Integrating Management for Forest Health and Cavity-Nesting Bird Conservation in Ponderosa Pine Forests

USDA Natural Resources Conservation Service
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Final Report
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David Pashley, Project Director, Vice-President, American Bird Conservancy
Bob Altman, Northern Pacific Conservation Officer, American Bird Conservancy
Daniel Casey, Northern Rockies Conservation Officer, American Bird Conservancy

Period of Performance Nov. 2010 – Nov. 2012

Deliverables:

- Provide private landowners information about balancing and integrating the habitat needs of cavity-nesting birds with ponderosa pine management for forest health by conducting 3 demonstration days to be held in Idaho, Montana, and Washington.
- Develop and distribute technical notes, landowner handbooks and brochures that will be used as outreach tools and educational materials.
- Conduct NRCS mini workshops at each State office in Idaho, Montana, Oregon and Washington.
- Design and complete on-the-ground management at 6 private landowner sites that will enhance approximately 10,000 acres of ponderosa pine forest.
- Produce and distribute a new technology and innovative approach fact sheet.
- Attend at least one NRCS CIG showcase or comparable NRCS event during the period of the agreement.

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Executive Summary

American Bird Conservancy and our partners implemented several innovative habitat management and outreach activities for the conservation of four high priority cavity-nesting birds on private lands in ponderosa pine forests of Idaho, Montana, Oregon, and Washington. Our project showcased the value of incorporating specific habitat management activities for bird conservation within the context of private landowner and Natural Resources Conservation Service (NRCS) priorities of economic and forest health goals. We also conducted extensive educational activities and developed several outreach materials to provide the NRCS with techniques that are easily adopted and transferable to private landowners interested in conservation of cavity-nesting birds, and that are compatible with existing conservation practices (e.g. Forest Stand Improvement -666; Upland Wildlife Habitat Improvement - 645) implemented under NRCS programs (e.g. EQIP).

Working with partner foresters, we implemented forest enhancement activities on 10 properties totaling 12,245 acres in four northwestern states (Idaho, Montana, Oregon and Washington). As part of this enhancement work, we created 86 snags using several techniques, and deployed 45 nest boxes for use by Lewis's Woodpeckers (and/or other species), across 312 acres treated with mosaic thinning. We estimated the landscape-level effect of these actions for cavity-nesting birds to be >10,000 acres including adjacent properties with suitable managed habitat.

We developed and printed 8,000 copies of a 32-page "*Land Managers' Guide to Cavity-Nesting Bird Populations in Ponderosa Pine Forests of the Pacific Northwest*" and 10,000 copies of "*Snags, Bark Beetles, and Cavity-Nesting Birds: Conservation and Management of Ponderosa Pine Forests of the Pacific Northwest."* We distributed these broadly including our field demonstration days, NRCS and other federal and state offices, and at several conferences/meetings. We conducted two field demonstration days on private lands where project work occurred (Washington and Montana). We conducted two webinars at state NRCS offices in Portland, OR and in Bozeman, MT (broadcast to all NRCS offices in those regions). We also prepared a 26-page NRCS Technical Note, a one-page Fact Sheet, and following our Montana webinar, we worked with the state NRCS office to develop a snag-creation cost element for their cost-share toolbox.

We were able to meet these objectives while staying below our original budget for contracted labor, as additional thinning was not required on the Montana properties. Some of the money saved was used to increase the printing of our outreach materials. Over $12,000 was saved from the original budget.

We expect the tools, partnerships, and on-the-ground successes delivered through this project to serve the needs of NRCS and other partner-funded private lands programs, private landowners, and large-scale corporate timberlands and public lands implementing sustainable forestry methods, and to benefit thousands of acres of ponderosa pine forest in the Pacific Northwest. We recommend that any entity embarking on thinning and restoration work in ponderosa pine forests use the information presented in our printed materials to conduct mosaic thinning where feasible, combined with snag retention and creation, to help meet the needs of declining and priority cavity-nesting birds. More specifically, we recommend that NRCS provide cost-share incentives for these specific conservation elements throughout the range of ponderosa pine forest, following a specific snag creation cost-share formula described herein and implemented by NRCS in Montana.

Introduction

American Bird Conservancy (ABC) and our partners used this Conservation Innovation Grant to implement and support conservation for declining cavity-nesting birds in ponderosa pine focal areas in Idaho, Montana, Oregon and Washington, from November 2010 through November 2012. We used a combination of thinning, snag creation and nest box deployment on targeted properties, and developed outreach materials that can be used to instigate and support similar work throughout the region. We combined demonstration days, webinars and distribution of the printed outreach materials, as well as the development of a Technical Note for Natural Resources Conservation Service (NRCS) staff to inform the agency and all of its potential partners of the need and opportunity for cavity-nester conservation in the context of meeting other forest resource objectives.

The goal of this project was to implement innovative habitat management activities for bird conservation within the context of standard management practices for forest health (e.g. NRCS Conservation Practices #324 and 666). Concurrently, we wanted to provide outreach and educational activities to broadcast our concept to a regional audience, using focused efforts for targeted landowners within priority landscapes to showcase the concepts. The project was designed to enhance both bird conservation and the participation in and delivery of NRCS programs to support ecological and economic goals in ponderosa pine habitats on private lands in Oregon, Washington, Idaho, and Montana. Specifically, the primary objectives and strategies were to:

- Design and complete on-the-ground management at six private landowner sites that will enhance approximately 10,000 acres of ponderosa pine forest to support cavity-nesting bird conservation within the context of forest health management through:
  1. The use of contracted foresters to implement site-specific habitat management (e.g., variable density thinning for fuels reduction and structure restoration, invasive species removal, snag management), and
  2. Habitat augmentation using nest boxes for Lewis's Woodpecker at four additional sites.

- Provide private landowners information about balancing and integrating the habitat needs cavity-nesting birds with ponderosa pine management for forest health. We estimated our target audience to be approximately 2,500 people owning approximately 500,000 acres, based on our past outreach experiences and on the land base in our ponderosa pine focal areas.

- Develop and distribute of three outreach and education products (~2,000 people):
  1. NRCS Technical Note to support NRCS staff in landowner guidance,
  2. Landowner Handbook for in-depth information and landowner reference, and
  3. Brochure on the interrelationships between snag management, bark beetles, and cavity-nesting bird conservation.

- Conduct demonstration days in the field, and NRCS mini-workshops at each State office to facilitate transfer of all the aforementioned information.

ABC is known in the conservation community for its collaborative approach to conservation and developing partnership networks that are most effective to the conservation issues that are being

addressed. ABC staff in the Pacific Northwest has extensive experience and leadership in bringing together the appropriate partners and providing critical technical expertise to the design and implementation of projects that maximize the regional effectiveness of local actions. The project leaders on this effort included:

Bob Altman, ABC: Bob has been providing leadership and project management on numerous bird and habitat conservation activities in the Pacific Northwest for the last 25 years. He emphasizes regional efforts that engage diverse partnerships across political and jurisdictional borders. He was Project Manager on the private lands ponderosa pine cavity-nesting bird project in Oregon, Washington, and Idaho described earlier.

Daniel Casey, ABC: Dan supports multiple conservation efforts in the Northern Rockies and throughout the Intermountain West. He was Project Manager for a grant from the National Forest Foundation to identify ponderosa pine stands in Montana and Idaho that met the needs of Flammulated Owls and Lewis's Woodpeckers, and to instigate appropriate measures to protect and enhance those stands.

Darin Stringer, Pacific Stewardship: Darin is the Director of Pacific Stewardship with more than 15 years experience working with private landowners developing innovative approaches to restoring ponderosa pine forests in the Pacific Northwest. FRP specializes in restorative silviculture, low impact thinning systems, and wildlife habitat creation. They are currently working on several projects in central Oregon on 2,500 acres of private land developing forest stewardship plans and implementing restorative forestry and small diameter wood marketing.

Craig Thomas, Cky-Ber Enterprises: Craig has worked on all aspects of field forestry across the nation for four decades, based out of Stevensville, MT. One specialty is forest restoration, focused on ponderosa pine systems. He has been working collaboratively with ABC to identify private lands suitable for restoration work, and to bridge the gap between the logging industry, landowners and the conservation community.

As with any project of this size and scope, the existing working relationships that ABC had with our partners greatly facilitated our ability to meet project objectives. We had collaborated with Pacific Stewardship and with Cky-Ber Enterprises on previous forestry-related projects, and each of these partners had an existing network of landowners for whom they had worked in the past. These relationships allowed us to be strategic in targeting parcels for enhancement, and created efficiencies in setting up subcontracts, and putting together our demonstration days and mini-workshops.

ABC used the $83,000 grant from NRCS to stimulate matching funding from several sources. First, we received a $70,000 grant from the Sustainable Forestry Institute, an independent, non-profit organization responsible for maintaining, overseeing and improving a sustainable forestry certification program. This partnership greatly expands our potential effect over a large landscape, and just as importantly, if NRCS adopts cost-share snag creation recommendations (see below) there is great potential for landscape collaborations between NRCS private land projects adjacent to industrial forest lands. Secondly, we received a $10,000 grant from Biophilia Foundation and a $10,000 grant from a private ABC donor.

Background

Ponderosa pine forests on private non-industrial lands face increasing threats to the sustained production of desirable ecological and economic services such as watershed function, wildlife habitat, carbon sequestration, and wood products. These threats stem from a variety of factors including many years of fire suppression that has altered the natural fire cycle and replaced historic open pine forests with dense stands of Douglas-fir and ponderosa pine, reducing growth rates and making them more susceptible to insects, disease, and crown fires. Additionally, years of unsustainable forest practices of high-grading timber harvest has reduced the presence of mature trees and altered the balance of forest age classes towards younger forests, reducing their ability to store carbon.

Concurrent with the altered ecology and loss of resiliency and function of ponderosa pine forests, there has been degradation and loss of suitable habitat for birds associated with those forests. In particular, several cavity-nesting birds highly associated with large, old pine trees and snags have experienced significantly declining populations and/or local extirpations. These species, including Flammulated Owl, Lewis's Woodpecker, Williamson's Sapsucker, and White-headed Woodpecker, have been identified as priorities for conservation by most natural resource agencies and conservation organizations. Additionally, as primary excavators, the woodpeckers are considered ecological keystone species by providing habitat for many other species, and by contributing to the control of damaging insect populations (e.g., budworm, tussock moth).

There are more than 19 million acres of ponderosa pine forest in the four states of the Pacific Northwest (ID, MT, OR, WA). More than 40% is on private lands, mostly lower elevation more productive sites, often adjacent to large expanses of public land. ABC has identified focal areas from among these nearly 8 million acres that offer the best opportunity to implement landscape level conservation, by identifying large contiguous blocks, restoration potential and other factors. Forests along the private/public interface are increasingly being managed to reduce fire risk. Significant recent funding and management actions have been implemented under NRCS cost-share programs, and by other partnerships on both public and private lands, focused on restoring ponderosa pine forest habitats towards historic conditions and improving their resiliency to fire. However, almost none of these efforts have been designed or implemented with guidelines or actions for snag management (i.e., snag retention or snag creation).

Snags were an important component of the historic conditions in ponderosa pine forests; however, our experiences with private landowners on previous projects indicate that snag removal during management operations is the status quo. Hence, snag levels have declined on private lands and the availability of dead or dying trees for cavity-nesting birds in ponderosa pine forests continues to be a broad-scale deficiency even where restoration is occurring. Furthermore, snag retention or creation is completely compatible ecologically with the thinning and fuels reduction activities of ponderosa pine management for forest health. It also is compatible with economic goals of the landowner because few trees are taken out of the potential timber harvest, and we work with the landowner to select deformed trees for snag creation that have limited economic value. To this end, ABC has taken leadership in the development of a program to support cavity-nesting bird conservation in ponderosa pine forests, including:

- ABC and partners in Montana used a $42,000 grant from the National Forest Foundation to work with 19 private landowners (> 4,000 acres), restoration loggers, and a local land trust for management and restoration of mature ponderosa pine habitats in the Bitterroot Valley. The project included an outreach brochure that has been used by partners to continue building interest in management activities in ponderosa pine forests and landowner participation in monitoring.
- ABC in cooperation with Forest Restoration Partnership and American Forest Foundation completed work on a $138,000 grant from the Wildlife Conservation Society to support conservation of cavity-nesting birds on private family forest lands in Oregon, Washington, and Idaho. The project included habitat management on six private lands with over 17,000 acres, a demonstration field day attended by 25 landowners, and the production of a 20-page color booklet "Landowners Stories in Bird Conservation: Managing for Cavity-Nesting Birds in Ponderosa Pine Forests" (www.abcbirds.org/newsandreports/ppine_landowner.pdf) that showcased the landowner participants in the project.

Additionally, our primary partner in this project, Pacific Stewardship, working with private landowners and the Deschutes Land Trust in central Oregon, had previously generated approximately $100,000 in grants for ponderosa pine restoration work on 2,500 acres with $500,000 in logging revenues from the restoration work. This included development of innovative thinning prescriptions to achieve a naturalized spacing of ponderosa pine trees (mosaic thinning) that was used in this project and innovative experiments with bark beetle pheromone packets for snag creation.

We had a unique opportunity to combine technical assistance, innovative practices, and landowner outreach to enhance the capacity of the NRCS to deliver wildlife conservation goals on private forest lands that have received limited attention in current management. Additionally, the 2008 Farm Bill extended the reach of several programs to deliver conservation on non-industrial forests; thus, programs such as Healthy Forest Reserve, Environmental Quality Incentives, and Wildlife Habitat Incentives will benefit greatly from efforts to increase technical knowledge and producer participation.

Methods

Our innovative approach to this project was to a use variety of outreach methods/tools that targeted private landowners and technical assistance staff of NRCS and other agencies to broadcast the recognition and use of with the following concepts and activities:

1. The role of cavity-nesting birds in ponderosa pine ecology, and promotion of snag and habitat management for cavity-nesting birds within the context of forest health and restoration and economic goals.
2. Emerging techniques for snag creation, including placement, tree selection, and using bark beetle pheromone packets; and integration of snag management (retention and creation) within the context of standard forest health and restoration prescriptions.
3. Integration and use of variable-spaced thinning (i.e., mosaic thinning), a new and uncommonly practiced yet scientifically validated practice to mimic historic conditions and achieve biodiversity and fire hazard reduction goals.
4. The use of nest boxes for Lewis's Woodpecker as an interim tool for bird conservation.

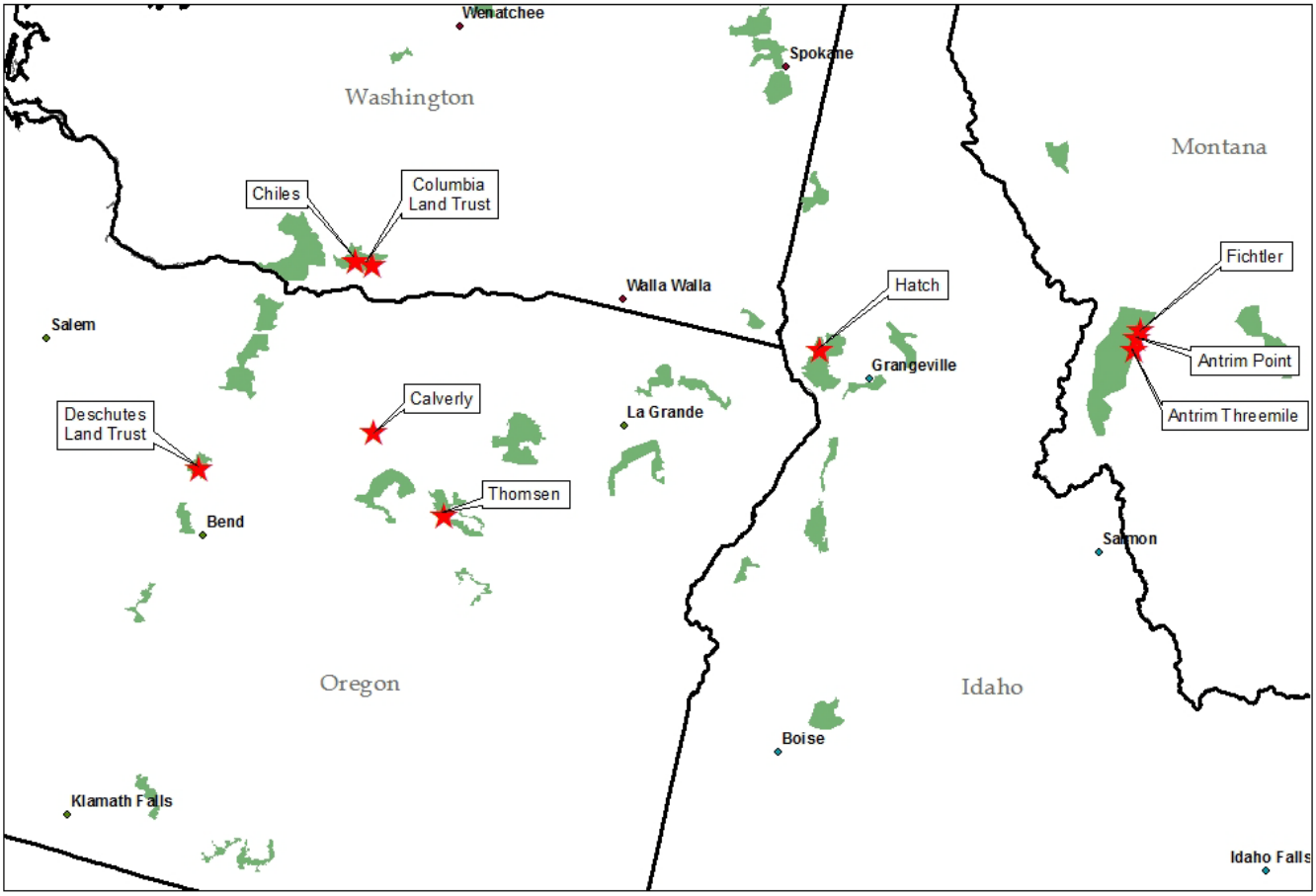
The culmination of these efforts was the development of several products for use by NRCS staff and others for a forest type (ponderosa pine) and ecological service (cavity-nesting bird conservation) where none currently exists.

