exclusive winter diet of ponderosa pine seeds.

Reproduction

White-headed woodpeckers are monogamous and may remain associated with their mate throughout the year. They build their nests in old trees, snags or fallen logs but always in dead wood. Every year the pair bond constructs a new nest. This may take three to four weeks. The nests are, on average 3m off the ground. The old nests are used for overnight roosting by the birds.

The woodpeckers fledge about 3-5 birds every year. During the breeding season (May to July) the male roosts in the cavity with the young until they are fledged. The incubation period usually lasts for 14 days and the young leave the nest after about 26 days. White-headed woodpeckers have one brood per breeding season and there is no replacement brood if the first brood is lost.

The woodpeckers are not very territorial except during the breeding season. They are not especially social birds outside of family groups and pair bonds and generally do not have very dense populations (about 1 pair bond per 8 ha).

Nesting

Generally large ponderosa pine snags consisting of hard outer wood with soft heartwood are preferred by nesting white-headed woodpeckers. In British Columbia 80 percent of reported nests have been in ponderosa pine snags, while the remaining 20 percent have been recorded in Douglas-fir snags. Excavation activities have also been recorded in Trembling Aspen, live Ponderosa pine trees and fence posts (Cannings *et al.* 1987).

In general, nesting locations in the South Okanagan, British Columbia have ranged between 450 - 600m (Blood 1997), with large diameter snags being the preferred nesting tree. Their nesting cavities range from 2.4 to 9 m above ground, with the average being about 5m. New nests are excavated each year and only rarely are previous cavities re-used (Garrett *et al.* 1996).

Migration
The white-headed woodpecker is a non-migratory bird.
Habitat Requirements
Breeding

White-headed woodpeckers live in montane, coniferous forests from British Columbia to California and seem to prefer a forest with a relatively open canopy (50-70 percent cover) and an availability of snags (a partially collapsed, dead tree) and stumps for nesting. The birds prefer to build nests in trees with large diameters with preference increasing with diameter. The understory vegetation is usually very sparse within the preferred habitat and local populations are abundant in burned or cut forest where residual large diameter live and dead trees are present.

Highest abundances of white-headed woodpeckers occur in old-growth stands, particularly ones with a mix of two or more pine species. They are uncommon or absent in monospecific ponderosa pine forests and stands dominated by small-coned or closed-cone conifers (e.g., lodgepole pine or knobcone pine).

Where food availability is at a maximum such as in the Sierra Nevadas, breeding territories may be as low as 10ha (Milne and Hejl 1989). Breeding territories in Oregon are 104 ha in continuous forest and 321 ha in fragmented forests (Dixon 1995b). In general, open Ponderosa pine stands with canopy closures between 30 - 50 percent are preferred. The openness however, is not as important as the presence of mature or veteran cone producing pines within a stand (Milne and Hejl 1989). In the South Okanagan, British Columbia, Ponderosa pine stands in age classes 8 -9 are considered optimal for white-headed woodpeckers (Haney 1997). Milne and Hejl (1989) found 68 percent of nest trees to be on southern aspects, this may be true in the South Okanagan as well, especially, towards the upper elevational limits of Ponderosa pine (800 - 1000m).

White-headed Woodpecker Population and Distribution
Population
Historic
No data are available.

Current
No data are available.

Distribution
Historic
No data are available.

Current

These woodpeckers live in montane, coniferous forests from southern British Columbia in Canada, to eastern Washington, southern California and Nevada and Northern Idaho in the United States. The exact population of the white-headed woodpecker is unknown but there are thought to be less than 100 of the birds in British Columbia. See Figure_100, Figure_101, and Figure_102 for current distribution.

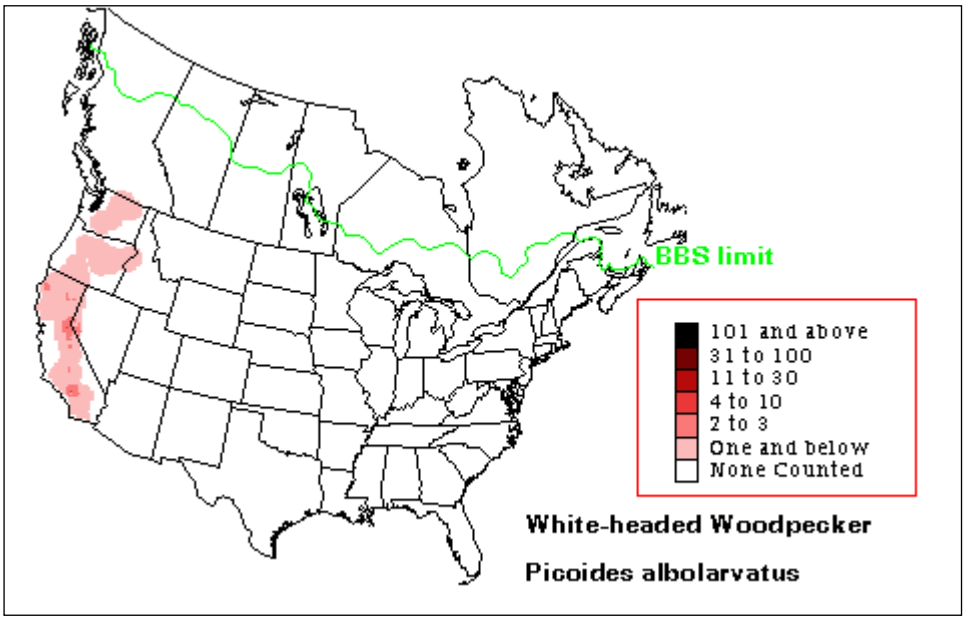

Figure 29. White-headed woodpecker year-round range (Sauer *et al*. 2003).

Woodpecker abundance appears to decrease north of California. They are uncommon in Washington and Idaho and rare in British Columbia. However, they are still common in most of their original range in the Sierra Nevada and mountains of southern California. The birds are non-migratory but do wander out of their range sometimes in search of food.

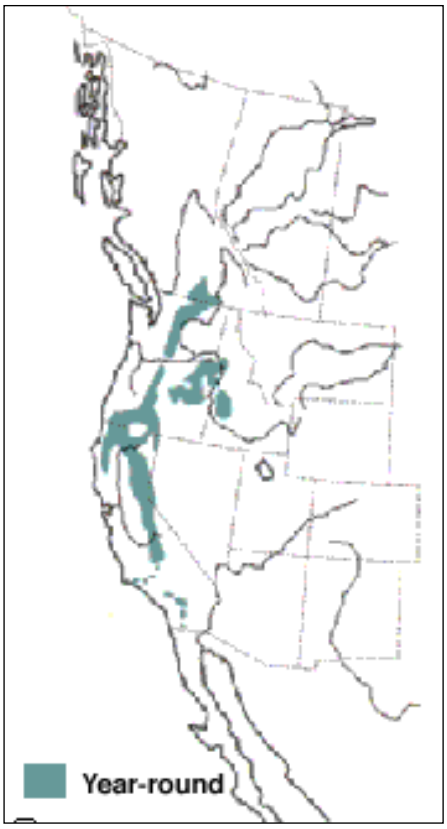

Figure 30 White-headed woodpecker breeding distribution (from BBS data) (Sauer *et al.* 2003).

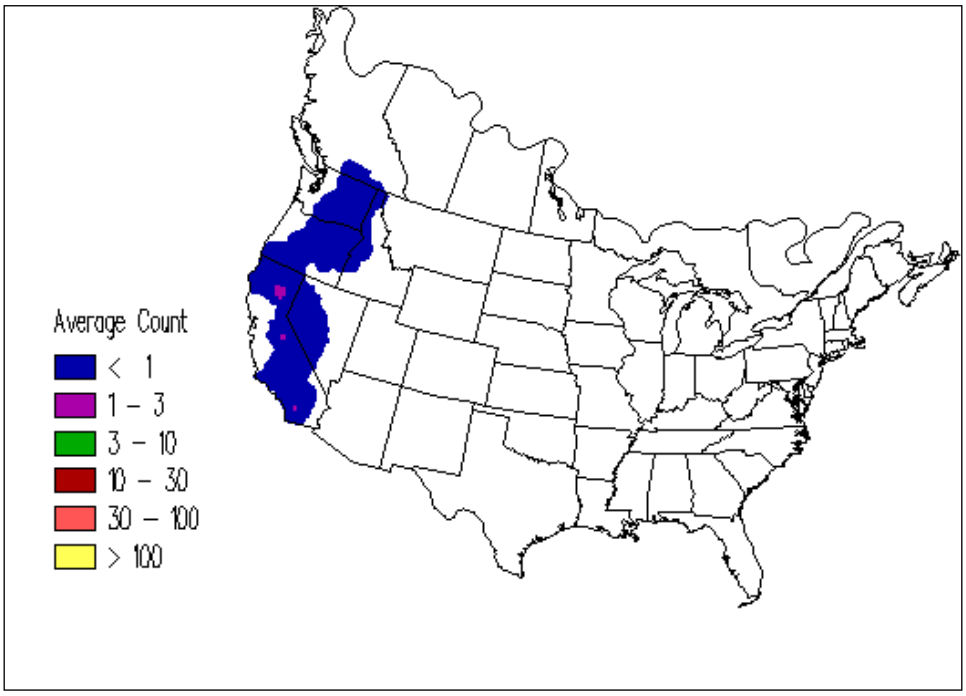

Figure 31. White-headed woodpecker winter distribution (from CBC data) (Sauer *et al.* 2003).

White-headed Woodpecker Status and Abundance Trends

Status

Although populations appear to be stable at present, this species is of moderate conservation importance because of its relatively small and patchy year-round range and its dependence on mature, montane coniferous forests in the West. Knowledge of this woodpecker's tolerance of forest fragmentation and silvicultural practices will be important in conserving future populations.

Trends

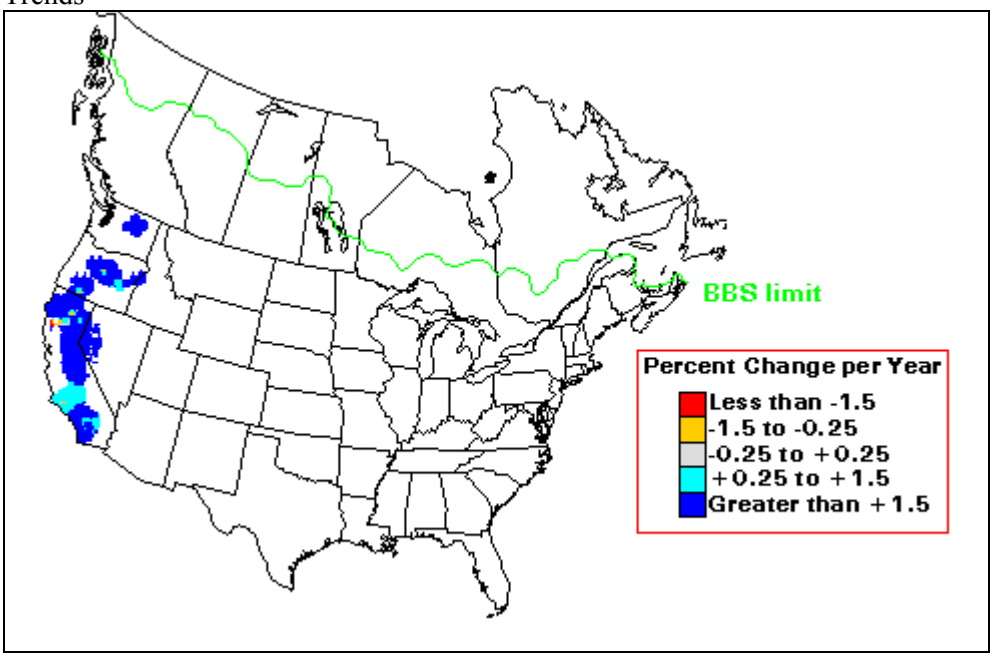

Figure 32. White-headed woodpecker Breeding Bird Survey (BBS) population trend: 1966-1996 (Sauer *et al.* 2003).

Factors Affecting White-headed Woodpecker Population Status

Key Factors Inhibiting Populations and Ecological Processes

Logging

Logging has removed much of the old cone producing pines throughout the South Okanagan. Approximately 27, 500 ha of ponderosa pine forest remain in the South Okanagan and 34.5 percent of this is classed as old growth forest (Ministry of Environment Lands and Parks 1998). This is a significant reduction from the estimated 75 percent in the mid 1800s (Cannings 2000). The 34.5 percent old growth estimate may in fact be even less since some of the forest cover information is incomplete and needs to be ground truthed to verify the age classes present. The impact from the decrease in old cone producing ponderosa pines is even more exaggerated in the South Okanagan because there are no alternate pine species for the white-headed woodpecker to utilize. This is especially true over the winter when other major food sources such as insects are not available. Suitable snags (DBH>60cm) are in short supply in the South Okanagan.

Fire Suppression

Fire suppression has altered the stand structure in many of the forests in the South Okanagan. Lack of fire has allowed dense stands of immature ponderosa pine as well as the more shade tolerant Douglas-fir to establish. This has led to increased fuel loads resulting in more severe stand replacing fires where both the mature cone producing trees and the large suitable snags are destroyed. These dense stands of immature trees has also led to increased competition for nutrients as well as a slow change from a Ponderosa pine climax forest to a Douglas-fir dominated climax forest.

Predation

There are a few threats to white-headed woodpeckers such as predation and the destruction of its habitat. Chipmunks are known to prey on the eggs and nestlings of white-headed woodpeckers. There is also predation by the great horned owl on adult white-headed woodpeckers. However, predation does not appreciably affect the woodpecker population.

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6.3.4 Sage Grouse

Sage Grouse (*Centrocercus urophasianus*) Keith Paul, USFWS

Sage Grouse, BLM et al. 2000.

Introduction

The sage grouse is North America's largest grouse, a characteristic feature of habitats dominated by big sagebrush (*Artemisia tridentate)* in Western North America (Schroeder et al. 1999). The first written accounts of this species were based on observations by the Lewis and Clark expedition in 1805, when the species was widespread in the West (Schroeder et al. 1999). Sage grouse were an important game species for Native Americans and European settlers and continue to be valued for hunting and food (Storch 2000). Because of the stunning display of sage grouse on their strutting grounds, they have become popular with naturalists and bird watchers.

Due to loss, fragmentation, and degradation of greater sage grouse habitat and large reductions of their population, seven petitions have been submitted to the U.S. Fish and Wildlife Service (Service) requesting listing of distinct populations and the entire species, collectively. The Service determined that there was not significant information available to classify the greater sage grouse into two distinct population segments (the western and eastern subspecies of sage grouse). In a recent news release dated April 15, 2004, the Service announced its completion of evaluating three petitions to list the greater sage grouse rangewide as either threatened or endangered. The Service has determined that the petitions and other available information provide substantial biological information indicating that further review of the status of the species is warranted. This status review will determine whether the greater sage grouse warrants listing as a threatened or endangered species.

Concern about long-term declines in sage grouse populations has prompted western State wildlife agencies and Federal agencies such as the Bureau of Land Management (BLM), U.S. Forest Service, and the Service to engage in a variety of cooperative efforts aimed at conserving and managing sagebrush habitat for the benefit of sage grouse and other sagebrush-dependent species.

Description, Life History, and Habitat Requirements

Description

Adult male sage grouse has fuscous upperparts, profusely marked with drab gray and white; tail long and pointed; primaries plain brown; chin and throat sepia (blackish); sides of neck, breast, and upper belly whitish and slightly distended, forming a ruff; belly and undertail-coverts sepia, with large white spots on tips of undertail-coverts; thighs buff (Schroeder et al. 1999). Head has yellow fleshy comb

above eye, and long filoplumes that arise from back of the neck (Schroeder et al. 1999). During courtship displays, tail fanned and breast distended, exposing two yellow ocher patches of bare skin (cervical apteria) on lower throat and breast (Schroeder et al. 1999). These apteria briefly exposed during the display, appearing as round balloons. The adult female is similar to the male but smaller and has fuscous feathers, marked with drab gray and white on head and breast, creating a more cryptic appearance overall than in male (Schroeder et al. 1999). Female also lacks cervical apteria and has smaller comb over eye than male (Schroeder et al. 1999).

Life History

Diet

Sagebrush dominates diet during late autumn, winter, and early spring (Girard 1937, Rasmussen and Griner 1938, Bean 1941, Batterson and Morse 1948, Patterson 1952, Leach and Hensley 1954, Barber 1968, Wallestad et al. 1975, Schroeder et al. 1999). Sage grouse eat numerous species of sagebrush, including big, low (*Artemisia arbuscula*), silver (*Artemisia cana*), and fringed (*Artemisia fridida*) (Remington and Braun 1985, Welch et al. 1988, 1991, Myers 1992, Schroeder et al. 1999). Insects are an important component of the juvenile diet, especially during the first three weeks of life; after which forbs increase in importance as juveniles age (Patterson 1952, Trueblood 1954, Klebenow and Gray 1968, Savage 1968, Peterson 1970, Johnson and Boyce 1990, Drut et al. 1994, Pyle and Crawford 1996, Schroeder et al. 1999). Although insects are also eaten by adults during spring and summer, forbs and sagebrush dominate their diet (Rasmussen and Griner 1938, Moos 1941, Knowlton and Thornley 1942, Patterson 1952, Leach and Hensley 1954, Schroeder et al. 1999).

Reproduction

The breeding of sage grouse begins in mid-March when the males start to congregate on the leks (BLM et al. 2000). Females come to the leks to mate and generally nest in the vicinity (BLM et al. 2000). Nesting rates vary from year to year and from area to area (Bergerud 1988, Coggins 1998, Connelly et al 1993, Gregg 1991, and Schroeder 1997). This variation is most likely a result of the quality of available nutrition and the general health of pre-laying females (Barnett and Crawford 1994). At least 70% of the females in a population will initiate a nest each year, with higher nest initiation rate recorded during years of higher precipitation in comparison to periods of drought (Coggins 1998). Renesting rates by females who have lost their first clutch are 10 to 40 % (Bergerud 1988, Connelly et al. 1993, Eng 1963, Patterson 1952, and Petersen 1980). Clutch size per nest normally ranges from seven to ten eggs (Connelly unpub., Schroeder 1997, Wakkinen 1990, BLM et al. 2000).

Breeding Territory/Home Range

Adult males are highly territorial on leks, actively defending areas of 53.8-1076 ft² (5-100 m²) (Simon 1940, Patterson 1952, Dalke et al 1960, Hartzler 1972, Wiley 1973, Gibson and Bradbury 1987, Schroeder et al. 1999). Yearling males rarely defend territories or breed, although they are physiologically capable of breeding (Eng 1963). Leks vary from 1 to 16 ha in size because of number of males attending lek and topography of lek site (Scott 1942, Patterson 1952, Wiley 1973, Schroeder et al. 1999). Male sage grouse are not territorial off leks (Schroeder et al. 1999). Home range for sage grouse may exceed 579 mi² (1,500 km²) (Connelly, unpub. data, cited in BLM et al. 2000). Sage grouse may have two or more seasonal ranges including a breeding range, a brood-rearing range, and a winter range (BLM et al. 2000).

Migration/Overwintering

Sage grouse populations can be migratory or non-migratory (Beck 1975, Berry and Eng 1985, Connelly et al 1988, Fischer 1994, Wakkinen 1990, and Wallestad 1975, BLM et al. 2000), depending on location and associated land form. Where topographic relief allows, sage grouse generally move to higher elevations from spring through fall as snow melts and plant growth advances (BLM et al. 2000). Non-migratory populations may spend the entire year within an area of 38.61 mi² (100 km²) or less in size (BLM et al. 2000). In migratory populations, seasonal movements may exceed 46.5 mi (75 km) (Connelly et al. 1998, Dalke et al. 1963, BLM et al. 2000).

Survivorship

Annual survival rates for yearling and adult sage grouse vary from 35 to 85 percent for females, and from 38 to 54 percent for males (Connelly et al. 1994, Wallestad 1975, and Zablan 1993, BLM et al.

2000). Lower survival rates for males may be related to the higher predation rates on males during the lekking season (Swensen 1986). Sage grouse tend to live longer than other upland gamebird species; individual birds four to five years old are common (BLM et al. 2000).

Mortality

Predation on eggs and birds is the primary cause of mortality (Schroeder et al. 1999). Other causes of mortality include human disturbance, livestock, farm machinery, moving vehicles, electric or telephone wires, fences, pesticides, fire flood, drought, sun exposure, heavy rain, and cold (Borell 1939, Bean 1941, Batterson and Morse 1948, Patterson 1952, Dalke et al. 1963, Rogers 1964, Wallestad 1975, Barber 1991, Schroeder et al. 1999).

Habitat Requirements

Breeding

Breeding grounds are centered on and within the vicinity of leks. The same lek sites are used from year to year. They are established in open areas surrounded by sagebrush, which is used for escape and protection from predators (Gill 1965, Patterson 1952, BLM et al. 2000). Examples of lek sites include landing strips, old lake beds or playas, low sagebrush flats, openings on ridges, roads, crop land, and burned areas (Connelly et al. 1981, Gates 1985, BLM et al. 2000). The lek is considered the center of year-round activity for resident grouse populations (Eng and Schladweiler 1972, Wallestad and Pyrah 1974, Wallestad and Schladweiler 1974). On the average, most nests are located within 4 miles (6.2 km) of the lek; however some females or hens may nest more than 12 miles (20 km) away from the lek (Autenrieth 1981, Fischer 1994, Hanf et al. 1994, Wakkinen et al. 1992, BLM et al. 2000). Most sage grouse nests are located under sagebrush plants (Gill 1965, Gray 1967, Patterson 1952, Schroeder et al. 1999, Wallestad and Pyrah 1974, BLM et al. 2000). Optimum sage grouse nesting habitat consists of the following: sagebrush stands containing plants 16 to 32 inches (40 to 80 cm) tall with a canopy cover ranging from 15 to 25 percent and an herbaceous understory of at least 15 percent grass canopy cover and 10 percent forb canopy cover that is at least 7 inches (18 cm) tall (BLM et al. 2000). Ideally, these vegetative conditions should be on 80 percent of the breeding habitat for any given population of sage grouse (BLM 2000).

Non-breeding

Sage grouse winter habitats are relatively similar throughout most of their ranges. Because their winter diet consists almost exclusively of sagebrush, winter habitats must provide adequate amounts of sagebrush (BLM et al. 2000). Sagebrush canopy can be highly variable (Beck 1977, Eng and Schladweiler 1972, Patterson 1952, Robertson 1991, Wallestad et al. 1975, BLM et al. 2000). Sage grouse tend to select areas with both high canopy and taller Wyoming big sagebrush (*A. t. wyomingensis*) and feed on plants highest in protein content (Remington and Braun 1985, Robertson 1991, BLM et al 2000). It is critical that sagebrush be exposed at least 10 to 12 inches (25 to 30 cm) above snow level to provide food and cover for wintering sage grouse (Hupp and Braun 1989, BLM et al. 2000). If snow covers the sagebrush, the birds move to areas where sagebrush is exposed. Therefore, good wintering habitat consists of sagebrush with 10 to 30 percent canopy cover on 80 percent of the wintering area (BLM et al. 2000).

Population and Distribution

Distribution

Historic Distribution

Historically, sage grouse occurred in at least 16 states and three Canadian provinces. Since then, sage grouse have been extirpated from British Columbia, Arizona, Utah, Montana, New Mexico, Colorado, Wyoming, Alberta, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, and Nebraska (Connelly and Braun 1997, Braun 1998, Schroeder et al. 1999). It is unclear whether birds in Oklahoma and Kansas represented a distinct population (Schroeder et al. 1999). Historically, it is estimated that 220 million acres (81 million ha) of sagebrush-steppe vegetation types existed in North America (McArthur and Ott 1996), making it one of the most widespread habitats in the country (BLM et al. 2000). However, much of this habitat has been lost or degraded over the last 100 years (BLM et al. 2000).

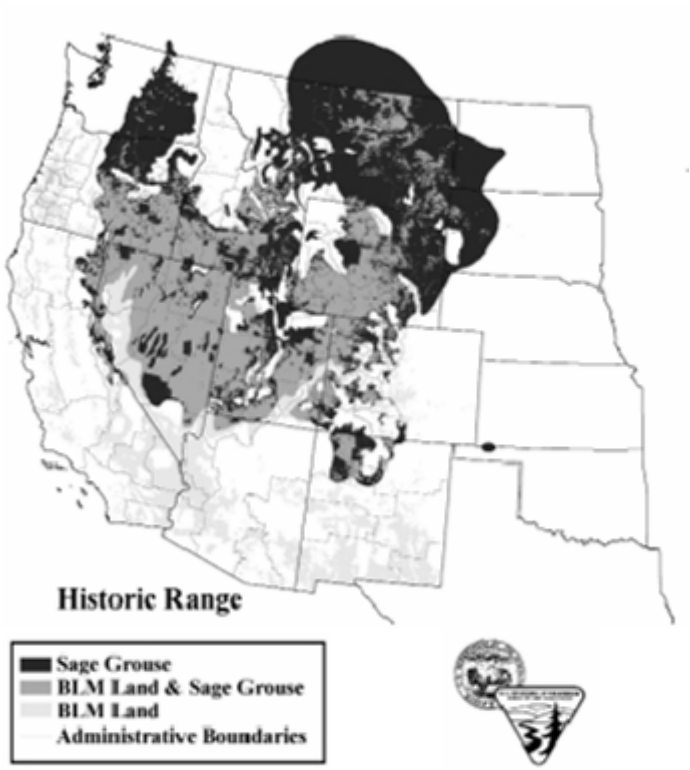
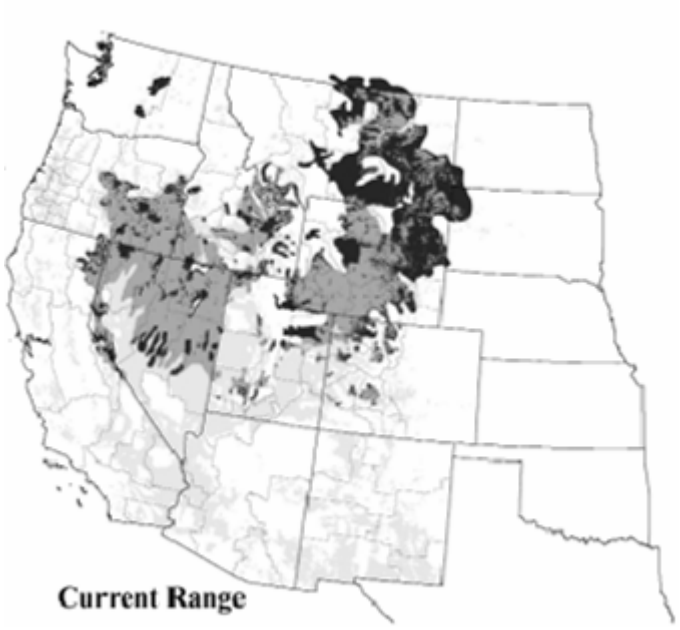


Figure 1. Sage Grouse historic range map (BLM et al. 2000)

Current Distribution

Currently, in states and provinces that still have sage grouse, their range has been reduced. Declines in distribution have been noted throughout the twentieth century (Hornaday 1916, Locke 1932, McClanahan 1940, Aldrich and Duvall 1955, Connelly and Braun 1997, Schroeder et al. 1999). Within the Interior Columbia River Basin, sagebrush habitat has been reduced from about 40 million acres (16 million ha) to 26 million acres (11 million ha), representing a loss of about 35% since the early 1900's (Hann et al. 1997, BLM et al. 2000). Most remaining sagebrush-steppe ecosystems in Oregon are on public lands managed by the Bureau of Land Management (BLM) (BLM et al. 2000).



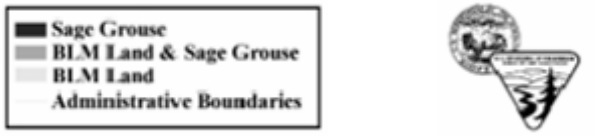


Figure 2. Sage Grouse current range map (BLM et al. 2000)

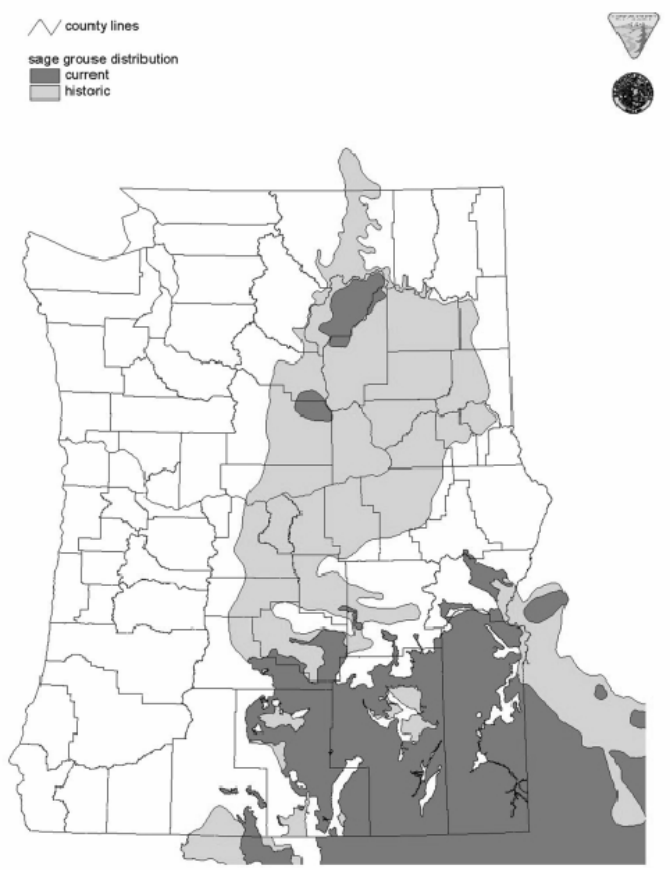


Figure 3. Current verses historic sage grouse rangemap in Oregon and Washington (BLM et al. 2000).

Population

Historic Population

Historically, there may have been roughly 1.6 million and 16 million sage grouse rangewide prior to European expansion across western North America (65 Federal Register 51578).

Current Population and Status

Rangewide, with the extirpation of sage grouse from several states, and the reduction and degradation of sagebrush-steppe habitat, the numbers of sage grouse have been reduced significantly. Between 1985 and 1994, populations declined by an average of 33% (Storch 2000). Braun (1998) estimated a rangewide sage grouse population of 142,000 in 1998, clearly lower than historic levels.

In Oregon, Oregon Department of Fish and Wildlife (ODFW) made a minimum estimate of sage grouse in 1992 of between 27,505 and 68,012 adults (see Table 1).

County	Known Leks	Mean Number of Males/Lek	Total Number of Males	Total Adult Estimate*
Malheur	112	24.3	2,722	6,805
Harney	119	31.0	3,689	9,223

Lake	108	24.3	2,624	6,560
Hart Refuge	22	28.8	634	1,585
Klamath	8	14.2	114	285
Deschutes	22	14.1	310	775
Crook	28	14.7	412	1,030
Baker	33	14.2	469	1,172
Union	2	14.2	28	70
Total	461		11,002	27,505
*Assumes a 60:40 female:male sex ratio to calculate totals.				

Table 1. Minimum Population Estimate of Adult Sage Grouse in Oregon, 1992 (ODFW 1993).

Oregon upland game bird harvest data (1993-2002) is shown below (Table 2).

Table 2. Source - ODFW Upland Game Bird Harvest 1993-2002.

Year	Sage Grouse	Year	Sage Grouse
1993	973	1998	839
1994	1,015	1999	808
1995[1]	857	2000	716
1996	1,015	2001	976
1997[1]	681	2002	549

[1] Concern for integrity of data collected in 1997. 1995 survey conducted by OSU.

Continuing Threats

Numerous activities have adversely impacted, and continue to have potential to adversely impact, the distribution and quality of sage grouse and their habitat. In addition, natural events and the human response to them could directly impact sage grouse, as well as their habitats (BLM et al. 2000).

Permanent conversion of sagebrush to agricultural lands is the single greatest cause of decline in sagebrush-steppe habitat in the interior Columbia Basin (Quigley and Arbelbide 1997, BLM et al. 2000). In the northern half of eastern Oregon, large areas of sagebrush-steppe habitat have been converted to agricultural lands (Wisdom et al. 2000).

Prior to the 1980's, herbicide treatment of large tracts of rangeland (primarily 2, 4-D) was a common method of reducing sagebrush (Braun 1987, BLM et al. 2000). In many cases, broad herbicide treatment may have contributed to declines in sage grouse breeding populations (Enyeart 1956, Higby 1969, Peterson 1970, Wallestad 1975, BLM et al. 2000).

Various livestock management practices have altered sage grouse habitat over the last century. In many areas, grazing has contributed to long-term changes in plant communities and reduced certain habitat components, such as biological crusts that contribute to the health of sagebrush-steppe habitat (Mack and Thompson 1982, Quigley and Arbelbide 1997, Wisdom et al. 2000, BLM et at. 2000).

Fire has altered sage grouse habitat on the landscape in Oregon. Existing BLM fire management plans have not, for the most part, identified sage grouse habitat as a high priority for protection (BLM et al. 2000). Repeated wildfires have favored invasion by cheatgrass (*Bromus tectorum*) and other exotic species (Pellant 1990, Valentine 1990, BLM et al. 2000). Conversion to cheatgrass alters the fire frequency from the historic 32-70 years in sagebrush-steppe habitat ecosystems to five years or less (Wright and others 1979). Additionally, prescribed fire has also contributed to the decrease in Wyoming big sagebrush habitat and sage grouse brood-rearing habitat (Connelly et al. 1994, Fischer et al. 1996, BLM et al. 2000).

The lack of prompt and appropriate fire rehabilitation following a wildfire can present additional threats to sage grouse habitat (BLM et al. 2000). If cheatgrass or any of a number of other exotic plant species are present before a fire occurs, they are likely to become more dominant afterwards if the area is not properly rehabilitated (BLM et al. 2000).

Power lines, fences, roads and urban development have all had an adverse impact on sage grouse habitat and their populations (Braun 1998).

Juniper expansion may also be contributing to declining sage grouse populations by reducing suitable sagebrush-steppe habitat (BLM et al. 2000).

Management Goals and Objectives

For detailed BLM management goals, objectives, and strategies see:
Greater Sage-Grouse and Sagebrush-Steppe Ecosystems Management Guidelines, August 21, 2000 (BLM et al. 2000).

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6.3.5 American Marten

American marten (Martes americana)

Distribution

In eastern Oregon, martens can be found in the Blue and Wallowa mountains (Verts and Carraway 1998).

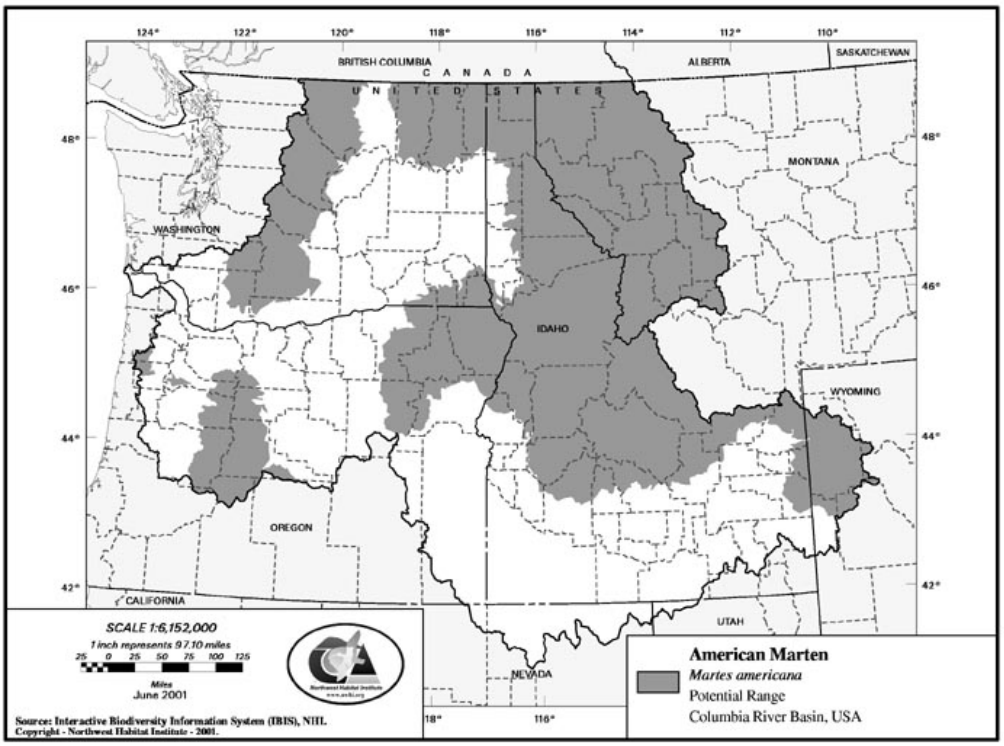

Figure 1. Current Distribution of American marten (*Martes americana*) in the Columbia River Basin (IBIS 2004).

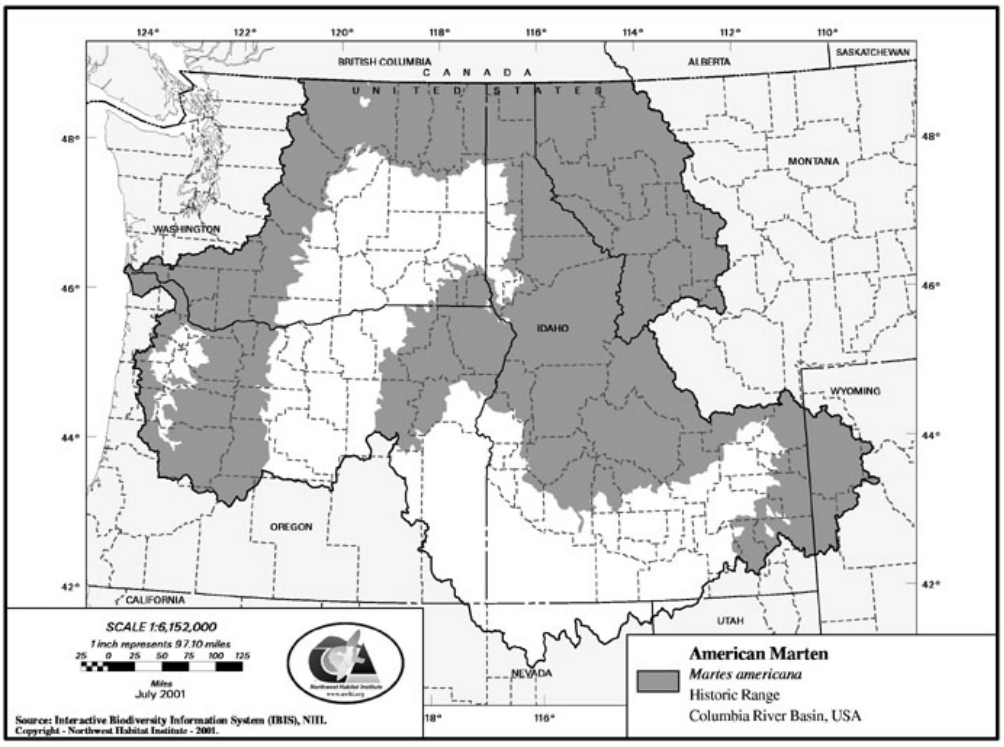

Figure 2. Historic distribution of American marten (*Martes americana*) in the Columbia River Basin (IBIS 2004).

Habitat and Density

The marten is a forest species capable of tolerating a variety of habitat types if food and cover are adequate (Strickland and Douglas 1987, cited in Verts and Carraway 1998).

Extensive logging and forest fires reduce the value of areas to martens, sometimes for many years (Strickland and Douglas 1987, cited in Verts and Carraway 1998). In addition to these areas supporting fewer individuals, martens in these areas have shorter life spans, are less productive, and suffer higher natural and trapping mortality than those in undisturbed forest (Thompson 1994, cited in Verts and Carraway 1998). In addition, martens captured significantly less mass of food per kilometer of foraging travel in logged forests (Thompson and Colgan, 1994, cited in Verts and Carraway 1998).

There is no known published quantitative information regarding habitats used by martens in Oregon (Verts and Carraway 1998).

*Evelyn Bull – working on marten studies

There are no estimates of density of martens for Oregon (Verts and Carraway 1998). Oregon Department of Fish and Wildlife has harvest data on marten.

Reported annual harvest of martens in Union and Wallowa Counties, OR (ODFW)

	Union	Wallowa		Union	Wallowa		Union	Wallowa
1969-1970	2		1978-1979	3		1987-1988		6
1970-1971	3		1979-1980		4	1988-1989	1	10
1971-1972	1		1980-1981		1	1989-1990		1
1972-1973		2	1981-1982		1	1990-1991	9	
1973-1974			1982-1983	2	1	1991-1992	2	
1974-1975		2	1983-1984			1992-1993		

1975-1976			1984-1985		10	1993-1994	9	2
1976-1977		18	1985-1986	8	10	1994-1995		1
1977-1978		4	1986-1987	1	29			

Diet

In Montana, remains of mammals occurred in 93.3% of 1,758 fecal droppings of martens; birds occurred in 12.0%, insects in 19.0%, and fruits in 29.2%. In California (Zielinski et al. 1983) and in Wyoming (Murie, 1961) the diet of martens is much the same as that in Montana (cited in Verts and Carraway 1998).

Remarks

We know little firsthand of the marten in Oregon, but we suspect that populations here likely will not increase greatly if short-rotation timber harvest and single-species replanting continue as recommended forest-management practices. Other practices, more of the past than of the present-such as burning or otherwise removing slash, snags, and downed logs, and large clear-cuttings-likely are detrimental to marten populations (Verts and Carraway 1998).

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6.3.6 Olive-sided Flycatcher

Olive-sided flycatcher (*Contopus cooperi*) Keith Paul, USFWS

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Introduction

The olive-sided flycatcher is one of the most recognizable breeding birds of Oregon's coniferous forests with its resounding, three-syllable, whistled song *quick, three beers* (Altman 2003) and its position of prominence perched atop a large tree or snag (Altman and Sallabanks 2000). This flycatcher undergoes one of the longest and most protracted migrations of all Nearctic migrants, wintering primarily in Panama and the Andes Mountains of South America (Altman and Sallabanks 2000).

Description, Life History, and Habitat Requirements

Description

The olive-sided flycatcher is a relatively large, somewhat bulky, large-headed, short-necked flycatcher that perches erect and motionless at the top of a tall tree or snag except when singing or darting out to capture flying insects (Altman 2003). The overall olive-gray plumage is generally nondescript except for a whitish stripe down the breast and belly which gives the impression of an unbuttoned vest, and white patches between the wings and lower back (Altman 2003).

Life History

Diet

Olive-sided flycatchers prey almost exclusively on flying insects including flying ants, beetles, moths, and dragonflies, but with a particular preference for bees and wasps (Bent 1942, Altman 2003).

Olive-sided flycatchers forage mostly from high, prominent perches at the top of snags or the dead tip or uppermost branch of a live tree (Altman 2003). They forage by "sallying" or "hawking" out to snatch a flying insect, and then often returning to the same perch ("yo-yo" flight) or another prominent perch (Altman 2003). Foraging behavior as an air-sallying insectivore requires exposed perches and unobstructed air space, thus tall trees or snags and broken canopy provide a better foraging environment than closed-canopy forest (Altman 2003, Altman and Sallabanks 2000). During the early reproductive period, the males usually forage from the tops of the tallest trees and snags, and females forage at lower heights and near the nest (Altman 2000, 2003).

Reproduction

Olive-sided flycatcher territory establishment and pairing begins upon arrival to breeding grounds (Altman 2003). Nest building is most evident during the first and second week of June, but completed nests have been reported as early as May 27 (Altman 2000). The nest area is aggressively defended by

both members of the pair (Altman and Sallabanks 2000). Olive-sided flycatchers are monogamous. They produce 3-4 eggs per clutch and one clutch per pair. Incubation period lasts 14-15 days, nestling period lasts approximately 19-22. The hatching of nestlings from a successful first nest occurs mostly in second week of July. Olive-sides flycatchers will renest after a failed clutch until about July 1. The latest fledging of nestlings is August 30 (Altman 2000). Adults remain with fledglings for up to two weeks (Altman 2003).

Females appear to choose the nest site; nests are most often found in coniferous trees (Altman and Sallabanks 2003). The nest is constructed primarily, if not totally, by the female (Altman and Sallabanks 2003). The foundation of the nest is built with larger twigs, while smaller twigs and larger rootlets are used to frame the nest. They will often use arboreal lichens to cover edges of nest rim and to line the cup of the nest (Altman and Sallabanks 2000); grasses, fine rootlets, or pine needles may also be used to line the nest (Bent 1942)

Breeding Territory/Home Range

Nesting pairs are generally well spaced and require relatively large territory. While estimates of territory size vary, most are 24.7-49.2 acres (10-20 ha) per pair (Altman 1997) and some as large as 100 ac (40-45 ha) per pair (Altman 2003).