Our past projects have shown that combining personal site visits, group demonstration days, workshops/seminars, and printed outreach materials allows us and our partners to reach the broadest possible audience. These activities were conducted according to the following schedule:

Objective	Strategy	Timeline
Habitat Management	Landowner Solicitation	Winter 2010-2011
	Landowner Site visits OR/WA	Spring-Summer 2011
	Landowner Site visits ID/MT	Spring-Summer 2012
	Management Plans	Spring-Summer 2011
	Habitat Management OR/WA	Spring-Summer 2011
	Habitat Management ID/MT	Summer 2012
	Nest Boxes	Spring 2011/Spring 2012
Education/Outreach	Demonstration Field Day, WA	Fall 2011
	Demonstration Field Day, MT	Summer 2012
	Technical Note	Fall 2012
	Landowners Guide	Fall 2012
	Snag Brochure	Winter 2011-2012
	NRCS Mini Workshop, OR/WA	April 2012
	NRCS Mini Workshop, MT/ID	August 2012

Though ponderosa pine forests can be found throughout the Pacific Northwest, ABC and our partners have concentrated efforts in a set of focal areas where the extent of this habitat and the potential for partnership-driven conservation is the greatest (Appendices). Eight of the 10 properties we conducted activities on during the performance of this project were in these focal areas (Figure below); the

Calverly property near Fossil, Oregon was near, but not in a focal area. We also deployed nest boxes on a property in southeastern Montana where we joined a field tour with NRCS staff to visit a landowner with 1,600 acres interested in managing her lands for cavity-nesting birds.



Location of nine sites where innovative conservation measures for cavity-nesting birds in ponderosa pine habitat were implemented by ABC and our partners, 2011-2012. Treatment sites are shown by red stars, and ponderosa pine focal areas are shown in green. We also worked with one landowner in eastern Montana, not shown.

Thinning in ponderosa pine forests has been widely applied in the Pacific Northwest and elsewhere across the range of the species, as a silvicultural method to increase productivity or to reduce fire risk. Such thinning, even when combined with brush removal, can be compatible with the needs of cavity-nesting birds. But all too often, dead and dying trees are removed, spacing is too uniform, and structural diversity (uneven-age patches) is lacking. The enhancements that we are initiating resolve some of these issues, adding value to managed stands through directed creation of the structural elements required by cavity-nesting birds. Thinning in mosaic patterns differs unsubstantially from traditional thinning both economically and silviculturally, and snag creation is a relative low-cost endeavor which has minimal effect on production if less vigorous trees are selected as snag recruits. Thus, the implementation of variable-spaced (mosaic) thinning and snag creation helps achieve landowner objectives for fire protection and sustainable harvest with minimal costs. In all of our treatment sites, the enhancements we implemented were fully compatible with the landowners' management objectives for the site.

Discussion of Quality Assurance

The project emphasized habitat management/augmentation, development of printed materials, and education and outreach rather than data collection. Thus, our quality assurance assessment is not about data, sampling, and analyses but one that emphasizes oversight and evaluation of implementation of the work performed. The project leaders have worked together on several previous projects and are well versed in the coordination and supervision required to implement these types of activities. Further, we have worked with the contracting foresters before and have developed confidence in their understanding of type and quality of work to be done, in addition to taking appropriate safety measures during all field work. Project leaders spent time with the contractors at the beginning of the work to provide guidance and oversight relative to the habitat prescriptions and then conducted post-management inspections. For several of the sites, work plans were developed with specific prescriptions for contracting foresters to conduct the work (Appendices).

The two primary project components outside of habitat management, development of printed materials and outreach events (demonstration days and webinars), had limited quality assurance needs, but did include professional editorial review of the brochures (G. Shire, American Bird Conservancy) and technical review of the Technical Note (N. Strong, Oregon State Extension, A. Egertson, Deschutes Land Trust).

Findings/Results

Results of the project are presented below relative to the deliverables in the contract.

Provide private landowners information about balancing and integrating the habitat needs of cavity-nesting birds with ponderosa pine management for forest health by conducting 3 demonstration days to be held in Idaho, Montana, and Washington.

Two demonstration days were conducted, one in Washington and one in Montana, which included visits to four of the 10 private landowner properties in this project. These were attended by landowners, foresters, agency personnel, local press, and the general public, and were well-received though lightly attended. We did not conduct a demonstration day in Idaho, because the one site we worked on there was too remote to draw a suitable audience.

The Washington demonstration day was on May 12, 2012 at two nearby properties, Matt Chiles Horseshoe Bend Ranch and the Columbia Land Trust's Bowman Creek property, both near Goldendale, Washington. Seven private individuals attended in addition to the site hosts, Matt Chiles and Lyndsey Cornelius of the Columbia Land Trust, and the project leaders Bob Altman of American Bird Conservancy and Darin Stringer of Pacific Stewardship. All the attendees have property in the general area and were interested in viewing and learning about the habitat management and restoration as part of this project.

At the Chiles property, we emphasized the thinning that was conducted on Matt's 3,000 acre property in early November, 2011 as part of this project. At the Bowman Creek property, we emphasized the habitat management that has been occurring by the land trust, and a snag inventory and snag creation which was conducted as part of this project in April, 2012.

The Washington demonstration field day provided a wealth of information to participants because it included two sites with very different primary management/restoration goals. The focus of the Chiles site was primarily on economic goals with wildlife and habitat values secondary, whereas the land trust site was focused on wildlife and habitat values only. Thinning and forest health were the emphasis of the discussion at the private lands site and snag management (creation and retention) were emphasized at the land trust site. Thus, participants were able to see how different objectives result in different management approaches and learn about the trade-offs and balancing among management goals. Matt Chiles also has received funding from other NRCS programs in the past which provided the opportunity for additional outreach and awareness of NRCS programs.

The attendance at the Washington demonstration day was less than anticipated. We attribute this primarily to its location somewhat distant from human population centers, but also because it was scheduled for a Saturday in early May when so many people are engaged in other outdoor activities.

The Montana demonstration day was on August 25, 2012 at two sites outside of Florence. Craig Thomas of Cky-Ber and one of the landowners (Katherine Fichtler) helped host the event, along with Dan Casey of ABC. Smoke from local fires and competing late summer weekend events limited attendance. Five other individuals attended including the editor of a local paper, Bitteroot Star, who

did a front page story about our work (Appendices) that emphasized the aspect of a logger and "environmentalist" working together for birds. That article spawned two calls from other landowners interested in snag creation/management. Both sites we visited had been thinned by Cky-Ber, and included created snags and nest box deployment. At the Antrim Point (Bull Run) site, we were able to discuss how the original treatment (which included commercial harvest) was meant to replicate historical spacing of mature pines, in part based on an old aerial photo of the site. The site adjoins a dense stand of younger pine and a low-density residential area, so it represented a good place to discuss fire safety concerns and compatibility with bird habitat needs. The inclusion of the landowner during our visit to the Fichtler site helped personalize the experience for the attendees. That site had been thinned using NRCS (EQIP) cost-share funds. The snags we created were mostly on the forest/grassland ecotone, as favored by Flammulated Owls. We were able to discuss the importance of landscape context with the attendees.

Develop and distribute technical notes, landowner handbooks, and brochures that will be used as outreach tools and educational products.

We completed two landowner brochures and an NRCS Technical Note. The two brochures are: *Snags, Bark Beetles, and Cavity-Nesting Birds: Conservation and Management in Ponderosa Pine Forests of the Pacific Northwest* and *Land Managers Guide to Cavity-Nesting Bird Habitat and Populations in Ponderosa Pine Forests of the Pacific Northwest.* Both brochures are important outreach tools that among other things describe a unique, innovative approach to snag creation (i.e., bark-beetle pheromone packets). These brochures are presented in an easy-to-read format with numerous photos of descriptions in the text. They complement a brochure created for a previous project, *Landowners Stories in Bird Conservation: Managing for Cavity-nesting Birds in Ponderosa Pine Forests,* and all three brochures will be used extensively in our future outreach to advance the goals of this project. All our outreach materials are available in electronic form as pdf files by request or on the ABC website (www.abcbirds.org/newsandreports/specialreports.htr).

We printed 10,000 copies of the *Snags, Bark Beetles* brochure and 8,000 copies of the *Land Managers Guide* brochure. We distributed the brochure to numerous outlets including many NRCS and State Department of Forestry and Department of Wildlife offices and staff, a Forest Restoration conference in Bend, Oregon attended by 200 people, several other regional natural resources meetings and conferences in all four states, and the Swan Ecosystem Center in Condon, MT where that group has a network of private landowners with an expressed interest in conservation work.

The Technical Note *Enhancing Habitat for Cavity-Nesting Birds in Dry Ponderosa Pine Forests of the Pacific Northwest* (Attachment) was developed to provide NRCS staff with specific information to use in landowner communications, but also for potential use in prescriptions for delivery of habitat conservation in ponderosa pine forests.

Conduct NRCS mini workshops at each State office in Idaho, Montana, Oregon and Washington.
Instead of mini-workshops at each State office where attendance would likely be limited to those working in that office, we worked with NRCS staff to greatly increase our audience participation by presenting two webinars that included attendees from that office and others able to participate remotely via open lines to other NRCS offices. One webinar was conducted at the NRCS regional office in Portland, Oregon on April 19, 2012 which covered Oregon and Washington NRCS offices. This was

part of their Lunch and Learn series (Appendices). Thirteen individuals attended the webinar in person and another nine individuals were listening to the on-line version, including NRCS staff from both Washington and Oregon, as well as our primary NRCS contact in Montana. We presented our second webinar in Bozeman, Montana on Aug. 27, 2012, inviting Idaho state office personal to attend as well. Three people attended in person, and another five were on the phone. The purpose of the webinars was to increase NRCS staff awareness of our outreach materials/tools, and to summarize the principles and implementation methods we used at project sites

The Portland webinar included NRCS forestry staff and elicited noteworthy discussion on various forest practices and real-world applications and challenges. The immediate payoff of the Montana webinar was that Pete Husby of Montana NRCS called later in the week to investigate the specifications for adding snag creation as a cost-share practice in the NRCS toolbox. We followed up by providing him with cost estimates (per snag created), and this has become the following specific cost-share practice (highlighted in yellow):

645 UPLAND WILDLIFE HABITAT MANAGEMENT
ID UNITS: Acres or Linear Feet or Each
Components:
1. Wildlife Structures of Low Intensity with Low Complexity, installation of wildlife structures to include habitat boxes (See Biology Technical Note, MT-31), perch poles (http://tommy51d.tripod.com/perch.html), down logs (See Specification MT 645, page 20), and built brush piles (See Biology Tech Note, MT-27, page 8) = $31.77 per acre.

NOTE: Intensity is the number of structures to be installed per acre. For this scenario the intensity is <0.5 structure per acre. Complexity is defined by the combination of skill level, equipment needed, and ease of accessibility for creating and installing these structures.
Example: A landowner has a 20 acre forest property which has been thinned under Forest Stand Improvement (Code 666) to improve forest health and to reduce the fuel load. The remaining mixed conifers are all small diameter; none are suitable for snag creation. Snags and a lack of understory ground cover for wildlife are limiting. The Wildlife Structures of Low Intensity with Low Complexity scenario requires < 5 structures per acre. It is determined (after talking with the NRCS Area Biologist) that 6 nest boxes (for cavity-nesting species) and 3 brush piles will suffice to bring the WHAG score up to Quality Criteria. The cost list provides $31.77 per acre X 20 acres = $635.40 for this practice to cover materials and labor.
2. Fence Markers, made from vinyl undersill material = $.11 per linear foot.

NOTE: Component 2 is specific to Sage Grouse. Cost-share is based on the length of fence not the length of total number of wires.
3. Escape Ramp, installed in watering facilities to avoid wildlife drowning = $84.96 each.
4. Snag Creation-Tree Topping or Tree Girdling, snags are created by cutting off approximately the upper third of a large diameter Ponderosa Pine, Western Larch, or Douglas Fir with a chain saw, providing three large diameter snags per acre throughout the unit (See Specification MT645, pages 20 and 21) = $229.86 per acre.

To further outreach to opportunities in Idaho, we gave a presentation at the Foresters Forum of the Idaho Sustainable Forestry Initiative Committee meeting on February 7, 2013, in Cour delene. We distributed our brochures at the general session, attended by >200 people. The presentation at the SFI committee meeting was attended by 20 people, primarily from commercial forestry interests.

Design and complete on-the-ground management at 6 private landowner sites that will enhance approximately 10,000 acres of ponderosa pine forest.

We worked on the following 10 properties:

Property	Total Acres	Total Pine acres	Acres Managed	Snags Created	Nest Boxes	Landscape acres affected*	Comments
Deschutes Land Trust, Sisters, OR	1,240	1,240	55	36	0	2,500	Completely surrounded by FS managed for ppine restoration
Thomsen, John Day, OR	4,200	2,000	20	3	3	1,500	Surrounded on two sides by FS
Calverly, Fossil, OR	240	200	25	2	4	450	Adjacent on one side by FS
Chiles, Goldendale, WA	3,000	1,500	12	1	3	2,000	One adjacent neighbor with managed ppine
Columbia Land Trust, Goldendale WA	340	180	0	6	6	360	Snag Inventory
Antrim (Point), Florence, MT	120	120	80	11	8	320	Snag inventory
Antrim (Three-Mile), Florence, MT	125	60	40	10	7	3,000	Snag Inventory; Adjacent to extensive landscape of managed ppine
Fichtler, Florence MT	280	80	40	12	4	80	EQIP; same landscape as Antrim (above)
Hatch, Lewiston, ID	1,100	200	0	5	4	200	EQIP
Howard, Miles City, MT	1,600	600	40	0	6	200	EQIP
TOTALS	12,245	6,180	312	86	45	10,610	

*Landscape acres affected includes the ponderosa pine habitat on the property plus any adjacent properties with ponderosa pine in habitat conditions suitable for our target bird species that would be positively affected by our management on the property in terms of woodpecker territories and home range.

Sisters, Oregon

The Metolius Preserve is a 1,240 acre property, managed by the Deschutes Land Trust (DLT) and located near Sisters, Oregon where there are significant populations of several of our target cavity-nesting bird species on thousands of acres of National Forest land surrounding the property. Much of the property is in typical degraded ponderosa pine condition with overstocked and younger trees relative to the historic condition. The DLT has been initiating limited restoration as funding allows, but was eager to use this opportunity to meet their broader ecological goals and the more specific bird

conservation goals of this project. Further, they participated in bark-beetle pheromone packet trials several years ago in another project with ABC which successfully attracted nesting white-headed woodpeckers last year, so they were eager to continue this innovative technique to improve habitat conditions for cavity-nesting wildlife. As an additional bonus, we are collaborating with University of Oregon professor Matt Orr and his students, who did layout and design for a research study of openings with paired snags (one created by topping and one by bark-beetle pheromones) which the students will be monitoring for the next several years.

The summary of habitat work included thinning 55 acres, creating nine forest gaps (0.5-0.75 acres), topping 18 trees as created snags (nine in openings and nine in adjacent forest) and pheromone baiting 18 trees, and hand-thinning and piling of small diameter trees over eight acres. The 55 acres of thinning and the nine forest gaps were distributed throughout the property, so we anticipate the effect of the habitat creation to extend to approximately 2000-3000 acres (includes the property and adjacent forest land) to encompass the home ranges of multiple white-headed woodpeckers.

John Day, Oregon

Tom Thomsen's Lone Pine Ranch near John Day, Oregon includes 4,200 acres at the interface of the ponderosa pine and juniper forest zones. Among our target cavity-nesting bird species, there are known breeding White-headed Woodpeckers and migrant Lewis's Woodpeckers, and suspected breeding Flammulated Owls and Williamson's Sapsuckers. Much of the property is in typical degraded ponderosa pine condition with overstocked and younger trees relative to the historic condition. Tom has conducted significant forest management to improve the forest condition both independently and through NRCS and other programs. This includes previous work with Tom in ABCs Cavity-Nesting Bird Conservation in Ponderosa Pine Forests program which resulted in thinning of 15 acres and the creation of eight snags under a grant from the Wildlife Conservation Society with Doris Duke Foundation funds.

The summary of habitat work at the Thomsen property included thinning and hand-piling on approximately 20 acres and the creation of 3 snags (2 topped and 1 girdled high). The habitat improvements for priority cavity-nesting birds is within the context of a large ponderosa pine forest landscape which includes thousands of acres of National Forest land immediately adjacent to the north and east of our habitat improvements. Thus, we anticipate the effect of our efforts to potentially significantly enhance suitable habitat for our priority bird species. Three Lewis's Woodpeckers nest boxes were placed in the thinned area along with appropriate locations elsewhere on the property before the next breeding season.

Fossil, Oregon

Paul Calverly's property near Fossil, Oregon includes 240 acres of mostly historic ponderosa pine forest with some patches of mixed-conifer forest in ravines and wetter areas. The presence of our target species are unknown, but likely since their populations are known occur in the area. Adjacent property includes similar habitat types on private lands in varying conditions of suitability for our target bird species. Much of the forest on the Calverly property is in typical degraded ponderosa pine condition with overstocked and younger trees relative to the historic condition. Our work is the initial forest management on the property since his ownership 40 years ago, and is being done in concert with NRCS funded work that is occurring on 20 acres this fall through a NRCS Wildlife Habitat Incentives Program grant.

The summary of habitat work at the Calverly property included thinning and hand-piling on approximately 25 acres, and the creation of two snags that were girdled high. Four Lewis's Woodpeckers nest boxes were placed on the thinned area along with appropriate locations elsewhere on the property.

One of the immediate benefits of the work described above was the interest expressed by neighbors to have us conduct work on their property. This includes Tom Thomsen's neighbor to the west, Jim Daniels, and Matt Chiles neighbor to the south, George Rohrbacker. Both individuals have large acreages in similar conditions and would like to have us conduct similar types of bird habitat and forest health improvements on their lands.