Migration/Overwintering

The olive-sided flycatcher is a long distance, complete migrant between its breeding grounds in North American and its wintering grounds in Central and South America (Murphy 1989). They have the longest migration route of any flycatcher breeding in North America (Murphy 1989).

In Oregon, the spring migration of olive-sided flycatchers is well documented because of the loud, distinctive song. Spring migration peaks in late May, earlier in southwest and coastal Oregon, and later in eastern Oregon. Timing of fall migration is less known, but peaks in late August and into the first week of September (Altman 2003).

Survivorship

There is limited knowledge of the life-span of olive-sided flycatchers. From Bird Banding Laboratory data, two individuals that were banded and recaptured were at least seven years old.

Mortality

Very limited data exists. In one instance, sibling competition caused mortality (Altman and Sallabanks 2000). Other data shows that olive-sided flycatcher remains were discovered in a peregrine nest (Cade et al. 1968).

Habitat Requirements

General

The olive-sided flycatcher breeds only in coniferous forests of North America and is associated with forest openings and forest edge. During migration olive-sided flycatchers have been observed in a great diversity of habitats compared to that of the breeding season, including lowland riparian, mixed or deciduous riparian at higher elevations and urban woodlots and forest patches (Altman 2003). Olive-sided flycatchers have been observed moving north through sagebrush flats in Malheur and Harney Counties, OR (M. Denny p.c., cited *in* Altman 2003).

Breeding/Foraging

Olive-sided flycatchers breed in coniferous forest, particularly in the following circumstances: within forest burns where snags and scattered tall, live trees remain; near water along the wooded shores of streams, lakes, rivers, beaver ponds, marshes, and bogs, often where standing dead trees are present; at the juxtaposition of late- and early-successional forest such as meadows, harvest units, or canyon edges; and in open or semi-open forest stands with a low percentage of canopy cover (Altman and Sallabanks 2000). In the Blue Mountains, territorial birds are found mostly along stream courses and around wet

openings (M. Denny p.c. cited *in* Altman 2003). Tall, prominent trees and snags, which serve as foraging and singing perches, are common features of all nesting habitat.

Wintering/Foraging

Wintering habitat is similar to that on breeding grounds; forest edges and forest openings, especially where scattered tall trees or snags are present (AOU 1983, Stotz et al. 1992, 1996, Ridgely and Tudor 1994, Altman and Sallabanks 2000). They are most commonly found in mature evergreen forest (Petit et al. 1995, particularly montane forest (Willis et al. 1993, Ridgely and Tudor 1994, Stotz et al. 1996).

Population and Distribution
Distribution

Historic Distribution

The historic distribution of olive-side flycatchers is similar to the distribution today. Several Breeding Bird Atlases, including Michigan (Evers 1991), New York (Peterson 1988), Ontario (Cheskey 1987), and Monterey Co., CA (Roberson and Tenney 1993), report few significant changes in distribution during the twentieth century (Altman and Sallabanks 2000).

Current Distribution

Figure 1. Birds of North America – Breeding distribution of the olive-sided flycatcher in North and Middle America.

The olive-sided flycatcher breeds only in coniferous forests of North America; from Alaska's boreal forest south to Baja California, in central North American south to northern Wisconsin, and in eastern North America south to northeast Ohio and southwest Pennsylvania, including all of New England, and locally in the Appalachians south to western North Carolina (Altman 2003).

Principal migratory route is throughout the forest of western North America, Mexico, and Central America (Bent 1942, Gabrielson and Lincoln 1959, Altman 2003).

Olive-sided flycatchers winter primarily in Panama and the Andes of northern and western South America, from northwestern Venezuela south through Ecuador to southeast Peru and northern Bolivia (Fitzpatrick 1980, DeGraaf and Rappole 1995, Altman 2003).

In Oregon, the olive-sided flycatcher breeds in low densities throughout conifer forests from near sea level along the coast to timberline in the Cascades and Blue Mountains (Altman 2003). The olive-sided flycatcher is most abundant throughout the Cascades (Sauer et al. 1997). In migration, they may occur in any forested habitat including forest patches, desert oases of southeast Oregon, urban forest, and deciduous or mixed deciduous/coniferous riparian forest (Altman 2003).

Population

Historic Population

Historic population numbers of olive-sided flycatchers are unknown.

Current Population and Status

Population trends for OSF based on Breeding Bird Surveys (BBS) data show highly significant declines for all continental (N. America), national (U.S. and Canada), and regional (e. and w. N. America) analysis, and for most state and physiographic region analyses (Sauer et al. 1997, Altman 2003). In Oregon, there has been a highly significant ($p < 0.01$) statewide decline of 5.1% per year from 1966-96 (Sauer et al. 1997, Altman 2003).

Causes of population decline have focused on habitat alteration and loss on the wintering grounds, because declines are relatively consistent throughout the breeding range of the species (Altman and Sallabanks 2000). Other factors potentially contributing to declines on the breeding grounds include habitat loss through logging, alteration of habitat from forest management practices (e.g., clearcutting, fire suppression), lack of food resources, and reproductive impacts from nest predation or parasitism (Altman 2003).

It has also been speculated by Hutto (1995a), that the olive-sided flycatcher may depend on early post-fire habitat, and has likely been negatively affected by fire-control policies of the past 50-100 years (Altman, 2003). The ability of forest management practices (e.g., selective cutting, clearcutting) to mimic natural disturbance regimes caused by forest fires has been questioned. Habitat created by these forest management scenarios may provide only the appearance of early post-fire habitat, but be lacking in some attributes or resources required by olive-sided flycatchers (Altman, 2003).

During the past 50 years, forest management resulted in an increase in forest openings and edge habitat, which has seemingly increased habitat for the olive-sided flycatcher. However, this dichotomy of increased habitat availability and declining populations may indicate that harvested forest represents an "ecological trap" (Hutto 1995b), where habitat may appear suitable, but reproductive success and/or survival is poor due to factors such as limited food resources, predation, or parasitism (Altman, 2003).

Continuing Threats

One of the largest continuing threats to the olive-sided flycatcher is deforestation in Central and South America. Diamond (1991), calculated that olive-sided flycatchers would lose 39% of their wintering habitat in the Andean montane forests between 1980 and 2000. This loss is in addition to habitat loss prior to 1980.

Continuing threats within the breeding range of olive-sided flycatcher include habitat loss to conversion to non-forest, alteration/degradation of habitat, reduced availability and acquisition of food resources, pesticides, and nest predation (Altman and Sallabanks 2003).

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Shaw Creek Bird Supply. Olive-sided flycatcher photo. Used with permission 4/23/04. http://www.shawcreekbirdsupply.com

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6.3.7 Yellow Warbler

Yellow Warbler (*Dendroica petechia*), P. Ashley and S. Stovall, WDFW

Introduction

The yellow warbler (*Dendroica petechia*) is a common species strongly associated with riparian and wet deciduous habitats throughout its North American range. In Washington it is found in many areas, generally at lower elevations. It occurs along most riverine systems, including the Columbia River, where appropriate riparian habitats have been protected. The yellow warbler is a good indicator of functional subcanopy/shrub habitats in riparian areas.

Yellow Warbler Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Diet

Yellow warblers capture and consume a variety of insect and arthropod species. The species taken vary geographically. Yellow warblers consume insects and occasionally wild berries (Lowther *et al.* 1999). Food is obtained by gleaning from subcanopy vegetation; the species also sallies and hovers to a much lesser extent (Lowther *et al.* 1999) capturing a variety of flying insects.

Reproduction

Although little is known about yellow warbler breeding behavior in Washington, substantial information is available from other parts of its range. Pair formation and nest construction may begin within a few days of arrival at the breeding site (Lowther *et al.* 1999). The reproductive process begins with a fairly elaborate courtship performed by the male who may sing up to 3,240 songs in a day to attract a mate. The responsibility of incubation, construction of the nest and most feeding of the young lies with the female, while the male contributes more as the young develop. In most cases only one clutch of eggs is laid; renesting may occur, however, following nest failure or nest parasitism by brown-headed cowbirds (Lowther *et al.* 1999). The typical clutch size ranges between 4 and 5 eggs in most research studies of the species (Lowther *et al.* 1999). Egg dates have been reported from British Columbia, and range between 10 May and 16 August; the peak period of activity there was between 7 and 23 June (Campbell *et al.* in press). The incubation period lasts about 11 days and young birds fledge 8-10 days after hatching (Lowther *et al.* 1999). Young of the year may associate with the parents for up to 3 weeks following fledging (Lowther *et al.* 1999).

Nesting

Results of research on breeding activities indicate variable rates of hatching and fledging. Two studies cited by Lowther *et al.* (1999) had hatching rates of 56 percent and 67 percent. Of the eggs that hatched, 62 percent and 81 percent fledged; this represented 35 percent and 54 percent, respectively, of all eggs laid. Two other studies found that 42 percent and 72 percent of nests fledged at least one young (Lowther *et al.* 1999); the latter study was from British Columbia (Campbell *et al.* in press).

Migration

The yellow warbler is a long-distance neotropical migrant. Spring migrants begin to arrive in the region in April. Early dates of 2 April and 10 April have been reported from Oregon and British Columbia, respectively (Gilligan *et al.* 1994, Campbell *et al.* in press). Average arrival dates are somewhat later, the average for south-central British Columbia being 11 May (Campbell *et al.* in press). The peak of spring migration in the region is in late May (Gilligan *et al.* 1994). Southward migration begins in late July, and peaks in late August to early September; very few migrants remain in the region in October (Lowther *et al.* 1999).

Mortality

Little has been published on annual survival rates. Roberts (1971) estimated annual survival rates of adults at 0.526 ±0.077 SE, although Lowther *et al.* (1999) felt this value underestimated survival because it did not account for dispersal. The oldest yellow warbler on record lived to be nearly 9 years old (Klimkiewicz *et al.* 1983).

Yellow warblers have developed effective responses to nest parasitism by the brown-headed cowbird (*Molothrus ater*). The brown-headed cowbird is an obligate nest brood parasite that does not build a nest and instead lays eggs in the nests of other species. When cowbird eggs are recognized in the nest the yellow warbler female will often build a new nest directly on top of the original. In some cases, particularly early in the incubation phase, the female yellow warbler will bury the cowbird egg within the nest. Some nests are completely abandoned after a cowbird egg is laid (Lowther *et al.* 1999). Up to 40 percent of yellow warbler nests in some studies have been parasitized (Lowther *et al.* 1999).

Habitat Requirements

The yellow warbler is a riparian obligate species most strongly associated with wetland habitats and deciduous tree cover. Yellow warbler abundance is positively associated with deciduous tree basal area, and bare ground; abundance is negatively associated with mean canopy cover, and cover of Douglas-fir (*Pseudotsuga menziesii*), Oregon grape (*Berberis nervosa*), mosses, swordfern (*Polystuchum munitum*), blackberry (*Rubus discolor*), hazel (*Corylus cornuta*), and oceanspray (*Holodiscus discolor*) (Rolph 1998).

Partners in Flight have established biological objectives for this species in the lowlands of western Oregon and western Washington. These include providing habitats that meet the following definition: >70 percent cover in shrub layer (<3 m) and subcanopy layer (>3 m and below the canopy foliage) with subcanopy layer contributing >40 percent of the total; shrub layer cover 30-60 percent (includes shrubs and small saplings); and a shrub layer height >2 m. At the landscape level, the biological objectives for habitat included high degree of deciduous riparian heterogeneity within or among wetland, shrub, and woodland patches; and a low percentage of agricultural land use (Altman 2001).

Nesting

Radke (1984) found that nesting yellow warblers 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. At Malheur National Wildlife Refuge, in the northern Great Basin, nest success 44 percent (n = 27), however, cowbird eggs and young removed; cowbird parasitism 33 percent (n = 9) (Radke 1984).

Breeding

Breeding yellow warblers are closely associated with riparian hardwood trees, specifically willows, alders, or cottonwood. They are most abundant in riparian areas in the lowlands of eastern Washington, but also occur in west-side riparian zones, in the lowlands of the western Olympic Peninsula, where high rainfall limits hardwood riparian habitat. Yellow warblers are less common (Sharpe 1993). There are no BBA records at the probable or confirmed level from subalpine habitats in the Cascades, but Sharpe (1993) reports them nesting at 4000 feet in the Olympics. Numbers decline in the center of the Columbia Basin, but this species can be found commonly along most rivers and creeks at the margins of the Basin. A local breeding population exists in the Potholes area.

Non-breeding

Fall migration is somewhat inconspicuous for the yellow warbler. It most probably begins to migrate the first of August and is generally finished by the end of September. The yellow warbler winters south to the Bahamas, northern Mexico, south to Peru, Bolivia and the Brazilian Amazon.

Yellow Warbler Population and Distribution

Population

Historic

No historic data could be found for this species.

Current

No current data could be found for this species.

Distribution

Historic

Jewett *et al.* (1953) described the distribution of the yellow warbler as a common migrant and summer resident from April 30 to September 20 in the deciduous growth of Upper Sonoran and Transition Zones in eastern Washington and in the prairies and along streams in southwestern Washington. They describe its summer range as north to Neah Bay, Blaine, San Juan Islands, Monument 83; east to Conconully, Swan Lake, Sprague, Dalkena, and Pullman; south to Cathlamet, Vancouver and Bly, Blue Mts., Prescott, Richland, and Rogersburg; and west to Neah Bay, Grays Harbor, and Long Beach. Jewett *et al. (*1953) also note that the yellow warbler was common in the willows and alders along the streamsof southeastern Washington and occurs also in brushy thickets. They state that its breeding range follows the deciduous timber into the mountains, where it porbably nests in suitable habitat to 3,500 or perhaps even to 4,000 feet – being common at Hart Lake in the Chelan region around 4,000 feet. They noted it was a common nester along the Burnt River, around the vicinity of Spokane, around Sylvan Lake, and along the shade trees along the streets of Walla Walla.

Current

The yellow warbler breeds across much of the North American continent, from Alaska to Newfoundland, south to western South Carolina and northern Georgia, and west through parts of the southwest to the Pacific coast (AOU 1998). Browning (1994) recognized 43 subspecies; two of these occur in Washington, and one of them, *D.p. brewsteri*, is found in western Washington. This species is a long-distance migrant and has a winter range extending from western Mexico south to the Amazon lowlands in Brazil (AOU 1998). Neither the breeding nor winter ranges appear to have changed (Lowther *et al.* 1999).

The yellow warbler is a common breeder in riparian habitats with hardwood trees throughout the state at lower elevations. It is a locally common breeder along rivers and creeks in the Columbia Basin, where it is declining in some areas. Core zones of distribution in Washington are the forested zones below the subalpine fir and mountain hemlock zones, plus steppe zones other than the central arid steppe and canyon grassland zones, which are peripheral.

Figure 33. Breeding bird atlas data (1987-1995) and species distribution for yellow warbler (Washington GAP Analysis Project 1997).

Breeding

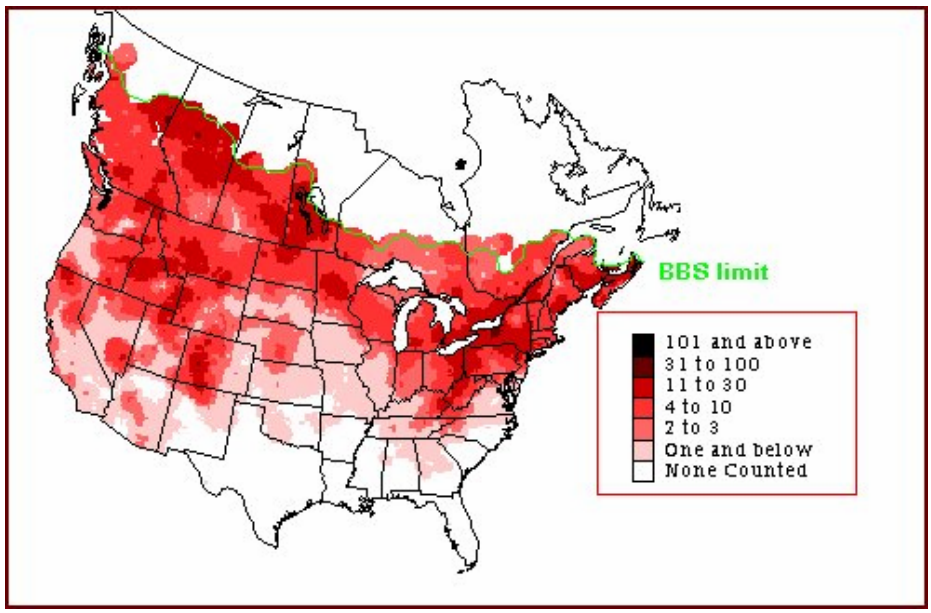

Figure 34 Yellow warbler breeding season abundance (from BBS data) (Sauer *et al.* 2003).

The yellow warbler breeds across much of the North American continent, from Alaska to Newfoundland, south to western South Carolina and northern Georgia, and west through parts of the southwest to the Pacific coast (AOU 1998).

Non-Breeding

This data is not readily available; however, the yellow warbler is a long-range neotropical migrant. Its winter range is from Northern Mexico south to Northern Peru.

Yellow Warbler Status and Abundance Trends

Status

Yellow warblers are demonstrably secure globally. Within the state of Washington, yellow warblers are apparently secure and are not of conservation concern (Altman 1999).

Trends

Yellow warbler is one of the more common warblers in North America (Lowther *et al.* 1999). Information from Breeding Bird Surveys indicates that the population is stable in most areas. Some subspecies, particularly in southwestern North America, have been impacted by degradation or destruction of riparian habitats (Lowther *et al.* 1999). Because the Breeding Bird Survey dates back only about 30 years, population declines in Washington resulting from habitat loss dating prior to the survey would not be accounted for by that effort.

Factors Affecting Yellow Warbler Population Status

Key Factors Inhibiting Populations and Ecological Processes

Habitat loss due to hydrological diversions and control of natural flooding regimes (e.g., dams) resulting in reduction of overall area of riparian habitat, conversion of riparian habitats, inundation from impoundments, cutting and spraying for ease of access to water courses, gravel mining, etc.

Habitat degradation from: loss of vertical stratification in riparian vegetation, lack of recruitment of young cottonwoods, ash, willows, and other subcanopy species; stream bank stabilization (e.g., riprap) which narrows stream channel, reduces the flood zone, and reduces extent of riparian vegetation; invasion of exotic species such as reed canary grass and blackberry; overgrazing which can reduce understory cover; reductions in riparian corridor widths which may decrease suitability of the habitat and may increase encroachment of nest predators and nest parasites to the interior of the stand.

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 be subject to high levels of human disturbance.

Recreational disturbances, particularly during nesting season, and particularly in high-use recreation areas.

Increased use of pesticide and herbicides associated with agricultural practices may reduce insect food base.

Out-of-Subbasin Effects and Assumptions

No data could be found on the migration and wintering grounds of the yellow warbler. It is a long-distance migrant and as a result faces a complex set of potential effects during it annual cycle. Habitat loss or conversions is likely happening along its entire migration route (H. Ferguson, WDFW, pers. comm. 2003). Riparian management requires the protection of riparian shrubs and understory and the elimination of noxious weeds. Migration routes, corridors and wintering grounds need to be identified and protected just as its breeding areas. In addition to loss of habitat, the yellow warbler, like many wetland or riparian associated birds, faces increased pesticide use in the metropolitan areas, especially with the outbreak of mosquito born viruses like West Nile Virus.

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6.3.8 American Beaver

American Beaver (Castor Canadensis) K. Paul, USFWS.

Distribution

In Oregon, the American beaver can be found in suitable habitats throughout the state (Verts and Carraway 1998).

Habitat

The beaver almost always is associated with riparian or lacustrine habitats bordered by a zone of trees, especially cottonwood and aspen (Populus), willow (Salix), alder (Alnus), and maple (Acer) (Verts and Carraway 1998). Small streams with a constant flow of water that meander through relatively flat terrain in fertile valleys and are subject to being dammed seem especially productive of beavers (Hill 1982, cited in Verts and Carraway 1998). Streams with rocky bottoms through steep terrain and more subject to wide fluctuations in water levels are less suitable to beavers. In large lakes with broad expanses subject to extensive wave action, beavers usually are restricted to protected inlets (Verts and Carraway 1998).

Harvest

Harvest of beavers in Oregon between 1969 and 1992 per 1,000 hectares in Union and Wallowa Counties were <1 and 1-10 respectively (ODFW, annual reports, cited in Verts and Carraway 1998).

Diet

Beavers are herbivorous. In summer, a variety of green herbaceous vegetation, especially aquatic species, is eaten (Jenkins and Busher 1979; Svendsen 1980, cited in Verts and Carraway 1998). In autumn and winter as green herbaceous vegetation disappears, beavers shift their diet to stems, leaves, twigs, and bark of many of the woody species that grow near the water (Verts and Carraway 1998). Bulbous roots of aquatic species also may be eaten in winter (Beer 1942, cited in Verts and Carraway 1998). Beavers cut mostly deciduous trees such as cottonwood, will, alder, maple, and birch, but in some regions, coniferous species may be used (Jenkins 1979, cited in Verts and Carraway 1998).

In southeastern Oregon, riparian-zone trees have been reduced or eliminated in many areas by browsing herbivores. However, comparison of growth of red willow (*Salix lasiandra*) in an area inaccessible to cattle but occupied by beavers with that in an area inaccessible to both cattle and beavers, indicated that beavers were not responsible for the deterioration. Although beavers harvested 82% of available stems annually, they cut them at a season after growth was completed and reserves were translocated to roots. Subsequent growth of cut willows increase exponentially in relation to the proportion of the stems cut by beavers (Kindschy 1985, cited in Verts and Carraway 1998).

Habits

Beavers, because of their ability to fell trees, dam streams (and irrigation ditches), dig canals, and tunnel into banks, and because of their taste for certain crops, doubtlessly have the greatest potential of any wild mammal in the state to affect the environment. Their economic value, both positive and negative, can be enormous, depending largely upon the point of view of those affected. However, the more subtle contributions such as to flood control, to maintenance of water flows, to fisheries management, and to soil conservation resulting from their activities, in the long term, may have the greatest economic value (Verts and Carraway 1998).

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6.3.9 Bald Eagle

Bald Eagle (*Haliaeetus leucocephalus*). Keith Paul, USFWS, La Grande, Oregon.

Introduction

Bald eagles in the lower 48 states were first protected in 1940 by the Bald Eagle Protection Act and then were federally listed as endangered in 1967. In 1995, the bald eagle was reclassified as threatened in all of the lower 48 States. The bald eagle was proposed for delisting on July 6, 1999; a decision on whether to delist the bald eagle is pending (64 FR 36453). No critical habitat has been designated for the bald eagle (USFWS 2003).