Goldendale WA

Matt Chiles Horseshoe Bend Ranch near Goldendale, Washington includes 3,000 acres of which approximately half is ponderosa pine forest and the remainder mostly grassland and pine-oak forest. Among our target cavity-nesting bird species, there is a small population of nesting Lewis's Woodpeckers in the open pine and pine-oak forest. We anticipate an expansion of this population with the thinning work as part of this project.

A description of forest condition and proposed forest management is presented in the Work Plan (Appendix). The summary of habitat work at the Chiles property included thinning and hand-piling on approximately 12 acres and the creation of one snag. Several Lewis's Woodpeckers nest boxes were placed in the thinned area along with appropriate locations elsewhere on the property.

One of the unique aspects of the management at the Chiles property was the need to design the thinning for birds within the context of ongoing habitat management for western gray squirrel, a Washington State listed species. The Chiles property has a significant population of squirrels and they have been working with Washington Department of Fish and Wildlife on finalizing a forestry management plan to meet the landowner's economic goals with conservation goals for the squirrel. Prior to implementing our management we reviewed maps of squirrel nests and consulted with the regional biologist form WDFW to develop our prescription.

One of the immediate benefits of the work at the Chiles property was the interest expressed by his neighbor to the south, George Rohrbacker. George has a large property in a similar condition to Chiles, and would like to have us conduct similar types of bird habitat and forest health improvements on his land.

Florence, MT

Priscilla Antrim's Bull Run property (Antrim Point) includes 120 acres, approximately 100 acres of which were thinned commercially by Cky-Ber in 2003. A unique aspect of that variable-spacing thinning effort was that it was informed in part by an historic aerial photo showing historic spacing on the site (which formerly housed a USFS fire lookout). Cky-Ber also placed an emphasis on identifying and leaving large snags and potential recruitment trees during that 2003 entry. Yet, like many managed sites, our snag inventory within the thinned area revealed 43 snags of more than 12" dbh, including just 19 snags >21" in diameter. This is the lowest elevation site of our three Montana sites; though the status of Lewis's Woodpecker is unknown on the site, ponderosa pine and cottonwood gallery forests

along the nearby Bitterroot River support one of the highest density populations of the species in Montana. We created 11 ponderosa snags at this site on June 16; four through topping, three through high girdling, and one with a combination. Nest boxes were added to eight of these.

Florence, MT

Priscilla Antrim's Three-Mile property includes 120 acres, 40 of which were thinned in an open mosaic pattern by Cky-Ber in 2008. Our snag inventory on the property indicated a density of 1 snag >12" per acre, with just 18 snags of >21" dbh. One reason we selected this site is that it is part of one of the largest contiguous landscapes of managed ponderosa pine forests in the Bitterrroot Valley, as identified by our previous NFF-funded work there. Stretching from the Fichtler property to the north (see below), this immediate area includes more than 1,300 ac of Plum Creek Timber land, the 6,089-ac Threemile Wildlife Management Area managed by Montana Fish, Wildlife and Parks, and four large private ranches (Brown, Bolin, Creech and Lamberson) under conservation easements totaling >6,100 acres. More than 3,000 ac of forests on these parcels had been treated by Cky-Ber and other loggers in recent years, and our work at Antrim's both complements that work, and may stimulate more as we continue our targeted outreach efforts. The site also adjoins a recently-burned stand, and supports both Lewis's Woodpecker and Williamson's Sapsucker. Flammulated Owls are common at this elevation in the region but of unknown status on the site; we do expect them to utilize this site over time, and will survey the site for them in 2013. On June 2, we created 10 snags on the site, two through topping and eight through high girdling and variable limbing. We supplemented this effort by deploying 7 nest boxes; we expect that doing so will accelerate response by Lewis's Woodpeckers while created snags begin the process of decay.

Florence MT

Richard and Katherine Fichtler's 280-acre property is primarily mixed conifer, with ponderosa pine dominant on drier ridges and southwest aspects, known to be inhabited by Flammulated Owls. Cky-Ber has been thinning (40 ac) at the site over the past two years using EQIP and other funding sources. We created 8 ponderosa snags created through topping and/or high girdling, and an additional 4 trees were clipped at ~20ft (including two Douglas-firs) during logging operations. We deployed 4 nest boxes on the Fichtler property, all of them along the forest/grassland ecotone.

Winchester, ID

Hunt Hatch owns several large forest parcels between Kamiah and Lewiston, Idaho. We had created five snags on one of his properties near Winchester in 2008 as part of our previous work funded by the Wildlife Conservation Society. We revisited this 1,100-ac property, primarily mixed conifer with older ponderosa stands on drier sites, in May 2012, and verified that cavities had been excavated in two of the five snags. One that did not yet have cavities had a pair of Lewis's Woodpeckers on it during our visit. We deployed a nest box there, and on three other of the created snags during our May visit. We also discussed whether he was interested in additional thinning, and whether any neighbors might be interested in similar work, but were unable to generate additional interest at this time. We will revisit the sites in 2013 to reassess usage and investigate further opportunities in north-central Idaho.

Miles City, MT

Although our efforts have been focused to date on that portion of Montana west of the Continental Divide, and opportunity arose through our contacts with NRCS to visit and tour a large ranch south of Miles City with several NRCS staff and Ella Mae Howard, the landowner, in April 2011. The ranch is a

mixture of grassland, sagebrush and dry forest types, with large expanses of mature ponderosa pine. We were able to distribute outreach brochures to the NRCS staff there, and provided six nest boxes for Ella Mae to put out. The site is potential Lewis's Woodpecker habitat, and also supports Red-headed Woodpecker, another declining cavity-nester not found in our Pacific Northwest project area.

NRCS staff participation at the sites included Lorraine Vogt at the Thomsen property, Damon Brosnan and Jeremy Maestas the Calverly property, Sergio Paredes at the Chiles property, and Pete Husby, Jenney Woodward, Carol Hilliard, and Corey Swenson at the Howard property in eastern Montana.

Produce and distribute a new technology and innovative approach fact sheet. The Fact Sheet is included as an Attachment to this report.

Attend at least one NRCS CIG showcase or comparable NRCS event during the period of the agreement. We attended at the National CIG showcase event at the Soil and Water Conservation Society meeting in Washington DC, July 17-21, 2011. This allowed for effective networking with other CIG grantees.

Conclusions and Recommendations

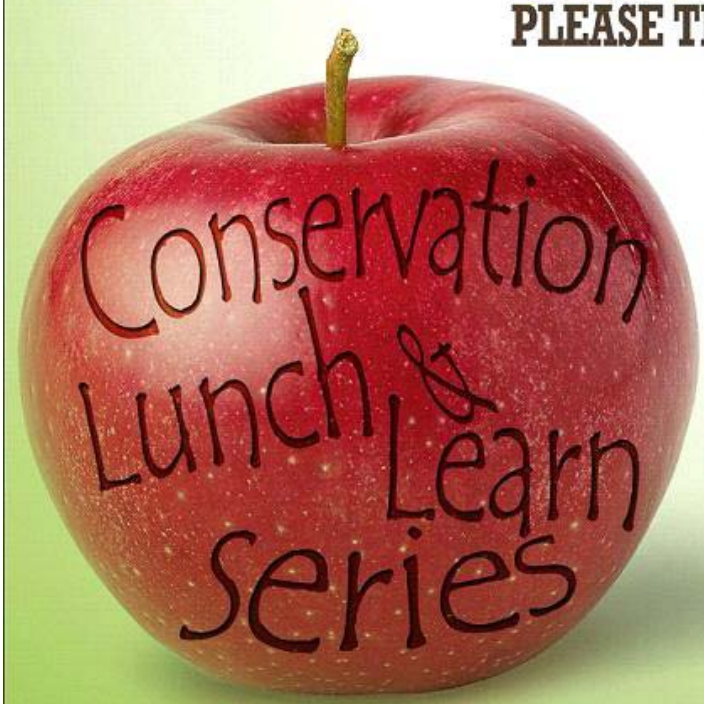
We successfully demonstrated habitat management activities, developed products, and conducted education and outreach activities for ponderosa pine forests and cavity-nesting birds that provide the information and the template for NRCS in the Pacific Northwest to transfer and expand into effectively working with private landowners in an ecologically important habitat type – ponderosa pine forests. Our efforts showcase the potential for extensive usage and effect of the habitat management techniques, and perhaps more importantly the tremendous potential benefits for a habitat type and a guild of wildlife that has not previously been the focus of the NRCS or its programs. Appropriate thinning and snag creation in ponderosa pine forests efforts in conjunction with outreach efforts are relatively cost effective and the techniques could easily be adopted into NRCS operations. In particular, we recommend the incorporation of snag creation as a cost-share practice in the NRCS toolbox according to the following specifications using the template developed and implemented by Montana NRCS and described above.

Reaching the (historic) density of snags requires active recruitment through retaining dead and dying trees of suitable size, and/or creating snags using the techniques we have described (topping, girdling, pheromones). If initial outreach suggests many landowners are economically hesitant about creating that many snags on larger parcels, even with cost-sharing on snag creation; we recommend consideration of an additional economic incentive for the higher snag densities to compensate landowners by cost-sharing the timber value of treated trees - e.g., 50% of the mill value of a 30-ft bole with a 12” diameter at the small end. This approach deserves investigation, perhaps through a survey of family forest owners. Finally, we believe that the active engagement of NRCS field personal with the technical guidance that can be provided by ABC and others is essential to maximizing opportunities to seamlessly incorporated meeting the needs of cavity-nesting birds within management activities for forest health and stewardship.

NRCS Natural Resources Conservation Service
OREGON

THOUGHT FOR FOOD

PLEASE THE MIND. PLEASE THE PALATE



SPEAKERS: **Bob Altman**
Dan Casey
Darin Stringer
American Bird Conservancy
Pacific Stewardship

TITLE: **Ponderosa Pine Restoration and Cavity-Nesting Birds**

DATE: **Thursday April 19th**

TIME: **Noon—1pm**

WHERE: **8th Floor Large Conference Room**

AMERICAN SIGN LANGUAGE (ASL) available upon request.

Got Questions? Contact Mike Merrill: michael.merrill@or.usda.gov
or Russ Hatz: russ.hatz@por.usda.gov

It's for the birds – creating snags for bird habitat

Posted on August 30, 2012 in Page One

Through the selective use of limbing, topping and girdling and by choosing the right tree in the right place, a snag can be created offering a smorgasbord of insects and a potential home to cavity nesting birds that can last up to 40 or 50 years. Michael Howell photo.

By Michael Howell

To the uneducated eye a snag is just an old, dead tree that's still standing. To the educated eye of Dan Casey from the American Bird Conservancy, however, a snag is crucial wildlife habitat. In the eyes of a Lewis' Woodpecker, or a Flammulated Owl, or other "cavity nesters," it looks like a good place to raise a family.

Dead and dying trees are, in fact, an essential component of natural forest ecosystems, providing valuable wildlife habitat and a means for important nutrients to cycle back into the forest. Snags provide essential habitat for approximately one quarter of all breeding birds in western coniferous forests. The dead trees are used by birds for foraging, cavity nesting, perching, food storage and drumming (pecking against the tree to communicate). In the dry forests of the Pacific Northwest dominated by ponderosa pine, there is renewed interest in the importance of snags as part of forest restoration efforts.

As part of this effort the American Bird Conservancy (ABC), a non-profit organization, the mission of which is to conserve native birds and their habitat throughout the Americas, is working with another non-profit, the Forest Restoration Partnership, across the Pacific Northwest designing and implementing cutting-edge habitat restoration projects on private lands. One of these demonstration projects, funded by a Conservation Innovation Grant from the Natural Resource Conservation Service, is located here in the Bitterroot Valley.

This demonstration site is located on 120 acres of wooded land northeast of Stevensville owned by Priscilla Antrim. The site was logged back in 2003 by Cky-Ber Enterprises, a local company owned and operated by Craig Thomas. It is an innovative company that employs state-of-the-art methods to harvest trees in an environmentally sensitive manner.

Thomas recognized a long time ago that much of the environmental damage done by logging could be mitigated at little or no cost to the property owner or the logging operation by practicing a little forethought and simply avoiding the kind of activity that creates the most damage.
“A lot of times it is just a matter of educating the guy on the ground with the saw and the one driving the skidder,” said Thomas.

Thomas plans out his logging activity with an eye toward leaving a natural looking landscape in the end. He calls it a “random mosaic.” If you look at areas like this one and others in the north valley logged by Thomas, they cannot be readily recognized as old logging sites. Open spaces are created, but clumps of thick growth are left sporadically, creating hiding places that animals can duck into for cover, as well as ribbons of forested area along some draws, which provide safe corridors for animals to travel. Now, working with Casey from ABC, Thomas has returned to some of his sites for a little snag creation.

Due to past fire management and logging practices, a lack of snags was created that led to the decline in population of several bird species associated with snags. As awareness of the importance of this element of the forest grew, loggers, especially on the national forests, began to leave snags. But these trees, usually isolated and standing in the open, were extremely susceptible to blow down, defeating the purpose for which they were left. Since then the “science” of creating good, long lasting snags has slowly developed.

There are a number of ways to create a good snag. They typically involve limbing, topping, girdling, and even using bugs to kill the tree by placing pheromone attractants on the tree. The aim is to create some snags that will be quickly available and others that will come to be snags over time. By picking the right tree and giving it the right treatment a snag may be produced that will last up to 40 years.

Another innovative part of the snag creation program is the placement of nesting boxes on some of the snags to provide immediate habitat for the cavity nesters such as the Lewis’s Woodpecker, Flammulated Owl and even the Mountain Bluebird. This gives the birds a temporary nesting place while the snag comes on line. Casey said that the addition of nesting boxes has proven helpful in the transition period on other sites throughout the Northwest.

Anyone interested in learning more about these practices may contact Dan Casey of the American Bird Conservancy at 406-756-2681 begin_of_the_skype_highlighting 406-756-2681 end_of_the_skype_highlighting or Craig Thomas at 363-8742.

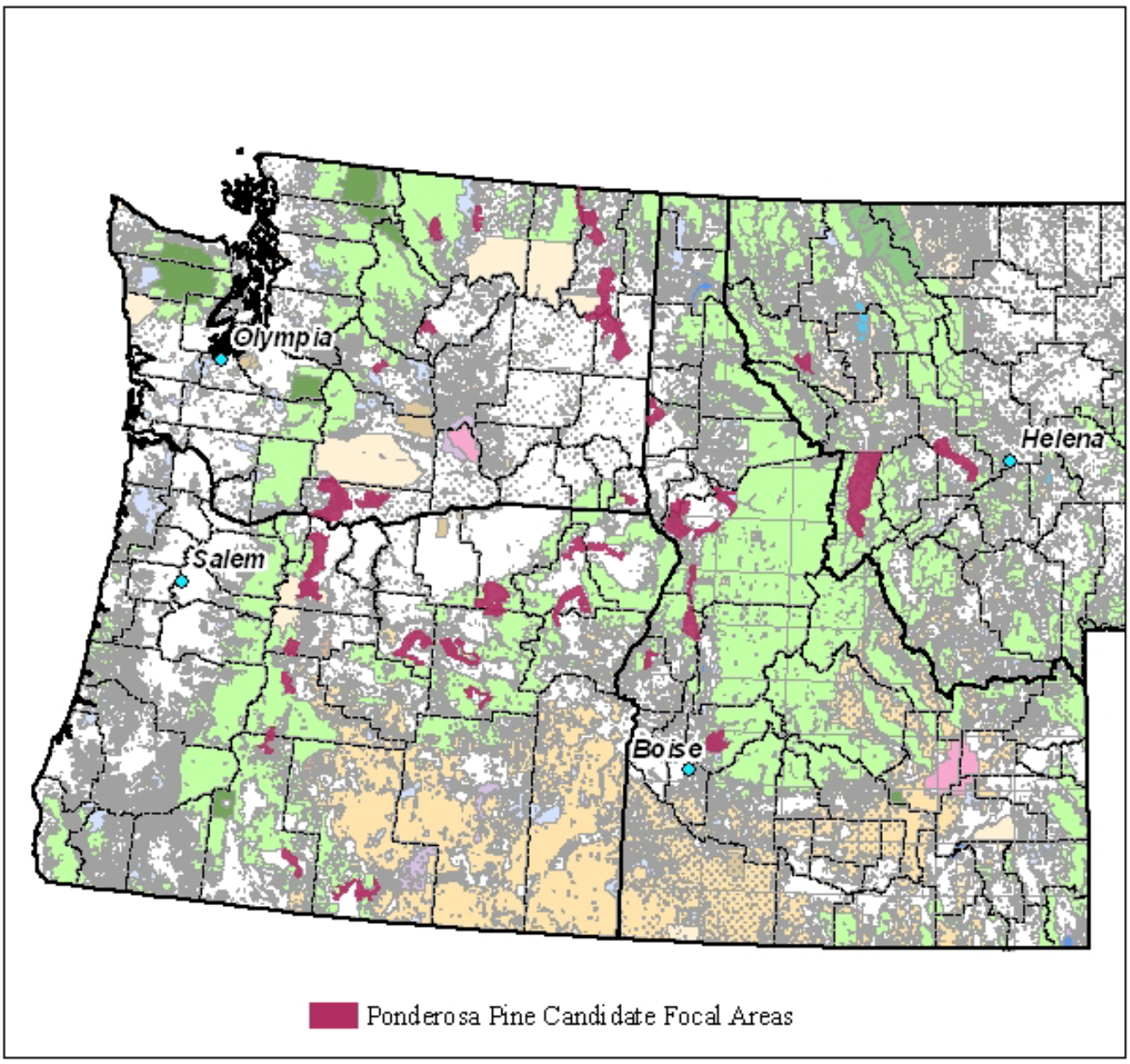

Olympia
Salem
Boise
Helena
Ponderosa Pine Candidate Focal Areas

Exhibit A Work Plan: Chiles

Prepared by Darin Stringer, Pacific Stewardship LLC. 11/1/2011

Project Area

This project will enhance approximately 8-10 acres of ponderosa pine and Oregon white oak woodland on Matt Chile's property near Goldendale, Washington (*see Figure 1 below*). The project area consists primarily of dense blackbark dominated ponderosa pine with scattered oak. Scattered Douglas-fir are found in portions of these stands. The project site is heavily overstocked which is stressing all crown classes of trees, and increasing risk of high intensity/severity fire and beetle outbreaks. There is a high degree of risk that a wildfire would be stand-replacing under normal to extreme summer weather patterns in these areas. High tree densities are severely reducing diameter increment, and opportunities for development of large diameter trees. This condition is a major limiting factor in achieving future desirable snag conditions (1-2 large diameter pines per acre in a variety of decay classes).