The bald eagle is one of eight species of sea-eagle (genus *Haliaeetus*) worldwide (Brown 1977), and the only sea eagle found throughout North America (Stalmaster 1987). Large size, wingspan of 6.6-8.0 ft (200-243 cm) (Stalmaster 1987), and the contrast of white head and tail, and yellow eyes, beak, and legs, to dark brown body and wings make the adult bald eagle one of our most distinctive raptors (Isaacs and Anthony 2003a).

Bald Eagle Life History, Key Environmental Correlates, and Habitat Requirements

Life History

As our national symbol, the bald eagle is widely recognized. Its distinctive white head and tail do not appear until the bird is four to five years old. These large powerful raptors can live for 30 or more years in the wild and even longer in captivity (USFWS 2003).

Diet

Bald eagles consume a variety of prey that varies by location and season. Prey are taken alive, scavenged, and pirated (Frenzel 1985, Watson et al. 1991). Fish were the most frequent prey among 84 species identified at nest sites in south-central Oregon, and a tendency was observed for some individuals or pairs to specialize in certain species (Frenzel 1985). Wintering and migrant eagles in eastern Oregon fed on large mammal carrion, especially road-killed mule deer, domestic cattle that died of natural causes, and stillborn calves, as well as cow afterbirth, waterfowl, ground squirrels, other medium-sized and small rodents, and fish. Proportions varied by month and location. Food habitats are unknown for nesting eagles over much of the state (Isaacs and Anthony 2003a).

Reproduction

Bald eagles are most abundant in Oregon in late winter and early spring, because resident breeders (engaged in early nesting activities), winter residents, and spring transients are all present. Nest building and repair occur any time of year, but most often observed from February to June (Isaacs and Anthony unpublished data). Bald eagles are territorial when breeding but gregarious when not (Stalmaster 1987). They exhibit strong nest-site fidelity (Jenkins and Jackman 1993), but "divorce" has been documented (Frenzel 1985, Garrett et al 1993). Cooperative nesting by three adults was reported (Garcelon et al. 1995). Both sexes build the nest, incubate eggs, and brood and feed young (Stalmaster 1987). Egg laying occurs mid-February to late April; hatching late March to late May; and fledging late June to mid-Aug (Isaacs and Anthony unpublished data) (Isaacs and Anthony 2003a).

Bald eagles lay one to four eggs in late March or early April and both adults incubate the eggs for about 35 days until hatching. During the nest building, egg laying and incubating periods, eagles are extremely sensitive and will abandon a nesting attempt if there are excessive disturbances in the area during this time. The eaglets are able to fly in about three months and then, after a month, they are on their own. The first year is particularly difficult for young eagles. Only half may survive the first year due to disease, lack of food, bad weather, or human interference (USFWS 2003).

Migration

Bald eagles can be resident year-round where food is available; otherwise they will migrate or wander to find food. When not breeding, may congregate where food is abundant, even away from water

(Stalmaster 1987). Migrants passing through Glacier National Park generally followed north-south flyways similar to those of waterfowl (McClelland et al. 1994). In contrast, juveniles and subadults form California traveled north to Oregon, Washington, and British Columbia in late summer and fall (D. K. Garcelon p.c., R. E. Jackman p.c.) (Isaacs and Anthony 2003a).

Mortality

Reviews of published literature (Harmata et al. 1999., Jenkins et al. 1999) suggested that survival varies by location and age; hatch-year survival was usually >60%, and survivorship increased with age to adulthood. However, recent work by Harmata et al. (1999) showed survival lowest among 3- and 4-year old birds (Isaacs and Anthony 2003a).

The major factor leading to the decline and subsequent listing of the bald eagle was disrupted reproduction resulting from contamination by organochlorine pesticides. Other causes of death in bald eagles have included shooting, electrocution, impact injuries, and lead poisoning (USFWS 2003).

Habitat Requirements

General

Bald eagles are generally associated with large bodies of water, but can occur in any habitat with available prey (Isaacs and Anthony 2003a).

Nesting Habitat

Bald eagles nest in forested areas near the ocean, along rivers, and at estuaries, lakes, and reservoirs (Isaacs and Anthony 2001). Consequently, shoreline is an important component of nesting habitat; 84% of Oregon nests were within 1 mi (1.6 km) of water (Anthony and Isaacs 1989). A nest in the Fort Rock Valley was the most distant from water at 18 mi (29 km) from the nearest shoreline (Isaacs and Anthony unpublished data). All nests observed in Oregon have been in trees, primarily Sitka spruce and Douglas-fir west of the Cascades and ponderosa pine, Douglas-fir, and sugar pine in eastern Oregon (Anthony and Isaacs 1989). Use of black cottonwood for nesting has increased recently as Columbia and Willamette River populations have increased. Bald eagles also nest in white fir, red fir, grand fir, incense-cedar, Oregon white oak, quaking aspen, and willow (Isaacs and Anthony unpublished data). Live trees are usually used for nest trees, although nests will continue to be used if the tree dies. Nest trees are usually large and prominent (Anthony et al. 1982). Large old trees have large limbs and open structure required for eagle access and nest territory. Some use has been made of artificial platforms placed in trees modified for Osprey (Witt 1996, Isaacs and Anthony unpublished data, R. Opp p.c.). Cliff nesting is thus for unknown, but possible, especially in sparsely forested areas of southeast Oregon (Isaacs and Anthony 2003a).

Wintering Habitat

Wintering eagles in the Pacific Northwest perch on a variety of substrates; proximity to a food source is probably the most important factor influencing perch selection by bald eagles (Steenhof et al. 1980). Favored perch trees are invariably located near feeding areas, and eagles consistently use preferred branches (Stalmaster 1976). Most tree perches selected by eagles provide a good view of the surrounding area (Servheen 1975, Stalmaster 1976), and eagles tend to use the highest perch sites available (Stalmaster 1976) (USFWS 1986).

Eagles use a variety of tree species as perch sites, depending on regional forest types and stand structures. Dead trees are used by eagles in some areas because they provide unobstructed view and are often taller than surrounding vegetation (Stalmaster 1976). Artificial perches may be important to wintering bald eagles in situations where natural perches are lacking. Along the Columbia River in Washington, where perch trees are not available, eagles regularly use artificial perches, including both crossarm perches and a tripod perch (Fielder, p.c.) (USFWS 1986).

Habitat requirements for communal night roosting are different form those for diurnal perching. Communal roosts are invariably near a rich food resource and in forest stands that are uneven-aged and have at least a remnant of the old-growth forest component (Anthony et al. 1982). Close proximity to a feeding area is not the only requirement for night roosting sites, as there are minimum requirements for forest stand structure. In open areas, bald eagles also use cottonwoods and willows for night roosting

(Isaacs and Anthony 1983). Most communal winter roosts used by bald eagles offer considerably more protection from the weather than diurnal habitat. Roost tree species and stand characteristics vary considerably throughout the Pacific Northwest (Anthony et al 1982) (USFWS 1986).

Isolation is an important feature of bald eagle wintering habitat. In Washington, 98% of wintering bald eagles tolerated human activities at a distance of 300 m (328 yards) (Stalmaster and Newman 1978). However, only 50% of eagles tolerated disturbances of 150 m (164 yards; USFWS 1986).

Bald Eagle Population and Distribution

Distribution

The bald eagle is a resident of North America, and can be found throughout Alaska, Canada, the contiguous U.S. (AOU 1998) as far south as Baja California Sur, Mexico (Henny et al. 1978), and as far west as the Aleutian Is., Alaska (Anthony et al. 1999) (Isaacs and Anthony 2003a).

Historic

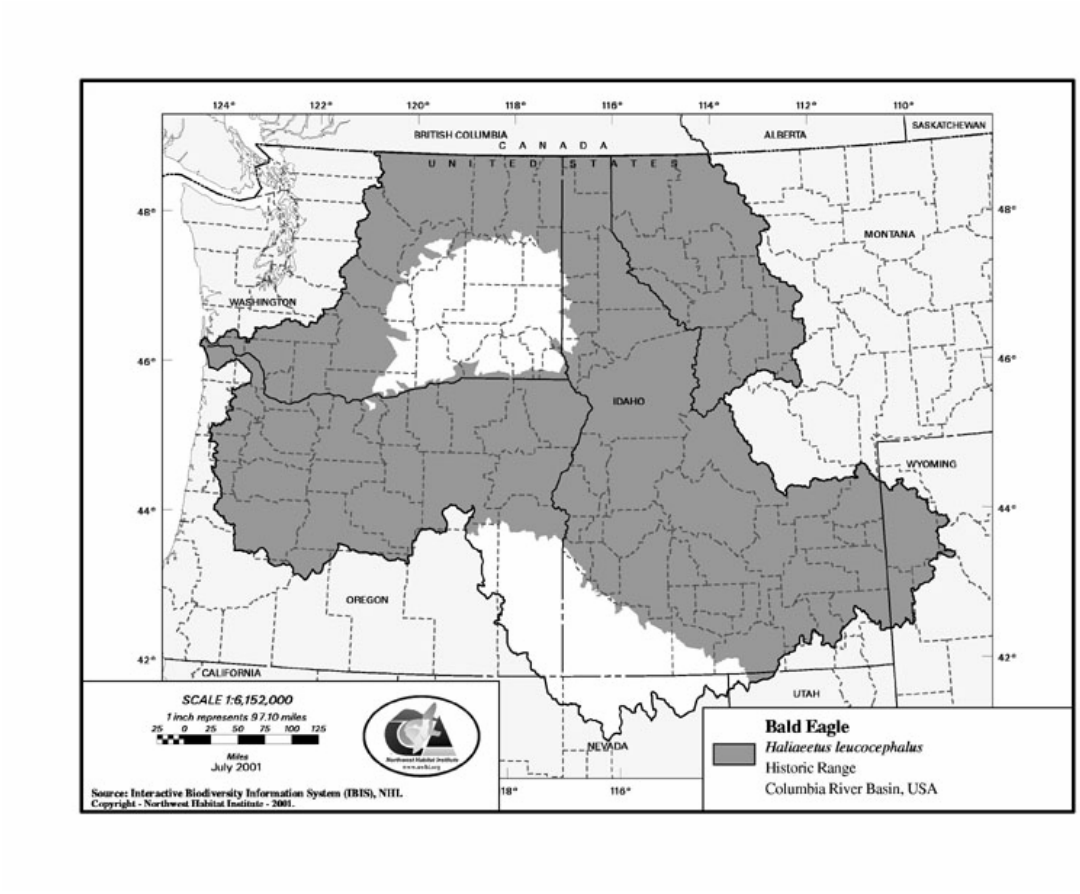

Figure 35. Bald eagle historic range in the Columbia River subbasin (IBIS 2003)

The status and distribution of bald eagle populations in the decades before World War II are poorly understood. Declines probably begin in some populations in the 19th century; other declines were probably not underway until the 1940's. Between 1947 and 1970, reproduction in most bald eagle populations declined drastically (Broley 1958, Sprunt et al. 1973), and the species disappeared form many parts of its breeding range (USFWS 1986).

Historical records provide evidence for the decline of bald eagles in the Pacific Northwest. Accounts by Baird (1858), Evermann (1886), Merrill (1888, 1897), Belding (1890), Bendire (1892),

Woodcock (1902), Hall (1933a, 1933b), and Buechner (1953) document the abundance of bald eagles in the region during the late 19th century. Later records suggest that a population decline may have occurred at the beginning of the twentieth century (Bowles 1906, Dawson and Bowles 1909, Kitchin 1939). These suspected declines are difficult to quantify, however, because no intensive surveys were conducted until the latter part of the twentieth century. In some cases, historical records have confirmed the disappearance of breeding eagles form parts of their former range. Breeding populations of bald eagles in Oregon and Washington are still widely distributed, but historical information suggests significant declines and changes in distribution (USFWS 1986).

Current

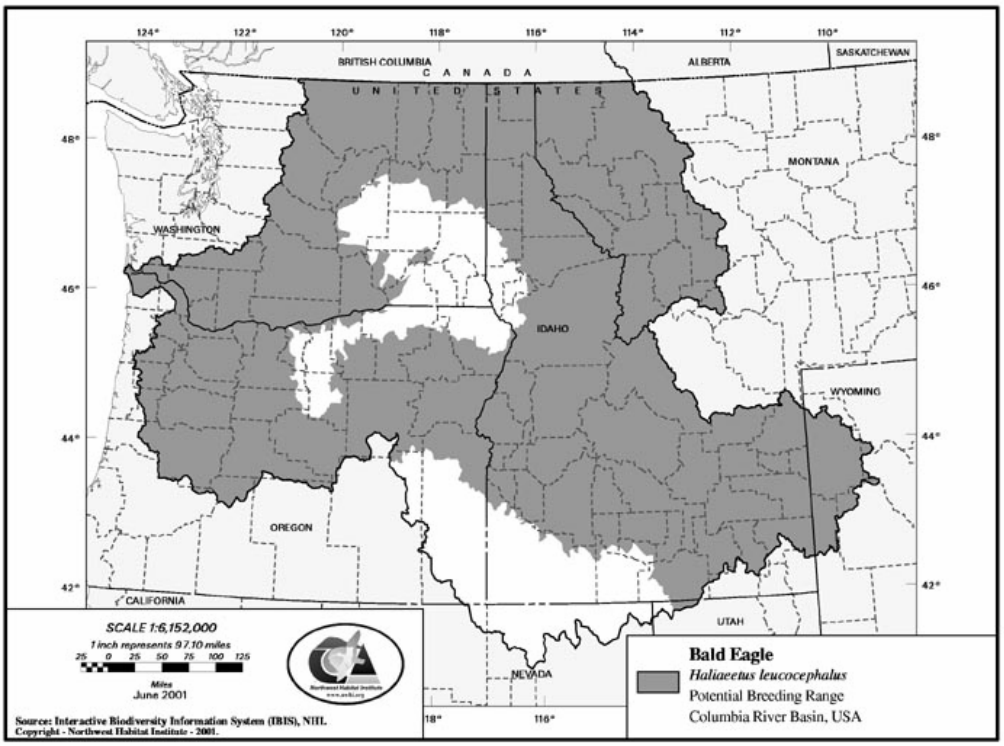

Figure 36. Bald eagle current breeding range in the Columbia River subbasin (IBIS 2003)

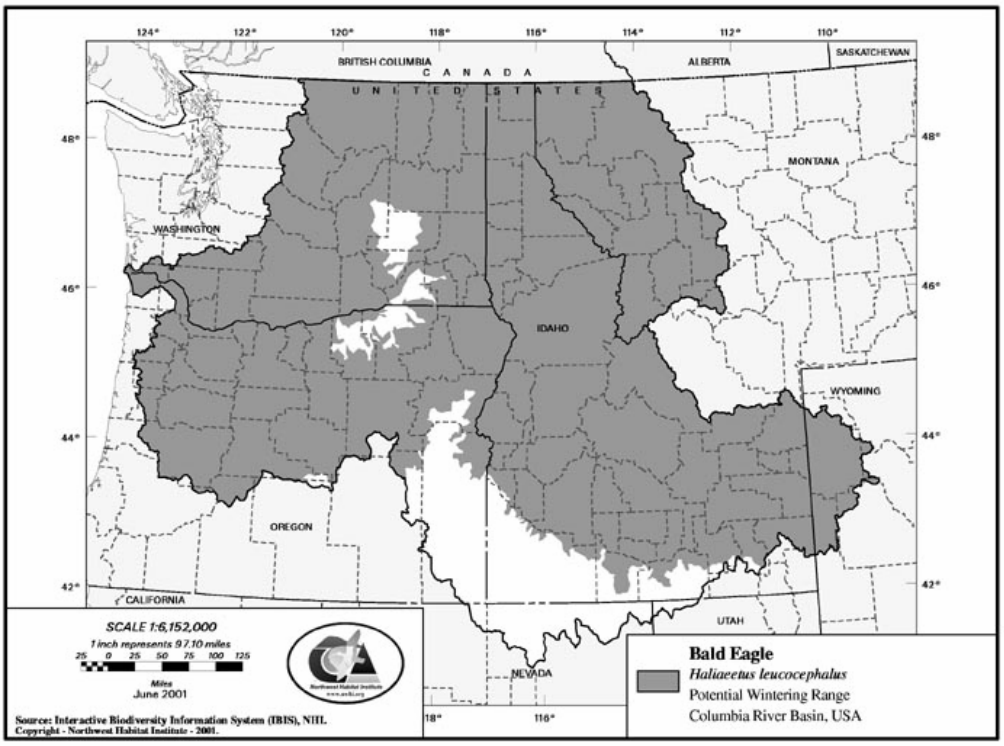

Figure 37. Bald Eagle Current Wintering Range (IBIS 2003)

In Oregon, the bald eagle nested in 32 of 36 counties. Those counties where breeding did not occur include Sherman, Gilliam, Morrow, and Malheur counties (Isaacs and Anthony 2001). Bald eagles can be found throughout the state during non-breeding. Variation locally in number of eagles and timing of peak abundance is due to weather and food supply. Eagles are very common in winter and early spring in the Klamath (Keister et al. 1987) and Harney (Garrett et al. 1988) basins, Columbia River estuary (Garrett et al. 1988), and L. Billy Chinook (Concannon 1998); common in winter and early spring at Hells Canyon, Oxbow, and Brownlee reservoirs, and along the Wallowa and Grande Ronde Rivers (Isaacs et al. 1992), the Crooked River Valley above Prineville Reservoir (Isaacs et al. 1993), the south end of the Willamette Valley (Isaacs unpublished data), the John Day River above Service Creek (Isaacs et al. 1996), the Columbia River in Lower Valley (Isaacs unpublished data), the Columbia River in the Umatilla National Wildlife Refuge area (Isaacs unpublished data), Goose Lower Valley (Isaacs unpublished data), Summer Lake and Chewaucan River downstream of Paisley (R.L. Madigan p.c.), and at Sauvie I. (Isaacs unpublished data); common in fall at Wickiup Reservoir (Isaacs unpublished data, G.J. Niehuser p.c.) and Odell Lake (Crescent Ranger District 1998) (Isaacs and Anthony 2003a).

An understanding of population structure, abundance, and distribution is complicated by multiple age classes, breeding status, nesting chronology, origin and movements of individuals, local and regional distribution and abundance of prey, local and regional weather, and season. For example, native and non-native juveniles (<1 yr old), subadults (1-4 yr old), and nonbreeding adults, and breeding adults can all occur in the same area (e.g., Klamath Basin) in winter and early spring (Isaacs and Anthony 2003a).

Bald Eagle Population, Status, and Abundance Trends

Population Status and Conservation

By 1940, the bald eagle had "become rather an uncommon bird" except along the coast and Columbia River, and in Klamath Co. (Gabrielson and Jewett 1940). Habitat loss (cutting of nest trees) and direct persecution (shooting, trapping, poisoning), probably caused a gradual decline prior to 1940. Between 1945 and 1974 over 4.5 million acres (1.8 million ha) of National Forest in Oregon were sprayed with DDT (Henny and Nelson 1981). Undocumented quantities were also applied on private forests and agricultural crops, and for mosquito control around municipalities. Consequently, the deleterious effects of DDT on reproduction (Stalmaster 1987) joined habitat loss and direct persecution as causes of decline through the early 1970's when the population may have reached its historical low. By then, nesting pairs were extirpated in northeastern Oregon (Isaacs and Anthony 2001), where applications of DDT on National Forest land were common and widespread (Henny and Nelson 1981) (Isaacs and Anthony 2003a).

The bald eagle was declared threatened in Oregon, Washington, Michigan, Minnesota, Wisconsin, and Florida, and endangered in the other 43 contiguous states in 1978 under the federal Endangered Species Act (ESA) because of declining number of nesting pairs and reproductive problems caused by environmental contaminants (USDI 1978). The recovery plan for the Pacific states was completed in 1986 (USFWS 1986b). The bald eagle was listed as threatened under the Oregon ESA in 1987 (Marshall et al. 1996). Listing resulted in protection of eagle habitat and restriction on human activities near nest and roost sites. Site-specific planning was recommended for nest and roost protection (USFWS 1986). Forest management in nesting (Arnett et al. 2001) and roosting (DellaSala et al. 1998) habitat proved useful when declining forest health or fire danger threatened nest and roost trees. Habitat protection and management, the ban on use of DDT (Greier 1982) and reduced direct persecution due to education were followed by a recent population increase. Improved nesting success and a population increase led to a 1999 proposal to delist federally (USDI 1999). Oregon also may propose to delist the species (Isaacs and Anthony 2003a).

The upward population trend could reverse if the species is delisted without maintaining habitat-protection measures implemented under the ESA (e.g., USFS and BLM special habitat management for bald eagles, Oregon Forest Practices Rules protecting bald eagle sites on nonfederal forest land, and local zoning laws that protect wildlife habitat). Habitat degradation and a population decline could go undetected if monitoring of nesting and wintering populations is not continued. Contaminants have been implicated in reduced productivity of nesting pairs on the Columbia River downstream of Portland (Anthony et al. 1993, Buck 1999) and warrant continued monitoring (Isaacs and Anthony 2003a).

Midwinter Bald Eagle Count

Each January, the U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center's Snake River Field Station (SRFS) coordinates the Midwinter Bald Eagle Survey, in which several hundred individuals count eagles along standard, non-overlapping survey routes.

Nationwide counts of eagles were coordinated by the National Wildlife Federation from 1979 until 1992, when the Raptor Research and Technical Assistance Center (now SRFS) assumed responsibility for overseeing the count. Initial objectives of the survey were to establish an index to the total wintering Bald Eagle population in the lower 48 states, to determine eagle distribution during a standardized survey period, and to identify previously unrecognized areas of important winter habitat. In 1986, Millsap (Wildl. Soc. Bull. 14:433-440) reported results of the midwinter survey from 1979 through 1986.

As summarized in Steenhof et al. (2002), mid-winter population trends from 1986-2000 for the Pacific Northwest are: Oregon (+1.4%), Washington (+4.6%), Idaho (+1.9).

*For more specific data (by route), see: http://ocid.nacse.org/qml/nbii/eagles/

Bald Eagle Nest Locations and History of Use in Oregon and the Washington portion of the Columbia River Recovery Zone, 1971 through 2003

Compiled by Frank B. Isaacs and Robert G. Anthony, 2003b

Highlights

- The 2003 survey year was the 26th year of bald eagle nest site surveys in Oregon (OR) and the Washington (WA) portion of the Columbia River Recovery Zone (CRRZ).