Objectives

The objectives of this project are as follows:

1- To release desirable ponderosa pine and oak from moisture competition and reduce high intensity/severity risk by removing suppressed and intermediate crown class pine and oak.

2- To maintain native understory dominance, increase bunchgrass cover and vigor, and prevent invasive annual grasses (20% increase in bunchgrass, forb and native shrub cover desired after five years, <5% increase in noxious weeds within 1-5 years after treatment).

3- To provide immediate nesting opportunities for Lewis's Woodpecker by providing the landowner with several nest boxes, and working with the landowner to identify appropriate locations for their installation.

Treatments

Conifer Thinning- Thinning will concentrate retained trees in clumps (2-10+ trees) and well spaced dominants and result in a variable or mosaic pattern of trees. Some dominants and clumps will be thinned to wider than average spacing to maximize growth. Healthy dominant and co-dominant ponderosa pine will be favored over other species. Conifers designated for removal will be hand felled, limbed, bucked and piled. Some boles maybe left scattered to reduce pine sizes. Plastic will be used to keep a 5X 5' portion of pile dry for wet season burning. Piles will be built in open areas wherever possible. Retained basal area will be 40-60 ft2/acre. Piles will be burned by the landowner. Oaks will be favored over pine in most cases. All snags >10" dbh and trees with cavities, including hollowed and deformed older oaks, regardless of vigor level will be retained. The timeline for treatments is shown below.

Native Grass Seeding- Burn piles will be seeded with native grass.

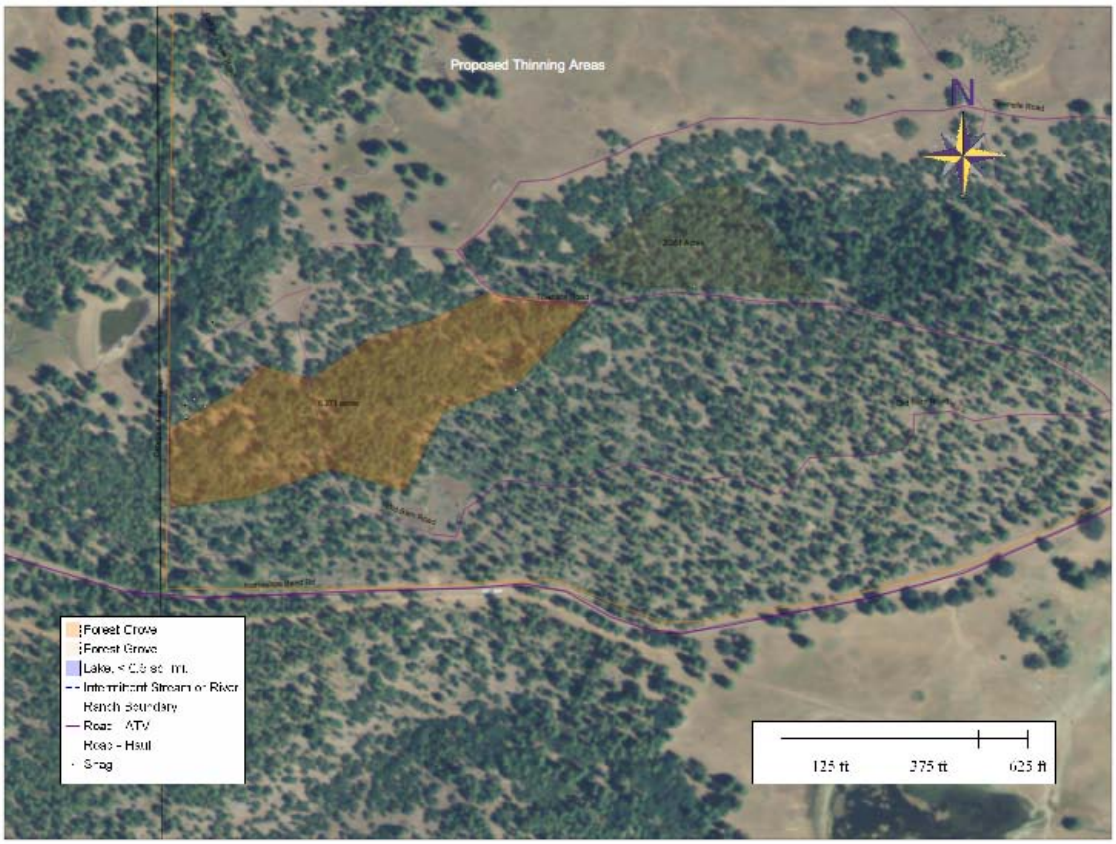
Snag Creation- One snag will be created (girdling high or topping) from a tree to be agreed upon by landowner and forester.

Timeline

Task	Timeline (Completed by)	Who
Tree Cutting and Piling	11-11-11	ABC/PS Contractor
Pile Burning	2012	Chiles
Seeding Burn Piles	2012 after burning	Chiles
Snag Creation: Topping or Girdling	TBD	ABC/PS Contractor

Budget

Pacific Stewardship is responsible for all costs associated with completing of tree cutting, piling and snag creation through funding provided by American Bird Conservancy. The landowner is responsible for pile burning and seeding.



The shaded area is where the habitat management occurred.

Exhibit A Work Plan: Calverly

Prepared by Darin Stringer, Pacific Stewardship LLC. 9/26/2011

Goal

The goal of this project is to improve ponderosa pine habitat for several cavity-nesting bird species including white-headed and Lewis's woodpeckers, Williamson's sapsucker, and flammulated owl.

Project Area

This project will enhance approximately 20-30 acres of ponderosa pine woodland by thinning understory conifers and creating snags on Paul Calverly's property near Fossil, Oregon. The project area consists of dense blackbark dominated ponderosa pine. The stand is heavily overstocked which is stressing the pine trees, and increasing risk of high intensity/severity fire and beetle outbreaks. There is a high degree of risk that a wildfire would be stand-replacing under normal to extreme summer weather patterns.

Large pine snags are currently deficient within the project area. Snag levels are inadequate to meet optimal habitat needs of many cavity-nesting bird species. The project area understory is high quality with few invasive weeds. There is concern that thinning operations could increase noxious weeds, particularly cheatgrass, which spreads primarily on disturbed soils.

Objectives

The objectives of this project are as follows:

1- To release desirable ponderosa pine from moisture competition with understory conifers and reduce high intensity/severity risk by removing suppressed pine and other conifers. Resulting structure will be clumps (2-10+ trees) and well spaced dominants.

2- To maintain native understory dominance, increase bunchgrass cover and vigor, and prevent invasive annual grasses (20% increase in bunchgrass, forb and native shrub cover desired after five years, <5% increase in cheatgrass within 1-5 years after treatment).

3- To increase snag density to 1-2 ponderosa snags per acre >15" dbh, with a mix of decay classes. This is a long-term (10-20 year) management target which will be achieved primarily by leaving naturally created snags over time, and increasing snag levels in the short-term by creating some snags in agreement with landowner.

4- To provide immediate nesting opportunities for Lewis's Woodpecker by providing the landowner with several nest boxes, and working with the landowner to identify appropriate locations for their installation.

Treatments

Conifer Thinning- Thinning will concentrate retained trees in clumps (2-10+ trees) and well spaced dominants. Ponderosa pine will be favored over other species. Conifers designated for removal will be hand felled, limbed, bucked and piled. Some boles maybe left scattered to reduce pine sizes. Plastic will be used to keep a 5X 5' portion of pile dry for wet season burning. Piles will be built in open areas wherever possible. Retained basal area will be 40-60 ft2/acre. Large healthy ponderosa pine will be retained. Piles will be burned by the landowner

Native Grass Seeding- Burn piles will be seeded with native grass.

Snag Creation- A number of ponderosa pine snags will be created by topping trees. All limbs will be removed below topped point. Limbs and tops from snag creation will be piled for burning. These trees will be identified and flagged for landowner approval.

Timeline

Task	Timeline (Completed by)	Who
Tree Cutting and Piling	10-31-11	ABC/PS Contractor
Pile Burning	2012	Calverly
Seeding Burn Piles	2012 after burning	Calverly
Snag Creation: Topping	10-31-11	ABC/PS Contractor

Budget

Pacific Stewardship is responsible for all costs associated with completing of tree cutting, piling and snag creation through funding provided by American Bird Conservancy. The landowner is responsible for pile burning and seeding.

Exhibit A Work Plan: Thomsen

Prepared by Darin Stringer, Pacific Stewardship LLC. 9/26/2011

Goal

The goal of this project is to improve ponderosa pine habitat for several cavity-nesting bird species including white-headed and Lewis's woodpeckers, Williamson's sapsucker, and flammulated owl.

Project Area

This project will enhance approximately 20 acres of ponderosa pine and Douglas-fir woodland by thinning understory conifers and creating snags on recently acquired lands added to the Lone Pine Ranch owned by Tom and Connie Thomsen, in Grant County, Oregon. The project area is a dense mixed-conifer stand dominated by ponderosa pine and white fir and includes many old growth trees. The stand is heavily overstocked which is stressing the pine trees, and increasing risk of high intensity/severity fire and beetle outbreaks. There is a high degree of risk that a wildfire would be stand-replacing under normal to extreme summer weather patterns.

Large pine snags are currently deficient within the project area. Snag levels are inadequate to meet optimal habitat needs of many cavity-nesting bird species. The project area understory is high quality with few invasive weeds. There is concern that thinning operations could increase noxious weeds, particularly cheatgrass, which spreads primarily on disturbed soils.

Objectives

The objectives of this project are as follows:

1- To release ponderosa pine from moisture competition with understory conifers and reduce high intensity/severity risk by removing understory fir up to 16" DBH. Ponderosa pine in dense clumps may also be thinned to a variable spacing. These actions will reduce fire risk and improve the vigor of the old growth

2- To maintain native understory dominance, increase bunchgrass cover and vigor, and prevent invasive annual grasses (20% increase in bunchgrass, forb and native shrub cover desired after five years, <5% increase in cheatgrass within 1-5 years after treatment).

3- To increase snag density to 1-2 ponderosa snags per acre >15" dbh, with a mix of decay classes. This is a long-term (10-20 year) management target which will be achieved primarily by leaving naturally created snags over time, and increasing snag levels in the short-term by creating some snags in agreement with landowner.

4- To provide immediate nesting opportunities for Lewis's Woodpecker by providing the landowner with several nest boxes, and working with the landowner to identify appropriate locations for their installation.

Treatments

Conifer Thinning- Conifers designated for removal will be hand felled, limbed, bucked and piled. Plastic will be used to keep a 5X 5' portion of pile dry for wet season burning. Piles will be built in open areas wherever possible. All fir under 8" DBH will be cut, and trees 9-16" DBH will be selectively marked and

cut based on several factors. All encroaching young juniper will be removed. Piles will be burned by the landowner.

Native Grass Seeding- Any tracks and burn piles will be seeded with native grass.

Snag Creation- Two-four ponderosa pine snags will be created by topping trees. All limbs will be removed below topped point. Limbs and tops from snag creation will be piled for burning. These trees will be identified and flagged for landowner approval.

Timeline

Task	Timeline (Completed by)	Who
Tree Cutting and Piling	10-31-11	ABC/PS Contractor
Pile Burning	2012	Thomsen
Seeding Burn Piles	2012 after burning	Thomsen
Snag Creation: Topping	10-31-11	ABC/PS Contractor

Budget

Pacific Stewardship is responsible for all costs associated with completing of tree cutting, piling and snag creation through funding provided by American Bird Conservancy. The landowner is responsible for pile burning and seeding.

Snags, Bark Beetles, and Cavity-Nesting Birds:

Conservation and Management in Ponderosa Pine Forests of the Pacific Northwest

Restoration logger Craig Thomas and landowner Priscilla Antrim with a wildlife snag left during a prescriptive timber harvest on her Montana property. Photo: Dan Casey

Cover photo credits (clockwise from top left): Mountain pine beetle: USFWS Forest Service; White-headed Woodpecker: Mac Knight; Lewis's Woodpecker; Greg Lavaty; created ponderosa pine snag: Dan Casey

Authors: Dan Casey, Bob Altman, Darin Stringer

Funding to produce this booklet provided by Biophilia Foundation and a grant from the Natural Resources Conservation Service's Conservation Innovation Grant Program.

To some people, dead trees (snags) are unattractive, wasteful, and indicate unhealthy forest conditions. However, dead and dying trees are an essential component of natural forest ecosystems, providing invaluable wildlife habitat and a means for important nutrients to cycle back into the forest. While too many snags may indicate unhealthy conditions, a truly healthy forest always contains some amounts of diseased, dying, and dead trees.

In those dry forests of the Pacific Northwest, dominated by ponderosa pine, there is renewed interest in the importance of snags as part of forest restoration efforts. Snags are deficient in many of these forest areas, especially on private forest lands, and several bird species associated with snags have been documented to have declining populations. This brochure is intended to *enhance awareness* of the ecology of ponderosa pine forests, including the relationship between snags, bark beetles, and cavity-nesting birds, and to *promote actions* to achieve healthy forests that support adequate snag resources and the populations of birds that depend on them.

Williamson's Sapsucker: Greg Lavaty; pine forest: Dan Casey

A truly healthy forest always contains some amounts of diseased, dying, and dead trees.

Old-growth ponderosa pine forest typical of historical conditions near Bend, Oregon.

A large ponderosa pine snag.
Photo: Dan Casey

Ponderosa Pine Snags: Past and Present

In ponderosa pine forests prior to Euro-American settlement, regular understory fires and bark beetles were the primary factors maintaining open forest understories with singular or small patches of snags. These snag patches in turn created canopy openings needed for tree regeneration. Thus, the periodic "disturbance" of fire and beetles ensured a healthy ponderosa pine forest with a continuous supply of snags over time, since the oldest trees were most susceptible to mortality, resulting in a forest with mostly large snags.

Fire and bark beetles are still influencing the ponderosa pine landscape, but the forest has changed, and with it the patterns of snag creation, persistence, and value. Throughout the region, past forest management policies and practices have contributed to unnatural tree densities. Fire suppression initiated in the early 20th Century was supposed to protect forests from a perceived enemy, but has actually succeeded in creating the perfect conditions for severe wildfires and beetle infestations. Fire suppression has resulted in crowded forests, more flammable material, and greater competition. This weakens tree growth and vigor and produces forests where younger trees dominate. Now, fires reach into the canopy and may kill large areas of forest. Likewise, beetles now cause mortality in larger patches of trees because the forest is so dense and overcrowded with stressed trees. However, the snags created by these circumstances are very dissimilar to historic conditions, with fewer of the large snags so important to birds.

Another difference between present and past conditions in ponderosa pine forests is that snags are often removed, especially on private lands. Finally, because many of the large, live trees have been harvested over previous decades, the snags that now occur are often smaller diameter and uncharacteristic of historic conditions, and of limited value to wildlife.

Bark Beetles and Snag Creation

The western pine beetle is typically the most common bark beetle in ponderosa pine, especially in mature forests. In younger ponderosa pine forests, mountain pine beetle is more common; it is also responsible for much of the widespread tree mortality in lodgepole pine forests covered in the news. Other bark beetles, such as the Ips beetle and red turpentine beetle, typically cause less severe tree mortality, but still play important roles in producing snags in these forests.

In healthy ponderosa pine forests, these native bark beetles occur naturally at low levels. Bark beetles attack slow-growing, decaying, or diseased trees, and those weakened by competition in overcrowded forests, lightning, fire, or other injuries. The tree mortality caused by bark beetles is a normal part of the ecological process, and over time produces a range of snag conditions as the forest matures and replaces itself.

Climate conditions heavily influence bark beetles including the number of eggs laid, their ability to disperse, and over-winter survival. Warmer and drier than normal conditions can increase bark beetle activity, while cooler, moister conditions will inhibit bark beetle activity.

Bark beetles attack trees by chewing through the outer bark and feeding on the nutritious, soft, inner bark. Healthy ponderosa pine trees ordinarily produce abundant amounts of resin, which pitches out or ejects attacking beetles or inhibits their larval development. However, when deprived of moisture, stressed trees cannot produce sufficient resin to thwart beetle attacks. After attack, female beetles emit a chemical scent (pheromone) that attracts other beetles. The beetles then mate and lay eggs in galleries or chambers they construct between the bark and the wood. A "blue stain" fungus carried by the beetles contributes to the death of the tree by clogging its water-conducting tissues. Larvae feed and overwinter before emerging as adults in mid-summer to attack new trees.

Mountain pine beetle: Ron Long, Simon Fraser University, Bugwood.org

Galleries of western pine beetle, showing characteristic serpentine pattern. Photo: Ladd Livingston, Idaho Department of Lands, Bugwood.org

Snags provide essential habitat for approximately one-quarter of all breeding birds in western coniferous forests.

Pygmy Nuthatch: James Ownby

Western Bluebird: Alan Wilson

Ponderosa Pine Snags and Wildlife

Ponderosa pine trees generally produce excellent snags for wildlife, due in part to their high proportion of sapwood (the outer tree layer). Sapwood decays fast in dead pine trees, and this thick layer provides a deep area of material for cavity excavation. The hollow cores that often develop in older trees are not as common in ponderosa pine as other conifers, but are occasionally caused by heart rot fungi or fires.