- History of bald eagle use has been compiled for a total of 1,303 nest trees (1,173 in OR, 130 in WA) at 502 nest sites (456 in OR, 46 in WA). Bald eagle nests have been discovered in 33 of 36 (92%) counties in OR, and 6 of 7 counties in the WA portion of the CRRZ. Counties in OR with no reported nests are Sherman, Gilliam, and Morrow. The first nest tree for Malheur County, Oregon was discovered this year. There are no nests known in the Benton County, WA portion of the study area.

- 77 previously unknown nest trees were documented (68 in OR, 9 in WA); 25 were at 23 previously unknown breeding territories (21 at 19 in OR, 4 at 4 in WA), and 52 (47 in OR, 5 in WA) were at previously known territories.

- 458 of 490 (416 of 444 in OR, 42 of 46 in WA) sites surveyed (93%) were occupied by bald eagles. 466 nestlings (430 in OR, 36 in WA) were observed at 445 occupied sites (405 in OR, 40 in WA) where nesting outcome was determined. 5,199 eaglets have been counted at nests in OR since 1971.

- Nesting outcome was 1.06 young per occupied site in OR and 0.90 in WA, resulting in 5-year productivity of 1.03 young per occupied site for OR and 0.94 for WA. This is the second year in a row that the 5-year productivity for OR has been greater than the recovery goal of 1.00.

- Nesting success was 64% in OR and 52% in WA, resulting in 5-year nesting success of 64% in OR and 58% in WA. Young/successful site was 1.65 in OR and 1.71 in WA. Three nestlings were observed at 7 sites in OR and 1 site in WA.

- Nesting success for Recovery Zones with at least 5 occupied sites was highest in Recovery Zone 9 (Blue Mountains) with 1.62 young per occupied site, and was lowest in Recovery Zone 22 (Klamath Basin) with 0.94 young per occupied site. 1.0 young per occupied site in the CRRZ in 2003 was ≥1.0 for the second year in a row.

- Net increase in the OR population was 3.7% for 2003. Annual increase averaged 7.4% from 1980-2001; the increase in 2002 was 2.0%. Reasons for the relatively low increase the past 2 years are unknown. Population growth may be slowing, or survey effort has not been sufficient to document eagles nesting in new areas. Data gathered during the next two nesting seasons should help determine the trend.

- Six nest trees at six nest sites burned in wildfires in July and August.

Additional information on nest locations is available.

Factors Affecting Bald Eagle Population Status

Key Factors Inhibiting Populations and Ecological Processes

Currently, loss of habitat and human disturbance are still potential threats. Habitat loss results from the physical alteration of habitat as well as from human disturbance associated with development or

recreation (i.e., hiking, camping, boating, and ORV use). Activities that can and have negatively impacted bald eagles include logging, mining, recreation, overgrazing (particularly in riparian habitats), road construction, wetland filling, and industrial development. These activities, as well as suburban and vacation home developments are particularly damaging when they occur in shoreline habitats. Activities that produce increased siltation and industrial pollution can cause dissolved oxygen reductions in aquatic habitats, reduction s in bald eagle fish prey populations followed by reductions in the number of eagles. Not all developments in floodplain habitats are detrimental to bald eagles, as some reservoirs and dams have created new habitat with dependable food supplies (USFWS 2003).

Although habitat loss and residual contamination remain a threat to the bald eagle's full recovery, breeding populations in most areas of the country are making encouraging progress. The following continue to be important conservation measures (USFWS 2003):

1. Avoid disturbance to nests during the nesting season: January – August.
2. Avoid disturbance to roosts during the wintering season: November – March.
3. Protect riparian areas from logging, cutting, or tree clearing.
4. Protect fish and waterfowl habitat in bald eagle foraging areas.
5. Development of site-specific management plans to provide for the long-term availability of habitat.

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6.3.10 Columbia Spotted Frog

Columbia Spotted Frog (*Rana luteiventris*). Keith Paul, USFWS, La Grande, Oregon.
Introduction

The Columbia spotted frog (CSF) is olive green to brown in color, with irregular black spots. They may have white, yellow, or salmon coloration on the underside of the belly and legs (Engle 2004). The hind legs are relatively short relative to body length and there is extensive webbing between the toes on the hind feet. The eyes are upturned (Amphibia Web 2004). Tadpoles are black when small, changing to a dark then light brown as they increase in size. CSFs are about one inch in body length at metamorphosis (Engle 2004). Females may grow to approximately 100 mm (4 inches) snout-to-vent length, while males may reach approximately 75 mm (3 inches) snout-vent length (Nussbaum et al. 1983; Stebbins 1985; Leonard et al. 1993).

Columbia Spotted Frog Life History, Key Environmental Correlates, and Habitat Requirements

Life History
Diet

The CSF eats a variety of food including arthropods (e.g., spiders, insects), earthworms and other invertebrate prey (Whitaker et al. 1982). Adult CSFs are opportunistic feeders and feed primarily on invertebrates (Nussbaum et al. 1983). Larval frogs feed on aquatic algae and vascular plants, and scavenged plant and animal materials (Morris and Tanner 1969).

In a study by Whitaker et al. (1982) in Grant County, OR (Blue Mountains) CSFs ate a wide variety of food items covering 98 food categories. Seventy-three categories consisted of insect materials, which represented 90.7% of the food by volume. Other invertebrates formed seven categories, and plant material formed three categories, representing 3.9% of the total volume. Frogs from the four variously managed sites displayed different dietary habits, indicating that land management practices may have caused changes in the abundance or composition of local insect populations.

Reproduction

The timing of breeding varies widely across the species range owing to differences in weather and climate, but the first visible activity begins in late winter or spring shortly after areas of ice-free water appear at breeding sites (Licht 1975; Turner 1958; Leonard et al 1996). Breeding typically occurs in late March or April, but at higher elevations, breeding may not occur until late May or early June (Amphibia Web 2004). Great Basin population CSFs emerge from wintering sites soon after breeding sites thaw (Engle 2001).

Adults exhibit a strong fidelity to breeding sites, with oviposition typically occurring in the same areas in successive years. Males arrive first, congregating around breeding sites, periodically vocalizing “advertisement calls” in a rapid series of 3-12 “tapping” notes that have little carrying power (Davidson 1995; Leonard et al. 1996). As a female enters the breeding area, she is approached by and subsequently pairs with a male in a nuptial embrace referred to as amplexus. From several hours to possibly days later, the female releases her complement of eggs into the water while the male, still clinging to the female, releases sperm upon the ova (Amphibia Web 2004). Breeding is explosive (as opposed to season-long), occurring only in the

first few weeks following emergence (USFWS 2002a). After breeding is completed, adults often disperse into adjacent wetland, riverine and lacustrine habitats (Amphibia Web 2004).

CSF's have a strong tendency to lay their eggs communally and it is not uncommon to find 25 or more egg masses piled atop one another in the shallows (Amphibia Web 2004). Softball-sized egg masses are usually found in groups, typically along northeast edges of slack water amongst emergent vegetation (USFWS 2002a). After a few weeks thousands of small tadpoles emerge and cling to the remains of the gelatinous egg masses. Newly-hatched larvae remain clustered for several days before moving throughout their natal site (USFWS 2002a). In the Columbia Basin tadpoles may grow to 100 mm (4 in) total length prior to metamorphosing into froglets in their first summer or fall. At high-elevation montane sites, however, tadpoles barely reach 45 mm (1.77 in) in total length prior to the onset of metamorphosis in late fall (Amphibia Web 2004). As young-of-the-year transform, many leave their natal sites and can be found in nearby riparian corridors (USFWS 2002a).

Females may lay only one egg mass per year; yearly fluctuations in the sizes of egg masses are extreme (Utah Division of Wildlife Resources 1998). Successful egg production and the viability and metamorphosis of CSF's are susceptible to habitat variables such as temperature, depth, and pH of water, cover, and the presence/absence of predators (e.g., fishes and bullfrogs) (Morris and Tanner 1969; Munger et al. 1996; Reaser 1996).

Migration

David Pilliod observed movements of approximately 2,000 m (6,562 ft) linear distance within a basin in montane habitats (Reaser and Pilliod, in press). Pilliod et al. 1996 (in Koch et al. 1997) reported that individual high mountain lake populations of *R. luteiventris* in Idaho are actually interdependent and are part of a larger contiguous metapopulation that includes all the lakes in the basin. In Nevada, Reaser (1996; in Koch et al. 1997) determined that one individual of R. luteiventris traveled over 5 km (3.11 mi) in a year (NatureServe 2003).

In a three-year study of R. luteiventris movement within the Owyhee Mountain subpopulation of the Great Basin population in southwestern Idaho, Engle (2000) PIT-tagged over 1800 individuals but documented only five (of 468) recaptures over 1,000 m (3,281 ft) from their original capture point. All recaptures were along riparian corridors and the longest distance between capture points was 1,765 m (5,791). Although gender differences were observed, 88 percent of all movement documented was less than 300 m (984 ft) from the original capture point (NatureServe 2003).

Though movements exceeding 1 km (0.62 mi) and up to 5 km (3.11 mi) have been recorded, these frogs generally stay in wetlands and along streams within 0.6 km (0.37 mi) of their breeding pond (Turner 1960, Hollenbeck 1974, Bull and Hayes 2001). Frogs in isolated ponds may not leave those sites (Bull and Hayes 2001) (NatureServe 2003).

In the Toiyabe Range in Nevada, Reaser (2000) captured 887 individuals over three years, with average mid-season density ranging from 2 to 24 frogs per 150 m (492 ft) of habitat (NatureServe 2003).

Mortality

Based on recapture rates in the Owyhee Mountains, some individuals live for at least five years. Skeletochronological analysis in 1998 revealed a 9-year old female (Engle and Munger 2000).

Mortality of eggs, tadpoles, and newly metamorphosed frogs is high, with approximately 5% surviving the first winter (David Pilliod, personal communication, cited in Amphibia Web 2004).

Habitat Requirements

General

This species is relatively aquatic and is rarely found far from water. It occupies a variety of still water habitats and can also be found in streams and creeks (Hallock and McAllister 2002). CSF's are found closely associated with clear, slow-moving or ponded surface waters, with little shade (Reaser 1997). CSF's are found in aquatic sites with a variety of vegetation types, from grasslands to forests (Csuti 1997). A deep silt or muck substrate may be required for hibernation and torpor (Morris and Tanner 1969). In colder portions of their range, CSF's will use areas where water does not freeze, such as spring heads and undercut streambanks with overhanging vegetation (IDFG et al. 1995). CSF's may disperse into forest, grassland, and brushland during wet weather (NatureServe 2003). They will use stream-side small mammal burrows as shelter. Overwintering sites in the Great Basin include undercut banks and spring heads (Blomquist and Tull 2002).

Breeding

Reproducing populations have been found in habitats characterized by springs, floating vegetation, and larger bodies of pooled water (e.g., oxbows, lakes, stock ponds, beaver-created ponds, seeps in wet meadows, backwaters) (IDFG et al. 1995; Reaser 1997). Breeding habitat is the temporarily flooded margins of wetlands, ponds, and lakes (Hallock and McAllister 2002). Breeding habitats include a variety of relatively exposed, shallow-water (<60 cm), emergent wetlands such as sedge fens, riverine over-bank pools, beaver ponds, and the wetland fringes of ponds and small lakes. Vegetation in the breeding pools generally is dominated by herbaceous species such as grasses, sedges (Cares spp.) and rushes (Juncus spp.) (Amphibia Web 2004).

Columbia Spotted Frog Population and Distribution

Distribution

Populations of the CSF are found from Alaska and British Columbia to Washington east of the Cascades, eastern Oregon, Idaho, the Bighorn Mountains of Wyoming, the Mary's, Reese, and Owyhee River systems of Nevada, the Wasatch Mountains, and the western desert of Utah (Green et al. 1997). Genetic evidence (Green et al. 1996) indicates that Columbia spotted frogs may be a single species with three subspecies, or may be several weakly-differentiated species.

The FWS recognizes four distinct population segments (DPS) based on disjunct distribution: the Wasatch Front DPS (Utah), West Desert DPS (White Pine County, NV and Toole County Utah), Great Basin DPS (southeast Oregon, southwest Idaho, and northcentral/northeast Nevada), and the Northern DPS (includes northeastern Oregon, eastern Washington, central and northern parts of Idaho, western Montana, northwestern Wyoming, British Columbia and Alaska) (C. Mellison, J. Engle, pers. comm., 2004).

There is still some uncertainty about whether the northeast Oregon frogs and the southeastern Washington frogs are part of the Great Basin or Northern population. This group of frogs (Blue and Wallowa Mountains) is isolated from the Great Basin population based on geography. Their habitat in the Blue and Wallowa Mountains is more like that of the Northern

population (montane) than the Great Basin (high desert). Until more genetic work is completed, this account will refer to the Blue and Wallowa Mountain populations as part of the Northern DPS.

Two populations of CSFs are found within the Columbia River Basin: Northern DPS and Great Basin DPS. The Great Basin DPS is further divided into five subpopulations: southeastern Oregon, Owyhee, Jarbidge-Independence, Ruby Mountains, and Toiyabe (J. Engle, C. Mellison, pers. comm., 2004). Of the five subpopulations, only the eastern Oregon, Owyhee, and the Jarbidge-Independence occur in the Columbia River subbasin.

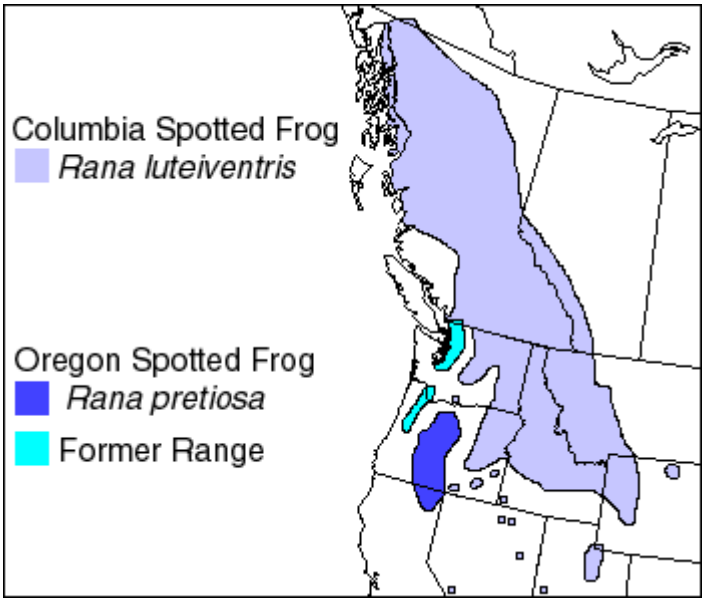
Historic

The historic range of the spotted frog includes Alaska, California, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming, and Alberta and British Columbia, Canada (Turner and Dumas 1972, Nussbaum et al. 1983, Hovingh 1986).

In Alaska, the historic distribution was restricted to southeast Alaska (Hodge 1976). Historic distributions in California include the Warner Mountains in Modoc County and a few locations in Lassen and Siskiyou County (Storer 1925). In Idaho, the historic range primarily occurred in the northern and central part of the state, where it is still considered common (Dumas 1964, 1966; Nussbaum et al. 1983), with scattered populations in the southwestern portion of the state. In Montana, the historical distribution occurred in the intermountain region of western Montana and extended east to the Rocky Mountain Front (Black 1969). The historical distribution in Nevada consisted of the north-central region of the state. In Oregon, spotted frogs were reported to have occurred throughout much of the state (Dumas 1966, Shay 1973, Marshall 1992). In Utah between 1930 and 1977, spotted frogs where recorded from 25 locations in Sanpete, Juab, Utah, Salt Lake, Wasatch, and Summit Counties and various locations along the western Utah/Nevada border (Utah Department of Natural Resources 1991). In Washington, spotted frogs were historically abundant throughout western Washington, including the Cascades and portions of eastern Washington. In Wyoming, the historical range included the northwest part of the state. In Canada, the spotted frog was historically found throughout British Columbia and the western edge of Alberta (USFWS 1992).

Historic range of the Northern population is most likely similar to that of the current range. Moving south into the southern populations (Great Basin, Wasatch Front, and West Desert) the range was most likely larger in size. Due to habitat loss and alteration, fragmentation, water diversion, dams, and loss of beaver the current distribution and abundance of CSF and suitable habitat has dramatically decreased.

Current



USGS, Northern Prairie Wildlife Research Center; range acquired from Green et al. 1997.

Wasatch Front DPS

Spotted frog populations in Utah represent the southern extent of the species range (Stebbins 1985). The Wasatch Front population occurs in isolated springs or riparian wetlands in Juab, Sanpete, Summit, Utah, and Wasatch counties in Utah. These counties are located within the Bonneville Basin of Utah. The Bonneville Basin encompasses the area that was covered by ancient Lake Bonneville and which, today, lies within the Great Basin province. The largest known concentration is currently in the Heber Valley; the remaining six locations are Jordanelle/Francis, Springville Hatchery, Holladay Springs, Mona Springs Complex/Burraston Ponds, Fairview, and Vernon (USFWS 2002b).

West Desert DPS

The West Desert spotted frog population occurs mainly in four large spring complexes. One new population, Vernon, was recently discovered in the eastern-most portion of the West Desert geographic management unit (GMU). CSFs in the West Desert DPS can be found along the eastern border of White Pine County, NV and Toole County, Utah. Populations have been extirpated from the northern portions of the West Desert range (USFWS 2002b).

Northern DPS

The Northern DPS includes northeastern Oregon, eastern Washington, central and northern parts of Idaho, western Montana, northwestern Wyoming, British Columbia and Alaska (J. Engle, C. Mellison, pers. comm., 2004). Populations within the Blue and Wallowa Mountains are found within this DPS.

Great Basin DPS

Nevada

The Great Basin population of Columbia spotted frogs in Nevada is geographically separated into three distinct subpopulations; the Jarbidge-Independence Range, Ruby Mountains, and Toiyabe Mountains subpopulations (USFWS 2002c).

The largest of Nevada's three subpopulation areas is the Jarbidge-Independence Range in Elko and Eureka counties. This subpopulation area is formed by the headwaters of streams in two major hydrographic basins. The South Fork Owyhee, Owyhee, Bruneau, and Salmon Falls drainages flow north into the Snake River basin. Mary's River, North Fork of the Humboldt, and Maggie Creek drain into the interior Humboldt River basin. The Jarbidge-Independence Range subpopulation is considered to be genetically and geographically most closely associated with Columbia spotted frogs in southern Idaho (Reaser 1997)(USFWS 2002c).

Columbia spotted frogs occur in the Ruby Mountains in the areas of Green Mountain, Smith, and Rattlesnake creeks on lands in Elko County managed by the U.S. Forest Service (Forest Service). Although geographically, Ruby Mountains spotted frogs are close to the Jarbidge-Independence Range subpopulation, preliminary allozyme evidence suggests they are genotypically different (J. Reaser, pers. comm., 1998). The Ruby Mountains subpopulation is considered discrete because of this difference (J. Reaser, pers. comm., 1998) and because it is geographically isolated from the Jarbidge-Independence Range subpopulation area to the north by an undetermined barrier (e.g., lack of suitable habitat, connectivity, and/or predators), and from the Toiyabe Mountains subpopulation area to the southwest by a large gap in suitable Humboldt River drainage habitat (USFWS 2002c).

In the Toiyabe Range, spotted frogs are found in seven drainages in Nye County, Nevada; the Reese River (Upper and Lower), Cow and Ledbetter Canyons, and Cloverdale, Stewart, Illinois, and Indian Valley Creeks. Although historically they also occurred in Lander County, preliminary surveys have found them absent from this area (J. Tull, Forest Service, pers. comm., 1998). Toiyabe Range spotted frogs are geographically isolated from the Ruby Mountains and Jarbidge-Independence Range subpopulations by a large gap in suitable habitat and they represent R. luteiventris in the southern-most extremity of its range. Genetic analyses of Great Basin Columbia spotted frogs from the Toiyabe Range suggest that these frogs are distinctive in comparison to frogs from the Ruby Mountains and Jarbidge-Independence Range subpopulation areas (Green et al. 1996, 1997; J. Reaser, pers. comm., 1998). Genetic (mtDNA) differences between the Toiyabe Range frogs and the Ruby Mountains frogs are less than those between the Toiyabe Range frogs and the Jarbidge-Independence Range frogs, but this may be because of similar temporal and spatial isolation (J. Reaser, pers. comm., 1998) (USFWS 2002c).

Idaho and Oregon

Surveys conducted in the Raft River and Goose Creek drainages in Idaho failed to relocate spotted frogs (Reaser 1997; Shipman and Anderson 1997; Turner 1962). In 1994 and 1995, the Bureau of Land Management (BLM) conducted surveys in the Jarbidge and Snake River Resource Areas in Twin Falls County, Idaho. These efforts were also unsuccessful in locating spotted frogs (McDonald 1996). Only six historical sites were known in the Owyhee Mountain range in Idaho, and only 11 sites were known in southeastern Oregon in Malheur County prior to 1995 (Munger et al. 1996) (USFWS 2002c).

Currently, Columbia spotted frogs appear to be widely distributed throughout southwestern Idaho (mainly in Owyhee County) and eastern Oregon, but local populations within this general area appear to be isolated from each other by either natural or human induced habitat disruptions. The largest local population of spotted frogs in Idaho occurs in Owyhee

County in the Rock Creek drainage. The largest local population of spotted frogs in Oregon occurs in Malheur County in the Dry Creek Drainage (USFWS 2002c).

Columbia Spotted Frog Population, Status, and Abundance Trends

Nevada

Declines of Columbia spotted frog populations in Nevada have been recorded since 1962 when it was observed that in many Elko County localities where spotted frogs were once numerous, the species was nearly extirpated (Turner 1962). Extensive loss of habitat was found to have occurred from conversion of wetland habitats to irrigated pasture and spring and stream dewatering by mining and irrigation practices. In addition, there was evidence of extensive impacts on riparian habitats due to intensive livestock grazing. Recent work by researchers in Nevada have documented the loss of historically known sites, reduced numbers of individuals within local populations, and declines in the reproduction of those individuals (Hovingh 1990; Reaser 1996a, 1996b, 1997). Surveys in Nevada between 1994 and 1996 indicated that 54 percent of surveyed sites known to have frogs before 1993 no longer supported individuals (Reaser 1997) (USFWS 2002c).