Snags are classified for wildlife in a number of ways. One key characteristic is the soundness of the wood, and is described as either "hard" or "soft." The wood in "hard snags" is essentially solid, while soft snags are in an advanced state of decay. Some birds only excavate in soft snags. Others, including most woodpeckers, typically require harder snags because of the stability they provide for nest cavities. Patterns of decay vary based on many factors including fungi in the wood, how the tree died, and the age of the tree.

Other characteristics of snags important to wildlife include the size (diameter and height) and their location and arrangement within the forest. In ponderosa pine stands and throughout western conifer forests, large snags are valuable habitat elements because they stand longer and provide higher quality foraging and nesting opportunities.

Cavity-Nesting Birds

Snags provide essential habitat for approximately one quarter of all breeding birds in western coniferous forests. Dead trees are used by birds for foraging, cavity nesting, perching, food storage and drumming (pecking against the tree to communicate). Some birds, such as sapsuckers and woodpeckers, excavate their own nests in snags (primary cavity nesters). Other birds occupy abandoned or natural cavities (secondary cavity nesters). Primary cavity nesters are considered "keystone species" because of the role they play in providing habitat for many other species, and their declines could have cascading effects in the ecosystem.

In addition to nesting habitat, snags provide food for many of these same species by way of insects beneath the bark. Most cavity-nesting birds consume large quantities of insects each year. Woodpeckers remove the outer bark from infested trees to feed on the larvae and can play a significant role in reducing the number of bark beetles within a tree. Additionally, beetle larvae that are not eaten are left with only a thin layer of protective bark, increasing their susceptibility to desiccation and parasitism. This "biological control" by woodpeckers can help stabilize conditions at low beetle population levels, but their action alone cannot control outbreaks.

Several of the ponderosa pine cavity-nesting bird species are considered high priorities for conservation because they are experiencing local and/or regional population declines. In the Pacific Northwest, these species include the Flammulated Owl, Lewis's Woodpecker, White-headed Woodpecker, and Williamson's Sapsucker. Some other cavity-nesting birds include Pygmy Nuthatch, White-breasted Nuthatch, Mountain Bluebird, and Western Bluebird.

Most cavity-nesting birds consume large quantities of insects each year.

White-headed Woodpecker: Tom Grey

General Habitat Requirements of Priority Cavity-Nesting Birds in Ponderosa Pine Forests

	Snag Size	Snag Densities	Canopy Cover (%)	Shrub Cover (%)	Key Factors
Lewis's Woodpecker	>21 in.	1-3	10-40	>40	Very open forest, shrub cover for insect production
White-headed Woodpecker	>21 in.	1-3	20-50	<50	Large territories, >350 acres per pair
Flammulated Owl	>12 in.	1-3	20-50	<20	Patches of young dense trees, small grassland openings
Williamson's Sapsucker	>18 in.	1-10	25-70	<50	Open to closed canopy; mixed ponderosa pine forest

Snag densities assume the tree is suitable for use (decay state, location, etc.)

Lewis's Woodpecker: James Ownby

Flammulated Owl: Michael Woodruff

Lewis's Woodpecker: The Lewis's Woodpecker is a large bird that will excavate its own cavity in soft wood, but also will use existing cavities and even nest boxes. It is dependent on open ponderosa pine habitat, preferring sites with very large snags and moderate shrub cover. Unlike other woodpeckers, it forages for insects by specialized aerial fly-catching behavior. It also feeds on ripe fruits and acorns in the fall.

Flammulated Owl: The tiny Flammulated Owl nests in cavities created by woodpeckers in moderate to large pine snags in forest stands that combine open forest with occasional clumps of dense, small trees for roosting and calling. Adjacent grassland openings are essential habitat for foraging. Flammulated Owls are neotropical migratory birds that feed almost entirely on insects, especially moths and beetles.

White-headed Woodpecker: The White-headed Woodpecker prefers large tracts of open, mature ponderosa pine forest with snags for nesting and large, live trees for foraging on pine seeds. It excavates nesting cavities in snags often less than ten feet from the ground.

Williamson's Sapsucker: The Williamson's Sapsucker uses open- to closed-canopy ponderosa pine and mixed conifer forest where there are large snags and an open understory with low shrub cover. These birds feed on the sap and phloem from small holes they drill in trees. Ants are a large part of their diet, though they also consume damaging insects such as the spruce budworm that periodically defoliate Douglas-fir and true firs.

Snags in Managed Forests

The first steps toward ensuring snag resources in a forest are adequate to meet the needs of cavity-nesting birds involves setting management goals and conducting an inventory of dead or dying trees. Once targets are set and snag conditions assessed, actions can be directed to enhance these habitat features by retaining existing snags and creating new snags as necessary to meet the habitat requirements of priority cavity-nesting birds.

Retaining and Recruiting Snags

Retaining snags is the primary approach to maintaining cavity-nesting bird habitat. A range of soft to hard snags should be left. Typically, all soft snags should be retained, as they have little if any commercial value, and are hazardous to cut. Hard, sound snags should be retained wherever possible when snag resources are lacking.

If all snags cannot be retained, land managers should try to leave dead or dying trees that have the following characteristics:

- ✔ large diameters
- ✔ existing woodpecker holes or cavities
- ✔ conks of heart rot fungi; wounds or scars from fire, lightning, or mechanical damage
- ✔ dead areas on living trees
- ✔ both sound and decayed wood
- ✔ occur in areas of both low and high tree density and across a range of topography (ridges, slopes, and bottomland)
- ✔ arranged as solitary dead trees or in small clumps (up to ten)

When conducting forest management such as thinning, it is also important to retain some trees that are likely to be good snags in the future. These "snag recruitment" trees should be as large as possible, and may have sections of dead

White-headed Woodpecker leaving nest hole. Photo: Larry Selman

Nest hole in created pine snag. Photo: Dan Casey

Washington landowner Matt Welles and forester Darin Stringer with large snag used by White-headed Woodpeckers. Photo: Dan Casey

Snags can be created to help establish heathly forest conditions. Photo: Dan Casey

wood, scars, and features that predispose them to dying, such as sparse, declining crowns or broken tops. Thinning the forest in variable patterns including relatively open conditions to dense patches of trees is a good way to encourage a steady recruitment of natural snag formation, while reducing the risk of wildfires and excessive beetle mortality.

Creating Snags

In areas where dead trees are deficient, snag creation will enhance habitat for cavity-nesting birds. Snag creation may require balancing the needs of cavity-nesting birds with other objectives. Developing a snag management plan will help landowners and managers choose areas to enhance with snags, select individual trees, and identify the best methods to use. In areas where tree density is too high, snag creation should be done after activities such as thinning and slash removal are completed. Additional considerations include:

- Most created snags should be well-distributed because of the territorial requirements of cavity-nesting birds. However, clumps of snags can also be beneficial for some species. Consider the position of a snag in the landscape and in relation to other trees, openings, and foraging areas.
- Snag-dependent birds and other wildlife have different preferences for location of snags. Many priority species prefer snags in more open areas.
- Avoid creating snags near structures or roads and other areas where falling trees pose a safety risk.
- Avoid creating snags in areas of high tree densities that may result in elevated bark beetle mortality.

There are three primary methods for creating ponderosa pine snags:

Girdling uses a chainsaw to sever the bark and cambium. Two cuts are made about 8-10 inches apart and the bark between the two cuts removed. This can be done low enough to kill the entire tree, or higher, to create a dead top.

Topping involves climbing a tree or using mechanized logging equipment to remove the top at a desired height, followed by disposing of live limbs below the topped section.

Pheromone Attractants is a recently tested method that shows promise as an effective snag creation technique that uses pheromones of naturally occurring bark beetles to target mortality to specific trees.

Choosing a Snag Creation Method

The different snag creation methods have tradeoffs. Topping is the most expensive because of the time and skills required. Additionally, topping trees can be hazardous, and girdling is also not without safety concerns.

Recent experimental trials using bark beetle pheromone packets in California and Oregon have yielded varying degrees of success. The pheromone packets resulted in mortality to nearly all the targeted trees with minimal to no spillover mortality to adjacent trees when placed in appropriate situations. This work also indicated that ponderosa pine snags created by bark beetles provided better and quicker foraging and nesting conditions for woodpeckers compared to girdling or topping. Using beetle pheromone packets is considerably less expensive and hazardous than manually topping trees to create snags. Girdling and/or topping may be substitutes for landowners who are not comfortable using beetle pheromones.

For those interested in the use of pheromones, a few key factors should be carefully considered before implementing:

- ✔ Treated areas should contain mostly vigorous, healthy trees to reduce risk of mortality of non-targeted trees, and contain trees large enough to be good snags for wildlife. A recently thinned stand where slash has been treated is a good candidate area.
- ✔ Pheromone packets should not be placed along property boundaries, especially if adjacent forests are overstocked or showing signs of stress.

A combination of topping, limbing, and/or girdling can be used to create snags. Photo: Dan Casey

Packet containing western pine beetle pheromones. Photo: Darin Stringer

These common "restoration" prescriptions address the need to reduce fire and beetle risk, but may degrade wildlife habitat if snags are removed.

Consulting forester Darin Stringer with a snag created on a property in central Oregon. Photo: Dan Casey

- ✔ Isolating pheromone-treated trees at least 50 feet from other trees should reduce or eliminate non-target tree mortality.
- ✔ Pheromone packets should be applied during summer months when adult beetles take flight.
- ✔ Pheromone packets should be targeted with mountain pine beetle for younger pine and western pine beetle for older pine.
- ✔ Pheromone packets should only be used in consultation with a professional experienced with this technique.

Integrating Snag Management with Forest Stewardship

Snags are just one component of a functional and resilient ponderosa pine forest. Their management should be incorporated into a broader plan that assesses and seeks to achieve the ecologically appropriate conditions for each site. The determination of "desired future conditions' is a key step to successful management of this resource.

Restoration prescriptions typically focus on removing trees such as Douglas fir, grand fir, lodgepole pine, and juniper that have encroached on ponderosa pine in the absence of fire, thinning dense ponderosa pine, retaining the largest trees, treating fuel build-ups in the understory to reduce intense fire behavior, and reintroducing fire to reinvigorate bunchgrasses and desirable shrubs while reducing fuels. These common "restoration" prescriptions address the need to reduce fire and beetle risk, but may degrade wildlife habitat if snags are removed, and do not address the full spectrum of ecological restoration when snag resources are not a part of the prescription. For this reason, American Bird Conservancy has developed a program for conservation of cavity-nesting birds in ponderosa pine forest that emphasizes education and habitat management to ensure that snags are adequately represented in the forest landscape to support populations of the priority bird species that depend on them.

FAQs

Q. Why do we need to create snags when there are millions of dead and dying trees in the West due to wildfires and beetle infestations?

A. Not all snags are created equal. Most of the recent, large-scale bark beetle attacks throughout the West are occurring in lodgepole pine forests, which has a very different relationship with insects and fire. These forests naturally grow very dense, are often killed by large bark beetle outbreaks, and burn under very intense conditions, setting the stage for a new cycle of dense tree regeneration. While the snags and habitats created by these conditions are important to some wildlife, the priority cavity-nesting birds associated with ponderosa pine forests require very different forest conditions, including larger snags arranged in small clumps and single trees within landscape mosaics of living tree structure and openings.

Q: I am doing ponderosa pine restoration trying to recreate healthy conditions…shouldn't that help the birds associated with those forests also?

A: Yes, these actions will help some non-cavity-nesting ponderosa pine birds, but most restoration prescriptions for ponderosa pine forests are being done to reduce fuels and risk of high-intensity fires, and do not consider snag resources. Thinning of low-vigor and defective trees is often a part of this prescription, which also removes future snags. Prescriptions might consider leaving some larger, weakened trees for future recruitment as snags, as well as some clumps of younger trees as roost sites.

Q: I want to provide habitat for cavity-nesting birds, but I also need to manage my forest for the economic value of the trees. Can I do both?

A: Yes. Trees desired by cavity-nesting birds typically have low economic value due to defect and decay. Dead trees do not occupy growing space resources for other trees. The bird communities that occupy snags contribute to the health of the forest, and these healthy forest conditions are ultimately the foundations for

Not all snags are created equal.

Natural snag in an open ponderosa pine stand in central Oregon. Photo: Dan Casey

A very large ponderosa pine in northern Idaho with broken sections suitable for cavity nesters. Photo: Dan Casey

This dead-topped pine on a property in Washington is a good candidate for conversion (or natural recruitment) into a snag. Photo: Dan Casey

protecting your future financial investments in the forest. Ideally, encouraging snag conditions for optimal wildlife populations is recommended. However, even a few snags can help bolster habitat quality on your property. By maintaining the proper density of trees, you can ensure bark beetles and fire don't cause undesirable economic losses. Leaving scattered patches of higher density forest as well as scattered large-diameter and weakened trees is a good approach.

Q: Don't snags cause fires and lead to beetle spread?

A: Snags have always been part of ponderosa pine forests, and these forests historically were very resilient to fire and beetles. Because burning snags can spread fire from the embers they emit during certain conditions, it is important that the forest is managed so fire (when it occurs) can behave as servant rather than master. Bark beetles only attack living trees. Once the cambium of the tree dies out (within a year of tree death), a snag will not contribute to the spread of bark beetles. In stands that are thinned to proper densities and have fuels removed, the risk posed by leaving some snags is minor compared to the ecosystem benefits from these structures.

Q: I want to provide habitat for cavity-nesting birds and I am considering the use of bark beetle pheromones, but I am concerned about killing more trees than are targeted. Aren't bark beetles too destructive to have on my property?

A: Bark beetles can play a positive role in properly managed ponderosa pine forests by thinning trees, creating snags, and providing food for birds. Research is showing that the use of pheromone packets to attract bark beetles (which are already present in the landscape) can be managed and controlled so the likelihood of impacts to other trees is very low. However, landowners should not implement this technique on their own, but consult a professional resource manager with experience in snag creation using this technique.

Q: How many snags do I need to create, and do I need to be concerned about placement of the snags?

A: The number of snags you retain and/or create on your property is based on your management objectives. It would be optimum to have 1-2 large snags (>20 inches diameter at breast height) or more per acre across the landscape, based on our understanding of historic conditions and species needs in ponderosa pine forests. Snag levels can and likely will fluctuate across your ownership based on current conditions, such as availability of good candidate trees for recruitment as dead trees. Snag placement is important to each cavity-nesting species; even a single, well-placed snag can be valuable. Maintaining snags in both open and denser forest will provide a range of conditions for wildlife. Remember, cavity-nesters need snags in a variety of decay stages, but moderately decayed are most desired by the greatest range of species.

Q: How long and often do I have to manage for snags?

A: Snag management should be included as part of periodic forestry operations. Ideally, snags are created naturally over time by the agents described above so a range of decay classes, positions and sizes occur on your property. Snags decay and fall, and so need to be replaced. Monitoring snag conditions every 5-10 years will guide whether additional snag creation is warranted based on the targets you have set for your forest.

Pygmy Nuthatch: Dan Casey

American Bird Conservancy has developed a program for conservation of cavity-nesting birds in ponderosa pine forest that emphasizes education and habitat management.

Photo: Darin Stringer

ABOVE AND BELOW: Snags in combination with a healthy understory can easily provide for the needs of declining birds.

Photo: Dan Casey

Photo: Dan Casey

American Bird Conservancy (ABC) is a non-profit organization whose mission is to conserve native birds and their habitats throughout the Americas. ABC acts across the full spectrum of conservation issues to safeguard the rarest bird species, restore habitats, and reduce threats, while unifying and strengthening the bird conservation movement. ABC advances bird conservation through direct action and by finding and engaging the people and groups needed to succeed. **www.abcbirds.org**

Forest Restoration Partnership is a non-profit organization founded to promote the conservation and restoration of declining forest habitats on private lands in the western United States. We promote this mission through collaborative projects that emphasize the design and implementation of cutting-edge habitat restoration practices and holistic forest management, and education and outreach to promote innovative forest restoration systems. **www.forestpartners.org**

Cavity-Nesting Birds in Ponderosa Pine Forests of the Pacific Northwest
FACT SHEET

This Fact Sheet is intended to highlight several important concepts for the conservation of cavity-nesting birds in ponderosa pine forests of the Pacific Northwest.

An essential habitat element for cavity-nesting birds is standing dead trees (snags) for nesting, roosting, and foraging.

Several bird species in ponderosa pine forests are high priorities for conservation because they are experiencing local and/or regional population declines. In the Pacific Northwest, these include the Flammulated Owl, Lewis's Woodpecker, White-headed Woodpecker, and Williamson's Sapsucker.

Some cavity-nesting bird species are considered keystone species because of the role they play in creating habitat for many other species.

Most managed private ponderosa pine forests are deficient in the amount, size, and condition of snags needed by cavity-nesting birds.

All snags are not created equal: Large snags (>21" DBH) are preferred by most cavity-nesting birds (essential for the larger birds), but smaller snags (>16" DBH) also provide habitat for some species; >2 snags/acre is recommended; diversity of decay classes is needed with most species using moderately decayed snags for nesting, and dying and recently dead trees for foraging; a range of snag locations is important for all species, but priority species may have specific requirements.

The life span of snags is finite and the identification of recruitment snags will help maintain the desired dead wood conditions through time.

Snag management includes both retention of naturally occurring snags and creation of snags to meet desired targets.

Cavity-nesting bird conservation is very compatible with ponderosa pine restoration to recreate historic conditions and reduce fuel loads and risk of high-intensity fires.

Thinning of overcrowded and degraded forests is often necessary along with snag management to meet the desired habitat conditions for cavity-nesting birds.

Nest boxes can be used as an interim conservation tool for some species (generally not woodpeckers except Lewis's) until sufficient snag abundance and distribution can be achieved.