Little historical or recent data are available for the largest subpopulation area in Nevada, the Jarbidge-Independence Range. Presence/absence surveys have been conducted by Stanford University researchers and the Forest Service, but dependable information on numbers of breeding adults and trends is unavailable. Between 1993 and 1998, 976 sites were surveyed for the presence of spotted frogs in northeastern Nevada, including the Ruby Mountains subpopulation area (Shipman and Anderson 1997; Reaser 2000). Of these, 746 sites (76 percent) that were believed to have characteristics suitable for frogs were unoccupied. For these particular sites there is no information on historical presence of spotted frogs. Of 212 sites that were known to support frogs before 1992, 107 (50 percent) sites no longer had frogs, while 105 sites did support frogs. At the occupied sites, surveyors observed more than 10 adults at only 13 sites (12 percent). Frogs in this area appear widely distributed (Reaser 1997). No monitoring or surveying has taken place in northeastern Nevada since 1998. The Forest Service is planning on surveying the area during the summer of 2002 (USFWS 2002c).

Between 1993 and 1998, 339 sites were surveyed for the presence of Columbia spotted frogs in the Toiyabe Range. Surveyors visited 118 sites (35 percent) with suitable habitat characteristics where no frogs were present. Ten historical frog sites no longer had frogs when surveyed by Reaser between 1993 and 1996 (Reaser 1997). However, at 211 other historical sites, frogs were still present during this survey period. Of these 211 sites, surveyors reported greater than 10 adult frogs at 133 sites (63 percent) (Reaser 1997). In 2000, frog mark-recapture surveys of the Toiyabe Range subpopulation was conducted by the University of Nevada, Reno. Preliminary estimates of frog numbers in the Indian Valley Creek drainage were around 5,000 breeding individuals, which is greater than previously believed (K. Hatch, pers. comm., 2001). However, during the 2000-2001 winter, Hatch (2002) noted a large population decrease, ranging between 66 and 86.5 percent at several sites. Research is currently being conducted to help understand this apparent winterkill. Lack of standardized or extensive monitoring and routine surveying has prevented dependable determinations of frog population numbers or trends in Nevada (USFWS 2002c).

Idaho and Oregon

Extensive surveys since 1996 throughout southern Idaho and eastern Oregon, have led to increases in the number of known spotted frog sites. Although efforts to survey for spotted frogs have increased the available information regarding known species locations, most of these data suggest the sites support small numbers of frogs. Of the 49 known local populations in southern Idaho, 61 percent had 10 or fewer adult frogs and 37 percent had 100 or fewer adult frogs (Engle 2000; Idaho Conservation Data Center (IDCDC) 2000). The largest known local population of spotted frogs occurs in the Rock Creek drainage of Owyhee County and supports under 250 adult frogs (Engle 2000). Extensive monitoring at 10 of the 46 occupied sites since 1997 indicates a general decline in the number of adult spotted frogs encountered (Engle 2000; Engle and Munger 2000; Engle 2002). All known local populations in southern Idaho appear to be functionally isolated (Engle 2000; Engle and Munger 2000) (USFWS 2002c).

Of the16 sites that are known to support Columbia spotted frogs in eastern Oregon, 81 percent of these sites appear to support fewer than 10 adult spotted frogs. In southeastern Oregon, surveys conducted in 1997 found a single population of spotted frogs in the Dry Creek drainage of Malheur County. Population estimates for this site are under 300 adult frogs (Munger et al. 1996). Monitoring (since 1998) of spotted frogs in northeastern Oregon in Wallowa County indicates relatively stable, small local populations (less than five adults encountered) (Pearl 2000). All of the known local populations of spotted frogs in eastern Oregon appear to be functionally isolated (USFWS 2002c).

Legal Status

In 1989, the U.S. Fish and Wildlife Service (USFWS) was petitioned to list the spotted frog (referred to as *Rana pretiosa*) under ESA (Federal Register 54[1989]:42529). The USFWS ruled on April 23, 1993, that the listing of the spotted frog was warranted and designated it a candidate for listing with a priority 3 for the Great Basin population, but was precluded from listing due to higher priority species (Federal Register 58[87]:27260). The major impetus behind the petition was the reduction in distribution apparently associated with impacts from water developments and the introduction of nonnative species.

On September 19, 1997 (Federal Register 62[182]:49401), the USFWS downgraded the priority status for the Great Basin population of Columbia spotted frogs to a priority 9, thus relieving the pressure to list the population while efforts to develop and implement specific conservation measures were ongoing. As of January 8, 2001 (Federal Register 66[5]:1295-1300), however, the priority ranking has been raised back to a priority 3 due to increased threats to the species. This includes the Great Basin DPS Columbia spotted frog populations

Factors Affecting Columbia Spotted Frog Population Status
Key Factors Inhibiting Populations and Ecological Processes

<u>The present or threatened destruction, modification, or curtailment of its habitat or range</u>

Spotted frog habitat degradation and fragmentation is probably a combined result of past and current influences of heavy livestock grazing, spring development, agricultural development, urbanization, and mining activities. These activities eliminate vegetation necessary to protect frogs from predators and UV-B radiation; reduce soil moisture; create undesirable changes in water temperature, chemistry and water availability; and can cause restructuring of habitat zones through trampling, rechanneling, or degradation which in turn can negatively affect the available invertebrate food source (IDFG et al. 1995; Munger et al. 1997; Reaser 1997; Engle and Munger

2000; Engle 2002). Spotted frog habitat occurs in the same areas where these activities are likely to take place or where these activities occurred in the past and resulting habitat degradation has not improved over time. Natural fluctuations in environmental conditions tend to magnify the detrimental effects of these activities, just as the activities may also magnify the detrimental effects of natural environmental events (USFWS 2002c).

Springs provide a stable, permanent source of water for frog breeding, feeding, and winter refugia (IDFG et al. 1995). Springs provide deep, protected areas which serve as hibernacula for spotted frogs in cold climates. Springs also provide protection from predation through underground openings (IDFG et al. 1995; Patla and Peterson 1996). Most spring developments result in the installation of a pipe or box to fully capture the water source and direct water to another location such as a livestock watering trough. Loss of this permanent source of water in desert ecosystems can also lead to the loss of associated riparian habitats and wetlands used by spotted frogs. Developed spring pools could be functioning as attractive nuisances for frogs, concentrating them into isolated groups, increasing the risk of disease and predation (Engle 2001). Many of the springs in southern Idaho, eastern Oregon, and Nevada have been developed (USFWS 2002c).

The reduction of beaver populations has been noted as an important feature in the reduction of suitable habitat for spotted frogs. Beaver are important in the creation of small pools with slow-moving water that function as habitat for frog reproduction and create wet meadows that provide foraging habitat and protective vegetation cover, especially in the dry interior western United States (St. John 1994). Beaver trapping is still common in Idaho and harvest is unregulated in most areas (IDFG et al. 1995). In some areas, beavers are removed because of a perceived threat to water for agriculture or horticultural plantings. As indicated above, permanent ponded waters are important in maintaining spotted frog habitats during severe drought or winter periods. Removal of a beaver dam in Stoneman Creek in Idaho is believed to be directly related to the decline of a spotted frog subpopulation there. Intensive surveying of the historical site where frogs were known to have occurred has documented only one adult spotted frog (Engle 2000) (USFWS 2002c).

Fragmentation of habitat may be one of the most significant barriers to spotted frog recovery and population persistence. Recent studies in Idaho indicate that spotted frogs exhibit breeding site fidelity (Patla and Peterson 1996; Engle 2000; Munger and Engle 2000; J. Engle, IDFG, pers. comm., 2001). Movement of frogs from hibernation ponds to breeding ponds may be impeded by zones of unsuitable habitat. As movement corridors become more fragmented due to loss of flows within riparian or meadow habitats, local populations will become more isolated (Engle 2000; Engle 2001). Vegetation and surface water along movement corridors provide relief from high temperatures and arid environmental conditions, as well as protection from predators. Loss of vegetation and/or lowering of the water table as a result of the above mentioned activities can pose a significant threat to frogs moving from one area to another. Likewise, fragmentation and loss of habitat can prevent frogs from colonizing suitable sites elsewhere (USFWS 2002c).

Though direct correlation between spotted frog declines and livestock grazing has not been studied, the effects of heavy grazing on riparian areas are well documented (Kauffman et al. 1982; Kauffman and Kreuger 1984; Skovlin 1984; Kauffman et al. 1985; Schulz and Leininger 1990). Heavy grazing in riparian areas on state and private lands is a chronic problem throughout the Great Basin. Efforts to protect spotted frog habitat on state lands in Idaho have been largely unsuccessful because of lack of cooperation from the State. In northeast Nevada, the

Forest Service has completed three riparian area protection projects in areas where spotted frogs occur. These projects include altering stocking rates or changing the grazing season in two allotments known to have frogs and constructing riparian fencing on one allotment. However, these three sites have not been monitored to determine whether efforts to protect riparian habitat and spotted frogs have been successful. In the Toiyabe Range, a proposal to fence 3.2 kilometers (km) (2 miles (mi)) of damaged riparian area along Cloverdale Creek to protect it from grazing is scheduled to occur in the summer of 2002. In addition to the riparian exclosure, BLM biologists located a diversion dam in 1998 on Cloverdale Creek which was completely de- watering approximately 1.6 km (1 mi) of stream. During the summer of 2000, this area was reclaimed and water was put back into the stream. This area of the stream is not currently occupied by spotted frogs but it is historical habitat (USFWS 2002c).

The effects of mining on Great Basin Columbia spotted frogs, specifically, have not been studied, but the adverse effects of mining activities on water quality and quantity, other wildlife species, and amphibians in particular have been addressed in professional scientific forums (Chang et al. 1974; Birge et al. 1975; Greenhouse 1976; Khangarot et al. 1985) (USFWS 2002c).

Disease or predation

Predation by fishes is likely an important threat to spotted frogs. The introduction of nonnative salmonid and bass species for recreational fishing may have negatively affected frog species throughout the United States. The negative effects of predation of this kind are difficult to document, particularly in stream systems. However, significant negative effects of predation on frog populations in lacustrine systems have been documented (Hayes and Jennings 1986; Pilliod et al. 1996, Knapp and Matthews 2000). One historic site in southern Idaho no longer supports spotted frog although suitable habitat is available. This may be related to the presence of introduced bass in the Owyhee River (IDCDC 2000). The stocking of nonnative fishes is common throughout waters of the Great Basin. The Nevada Division of Wildlife (NDOW) has committed to conducting stomach sampling of stocked nonnative and native species to determine the effects of predation on spotted frogs. However, this commitment will not be fulfilled until the spotted frog conservation agreements are signed. To date, NDOW has not altered fish stocking rates or locations in order to benefit spotted frogs (USFWS 2002c).

The bull frog (Rana catesbeiana), a nonnative ranid species, occurs within the range of the spotted frog in the Great Basin. Bullfrogs are known to prey on other frogs (Hayes and Jennings 1986). They are rarely found to co-occur with spotted frogs, but whether this is an artifact of competitive exclusion is unknown at this time (USFWS 2002c).

Although a diversity of microbial species is naturally associated with amphibians, it is generally accepted that they are rarely pathogenic to amphibians except under stressful environmental conditions. Chytridiomycosis (chytrid) is an emerging panzootic fungal disease in the United States (Fellers et al. 2001). Clinical signs of amphibian chytrid include abnormal posture, lethargy, and loss of righting reflex. Gross lesions, which are usually not apparent, consist of abnormal epidermal sloughing and ulceration; hemorrhages in the skin, muscle, or eye; hyperemia of digital and ventrum skin, and congestion of viscera. Diagnosis is by identification of characteristic intracellular flask-shaped sporangia and septate thalli within the epidermis. Chytrid can be identified in some species of frogs by examining the oral discs of tadpoles which may be abnormally formed or lacking pigment (Fellers et al. 2001) (USFWS 2002c).

Chytrid was confirmed in the Circle Pond site, Idaho, where long term monitoring since 1998 has indicated a general decline in the population (Engle 2002). It is unclear whether the

presence of this disease will eventually result in the loss of this subpopulation. Two additional sites may have chytrid, but this has yet to be determined (J. Engle, pers. comm., 2001). Protocols to prevent further spread of the disease by researchers were instituted in 2001. Chytrid has also been found in the Wasatch Columbia spotted frog distinct population segment (K. Wilson, pers comm., 2002). Chytrid has not been found in Nevada populations of spotted frogs (USFWS 2002c).

The inadequacy of existing regulatory mechanisms

Spotted frog occurrence sites and potential habitats occur on both public and private lands. This species is included on the Forest Service sensitive species list; as such, its management must be considered during forest planning processes. However, little habitat restoration, monitoring or surveying has occurred on Forest Service lands (USFWS 2002c).

In the fall of 2000, 250 head of cattle were allowed to graze for 45 days on one pasture in the Indian Valley Creek drainage of the Humboldt-Toiyabe National Forest in central Nevada for the first time in 6 years (M. Croxen, pers. comm., 2002). Grazing was not allowed in this allotment in 2001. Recent mark-recapture data indicated that this drainage supports more frogs than previously presumed, potentially around 5,000 individuals (K. Hatch, pers. comm., 2000). Perceived improvements in the status of frog populations in the Indian Valley Creek area may be a result of past removal of livestock grazing. The reintroduction of grazing disturbance into this relatively dense area of frogs has yet to be determined (USFWS 2002c).

BLM policies direct management to consider candidate species on public lands under their jurisdiction. To date, BLM efforts to conserve spotted frogs and their habitat in Idaho, Oregon, and Nevada have not been adequate to address threats (USFWS 2002c).

The southernmost known population of spotted frogs can be found on the BLM San Antone Allotment south of Indian Valley Creek in the Toiyabe Range. Grazing is allowed in this area from November until June (L. Brown, pers. comm., 2002). The season of use is a very sensitive portion of the spotted frog annual life cycle which includes migration from winter hibernacula to breeding ponds, breeding, egg laying and hatching, and metamorphosing of young. Additionally, the riparian Standards and Guidelines were not met in 1996, the last time the allotment was evaluated (USFWS 2002c).

The status of local populations of spotted frogs on Yomba-Shoshone or Duck Valley Tribal lands is unknown. Tribal governments do not have regulatory or protective mechanisms in place to protect spotted frogs (USFWS 2002c).

The Nevada Division of Wildlife classifies the spotted frog as a protected species, but they are not afforded official protection and populations are not monitored. Though the spotted frog is on the sensitive species list for the State of Idaho, this species is not given any special protection by the State. Columbia spotted frogs are not on the sensitive species list for the State of Oregon. Protection of wetland habitat from loss of water to irrigation or spring development is difficult because most water in the Great Basin has been allocated to water rights applicants based on historical use and spring development has already occurred within much of the known habitat of spotted frogs. Federal lands may have water rights that are approved for wildlife use, but these rights are often superceded by historic rights upstream or downstream that do not provide for minimum flows. Also, most public lands are managed for multiple use and are subject to livestock grazing, silvicultural activities, and recreation uses that may be incompatible with spotted frog conservation without adequate mitigation measures (USFWS 2002c).

Other natural or manmade factors affecting its continued existence

Multiple consecutive years of less than average precipitation may result in a reduction in the number of suitable sites available to spotted frogs. Local extirpations eliminate source populations from habitats that in normal years are available as frog habitat (Lande and Barrowclough 1987; Schaffer 1987; Gotelli 1995). These climate events are likely to exacerbate the effects of other threats, thus increasing the possibility of stochastic extinction of subpopulations by reducing their size and connectedness to other subpopulations (see Factor A for additional information). As movement corridors become more fragmented, due to loss of flows within riparian or meadow habitats, local populations will become more isolated (Engle 2000). Increased fragmentation of the habitat can lead to greater loss of populations due to demographic and/or environmental stochasticity (USFWS 2002c).

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6.3.11 Great Blue Heron

Great Blue Heron (*Ardea herodias*). Paul Ashley and Stacey Stovall. 2004. Southeast Washington Subbasin Planning Ecoregion Wildlife Assessment.

Introduction

The great blue heron (*Ardea herodias*) is the largest, most widely distributed, and best known of the American herons (Henny 1972). Great blue herons occur in a variety of habitats from freshwater lakes and rivers to brackish marshes, lagoons, mangrove areas, and coastal wetlands (Spendelow and Patton in prep.).

Great Blue Heron Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Diet

Fish are preferred food items of the great blue heron in both inland and coastal waters (Kirkpatrick 1940; Palmer 1962; Kelsall and Simpson 1980), although a large variety of dietary items has been recorded. Frogs and toads, tadpoles and newts, snakes, lizards, crocodilians, rodents and other mammals, birds, aquatic and land insects, crabs, crayfish, snails, freshwater and marine fish, and carrion have all been reported as dietary items for the great blue heron (Bent 1926; Roberts 1936; Martin *et al.* 1951; Krebs 1974; Kushlan1978). Fish up to about 20 cm in length dominated the diet of herons foraging in southwestern Lake Erie (Hoffman 1978). Ninety-five percent of the fish eaten in a Wisconsin study were 25 cm in length (Kirkpatrick 1940).

Great blue herons feed alone or occasionally in flocks. Solitary feeders may actively defend a much larger feeding territory than do feeders in a flock (Meyerriecks 1962; Kushlan 1978). Flock feeding may increase the likelihood of successful foraging (Krebs 1974; Kushlan 1978) and usually occurs in areas of high prey density where food resources cannot effectively be defended.

In southeast Washington, blue herons are often seen hunting along rivers and streams. In the winter months they are often seen hunting rodents in alfalfa fields (P. Fowler, WDFW, pers. comm.. 2003).

Reproduction

The great blue heron typically breeds during the months of March - May in its northern range and November through April in the southern hemisphere. The nest usually consists of an egg clutch between 3-7 eggs, with clutch size increasing from south to north. Chicks fledge at about two months.

Nesting

Great blue herons normally nest near the tree tops. Usually, nests are about 1 m in diameter and have a central cavity 10 cm deep with a radius of 15 cm. This internal cavity is sometimes lined with twigs, moss, lichens, or conifer needles. Great blue herons are inclined to renest in the same area year after year. Old nests may be enlarged and reused (Eckert 1981).

The male gathers nest-building materials around the nest site, from live or dead trees, from neighboring nests, or along the ground, and the female works them into the nest. Ordinarily, a pair takes less than a week to build a nest solid enough for eggs to be laid and incubated. Construction continues during almost the entire nesting period. Twigs are added mostly when the eggs are being laid or when they hatch. Incubation, which is shared by both partners, starts with the laying of the first egg and lasts about 28 days. Males incubate during the days and females at night.

Herons are particularly sensitive to disturbance while nesting. Scientists suggest as a general rule that there should be no development within 300 m of the edge of a heron colony and no disturbance in or near colonies from March to August.

Mortality

The great blue heron lives as long as 17 years. The adult birds have few natural enemies. Birds of prey occasionally attack them, but these predators are not an important limiting factor on the heron population. Draining of marshes and destruction of wetland habitat is the most serious threat. The number of herons breeding in a local area is directly related to the amount of feeding habitat.

Mortality of the young is high: both the eggs and young are preyed upon by crows, ravens, gulls, birds of prey, and raccoons. Heavy rains and cold weather at the time of hatching also take a heavy toll. Pesticides are suspected of causing reproductive failures and deaths, although data obtained up to this time suggest that toxic chemicals have not caused any decline in overall population levels.

Habitat Requirements

Minimum Habitat Area

Minimum habitat area is defined as the minimum amount of contiguous habitat that is required before a species will live and reproduce in an area. Minimum habitat area for the great blue heron includes wooded areas suitable for colonial nesting and wetlands within a specified distance of the heronry where foraging can occur. A heronry frequently consists of a relatively small area of suitable habitat. For example, heronries in the Chippewa National Forest, Minnesota, ranged from 0.4 t o 4.8 ha in size and averaged 1.2 ha (Mathisen and Richards 1978). Twelve heronries in western Oregon ranged from 0.12 t o 1.2 ha in size and averaged 0.4 ha (Werschkul *et al.* 1977).

Foraging

Short and Cooper (1985) provide criteria for suitable great blue heron foraging habitat. Suitable great blue heron foraging habitats are within 1.0 km of heronries or potential heronries. The suitability of herbaceous wetland, scrub-shrub wetland, forested wetland, riverine, lacustrine or estuarine habitats as foraging areas for the great blue heron is ideal if these potential foraging habitats have shallow, clear water with a firm substrate and a huntable population of small fish. A potential foraging area needs to be free from human disturbances several hours a day while the herons are feeding. Suitable great blue heron foraging areas are those in which there is no human disturbance near the foraging zone during the four hours following sunrise or preceding sunset or the foraging zone is generally about 100m from human activities and habitation or about 50m from roads with occasional, slow-moving traffic.

A smaller energy expenditure by adult herons is required to support fledglings if an abundant source of food is close to the nest site than if the source of food is distant. Nest sites frequently are located near suitable foraging habitats. Social feeding is strongly correlated with colonial nesting (Krebs 1978), and a potential feeding site is valuable only if it is within “commuting” distance of an active heronry. For example, 24 of 31 heronries along the Willamette River in Oregon were located within 100m of known feeding areas (English 1978). Most heronries along the North Carolina coast were located near inlets, which have large concentrations of fish (Parnell and Soots 1978). The average distance from heronries to inlets was 7.0 to 8.0 km. The average distance of heronries to possible feeding areas (lakes 140 ha in area) varied from 0 to 4.2 km and averaged 1.8 km on the Chippewa National Forest in Minnesota (Mathisen and Richards 1978). Collazo (1981) reported the distance from the nearest feeding grounds to a heronry site as 0.4 and 0.7 km. The maximum observed flight distance from an active heronry to a foraging area was 29 km in Ohio (Parris and Grau 1979).

Great blue herons feed anywhere they can locate prey (Burleigh 1958). This includes the terrestrial surface but primarily involves catching fish in shallow water, usually 150m deep (Bent 1926; Meyerriecks 1960; Bayer 1978).

Thompson (1979b) reported that great blue herons along the Mississippi River commonly foraged in water containing emergent or submergent vegetation, in scattered marshy ponds, sloughs, and forested wetlands away from the main channel. He noted that river banks, jetties, levees, rip-rapped banks, mudflats, sandbars, and open ponds were used to a lesser extent. Herons near southwestern Lake Erie fed intensively in densely vegetated areas (Hoffman 1978).

Other studies, however, have emphasized foraging activities in open water (Longley 1960; Edison Electric Institute 1980). Exposed mud flats and sandbars are particularly desirable foraging sites at low tides in coastal areas in Oregon (Bayer 1978), North Carolina (Custer and Osborn 1978), and elsewhere (Kushlan 1978). Cooling ponds (Edison Electric Institute 1980) and dredge spoil settling ponds (Cooper *et al.* in prep.) also are used extensively by foraging great blue herons.

Water

The great blue heron routinely feeds on soft animal tissues from an aquatic environment, which provides ample opportunity for the bird to satisfy its physiological requirements for water.

Cover

Cover for concealment does not seem to be a limiting factor for the great blue heron. Heron nests often are conspicuous, although heronries frequently are isolated. Herons often feed in marshes and areas of open water, where there is no concealing cover.

Reproduction

Short and Cooper (1985) describe suitable great blue heron nesting habitat as a grove of trees at least 0.4 ha in area located over water or within 250m of water. These potential nest sites may be on an island with a river or lake, within a woodland dominated swamp, or in vegetation near a river or lake. Trees used as nest sites are at least 5m high and have many branches at least 2.5 cm in diameter that are capable of supporting nests. Trees may be alive or dead but must have an “open canopy” that allows an easy access to the nest. The suitability of potential heronries diminishes as their distance from current or former heronry sites increases because herons develop new heronries in suitable vegetation close to old heronries.

A wide variety of nesting habitats is used by the great blue heron throughout its range in North America. Trees are preferred heronry sites, with nests commonly placed from 5 to 15 m above ground (Burleigh 1958; Cottrille and Cottrille 1958; Vermeer 1969; McAloney 1973). Smaller trees, shrubs, reeds (*Phragmites communis*), the ground surface, rock ledges along coastal cliffs, and artificial structures may be utilized in the absence of large trees, particularly on islands (Lahrman 1957; Behle 1958; Vermeer 1969; Soots and Landin 1978; Wiese 1978). Most great blue heron colonies along the Atlantic coast are located in riparian swamps (Ogden 1978). Most colonies along the northern Gulf coast are in cypress - tupelo (*Taxodium Nyssa*) swamps (Portnoy 1977). Spendelow and Patton (in prep.) state that many birds in coastal Maine nest on spruce (*Picea spp*.) trees on islands. Spruce trees also are used on the Pacific coast (Bayer 1978), and black cottonwood (*Populus trichocarpa*) trees frequently are used as nest sites along the Willamette River in Oregon (English 1978). Miller (1943) stated that the type of tree was not as important as its height and distance from human activity. Dead trees are commonly used as nest sites (McAloney 1973). Nests usually consist of a platform of sticks, sometimes lined with smaller twigs (Bent 1926; McAloney 1973), reed stems (Roberts 1936), and grasses (Cottrille and Cottrille 1958).

Heron nest colony sites vary, but are usually near water. These areas often are flooded (Sprunt 1954; Burleigh 1958; English 1978). Islands are common nest colony sites in most of the great blue heron's range (Vermeer 1969; English 1978; Markham and Brechtel 1979). Many colony sites are isolated from human habitation and disturbance (Mosely 1936; Burleigh 1958). Mathisen and Richards (1978) recorded all existing heronries in Minnesota as at least 3.3 km from human dwellings, with an average distance of 1.3 km to the nearest surfaced road. Nesting great blue herons may become habituated to noise (Grubb 1979), traffic (Anderson 1978), and other human activity (Kelsall and Simpson 1980). Colony sites usually remain active until the site is disrupted by land use changes.

A few colony sites have been abandoned because the birds depleted the available nest building material and possibly because their excrement altered the chemical composition of the soil and the water. Heron exretia can have an adverse effect on nest trees (Kerns and Howe 19667; Wiese 1978).

Great Blue Heron Population and Distribution

Population

Historic

In the past, herons and egrets were shot for their feathers, which were used as cooking utensils and to adorn hats and garments, and they also provided large, accessible targets. The slaughter of these birds went relatively unchecked until 1900 when the federal government passed the Lacey Act, which prohibits the foreign and interstate commercial trade of feathers. Greater protection was afforded in 1918 with the Migratory Bird Treaty Act, which empowered the federal government to set seasons and bag limits on the hunting of waterfowl and waterbirds. With this protection, herons and other birds have made dramatic comebacks.

In southeast Washington, few historical colonies have been reported. The Foundation Island colony is the oldest, but has been taken over by cormorants. It appears blue herons numbers in the colony have declined significantly.

One colony was observed from a helicopter in 1995 on the Touchet River just upriver from Harsha, but that colony appears to have been destroyed by a wind storm (trees blown down), and no current nesting has been observed in the area (Fowler per. com.)

Current

The great blue heron breeds throughout the U.S. and winters as far north as New England and southern Alaska (Bull and Farrand 1977). The nationwide population is estimated at 83,000 individuals (NACWCP 2001).

In southeast Washington, three new colonies have been discovered over the last few years. One colony on the Walla Walla River contains approximately 24 nests. This colony has been active for approximately 12 years. Two new colonies were discovered in 2003, one on a railroad bridge over the Snake River at Lyons Ferry, and one near Chief Timothy Park on the Snake River. The Lyons Ferry colony contained approximately 11 nests, and the Chief Timothy colony 5 nests (P. Fowler, WDFW, personal communication, 2003).

Distribution

Two known heron rookeries occur within the Walla Walla subbasin, one on the Walla Walla and one on the Touchet River (NPPC 2001). The Walla Walla River rookery contains approximately 13 active nests. The Touchet River rookery contains approximately 8-10 active nests. Blue herons are observed throughout the lowlands of southeast Washington near rivers or streams (P. Fowler, WDFW, personal communication, 2003).

Historic

No data are available.

Current

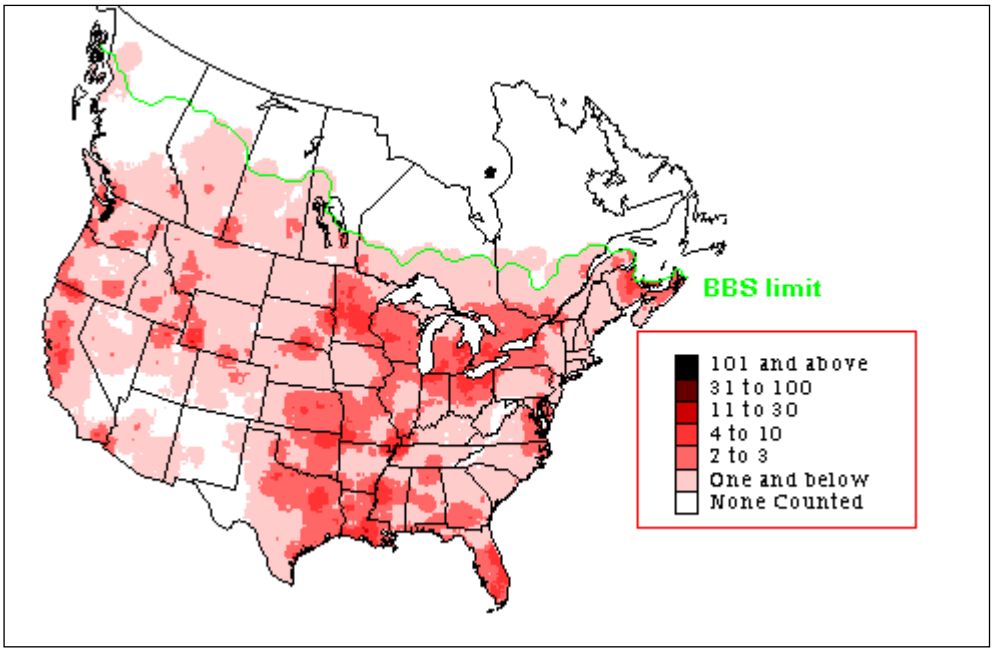

Figure 38. Great blue heron summer distribution from Breeding Bird Survey (BBS) data (Sauer *et al.* 2003).

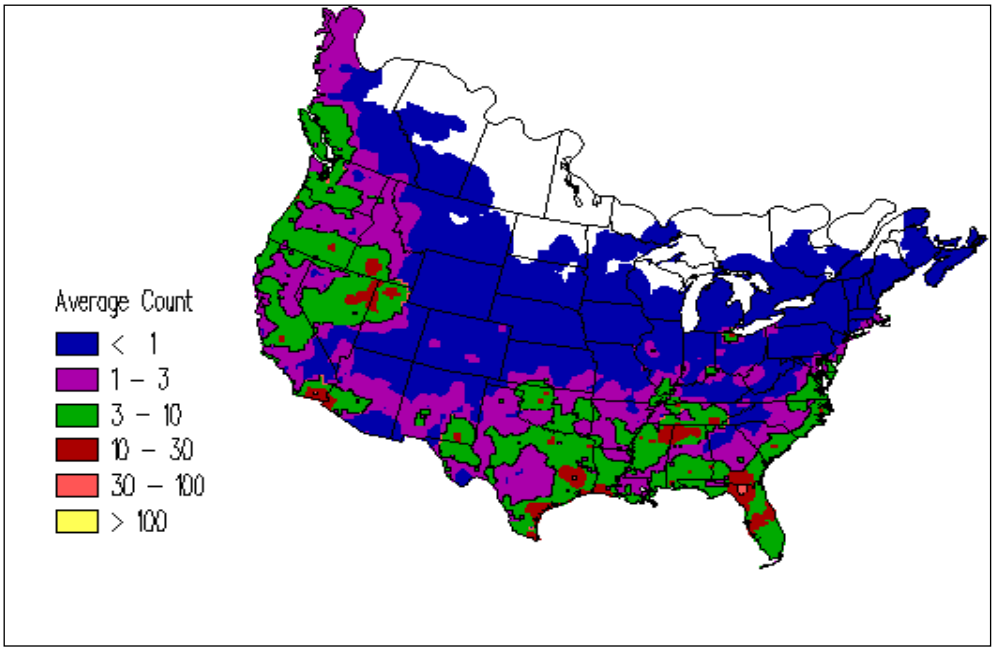

Figure 39Great blue heron breeding distribution from Breeding Bird Survey (BBS) data (Sauer *et al.* 2003).

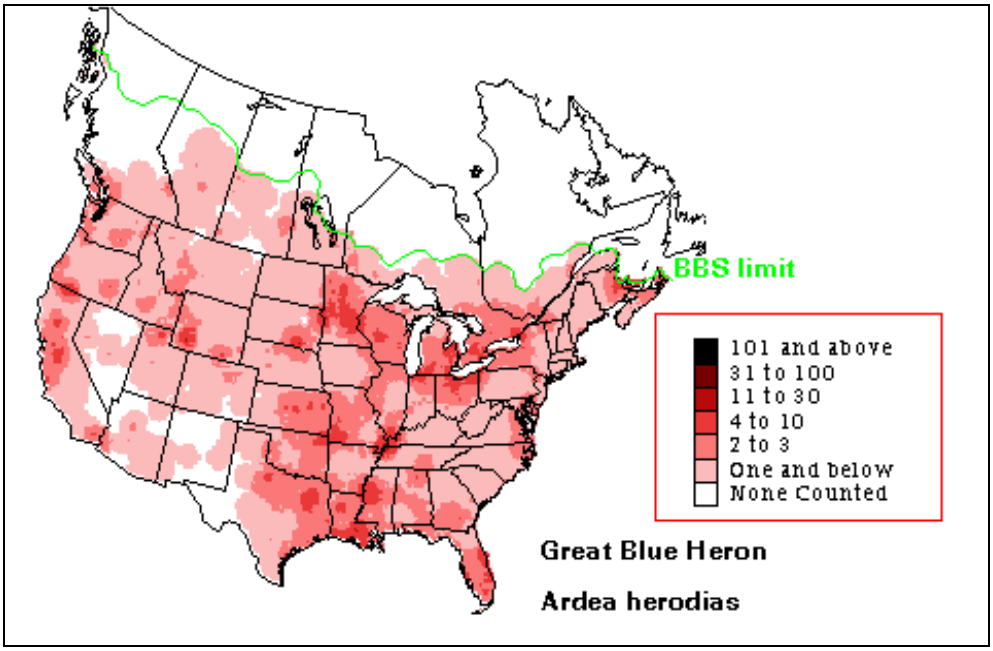

Figure 40. Great blue heron winter distribution from Christmas Bird Count (CBC) data (Sauer *et al.* 2003).

Great Blue Heron Status and Abundance Trends

Status

Surveys of blue heron populations are not conducted. However, populations appear to be stable and possibly expanding in some areas. Two new nesting colonies have been found in on the Lower Snake River (P. Fowler, WDFW, personal communication, 2003).

Trends

Populations in southeast Washington appear to be stable, and may actually be increasing.

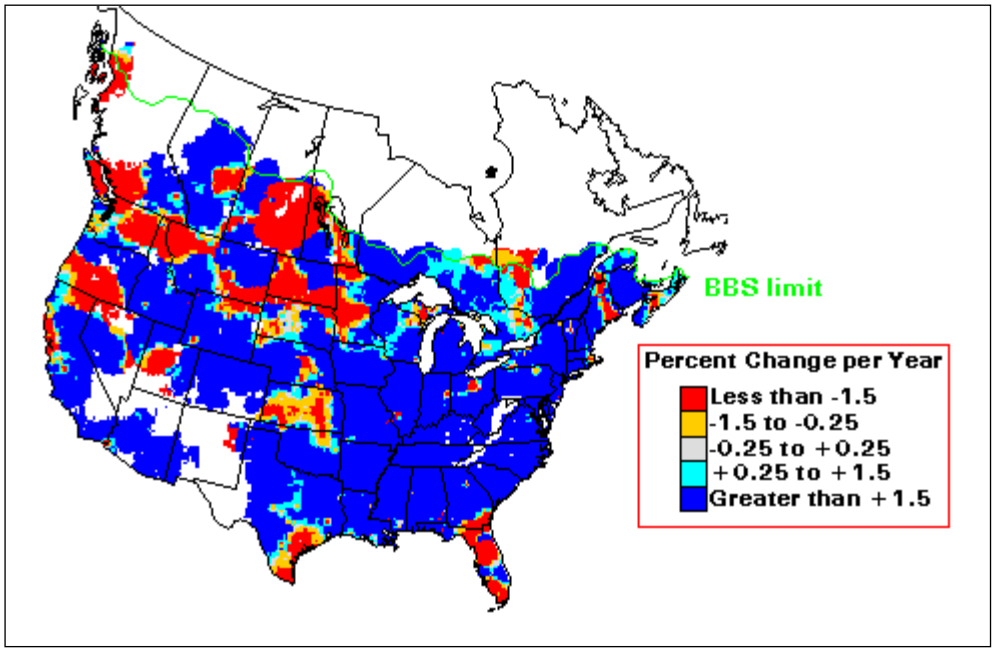

Figure 41. Great blue heron Breeding Bird Survey (BBS) trend results: 1966-1996 (Sauer *et al.* 2003).

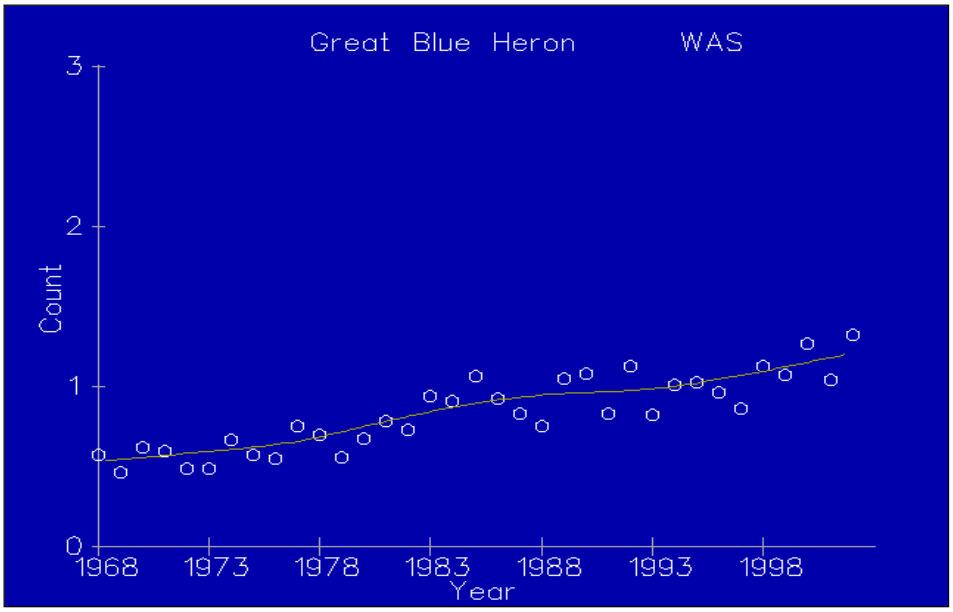

Figure 42. Great blue heron Breeding Bird Survey (BBS) Washington trend results: 1966-2002 (Sauer *et al.* 2003).

Factors Affecting Great Blue Heron Population Status
Key Factors Inhibiting Populations and Ecological Processes
Habitat destruction and the resulting loss of nesting and foraging sites, and human disturbance probably have been the most important factors contributing to declines in some great blue heron populations in recent years (Thompson 1979a; Kelsall and Simpson 1980; McCrimmon 1981).

Habitat Loss

Natural generation of new nesting islands, created when old islands and headlands erode, has decreased due to artificial hardening of shorelines with bulkheads. Loss of nesting habitat in certain coastal sites may be partially mitigated by the creation of dredge spoil islands (Soots and Landin 1978). Several species of wading birds, including the great blue heron, use coastal spoil islands (Buckley and McCaffrey 1978; Parnell and Soots 1978; Soots and Landin 1978). The amount o f usage may depend on the stage of plant succession (Soots and Parnell 1975; Parnell and Soots 1978), although great blue herons have been observed nesting in shrubs (Wiese 1978), herbaceous vegetation (Soots and Landin 1978), and on the ground on spoil islands.

Water Quality

Poor water quality reduces the amount of large fish and invertebrate species available in wetland areas. Toxic chemicals from runoff and industrial discharges pose yet another threat. Although great blue herons currently appear to tolerate low levels of pollutants, these chemicals can move through the food chain, accumulate in the tissues of prey and may eventually cause reproductive failure in the herons.

Several authors have observed eggshell thinning in great blue heron eggs, presumably as a result of the ingestion of prey containing high levels of organochlorines (Graber *et al.* 1978; Ohlendorf *et al.* 1980). Konermann *et al.* (1978) blamed high levels of dieldrin and DDE use for reproductive failure, followed by colony abandonment in Iowa. Vermeer and Reynolds (1970) recorded high levels of DDE in great blue herons in the prairie provinces of Canada, but felt that reproductive success was not diminished as a result. Thompson (1979a) believed that it was too early to tell if organochlorine residues were contributing to heron population declines in the Great Lakes region.

Human Disturbance

Heronries often are abandoned as a result of human disturbance (Markham and Brechtel 1979). Werschkul *et al.* (1976) reported more active nests in undisturbed areas than in areas that were being logged. Tree cutting and draining resulted in the abandonment of a mixed-species heronry in Illionois (Bjorkland 1975). Housing and industrial development (Simpson and Kelsall 1979) and water recreation and highway construction (Ryder *et al.* 1980) also have resulted in the abandonment of heronries. Grubb (1979) felt that airport noise levels could potentially disturb a heronry during the breeding season.

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6.4 Appendix 4 - QHA Output Tables

Scoring	
Confidence Rating	Attribute Rating
	0 = 0% of normative
0 = Speculative	1 = 25% of normative
1 = Expert Opinion	2 = 50% of normative
2 = Well Documented	3 = 75% of normative
	4 = 100% of normative

Describe the natural physical condition of the stream

Stream Name: Burnt River

Describe the normative condition for this stream in regard to the physical conditions relative to an optimal condition for similar streams in this ecological province. The default rating for the reference condition is 4, however, ratings less than 4 inherent "limitations" of streams and reaches caused by geology, topography or other factors.