AMERICAN BIRD CONSERVANCY

Land Managers' Guide to

Cavity-Nesting Bird Habitat and Populations *in* Ponderosa Pine Forests *of the* Pacific Northwest

This open ponderosa pine slope with snags and grassland elements is Flammulated Owl habitat. Photo: Dan Casey, ABC

Authors: Dan Casey, Bob Altman, Darin Stringer, Craig Thomas

Cover photos courtesy of Dan Casey and Bob Altman, ABC

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Land Managers' Guide to Cavity-Nesting

Bird Habitat and Populations in Ponderosa Pine Forests *of the* Pacific Northwest

Low older snag with multiple cavities, shrub understory. Photo: Dan Casey, ABC
TOP OF PAGE Mountain Bluebirds: Greg Homel, Natural Elements Productions

Pygmy Nuthatch: Greg Lavaty, www.texastargetbirds.com

Dan Casey next to a legacy ponderosa pine >150 cm (>60 in) dbh, in a multi-aged stand, February 2011. Photo: Susannah Casey, ABC

Purpose of the Ponderosa Pine Cavity-Nesting Bird Guide

This Ponderosa Pine Cavity-Nesting Bird Guide is intended to provide land managers in ponderosa pine habitats with information on bird species' status, distribution, density, habitat relationships, and potential responses to habitat management or restoration activities. This information can be used to facilitate sound decisions to support bird conservation in the context of protection and management of the threatened ponderosa pine ecosystems of the Pacific Northwest.

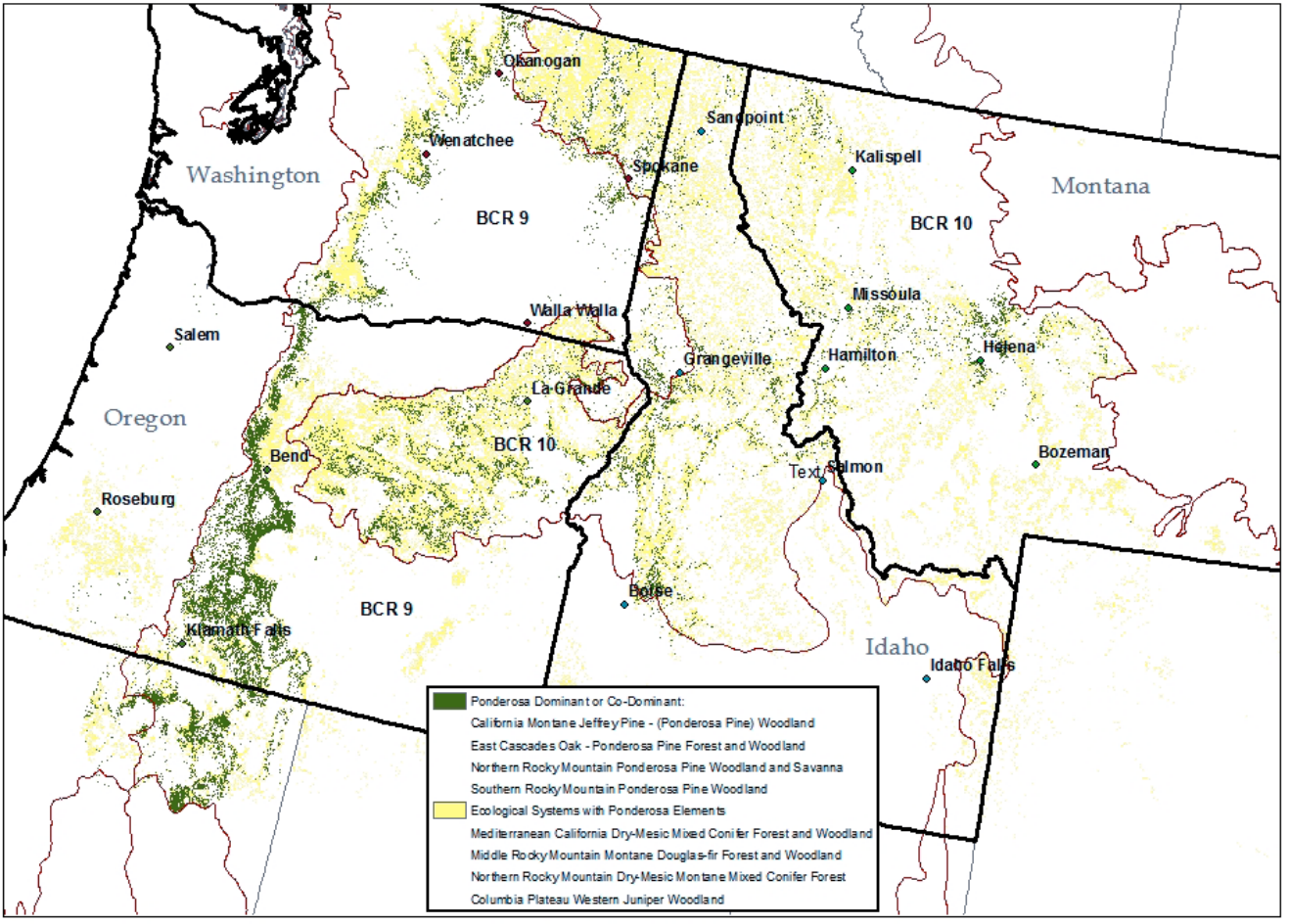
Ponderosa Pine Forests in the Pacific Northwest

There are more than 19 million acres of dry forests dominated by ponderosa pine distributed widely in the four states of the Pacific Northwest (Figure 1). More than 40% is on private lands, but often adjacent to large expanses of public land. Ponderosa pine forests typically occur at low- to mid-elevations (650-2,000 m [2,100-6,500 ft]), often representing the first forest zone above lower elevation grasslands and sagebrush.

Ponderosa pine forests, especially those at lower elevations, historically burned naturally at regular intervals of 5-25 years. This promoted an open, uneven-aged forest dominated by large pines, with open understories of grasses and scattered shrubs. Because fires were generally low-intensity ground fires, more than 70% of the acres of this forest type were stands of large, mature pines as recently as 100 years ago.

Open, park-like stands composed exclusively of ponderosa pine occurred on the driest low-elevation sites, with higher fire frequencies often on moderate to steep south- or west-facing slopes. On other sites with lower fire frequencies or different elevation, slope, or temperature/moisture regimes, ponderosa pines often occurred with a sub-dominant or co-dominant layer of juniper, Douglas-fir, Jeffrey Pine, or (rarely) grand fir.

Figure 1. Distribution of ponderosa pine habitats in the four Pacific Northwest states (ID, MT, OR and WA).



Larger ponderosa pines can withstand typical low intensity fires. Photo: Dan Casey, ABC

Recently burned young ponderosa pine. Photo: Bob Altman

Logging, habitat conversion, and fire suppression have resulted in a dramatic decrease in the quantity, quality, and distribution of mature ponderosa pine forest in the last 50 years. Low-elevation, dry forest types (especially ponderosa pine communities) were among the first trees to be harvested in the late 1800s, throughout much of the Pacific Northwest. The majority of the early logging occurred on private lands in valley bottoms, primarily in support of the railroad and mining industries. Large portions of these valley bottoms were covered with fire-maintained old-growth ponderosa pine forests. Except for small, forested remnants, conversion of these valley-bottom forests to agricultural and residential uses has been complete in most areas. Logging on higher elevation mountain slopes (primarily public lands) continued throughout the 20th Century with a peak in ponderosa pine cutting occurring in the 1960s. As a result of logging, few old-growth structured ponderosa pine stands remain.

Fire suppression in Pacific Northwest forests started in the late 1800s, and had become organized and effective by the 1930s. Wildfire suppression policies and practices interrupted the natural fire cycle, and resulted in unnaturally high tree densities in ponderosa pine forests, with greater competition and less vigor and growth, more stressed trees that are highly susceptible to beetle infestations, and more flammable material to exacerbate conditions for stand-replacing fires. It also resulted in the replacement of older single- and multiple-layer forests dominated by ponderosa pine with mixed ponderosa pine/Douglas-fir stands in stem exclusion and other young structural stages. Douglas-fir regeneration in the understory creates a fire ladder, greatly increasingly the potential of stand-destroying crown fires. The consequence of all these conditions is the severe wildfires and beetle infestations that have occurred in the last 10-15 years.

Much recent funding and forest management has focused on restoring ponderosa pine forests towards historic conditions, thereby improving their resiliency to large-scale mortality from wildfire and beetle infestations. The typical prescription includes thinning out the invasive, non-pine canopy trees and the unhealthy pine trees to open up the canopy. This gives the dominant trees that remain a better chance for enhanced growth and vigor to make them fire- and beetle-proof.

Understory slash and debris is removed, and lower branches are pruned to open up the forest floor and reduce ground fuel levels and ladder fuels that would assist in creating conditions for stand-replacing wildfires. However, few of these restoration efforts have been implemented with specific prescriptions for the historic conditions of snag (dead, standing tree) abundance and distribution. The availability of dead or dying ponderosa pine trees for cavity-nesting birds and other wildlife is a broad-scale deficiency where otherwise ecologically-driven restoration is occurring.

Ponderosa pine stand thinned to even spacing, with no snags.
Photo: Darin Stringer, Pacific Stewardship

American Bird Conservancy and Cavity-nesting Birds in Ponderosa Pine Forests

American Bird Conservancy (ABC), in cooperation with numerous partners, has developed a full-spectrum, regional conservation alliance to improve habitat conditions and stabilize or increase populations of cavity-nesting birds in ponderosa pine forests of the Pacific Northwest. The program emphasizes priority cavity-nesting birds such as Lewis's Woodpecker, White-headed Woodpecker, Flammulated Owl, and Williamson's Sapsucker in Oregon, Washington, Idaho, and Montana. The primary focus has been to assist landowners to incorporate management prescriptions with the specific needs of these bird species into the more general prescriptions of forest management to improve forest health. Accomplishments so far include habitat restoration and management activities on 15 properties totaling over 16,187 ha (40,000 ac), including approximately 4,047 ha (10,000 ac) of ponderosa pine forest, thinning on approximately 81 ha (200 ac), creation of 115 snags, placement of approximately 60 Lewis's Woodpecker nest boxes on 10 sites, three field demonstration days at five private landowner sites, two webinars to Natural Resources Conservation Service staff broadcast throughout the region, and two outreach booklets on cavity-nesting bird conservation (www.abcbirds.org/newsandreports/specialreports.html). Though the program emphasis is on the four species listed above, concurrent benefits are occurring to numerous other birds and wildlife species in ponderosa pine forests including Mountain and Western Bluebird and Pygmy Nuthatch, bats, and northern flying squirrels.

Lewis's Woodpecker: Dan Casey, ABC

White-headed Woodpecker: Alan Wilson

Bird Conservation Regions (BCRs)

This Guide covers ponderosa pine ecosystems in the four U.S. states of the Pacific Northwest, from their western extent along the east slope of the Cascade Mountains in Oregon and Washington and into the Klamath Mountains of southwestern Oregon, north to the Canadian border, east to the southeastern hills of Montana, and south to the California border with Oregon (Figure 1). This area includes the following three Bird Conservation Regions (BCRs), which are aggregations of ecoregions with similar bird communities, habitats, and resource management issues.

Northern Pacific Rainforest (BCR 5)

The Northern Pacific Rainforest BCR in the Pacific Northwest includes all of Oregon and Washington west of the crest of the Cascade Mountains. Its maritime climate is characterized by heavy precipitation and mild temperatures. The region is dominated by forests of western hemlock and Sitka spruce, except for the Klamath Mountains ecoregion of southwestern Oregon, where drier forest types, including ponderosa pine, are more important. Characteristic ponderosa pine cavity-nesting bird species include Western Bluebird and White-headed Woodpecker.

Great Basin (BCR 9)

The Great Basin BCR in the Pacific Northwest includes the Northern Basin and Range ecoregion in Oregon, and the Columbia Plateau and the East-slope of the Cascade Mountains ecoregion in Oregon and Washington. It is characterized by dry ecosystems due to its position in the rain shadow of the Cascade Mountains, including grassland and sagebrush in the intermountain areas, and dry forests of ponderosa pine in the transition to the montane forests. Characteristic ponderosa pine cavity-nesting bird species include Lewis's Woodpecker, White-breasted Nuthatch, and White-headed Woodpecker.

Northern Rockies (BCR 10)

The Northern Rockies BCR in the Pacific Northwest includes the Northern Rocky Mountains and the intermontane Wyoming Basin ecoregions, the Blue Mountains ecoregion of eastern Oregon, southeastern Washington, northern Idaho, and Montana west of the Continental Divide. It is characterized by a variety

of coniferous forest habitats, including ponderosa pine forests in the drier areas. Characteristic ponderosa pine cavity-nesting bird species include Flammulated Owl, Mountain Bluebird, Pygmy Nuthatch, and Williamson's Sapsucker.

Ponderosa Pine Ecosystems and Habitat Types

There are four ecological systems in the Pacific Northwest where ponderosa pine is the dominant landscape element (Figure 1):

California Montane Jeffrey Pine/(Ponderosa Pine) Woodland. This ecological system is found on relatively dry sites in mountains and plateaus in southern Oregon from 550-1525 m (1,800-5,000 ft) in elevation. Stands are pure Jeffrey pine, ponderosa pine, or a mix of the two, with shrub understories including sagebrush, skunkbush sumac, snowberry, ceanothus, and mountain mahogany.

East Cascades Oak/Ponderosa Pine Forest and Woodland. This ecological system appears at or near lower tree line in the foothills of the eastern Cascades in Washington and Oregon within 65 km (40 miles) of the Columbia River Gorge. It also occurs in the adjacent Columbia Plateau ecoregion. Elevations range from 460-1920 m (1,500-6,300 ft). Most occurrences of this system are dominated by a mix of Oregon white oak and ponderosa pine or Douglas-fir. The understory may include dense stands of shrubs, including skunkbush sumac, sagebrush, or rabbitbrush. More often, they are dominated by grasses, sedges, or forbs.

Northern Rocky Mountain Ponderosa Pine Woodland and Savanna. This ecological system occurs in the foothills of the northern Rocky Mountains in the Columbia Plateau region and eastern Cascades into southern interior British Columbia. These woodlands and savannas occur at the lower tree line between grasslands or shrublands and coniferous forests typically in warm, dry, exposed sites. Elevations range from 500-1,600 m (1,650-5,250 ft). Ponderosa pine is the predominant conifer, but Douglas-fir is occasionally present in the tree canopy. The understory can include a wide variety of shrub species, from sagebrush to chokecherry and serviceberry. Understory vegetation in the true savanna occurrences is predominantly fire-resistant grasses and forbs, such as dry sedges and ryegrass, that re-sprout following surface fires.

Flammulated Owl: Greg Homel, Natural Elements Productions

Western Bluebird: Greg Homel, Natural Elements Productions

Southern Rocky Mountain Ponderosa Pine Woodland. This widespread ecological system is most common throughout the Rocky Mountains, from the Greater Yellowstone region of Montana and Idaho south. These woodlands occur at the lower tree line between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops are most common. Ponderosa pine dominates, but Douglas-fir, lodgepole pine, aspen, and juniper may be present in the tree canopy. The understory is usually a mixture of a wide variety of grasses, with shrubs such as sagebrush, skunkbush sumac, mountain mahogany, Gambel's oak, snowberry, chokecherry, and rose.

Within these ecological systems, ponderosa pine habitats can be categorized into five general types:

Ponderosa pine savanna.
Photo: Dan Casey, ABC

Pine Savanna. The most open habitats where ponderosa pine is the dominant tree species are considered savanna, generally characterized by widely spaced trees whose canopies cover less than 10% of the landscape. These open, park-like stands have an understory dominated by grasses and forbs. They were historically dominated by older (>150 year-old) pines. Characteristic cavity-nesting bird species include Lewis's Woodpecker and Western Bluebird.

Pine Woodland. Ponderosa pine woodlands are defined as those stands with open (10-40%) canopies, and understories with varying mixes of grasses, forbs, and shrubs. Lodgepole pine, juniper, aspen, Douglas-fir, and other tree species may be intermixed. Like savanna types, these open woodlands were historically dominated by older trees and maintained by frequent, low-intensity fires. Characteristic cavity-nesting bird species include Mountain Bluebird and White-headed Woodpecker.

Pine Forest. Ponderosa pine forests are defined as stands with >40% canopy coverage. Douglas-fir, oak, larch, aspen, lodgepole pine, or grand fir may comprise a component of the forest. Dominant understory shrubs vary across the region, from snowberry and currant to Ceanothus and manzanita. Characteristic cavity-nesting bird species include Pygmy Nuthatch and White-breasted Nuthatch.

Mixed Pine/Conifer. Mixed pine/conifer forests are dry forests composed of a co-dominant mix of ponderosa pine, Douglas-fir, and occasionally grand fir. They are typically found on more Pacific-influenced sites that are slightly higher, cooler, and wetter than adjacent ponderosa pine habitats, but still too warm and dry for most other conifers. Characteristic cavity-nesting bird species include Flammulated Owl and Williamson's Sapsucker.

Pine/Juniper. Ponderosa pine can occur as a co-dominant species with Rocky Mountain juniper on the driest sites with poor soils. This usually occurs at lower elevations in the forest transition zone, where the understory is often dominated by sagebrush species, and the growth form of the pines can be stunted. Characteristic cavity-nesting bird species include Mountain Bluebird and Western Bluebird.

Thinned ponderosa woodland with recent understory fuels reduction and prescribed fire. Photo: Bob Altman, ABC

Ponderosa pine/Juniper woodland habitats can include open areas with suitable nesting snags, but fire risk increases with juniper density. Photo: Dan Casey, ABC

Lewis's Woodpecker: Tom Grey

Short, large diameter snags can be long-standing. Photo: Dan Casey, ABC

Ponderosa Pine Snags and Cavity-Nesting Birds

Ponderosa pine trees generally produce excellent snags for birds, due in part to their high proportion of sapwood (the outer tree layer). Sapwood decays fast in dead pine trees, and this thick layer provides a deep area of material for cavity excavation. The hollow cores that often develop in older trees are not as common in ponderosa pine as other conifers, but are occasionally caused by heart rot fungi or fires.

Snags are classified for wildlife in a number of ways. One key characteristic is the soundness of the wood, and is described as either "hard" or "soft." The wood in hard snags is essentially solid, while soft snags are in an advanced state of decay. Some birds only excavate in soft snags. Others, including most woodpeckers, typically require harder snags because of the stability they provide for nest cavities.