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FALSE Definitions Error Check No Error / Error

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Reach Name	Description	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions	Reach Confidence	Documentation	Miles of Mainstem	Miles of Tributary	Total Miles of Habitat	Error Check
Attribute Confidence		2.0	2.0	2.0	2.0	2.0	1.5	2.0	2.0	1.5	2.0	2.0						
Attribute Toggle		1	1	1	1	1	1	1	1	1	1	1						
Burnt-1	t Durbin Creek watershed.	4.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	2.0	4.0	4.0	1.0		5.55	57.90	63.45	
Burnt 1-Durbin Creek	e Durbin Creek watershed.	4.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	2.0	4.0	4.0	1.0		9.20	22.14	31.35	
Burnt-2	Dixie Cr, including all tribs.	4.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	2.0	4.0	4.0	1.0		6.02	78.68	84.70	
Dixie Cr	watershed, except NF/SF.	4.0	4.0	4.0	3.0	3.0	3.0	4.0	4.0	2.5	4.0	4.0	1.0		6.92	163.94	170.86	
Dixie Cr NF	ire Dixie Cr NF watershed.	4.0	4.0	4.0	3.0	3.0	3.0	4.0	4.0	2.5	4.0	4.0	1.0		11.23	181.97	193.20	
Dixie Cr SF	ire Dixie Cr SF watershed.	4.0	4.0	4.0	3.5	4.0	3.5	4.0	4.0	4.0	4.0	3.5	1.0		9.60	145.78	155.38	
Burnt-3	cept Jordan and Sisley Cr.	4.0	4.0	4.0	3.5	4.0	3.5	4.0	4.0	4.0	4.0	3.5	1.0		6.34	20.34	26.68	
Burnt-3 Sisely and Jor	y Cr watersheds combined.	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		3.03	90.31	93.35	
Burnt-4	ayze Cr, including all tribs.	4.0	4.0	4.0	3.5	4.0	3.5	4.0	4.0	4.0	4.0	3.5	1.0		5.69	63.26	68.95	
Burnt-5	hambeam and Banks Ditch).	4.0	4.0	4.0	3.5	4.0	3.5	4.0	4.0	4.0	4.0	3.5	1.0		5.28	142.21	147.49	
Manning	tire Manning Cr watershed.	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	2.5	4.0	4.0	1.0		11.55	162.10	173.65	
Pritchard/Lawrence Cr	xcept Durkee and Alder Cr.	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	3.0	4.0	4.0	1.0		13.02	229.87	242.90	
Durkee Cr	ntire Durkee Cr watershed.	4.0	3.0	4.0	3.5	3.0	4.0	4.0	4.0	2.5	4.0	4.0	1.0		10.01	137.53	147.54	
Alder Cr-1	crossing, including all tribs.	4.0	3.5	4.0	3.5	3.0	4.0	4.0	4.0	2.5	4.0	4.0	1.0		10.05	177.38	187.43	
Alder Cr-2	hed I-84 E bound crossing.	4.0	3.5	4.0	3.5	3.0	4.0	4.0	4.0	2.5	4.0	4.0	1.0		7.67	117.96	125.63	
Burnt-6	am, Elliot and Banks Ditch).	4.0	4.0	4.0	3.5	4.0	3.5	4.0	4.0	4.0	4.0	4.0	1.0		16.07	189.12	205.19	
Clarks Cr	ntire Clarks Cr watershed.	4.0	3.0	3.5	3.5	4.0	3.5	4.0	4.0	4.0	4.0	4.0	1.0		7.95	152.68	160.63	
Burnt-7	g Flat, and China Cr Ditch).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		39.53	165.11	204.63	
Auburn Cr	6 boundaries (Elliot Ditch).	4.0	4.0	4.0	4.0	4.0	3.5	4.0	4.0	3.5	4.0	4.0	1.0		6.62	46.26	52.88	
Big Cr-1	Entire Big Cr watershed.	4.0	4.0	4.0	4.0	4.0	3.5	4.0	4.0	3.5	4.0	4.0	1.0		11.40	118.96	130.36	
Camp Cr-1 (Burnt)	kwood and Camp Cr Ditch).	4.0	4.0	4.0	4.0	4.0	3.5	4.0	4.0	3.0	4.0	4.0	1.0		3.07	15.42	18.50	
Camp Cr-2 (Burnt) and	(Williams and Elms Ditch).	4.0	4.0	4.0	4.0	4.0	3.5	4.0	4.0	3.0	4.0	4.0	1.0		3.86	97.22	101.08	
Camp Cr EF (Burnt) abo	rom Milk Cr to headwaters.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		8.50	62.00	70.49	
Camp Cr WF (Burnt)	oundaries (Williams Ditch).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		9.30	53.50	62.80	
NF and SF Camp	in WF Camp Cr watershed.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		3.52	14.09	17.60	
Burnt-8	Tigar, and Unnamed Ditch).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		0.50	79.32	79.81	
Job Cr	Calvin, and Unnamed Ditch).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	4.0	4.0	1.0		10.08	78.82	88.90	
Burnt SF-1	ies (Elms and Calvin Ditch).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0	1.0		4.45	11.71	16.16	
Burnt SF-2	rney Creek to headwaters.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		7.26	7.26	14.52	
Burnt NF-1	g Flat, and Unnamed Ditch).	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	3.0	4.0	4.0	1.0		6.47	68.75	75.22	
Burnt MF	n Whited and Tigar Ditch).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		10.99	62.28	73.27	
Burnt WF	ntire Burnt WF watershed.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		5.36	51.29	56.65	
Burnt NF-2	oundaries (Big Flat Ditch).	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		7.30	45.93	53.23	
Trout & Camp Cr	except Trout and Camp Cr	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		9.17	38.63	47.80	
Burnt NF-3	r and Camp Cr watersheds.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		9.10	29.47	38.56	
Burnt NF-4	above highway 7 crossing.	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0		8.66	20.37	29.03	

Table 28. Reference habitat ratings for Burnt River stream reaches**.**

No Error
Error
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Reach Name	Description	Not Rated	Riparian Condition	Channel Stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions	Reach Confidence	Documentation	Miles of Mainstem	Miles of Tributary	Total Miles of Habitat	Error Check
Attribute Confidence			1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0						
Attribute Toggle			1	1	1	1	1	1	1	1	1	1	1						
Burnt-1	From mouth of Burnt R at the Brownlee Reser		2.0	2.0	2.0	1.0	2.0	2.0	4.0	4.0	1.0	3.0	3.0	1.5		5.55	57.90	63.45	
Burnt 1-Durbin Creek	Entire Durbin Creek watershed.		2.0	2.0	2.5	2.0	2.0	1.5	4.0	4.0	2.0	4.0	2.0	1.5		9.20	22.14	31.35	
Burnt-2	From bridge at river elevation 2163 ft to Dixie C		2.0	2.0	2.0	1.0	2.0	2.0	4.0	4.0	1.0	3.0	3.0	1.5		6.02	78.68	84.70	
Dixie Cr	Entire Dixie Cr watershed, except NF/SF.		2.0	2.0	1.5	1.5	1.5	2.0	4.0	4.0	1.0	2.5	3.5	1.5		6.92	163.94	170.86	
Dixie Cr NF	Entire Dixie Cr NF watershed.		2.0	2.0	1.5	1.5	1.5	2.0	4.0	4.0	1.0	2.5	3.5	1.5		11.23	181.97	193.20	
Dixie Cr SF	Entire Dixie Cr SF watershed.		3.0	3.0	2.5	2.0	2.5	2.0	4.0	4.0	3.5	2.5	3.0	1.5		9.60	145.78	155.38	
Burnt-3	From Dixie Cr to just above the 2400 ft level ne		2.0	2.0	2.0	1.0	2.0	2.0	4.0	4.0	1.0	3.0	3.0	1.5		6.34	20.34	26.68	
Burnt-3 Sisely and Jordan Creeks	Entire Jordan and Sisley Cr watersheds combi		2.0	2.0	1.5	1.5	1.5	2.0	4.0	4.0	1.0	2.5	2.5	1.5		3.03	90.31	93.35	
Burnt-4	From Dixie Cr to just above the 2400 ft level ne		2.0	2.0	2.0	1.0	2.0	2.0	4.0	4.0	1.0	3.0	3.0	1.5		5.69	63.26	68.95	
Burnt-5	From Swayze Cr to Powell Cr, including all trib		2.0	2.0	2.0	1.0	2.0	2.0	4.0	4.0	1.0	3.0	3.0	1.5		5.28	142.21	147.49	
Manning	Entire Manning Cr watershed.		2.0	3.0	2.5	2.5	3.0	2.5	4.0	4.0	1.5	2.0	2.5	1.5		11.55	162.10	173.65	
Pritchard/Lawrence Cr	Entire Pritchard Cr watershed, except Durkee		2.0	3.0	2.5	2.5	3.0	2.5	4.0	4.0	1.5	2.0	2.0	1.5		13.02	229.87	242.90	
Durkee Cr	Entire Durkee Cr watershed.		2.0	3.0	2.5	2.5	3.0	1.0	4.0	4.0	1.0	1.0	1.5	1.5		10.01	137.53	147.54	
Alder Cr-1	From mouth at Pritchard Cr to I-84 E bound cr		2.0	2.0	2.0	2.0	2.5	1.5	4.0	4.0	1.5	1.5	1.5	1.5		10.05	177.38	187.43	
Alder Cr-2	Entire Alder Cr watershed I-84 E bound crossi		2.0	2.0	2.0	2.0	2.5	1.5	4.0	4.0	1.5	1.5	1.5	1.5		7.67	117.96	125.63	
Burnt-6	From Powell Cr to Clarks Cr, including all tribs		3.0	3.0	3.5	2.5	2.5	2.5	4.0	4.0	1.0	3.5	4.0	1.5		16.07	189.12	205.19	
Clarks Cr	Entire Clarks Cr watershed.		1.0	1.0	1.0	1.0	1.5	1.0	4.0	4.0	2.5	2.5	1.0	1.5		7.95	152.68	160.63	
Burnt-7	From Clarks Cr to Unity Lake Dam including all		2.5	3.0	2.5	1.0	2.0	2.0	4.0	4.0	1.5	2.5	1.0	1.5		39.53	165.11	204.63	
Auburn Cr	Entire Auburn Cr watershed and only sections		2.0	1.0	2.0	1.0	2.0	1.0	4.0	4.0	1.5	2.5	1.0	1.5		6.62	46.26	52.88	
Big Cr-1	Entire Big Cr watershed.		2.5	2.0	3.0	2.0	2.0	2.5	4.0	4.0	1.5	2.5	1.0			11.40	118.96	130.36	
Camp Cr-1 (Burnt)	From mouth at Burnt R to Higgins Reservoir in		2.0	3.0	2.0	2.0	3.0	3.0	4.0	4.0	2.5	4.0	2.5			3.07	15.42	18.50	
Camp Cr-2 (Burnt) and EF to Milk	From Higgins Reservoir to Milk Creek on EF in		2.0	3.0	2.0	2.0	3.0	3.0	4.0	4.0	2.5	4.0	4.0			3.86	97.22	101.08	
Camp Cr EF (Burnt) above Milk	Entire EF watershed from Milk Cr to headwater		3.0	2.0	3.0	2.0	2.5	3.0	4.0	4.0	2.5	4.0	1.0			8.50	62.00	70.49	
Camp Cr WF (Burnt)	Entire Camp Cr WF watershed, except NF and		3.0	3.5	3.5	3.0	3.5	3.0	4.0	4.0	3.0	4.0	3.0			9.30	53.50	62.80	
NF and SF Camp	Entire NF and SF watersheds within WF Camp		2.0	2.5	2.5	2.0	2.5	2.0	4.0	4.0	2.5	4.0	3.5			3.52	14.09	17.60	
Burnt-8	From Unity Reservoir Dam to Whited Reservoi		3.5	3.5	3.0	3.5	3.5	2.5	4.0	4.0	2.5	4.0	1.0	1		0.50	79.32	79.81	
Job Cr	Entire Job Cr watershed, and only sections of		3.5	3.5	3.0	3.5	3.5	2.0	4.0	4.0	2.0	4.0	0.0	1		10.08	78.82	88.90	
Burnt SF-1	Frrom Whited Reservoir Dam to Barney Cr inc		3.5	3.5	3.0	3.5	3.5	3.0	4.0	4.0	3.5	4.0	1.0	1		4.45	11.71	16.16	
Burnt SF-2	Entire Burnt SF watershed from Barney Creek		3.5	3.5	3.0	3.5	3.5	3.0	4.0	4.0	3.5	4.0	4.0	1		7.26	7.26	14.52	
Burnt NF-1	From mouth at Burnt R to and including China		2.5	2.5	2.0	1.0	2.5	3.0	4.0	4.0	1.5	4.0	4.0	1		6.47	68.75	75.22	
Burnt MF	Entire Burnt MF watershed, and only sections		3.5	3.5	3.5	3.0	3.0	2.5	4.0	4.0	1.5	4.0	1.0	1		10.99	62.28	73.27	
Burnt WF	Entire Burnt WF watershed.		3.0	3.5	3.5	3.0	3.0	2.5	4.0	4.0	2.5	4.0	2.0	1		5.36	51.29	56.65	
Burnt NF-2	From China Cr at King Ranch to Trout Cr inclu		3.5	3.5	3.5	3.0	3.5	2.5	4.0	4.0	3.0	4.0	1.0	1.5		7.30	45.93	53.23	
Trout & Camp Cr	From Trout Cr to Highway 7 crossing including		2.5	2.5	3.0	2.0	2.5	2.5	4.0	4.0	3.0	4.0	1.0	1.5		9.17	38.63	47.80	
Burnt NF-3	Entire Trout Cr and Camp Cr watersheds.		1.5	1.5	1.0	1.0	1.0	1.5	4.0	4.0	2.0	4.0	1.0	1.5		9.10	29.47	38.56	
Burnt NF-4	Entire Burnt NF watershed above highway 7 cr		3.0	3.0	3.0	2.0	3.0	3.0	4.0	4.0	2.5	4.0	4.0	1.5		8.66	20.37	29.03	

Table 29. Current Habitat Ratings for Burnt River subbasin stream reaches.

Species habitat hypothesis

Focal Species: Redband in Burnt River

	Spawning/incubation	Summer Rearing	Winter Rearing	Migration	Error Check
Life Stage Rank (1-4)	4.0	3.5	2.5	2.0	
Assign a weight to each attribute (0-2) relative to its importance to the life stage					
Riparian Condition	1.5	2.0	1.5	0.5	
Channel stability	1.5	2.0	2.0	1.0	
Habitat Diversity	1.5	2.0	2.0	1.0	
Fine sediment	2.0	1.0	2.0	0.0	
High Flow	1.5	0.5	2.0	2.0	
Low Flow	1.0	2.0	0.5	1.5	
Oxygen	2.0	2.0	2.0	2.0	
Low Temp	2.0	0.0	1.0	0.0	
High Temp	1.0	2.0	0.0	0.0	
Pollutants	2.0	2.0	2.0	2.0	
Obstructions	0.0	0.0	0.0	2.0	
Error Check					

Table 30. Species habitat hypothesis for redband trout in the Burnt River subbasin.

Confidence Ratings
0 = Speculative
1 = Expert Opinion
2 = Well Documented

Species habitat range

Focal Species: Redband in Burnt River

Assign a weight to each attribute (0-2) relative to the reach's importance to the life stage

No Error

Error

Error Check

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	0-100%	Current Range (0-2)					0-100%	Reference Range (0-2)					
Reach Name	Percent reach untilization	Spawn and incubation	Summer rearing	Winter rearing	Migration	Confidence	Percent Reach utilization	Spawn and incubation	Summer rearing	Winter rearing	Migration	Confidence	Doc
Burnt-1	20%	0.0	0.0	1.0	1.0	1	20%	0.0	0.0	1.5	2.0	0.5	
Burnt 1-Durbin Creek	5%	0.0	0.0	0.1	0.0	1	35%	0.0	0.0	0.1	0.0	0.5	
Burnt-2	20%	0.0	0.0	1.0	1.0	1	25%	0.0	0.0	1.5	2.0	0.5	
Dixie Cr	30%	0.0	0.0	1.0	1.0	1	35%	1.5	1.0	1.5	2.0	0.5	
Dixie Cr NF	25%	1.0	0.0	1.0	1.0	1	30%	2.0	1.0	1.5	1.5	0.5	
Dixie Cr SF	35%	1.0	1.5	1.5	1.0	1	40%	2.0	2.0	1.5	1.5	0.5	
Burnt-3	20%	0.0	0.0	1.0	1.0	1	25%	0.0	0.0	1.5	2.0	0.5	
Burnt-3 Sisely and Jor	25%	1.0	2.0	0.5	1.5	1	35%	1.5	2.0	0.5	1.5	0.5	
Burnt-4	20%	0.0	0.0	1.0	1.0	1	25%	0.0	0.0	1.5	2.0	0.5	
Burnt-5	20%	0.0	0.0	1.0	1.0	1	25%	0.0	0.0	1.5	2.0	0.5	
Manning	25%	1.5	0.5	1.5	0.5	1	30%	2.0	2.0	1.5	1.5	0.5	
Pritchard/Lawrence Cr	35%	2.0	1.0	1.5	1.0	1	40%	2.0	2.0	1.5	1.5	0.5	
Durkee Cr	15%	0.5	0.0	1.0	0.5	1	20%	1.0	0.5	1.5	1.0	0.5	
Alder Cr-1	25%	1.0	0.5	1.0	1.0	1	30%	2.0	1.5	1.0	1.5	0.5	
Alder Cr-2	30%	1.0	0.5	1.0	1.0	1	35%	2.0	1.5	0.5	1.5	0.5	
Burnt-6	20%	0.0	0.0	1.0	1.0	1	20%	0.0	0.0	1.5	2.0	0.5	
Clarks Cr	20%	0.5	1.0	1.0	1.0	1	30%	2.0	2.0	1.5	1.5	0.5	
Burnt-7	20%	0.0	0.0	1.0	1.0	1	20%	0.0	0.0	1.5	2.0	0.5	
Auburn Cr	10%	0.5	0.1	0.5	0.5	1	20%	1.0	0.5	1.0	1.0	0.5	
Big Cr-1	25%	1.0	0.5	0.5	1.0	1	35%	1.5	1.0	1.0	1.0	0.5	
Camp Cr-1 (Burnt)	15%	0.0	0.0	0.5	0.5	1	25%	1.0	1.0	1.0	1.5	0.5	
Camp Cr-2 (Burnt) and	20%	0.0	0.0	0.5	0.5	1	25%	1.0	1.0	1.0	1.5	0.5	
Camp Cr EF (Burnt) ab	15%	0.5	0.5	0.5	0.5	1	20%	1.5	1.5	1.5	1.5	0.5	
Camp Cr WF (Burnt)	30%	1.5	1.0	1.0	1.0	1	35%	2.0	1.5	1.5	1.5	0.5	
NF and SF Camp	30%	1.5	1.0	1.0	1.0	1	35%	2.0	1.5	1.5	1.5	0.5	
Burnt-8	10%	0.5	0.0	0.5	0.0	1.5	25%	2.0	1.0	1.5	1.5	0.5	
Job Cr	10%	0.2	0.2	0.2	0.2	1	10%	0.1	0.1	0.1	0.1	0.5	
Burnt SF-1	20%	1.5	1.5	1.0	1.5	1.5	25%	2.0	2.0	2.0	1.5	0.5	
Burnt SF-2	20%	1.5	1.5	1.0	1.5	1.5	25%	2.0	2.0	2.0	1.5	0.5	
Burnt NF-1	5%	0.0	0.0	0.5	1.0	1	10%	0.5	0.5	1.0	1.5	0.5	
Burnt MF	10%	0.0	0.0	0.1	0.1	1	15%	0.2	0.1	0.5	0.5	0.5	
Burnt WF	10%	0.5	0.1	0.5	0.5	1	15%	0.5	0.1	0.5	0.5	0.5	
Burnt NF-2	25%	1.0	0.5	1.0	1.5	1	35%	1.5	1.0	1.0	1.5	0.5	
Trout & Camp Cr	25%	1.0	0.5	1.0	1.5	1	35%	1.5	1.0	1.0	1.5	0.5	
Burnt NF-3	10%	0.5	0.5	1.0	1.0	1	35%	1.0	1.5	1.5	1.0	0.5	
Burnt NF-4	35%	1.0	1.5	1.5	1.0	1	50%	2.0	1.5	1.5	1.0	0.5	

Table 31. Species habitat range for redband trout in the Burnt River subbasin.

NPC= Not present currently

Protection Habitat Ranking

NPR = Not present in reference condition

Restoration Habitat Ranking

Reach Name	Reach Rank	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions	Reach Rank	Riparian Condition	Channel form	Channel complexity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions
Burnt-1	24	8	4	4	10	3	9	1	7	11	2	6	28	5	2	2	6	1	8	9	9	9	4	7
Burnt 1-Durbin Creek	36	8	4	3	4	4	9	1	4	10	1	10	36	3	1	3	5	1	6	7	7	7	7	7
Burnt-2	24	8	4	4	10	3	9	1	7	11	2	6	28	5	2	2	6	1	8	9	9	9	4	7
Dixie Cr	30	8	3	6	10	5	9	1	7	11	2	3	9	4	2	1	6	5	7	10	10	8	3	9
Dixie Cr NF	15	6	4	7	7	5	9	1	3	11	2	10	7	4	2	1	6	5	8	10	10	7	3	9
Dixie Cr SF	6	4	2	5	9	7	10	1	8	6	3	11	11	7	6	2	3	4	5	10	10	8	1	9
Burnt-3	24	8	4	4	10	3	9	1	7	11	2	6	25	6	2	2	4	1	7	9	9	9	5	8
3 Sisely and Jordan Creeks	10	4	3	6	9	8	5	1	7	10	2	11	2	4	3	1	8	5	7	10	10	2	6	9
Burnt-4	24	8	4	4	10	3	9	1	7	11	2	6	25	6	2	2	4	1	7	9	9	9	5	8
Burnt-5	24	8	4	4	10	3	9	1	7	11	2	6	25	6	2	2	4	1	7	9	9	9	5	8
Manning	9	8	2	6	5	4	9	1	2	10	7	11	8	2	6	3	4	9	5	9	9	7	1	8
Pritchard/Lawrence Cr	5	8	2	5	7	4	9	1	3	10	6	11	5	2	6	3	4	9	5	9	9	7	1	8
Durkee Cr	20	7	3	5	5	2	9	1	4	11	8	10	17	3	8	4	5	8	2	8	8	6	1	7
Alder Cr-1	12	8	4	4	7	3	9	1	2	10	6	11	4	4	5	2	6	9	3	10	10	7	1	8
Alder Cr-2	12	8	4	4	7	3	9	1	2	10	6	11	6	4	5	3	6	9	2	10	10	7	1	8
Burnt-6	21	7	5	3	8	4	9	1	10	11	2	6	32	5	2	7	6	1	3	8	8	8	4	8
Clarks Cr	16	8	6	6	10	5	9	1	3	4	2	11	1	1	4	2	3	5	6	10	10	8	7	9
Burnt-7	23	6	3	5	9	4	8	1	7	11	2	10	21	8	7	5	4	1	6	9	9	9	3	2
Auburn Cr	29	6	7	5	8	4	9	1	3	10	2	11	13	7	1	3	2	4	6	10	10	8	5	9
Big Cr-1	14	5	6	3	9	8	7	1	4	10	2	11	12	5	1	7	3	4	8	10	10	6	2	9
Camp Cr-1 (Burnt)	34	10	4	5	7	3	6	1	7	11	1	7	18	2	4	1	3	5	7	9	9	8	9	6
Cr-2 (Burnt) and EF to Milk	33	10	4	6	8	3	7	1	8	11	1	5	19	2	4	1	3	5	6	8	8	7	8	8
p Cr EF (Burnt) above Milk	17	4	8	3	9	7	5	1	6	10	1	11	14	5	1	4	2	3	7	9	9	6	9	8
Camp Cr WF (Burnt)	3	6	3	3	7	5	9	1	8	10	1	11	22	1	5	5	2	7	3	9	9	4	9	8
NF and SF Camp	7	7	4	4	8	6	9	1	3	10	1	11	10	1	4	4	2	6	3	9	9	7	9	8
Burnt-8	22	7	5	8	3	5	9	1	4	10	1	11	20	8	5	2	7	6	1	9	9	3	9	4
Job Cr	32	4	3	5	7	6	9	1	8	10	1	11	35	6	5	2	8	7	1	9	9	3	9	4
Burnt SF-1	2	4	3	5	7	6	8	1	9	10	1	11	23	4	3	1	5	6	2	8	8	7	8	8
Burnt SF-2	1	4	3	5	7	6	8	1	9	10	1	11	23	4	3	1	5	6	2	8	8	7	8	8
Burnt NF-1	31	8	5	7	10	3	6	1	9	11	1	4	30	4	3	2	1	7	5	8	8	6	8	8
Burnt MF	35	6	4	4	7	3	8	1	9	11	1	10	34	8	6	6	4	2	3	9	9	5	9	1
Burnt WF	19	8	3	3	7	5	9	1	6	10	1	11	33	4	7	7	3	1	2	9	9	5	9	6
Burnt NF-2	8	6	4	4	7	3	9	1	8	10	1	11	31	8	5	5	2	7	1	9	9	4	9	3
Trout & Camp Cr	11	7	5	3	9	4	8	1	6	10	1	11	16	4	2	6	1	3	5	9	9	8	9	7
Burnt NF-3	18	5	4	7	10	8	6	1	3	9	1	11	3	5	2	1	3	4	6	9	9	7	9	8
Burnt NF-4	4	5	3	3	9	6	7	1	8	10	1	11	15	4	2	2	1	6	7	8	8	5	8	8

Table 32. Protection and restoration ranking for stream reaches in the Burnt River subbasin.