Patterns of decay of snags vary based on many factors including fungi in the wood, how the tree died, and the age of the tree. Other characteristics of snags important to cavity-nesting birds include the size (diameter and height), and their location and arrangement within the forest. In ponderosa pine stands and throughout western conifer forests, large snags are valuable habitat elements because they stand longer and provide higher quality foraging and nesting opportunities for more species.

Snags provide essential habitat for approximately one quarter of all breeding birds in western coniferous forests. Dead trees are used by birds for foraging, cavity nesting, perching, food storage and drumming (pecking against the tree to communicate). Some birds, such as sapsuckers and woodpeckers, excavate their own nests in snags (primary cavity nesters). Other birds occupy abandoned or natural cavities (secondary cavity nesters). Primary cavity nesters are considered "keystone species" because of the role they play in providing habitat for many other species, and their declines could have cascading effects in the ecosystem.

Table 1. Priority cavity-nesting bird species associated with ponderosa pine forests in the Pacific Northwest

	USFWS BCC[1]			State Wildlife Action Plans[2]			
Species	**BCR 5[3]**	**BCR 9[3]**	**BCR 10[3]**	**ID**	**MT**	**OR**	**WA**
Flammulated Owl		X	X	X	X	EC,BM	OK,BM,RM,CP
Lewis's Woodpecker			X	X	X	CP,EC,KM,BM	OK,BM,RM,CP
Mountain Bluebird							
Pygmy Nuthatch			X				OK,BM,RM
White-breasted Nuthatch							
White-headed Woodpecker		X	X	X		EC,KM,BM	OK,BM,CP
Williamson's Sapsucker		X	X				
Western Bluebird							

[1] USFWS BCC = U.S. Fish and Wildlife Service Birds of Conservation Concern www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008.pdf

[2] Ecoregions as defined in the State Plans: EC = East-slope Cascades, BM = Blue Mountains, RM = Rocky Mountains, CP = Columbia Plateau, KM = Klamath Mountains, OK = Okanogan

[3] BCR 5 = Northern Pacific Rainforest, BCR 9 = Great Basin, BCR 10 = Northern Rockies

Williamson's Sapsucker: Greg Lavaty, www.texastargetbirds.com

In addition to nesting habitat, snags provide food for many of these same species by way of insects beneath the bark. Most cavity-nesting birds consume large quantities of insects each year. Woodpeckers remove the outer bark from infested trees to feed on the larvae, and can play a significant role in reducing the number of bark beetles within a tree. Additionally, beetle larvae that are not eaten are left with only a thin layer of protective bark, increasing their susceptibility to desiccation and parasitism. This "biological control" by woodpeckers can help stabilize conditions at low beetle population levels, but their action alone cannot control outbreaks.

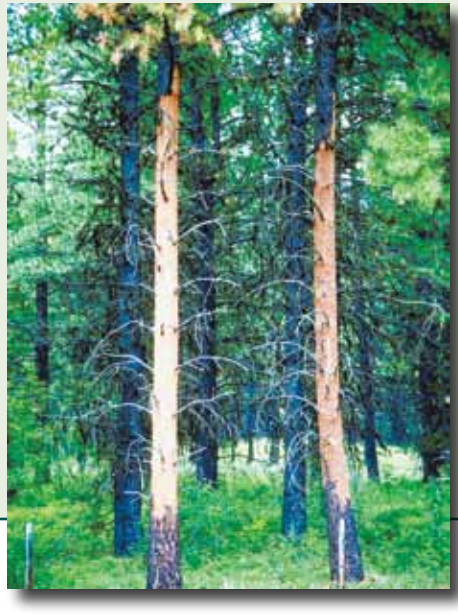
Large Scale Beetle-Kill Tree Mortality and Cavity-Nesting Birds: All Snags are not Created Equal

There are a variety of bark beetles that occur naturally at low levels in western forests, but under particular circumstances (e.g., periods of drought with stressed trees, overstocked forests) can cause infestations that result in significant tree mortality. The large-scale beetle outbreaks in western forests in recent years that have received significant press have occurred predominately in lodgepole pine forests from mountain pine beetles. These forests naturally occur in densely packed stands of relatively small trees that evolved with large-scale mortality.

Unlike lodgepole pine forests, ponderosa pine forests are mostly inhabited by western pine beetles. These forests were historically more open, most of the tree mortality from beetle kill was local and patchy, and large-scale tree mortality was rare compared to lodgepole pine forests. Under current conditions of fire suppression, dense forests of ponderosa pine and mixed conifer species are undergoing more large-scale mortality from beetle infestations or wildfire, either directly or indirectly when mixed or adjacent to lodgepole pine.

When beetle-kill tree mortality does occur in ponderosa pine forests, the potential value of this habitat to priority cavity-nesting bird species can be limited based on the following factors:

- ✔ If the mortality occurs on private industrial or family forest lands, the dead trees are almost always removed.
- ✔ If the mortality occurs on public lands, some level of salvage often occurs.
- ✔ If the dead trees are not removed, their value to priority bird species depends on numerous species-specific factors including tree size, condition, and particularly location or context in the immediate and broader landscape. Most ponderosa pine cavity-nesting bird species evolved to utilize scattered or small clumps of snags that occurred in the natural process of aging or decay within an otherwise intact living forest. Thus, the specific habitat conditions required by these bird species are unlikely to be met by the random and often all-consuming beetle-kill or wildfire.



Western pine beetle damage. Photo: Kenneth E. Gibson, USDA Forest Service, Bugwood.org

As a consequence of habitat loss and degradation, and the altered ecology of ponderosa pine forests, several cavity-nesting bird species that are highly associated with these forests have experienced significant population declines and/or local extirpations. These include four species, Lewis's Woodpecker, White-headed Woodpecker, Flammulated Owl, and Williamson's Sapsucker, that have been identified as priority species for conservation by many conservation organizations and natural resource management agencies (Table 1). Some other ponderosa pine cavity-nesting species include Pygmy Nuthatch, White-breasted Nuthatch, Mountain Bluebird, and Western Bluebird.

Snag Retention and Creation for the Conservation of Ponderosa Pine Cavity-Nesting Birds

Retaining and recruiting snags is the primary approach to maintaining cavity-nesting bird habitat. A range of soft to hard snags should be present. Typically, all soft snags should be retained, as they have little if any commercial value and are hazardous to cut. Hard, sound snags should be retained wherever possible when snag resources are lacking.

If all snags cannot be retained, land managers should try to leave dead or dying trees that have the following characteristics:

- ✔ large diameters, especially those >21 inch (53 cm) diameter at breast height (dbh)
- ✔ existing woodpecker holes or cavities
- ✔ conks of heart rot fungi, wounds or scars from fire, lightning or mechanical damage
- ✔ both sound and decayed wood
- ✔ occur in areas of both low and high tree density, and across a range of topography (ridges, slopes, and bottomland)
- ✔ arranged as solitary dead trees or in small clumps

When conducting forest management such as thinning, it is also important to retain some trees that are likely to be good snags in the future. These snag

Recently dead recruitment snag with intact top. Photo: Dan Casey, ABC

Broken-topped snag created by windthrow. Photo: Dan Casey, ABC

Darin Stringer and created snag with nest cavities, July 2008. Photo: Dan Casey, ABC

Girdling high on a created snag. Photo: Dan Casey, ABC

recruitment trees should be as large as possible, and may have sections of dead wood, scars, and features that predispose them to dying, such as sparse, declining crowns or broken tops.

In areas where dead trees are deficient, snag creation will create or enhance habitat for cavity-nesting birds. Snag creation may require balancing the needs of cavity-nesting birds with other objectives. Developing a snag management plan will help landowners and managers determine the areas to make snags, selection of individual trees, and the best methods to use. In areas where tree density is too high, snag creation should be done after activities such as thinning and slash removal are completed. Additional considerations include:

- ✔ Most snags should be well-distributed because of the territorial requirements of cavity-nesting birds. However, clumps of snags also can be beneficial for some species, especially for foraging. Consider the position of a snag in the landscape and in relation to other trees relative to the habitat needs of priority or local cavity-nesting birds.
- ✔ Select mostly larger trees to meet the habitat needs of a greater number of bird species.
- ✔ If tree harvest economics is a consideration, select deformed trees or trees of low economic value such as curved trunks.
- ✔ Avoid creating snags near structures or roads and other areas where falling trees pose a safety risk.
- ✔ Avoid creating snags in areas where high tree densities may result in elevated bark beetle mortality.

There are three primary methods for creating ponderosa pine snags. Descriptions of the techniques and trade-offs related to costs, equipment, safety etc. are described in a variety of sources (e.g. http://wdfw.wa.gov/living/snags/).

Girdling uses a chainsaw to sever the bark and cambium. Two or three cuts around the full diameter of the trunk are made about 8-10 inches apart; sometimes the bark between the cuts is removed.

Topping involves climbing a tree or using mechanized logging equipment to remove the top at a desired height, followed by disposing of live limbs below the topped section.

Pheromone Attractants is a recently tested method that shows promise as an effective snag-creation technique that uses pheromones of naturally occurring bark beetles to target mortality to specific trees.

Craig Thomas and Cy Bailey (sawyer), snag creation through topping, June 2012. Photo: Dan Casey, ABC.

The Role of Nest Boxes in the Conservation of Ponderosa Pine Cavity-Nesting Birds

The provision of nest boxes or artificial cavities has played an important role in the conservation of many different cavity-nesting bird species, from "backyard" birds such as the Purple Martin and bluebirds, to Wood Ducks and owls. Nest boxes represent a potential conservation tool that, if used judiciously, may help maintain and perhaps expand populations until sufficient snag abundance and distribution can be achieved at a site. They provide multiple benefits: they are accessible to researchers to assess nesting ecology and reproduction, or to band young for studies of survival and site fidelity; they allow viewing opportunities for landowners where the species might not otherwise nest; and, depending on the species (e.g., swallows and bluebirds), they provide some measure of insect pest control near orchards and homes. They also provide an opportunity for landowners to see first-hand the effect that providing suitable nest sites can have.

Nest boxes can serve as an interim measure to attract Lewis's Woodpeckers or other cavity nesters until created snags (in this case a tree girdled about 30 ft off the ground) become suitable for nesting. Photo: Dan Casey, ABC

In cases where habitat structure, vegetation type, and suitable insect prey base exist, but snags are lacking, nest boxes can serve as a useful short-term tool to attract cavity-nesting birds. However, they should not be viewed as a long-term alternative to snag retention, recruitment, and creation, which will provide more sustainable habitat quality over the long term. Nest boxes only provide for one aspect of the function of snags for birds – nesting and roosting cavities. This may be sufficient for cavity-

Nest Boxes Aid Lewis's Woodpecker Population in Central Oregon

Lewis's Woodpeckers: www.kevinsmithnaturephotos.com

In 1990, the Aubrey Hall fire burned about 3,000 acres on Forest Service land just outside the city limits of Bend, Oregon. Lewis's Woodpeckers began to use the site as the dead trees provided nesting opportunities. However, after about ten years, many of the snags had fallen and the population of woodpeckers was dropping.

In 2003, volunteers of the East Cascades Bird Conservancy (now East Cascades Audubon Society) put up four experimental nest boxes for Lewis's Woodpeckers based on the knowledge that they are weak excavators and will modify existing partial cavities, and that Northern Flickers are occasionally known to use nest boxes. Just one pair laid eggs during the first three years, and the clutch was lost to predators. However, this provided time to learn about how to deal with starlings (timing of when the boxes are opened), the amount of wood shavings to put in the box as nesting substrate (15 cm [6 in]), and other factors such as sticking bark on the front of the box. After the modifications, in 2006, eight of the 16 available boxes were used by Lewis's Woodpeckers and all fledged young birds. Since then, 8-12 boxes are regularly used by Lewis's Woodpeckers, and some boxes placed at other sites in the region are also being used. American Bird Conservancy has expanded the effort by placing Lewis's Woodpecker nest boxes at many sites on private lands throughout the Pacific Northwest as part of its Ponderosa Pine Cavity-Nesting Bird Conservation Program.

nesting birds that do not forage in association with the snags. However, for most woodpeckers, snags are used not only for nesting, but are also important as a foraging substrate for insects within the decaying bark.

Non-Snag Habitat Requirements for Ponderosa Pine Cavity-Nesting Birds

Snags are an essential habitat feature for cavity-nesting birds, but they are only suitable when they occur in the context of the other habitat elements required by each bird species. These non-snag features are highly variable among species (Appendix A). Therefore, decisions regarding what species to manage

for require local knowledge of species' ranges and their conservation priority status, prior to implementing habitat prescriptions. In general, throughout most of the Pacific Northwest, where geographically and ecologically appropriate, White-headed Woodpecker, Lewis's Woodpecker, and Flammulated Owl are usually the highest priority (Table 1).

Degraded ponderosa pine stands with high densities of Douglas-fir in the understory and canopy can still represent high fire risk, even when partially thinned. Photo: Dan Casey, ABC

One of the primary restoration and management activities for ponderosa pine habitat is thinning the degraded, dense, mixed-conifer forests that were historically ponderosa pine to the historic canopy and understory conditions with which the species evolved. These can be highly variable, from the open savannah conditions preferred by Lewis's Woodpecker and Western and Mountain Bluebirds to the more closed canopies used by Williamson's Sapsucker and Pygmy and White-breasted Nuthatch. Additionally, a species such as the Flammulated Owl requires a mosaic of both open and closed canopies, including meadows for foraging and dense thickets for daytime roosting and cover. Shrub cover in the understory can be important for Lewis's Woodpecker by providing a substrate for insect productivity to support its aerial flycatching, but can be detrimental by also providing small mammal predators cover and access to the low nests of White-headed Woodpeckers if the shrubs are adjacent to nesting snags.

Flammulated Owl: Dick Cannings

Appendix A. Ponderosa Pine Bird Species Accounts

Key to the Species Accounts

Population Status and Trends:

BBS = Breeding Bird Survey www.mbr-pwrc.usgs.gov/bbs/trend/tf10.html

All three Bird Conservation Regions (BCR) include areas outside our definition of the Pacific Northwest, thus BBS trend data for a BCR reflects the entire BCR and not just that portion within the Pacific Northwest.

GB = Great Basin is a BCR in the Pacific Northwest that includes parts of eastern Washington, eastern Oregon and southern Idaho.

NR = Northern Rockies is a BCR in the Pacific Northwest that includes parts of eastern Oregon, eastern and northern Idaho, and western Montana.

NPR = Northern Pacific Rainforest is a BCR in the Pacific Northwest that includes western Oregon (OR) and western Washington (WA). Ponderosa pine habitat primarily only occurs in the Klamath Mountains ecoregion of southwestern Oregon.

All statistically significant trends[1] are in bold. For species that are not obligate to ponderosa pine habitats (most species), trends represent their status in all habitats in which they occur.

Nest Location and Timing:

The locations and dates are those most typical for each species. However, nesting dates also can vary with elevation and latitude – e.g., nesting and finishing earlier in lower elevations and more southerly locations.

Breeding Range in Ponderosa Pine Habitats:

The basic geographic scope of each species breeding range. However, nesting at a particular site or area within the range is based on local and/or landscape factors.

Comments:

Noteworthy observations relative to a species ecology or conservation that might be useful to a land manager.

Ponderosa Pine Habitat Conditions/Relationships:

This summary only included results from studies in ponderosa pine or mixed ponderosa pine types during the breeding season that reported significant correlations between species abundance and habitat variables.

dbh = diameter at breast height

Optimal Ponderosa Pine Habitat:

The habitat conditions (e.g., tree size, canopy cover, shrub cover) most suitable for the species in ponderosa pine habitats. Species may occur outside these conditions in lesser quality ponderosa pine or other habitats.

FLAMMULATED OWL

(Otus flammeolus)

Population Status and Trends: No BBS trend data.[1] Flammulated Owls are almost strictly nocturnal, and BBS data are inadequate to establish trends. Its preference for mature open dry forests means it has probably declined in population during this century, although the species is poorly monitored throughout much of its range.

Nest Location and Timing: Nest in natural cavities or those excavated by woodpeckers usually 8-15 m (25-50 ft) above ground. Nesting occurs primarily from early May into early July.

Breeding Range in Ponderosa Pine Habitats: Distributed throughout ponderosa pine habitat in the Pacific Northwest except the Klamath Mountains ecoregion of southwest Oregon.

Comments: Long-distance Migrant. Ponderosa pine breeding habitat for Flammulated Owls consists primarily of mid-elevation, mature to old-growth pure ponderosa pine or mixed ponderosa pine/Douglas-fir. Consistently select habitat that combines open forest stands with moderate to large trees and snags for nesting and foraging, occasional clusters of thick patches of small understory trees for roosting and calling, and adjacent grassland openings that provide optimum edge habitat for foraging. They feed almost entirely on insects, especially moths and beetles.

Ponderosa Pine Habitat Conditions/Relationships:

Northern Rockies

- in northeastern Oregon, breeding season mean home range 4.2 ha (10.3 ac), but 6.4 ha (15.9 ac) during incubation; roosts averaged 53 m (174 ft) from nests during nestling period; roosted in mixed conifer forest more than expected from availability, and avoided roosting in ponderosa pine forest; high foliage density key component of roost sites; nested primarily in ponderosa pine snags (85%); nest sites characterized by canopy cover <50%, mature trees 30-50 cm (12-20 in) dbh, stands with multi-layered canopies within 30 m (100 ft) of a clearing; mean nest tree dbh 56.3 cm (22 in) and height 26.6 m (87 ft)[2]
- in northeastern Oregon, nested in stands of large-diameter (>50 cm [20 in] dbh) ponderosa pine and Douglas-fir or grand fir with ponderosa pine in the overstory (Bull and Anderson 1978, Bull et al. 1990)

Hugh Ranson

- in central Idaho, occupied relatively open, multi-storied Douglas-fir, ponderosa pine, and mixed conifer stands with some mature trees usually present[3]
- in Montana's Bitterroot Valley, absent unless the larger landscape consisted of low canopy cover ponderosa pine/Douglas-fir forests, and then only where grassland or xeric shrubland openings were present at a home-range scale; not found on otherwise suitable sites when the surrounding landscape was predominantly moister coniferous forest types, and less abundant in ponderosa pine/Douglas-fir landscapes that were heavily logged (even-aged cuts)[4]
- in British Columbia, nested in mature/old-growth (>100 year-old) Douglas-fir and Douglas-fir/ponderosa pine stands; densities highest in stands 140-200+ years old; restricted to open stands with multi-layered canopies and an abundance of large, well-spaced trees interspersed with grassy openings up to two ha (4.9 ac) in size; regenerating thickets within stands used for roosting[5]

Optimal Ponderosa Pine Breeding Habitat: Relatively open (20-50% canopy cover) mature forests with >3 snags/ha (>1.2 snags/ac) >46 cm (18 in) dbh, small patches of dense saplings and/or young trees for roosting or calling, 10-30% shrub layer cover substrate for production of insect prey, and small grassy openings < 2 ha (>0.40 ac) or adjacent to similar larger grasslands for foraging.

LEWIS'S WOODPECKER

(Melanerpes lewisii)

Population Status and Trends: BBS trend data indicates relatively stable trends in the Great Basin, but substantial declining trends elsewhere including a long-term significantly declining trend in the Northern Rockies.[1]

Bird Conservation Region	Annual % Change	
	1966-2010	2000-2010
Great Basin	0.08	0.32
Northern Rockies	**-4.32**	-2.58
Northern Pacific Rainforest	-3.03	-1.99

Nest Location and Timing: Nest in natural cavities or those they excavate in soft wood at variable heights 4-15 m (13-50 ft) above ground. Will use nest boxes. Nesting occurs primarily from late April into early July.

Breeding Range in Ponderosa Pine Habitats: Distributed throughout ponderosa pine habitat in the Pacific Northwest.

Comments: Short-distant Migrant. Lewis's Woodpeckers are most associated with an open forest canopy and sub-canopy that permits flycatching foraging maneuvers, moderate to dense understory shrub cover to generate an abundance of insects, and large snags for nesting cavities. Highly associated with burned forests where they can reach high nesting densities. In unburned forests necessary snag and understory conditions are generally found in older forests. Also occur in oak and oak-pine habitat in the Cascade Mountains of Oregon and Washington, and cottonwood riparian forest throughout the Pacific Northwest. In addition to its unique aerial flycatching behavior among woodpeckers, it also feeds on ripe fruits and acorns outside the breeding season. Proximity to water (especially with riparian shrubs) enhances prey availability.

Bill Hubick

Ponderosa Pine Habitat Conditions/Relationships:

Great Basin

- in north-central Oregon, mean nest height in ponderosa pine trees (pine-oak habitat) 12 m (40 ft) (range 6-20 m [20-62 ft]); mean dbh for nest trees 76 cm (30 in) (range 41-109 cm [16-43 in]); used all stages of ponderosa pine tree decay for nesting: canopy cover around nest tree mostly <30%[6]

Northern Rockies

- in the Bitterroot Valley of Montana, nested in ponderosa pine trees with mean dbh of 105 cm (41.5 in); mean cavity height 12 m (39 ft) in trees averaging 21 m (65.9 ft) tall; all nests in snags (moderate decay, class 3-4) or dead-topped live trees[7]
- in burned forest of central Idaho, favored partially logged areas to unlogged areas[8]
- in unlogged ponderosa pine/Douglas-fir burned forest of western Idaho, mean dbh of nest trees 51.4 cm (20 in)[9]

Optimal Ponderosa Pine Breeding Habitat: Open ponderosa pine forest with <30% canopy cover, >50% shrub cover, >3 soft snags/ha (>0.40/soft snags/ac) >53 cm (>21 in) dbh, .>81 cm (>32 in) dbh. .

MOUNTAIN BLUEBIRD

(Sialia currucoides)

Population Status and Trends: BBS trend data indicates non-significant increasing trends where most of the population occurs in the Great Basin and Northern Rockies, but substantial declining trends, including a significant long-term declining trend in the Northern Pacific Rainforest.[1]

Bird Conservation Region	Annual % Change	
	1966-2010	2000-2010
Great Basin	0.89	1.48
Northern Rockies	0.88	1.49
Northern Pacific Rainforest	**-5.03**	-4.10

Nest Location and Timing: Nest in natural cavities or those excavated by woodpeckers at relatively low heights usually within 3 m (10 ft) above ground. Nesting occurs primarily from late April into early July.

Breeding Range in Ponderosa Pine Habitats: Distributed throughout ponderosa pine habitat in the Pacific Northwest except the Klamath Mountains ecoregion of southwest Oregon.

Comments: Resident. Mountain Bluebird habitat is open woodland and forest edges with exposed substrates for perching, natural or article cavities for nesting, and open understories with short and sparse ground cover for foraging. They are highly associated with burned forest and to a lesser extent logged areas where snags are present and shrub cover is low. They forage from exposed perches where they drop down to ground to capture insect prey.

Dan Casey, ABC

Ponderosa Pine Habitat Conditions/Relationships:

Northern Rockies

- in burned forest of central Idaho, favored unlogged areas to logged areas; used snags with smaller diameters than the average available snags with a woodpecker cavity and used available cavities surrounded by higher than average snag densities for nesting[8]
- in unlogged ponderosa pine/Douglas-fir burned forest of western Idaho, mean dbh of nest trees 39.5 cm (16 in)[9]

Optimal Ponderosa Pine Breeding Habitat: Ponderosa pine savanna and open woodland (<35% canopy cover), low shrub cover (<25%), a short, sparsely vegetated ground cover, and >5 snags/ha (>2 snags/ac) >40 cm (>16 in) dbh.

PYGMY NUTHATCH

(Sitta pygmaea)

Population Status and Trends: BBS trend data indicates non-significant and mostly increasing trends throughout the Pacific Northwest except for short-term declining trends in the Great Basin and Northern Rockies.[1]

Bird Conservation Region	Annual % Change	
	1966-2010	2000-2010
Great Basin	0.84	-1.23
Northern Rockies	2.82	-0.99
Northern Pacific Rainforest	2.01	1.72

Nest Location and Timing: Nest in natural cavities, those excavated by woodpeckers, or those they excavate in soft wood at variable heights from 3-15 m (10-50 ft) above ground. Will use nest boxes and will nest near or far away from human settlement. Nesting occurs primarily from the end of April through late June.

Breeding Range in Ponderosa Pine Habitats: Distributed throughout ponderosa pine habitat in the Pacific Northwest except the Klamath Mountains ecoregion of southwest Oregon.

Comments: Resident. Near obligate to ponderosa pine habitat in the Pacific Northwest. Prefers mature/old-growth forest where snags and natural cavities are more prevalent, there is heterogeneity in forest structure, and a relatively open canopy, but tolerates a wide range of canopy closure. Nests in dead trees, although essentially all foraging is in live canopy. Large, hollow ponderosa pine snags important as winter roost sites, where as many as 150 individuals have been reported roosting in a single tree.

Greg Homel, Natural Elements Productions

Ponderosa Pine Habitat Conditions/Relationships:

Great Basin

- in managed ponderosa pine forests in the Cascade Mountains of southcentral Washington, occurred in low densities (0.01 birds/ha [<0.01 birds/ac]) in pre-commercially thinned stands, but absent in unthinned stands[10]

Northern Rockies

- in western Montana, found in mature or old growth pine with <70% canopy cover[11]
- in western Montana, eleven of 12 nests in ponderosa pines; mean nest cavity height 3.3 m (10.8 ft) (range = 0.9-6.5 m [3.0 -21.3]) and mean dbh 36.3 cm (14.3 in) (range 14-59 cm [5.5 - 23.2 in])[12]
- in Blue Mountains of northeast Oregon, mean dbh of nest trees 54.6 cm (22 in); range 18-93 cm (7-37 in); preferred snags in decay class 2; areas around nests characterized by open forest with large stems[13]

Optimal Ponderosa Pine Breeding Habitat: Moderately open to closed canopy (30-70% canopy cover) in mature or old-growth forest with well-developed live canopies for feeding and >3 snags/ha (1.2 snags/ac) >53 cm (>21 in) dbh, including at least one large, hollow pine snag/ha (0.40/ac) for roosting.

WESTERN BLUEBIRD

(Sialia mexicana)

Population Status and Trends: BBS trend data indicates relatively stable and non-significant long and short-term trends in the Northern Rockies and Northern Pacific Rainforest, but substantial and significant increasing long-and short-term trends in the Great Basin.[1]

Bird Conservation Region	Annual % Change	
	1966-2010	2000-2010
Great Basin	**3.87**	**4.97**
Northern Rockies	0.65	2.77
Northern Pacific Rainforest	-0.73	0.04

Nest Location and Timing: Nest in natural cavities or those excavated by woodpeckers at relatively low heights usually within 3 m (10 ft) above ground. Nesting occurs primarily from mid April into early July.

Breeding Range in Ponderosa Pine Habitats: Distributed throughout ponderosa pine habitat in the Pacific Northwest.

Comments: Short-distance Migrant. Western Bluebird habitat is open woodland and forest edges with exposed substrates for perching, natural or article cavities for nesting, and open understories with short and sparse ground cover for foraging. They also occur in burned forest and logged areas where snags are present and shrub cover is low. They forage from exposed perches where they drop down to ground to capture insect prey.

Tom Grey

Ponderosa Pine Habitat Conditions/Relationships:

Northern Rockies

- in burned forest of central Idaho, favored partially salvaged areas over unlogged areas; used snags with smaller diameters than the average available snags with a woodpecker cavity and used available cavities surrounded by higher than average snag densities for nesting; a negative association with snag diameter – used nest cavities in the smaller range of snag diameters[8]
- in unlogged ponderosa pine/Douglas-fir burned forest of western Idaho, mean dbh of nest trees 35.3 cm (14 in)[9]

Optimal Ponderosa Pine Breeding Habitat: Ponderosa pine savanna and open woodland with low canopy cover (<35%), low shrub cover (<25%), a short, sparsely vegetated ground cover, and >5 snags/ha (>2 snags/ac) >36 cm (>14 in) dbh.

WHITE-BREASTED NUTHATCH

(Sitta carolinensus)

Population Status and Trends: BBS trend data indicates increasing trends in the Great Basin and Northern Rockies, including significant long and short-term trends in the Great Basin.[1] Populations in the Northern Pacific Rainforest, with significant long-term declines and non-significant short-term increases, are of a different subspecies.

Bird Conservation Region	Annual % Change	
	1966-2010	2000-2010
Great Basin	**2.12**	**3.90**
Northern Rockies	0.60	1.47
Northern Pacific Rainforest	**-1.78**	2.22

Nest Location and Timing: Nest in natural cavities or those excavated by woodpeckers at variable heights 5-18 m (18-55 ft) above ground. Nesting occurs primarily from mid-April through mid-June.

Breeding Range in Ponderosa Pine Habitats: Distributed throughout ponderosa pine habitat in the Pacific Northwest.

Comments: Resident. White-breasted Nuthatches prefer areas of older forest with large trees and low to moderate canopy cover and an abundance of snags, both large and small. They spend the majority of observed foraging time gleaning from the surface of the tree boles in the middle stratum. Time not spent on the bole of the tree was evenly distributed between live and dead branches.

Ponderosa Pine Habitat Conditions/Relationships:

Great Basin

- in managed ponderosa pine forests in the Cascade Mountains of southcentral Washington, occurred in similarly low densities (0.06 birds/ha [0.02 birds/ac]) in both pre-commercially thinned and unthinned stands[10]

Alan Wilson

- in ponderosa pine and mixed ponderosa pine forests in the Cascade Mountains of north-central Washington, mean nest tree dbh 54.3 cm (21.4 in) and nest height 11.8 m (38.7 ft); most nest trees in decay stages 3 and 4 (moderate); all nests located in partial cut and shelterwood managed stands in open forest conditions with low canopy cover (mean 30%) and few large snags (mean 1.5/ha [0.6/ac]) >53 cm (>21 in) dbh, but many small snags (mean 4.0/ha [1.6/ac], 15-23 cm [6-9 in] dbh)[14]

Northern Rockies

- in western Montana, selected larger trees as foraging substrates; tree diameter was the only variable with a strong influence on selection; encountered almost exclusively in thinned/burned sites[15]

Optimal Ponderosa Pine Breeding Habitat: Mature ponderosa pine woodlands (canopy cover 25-65%) with 2.5 large trees/ha (1 tree/ac) >53 cm (>21 in) dbh, and 10 snags/ha (4 snags/ac) >38 cm (15 in) dbh.. Understory shrub cover appears to be unimportant.

WHITE-HEADED WOODPECKER

(Picoides albolarvatus)

Population Status and Trends: BBS trend data indicates increasing trends where most of the population occurs in the Great Basin and Northern Rockies, including a significantly increasing long-term trend in the Great Basin.[1] Trends in the Northern Pacific Rainforest, where there is a small population, are relatively stable.

Bird Conservation Region	Annual % Change	
	1966-2010	2000-2010
Great Basin	**2.57**	2.70
Northern Rockies	1.25	0.42
Northern Pacific Rainforest	-0.77	0.01

Nest Location and Timing: Nest in natural cavities or those they excavate at relatively low heights usually <5 m (16 ft) above ground. Only rarely reuse cavities from previous years. Nesting occurs primarily from late April into early July.

Breeding Range in Ponderosa Pine Habitats: Distributed throughout ponderosa pine habitat in the Pacific Northwest except for northern Idaho and western Montana.

Comments: Resident. The White-headed Woodpecker prefers large tracts of open, mature ponderosa pine forest with snags for nesting and large, live trees for foraging on pine seeds. An important consideration is low shrub cover in nesting habitat to reduce small mammal populations (e.g., chipmunks) that can prey on eggs and nestlings in accessible low nest sites. White-headed Woodpeckers are attracted to areas with openings created by silvicultural treatments; however, nesting success at these sites may be reduced.

Greg Homel, Natural Elements Productions

Ponderosa Pine Habitat Conditions/Relationships:

Great Basin

- in the Cascade Mountains of north-central Washington, only detected in thinned stands in mixed ponderosa pine forest[16]
- in young forests along east-slope of the Cascade Mountains in central Washington, mean dbh of nest substrates 43.1 cm (17 in) in burned forest, and 38.1 cm (15 in) in unburned forest; 48% of excavated cavities in well-decayed snags with broken tops[17]
- along east-slope of the Cascade Mountains in central Washington, characteristics of forests used for nesting were mean live-tree density 182.3 trees/ha (73.8 trees/ac) >10.16 cm (4 in) dbh, mean snag density 11.5 snags/ha (2.5 snags/ac) ≥10.16 cm dbh (4 in dbh), mean dbh of ponderosa pines 33.0 cm (13 in) and ranged from 26.1-50.2 cm (10.3-19.8 in), mean density of ponderosa pine greatest in 20.3-30.5 cm (8-12 in) dbh size class, and lowest in the 50.8-61.0 cm (20-24 in) and >61.0 cm (24 in) dbh size classes and >61.0 cm (24 in) dbh size class.[18]

- in the Cascade Mountains of central Washington, mean dbh of nest trees 36.6 cm (14.4 in); nest sites canopy cover 42.6% and shrub cover 19.3%; 61% of nest snags of highest decay class; 80.6% of nest snags in ponderosa pine[19]
- in Cascade Mountains of central Washington, most nests (16 of 21) in ponderosa pine and 17 of 21 in snags; mean nest tree dbh 51.5 cm (20.3 in) and mean height 12.6 m (40 ft); mean height of nest cavity entrance 5.8 m (18 ft); nest sites characterized by a greater abundance, size, and basal area of large trees and snags[20]
- in managed ponderosa pine forests in Cascade Mountains of southcentral Washington, occurred in low densities (0.02 birds/ha [0.01 birds/ac]) in pre-commercially thinned stands, but absent in unthinned stands[10]
- in the Cascades Mountains of central Oregon, fragmented habitat required larger home ranges (mean 320 ha [793 ac]) than continuous tracts of old-growth (mean 104 ha [257 ac]); used large diameter snag classes for nesting and roosting in greater proportion than available; snag density ranged from 1.7-9.9 snags/ha (0.7-3.9 snags/ac); shrub cover >30%[21,22]
- in ponderosa pine forest of the Cascades Mountains of central Oregon, abundance increased with increasing densities of large (>50.8 cm [20 in] dbh) green trees and hard snags, and with hard snag density (>20.3 cm [8 in] dbh)[23]
- in the Cascade Mountains of central Oregon, percent shrub cover and number of layers in the canopy were nest-site variables most influencing nesting success; successful nests had lower shrub cover, more overstory layers, higher canopy closure, and higher densities of snags and large trees (dbh ≥ 53 cm [21 in]) than unsuccessful nests; nests at sites with high densities of large-diameter trees (>53 cm [21in]) had a significantly higher survival than nests in recently cut sites; mean nesting success negatively correlated with classes of percent shrub cover - nests at sites with <5% shrub cover had a mean nesting success of 61.1%, while mean success at nests with higher shrub cover was 41.9% (range 36.7– 47.9); mean density of large snags (>53 cm [21 in] dbh) was 9.2/ha (3.7/ac) at nest sites and mean density of large trees (>53 cm [21 in] dbh) was 37.7/ha (15.2/ac)[24]

Northern Rockies

- in west-central Idaho, all observations in open canopy forest (mean 56% canopy cover) with relatively low tree density (mean 289 trees/ha [117 trees/ac]); did not nest in forest with canopy cover >26% or tree density >411trees/ha (166 trees/ac); mean dbh of nest trees 56 cm (22 in); mean dbh of ponderosa pine trees in 17 foraging observations 70 cm (27.6 in)[25]
- in Blue Mountains of northeast Oregon, 80% of foraging during breeding season on live trees and only on ponderosa pine; mean dbh of 142 foraging trees 44 cm (17.3 in)[26]

Optimal Ponderosa Pine Breeding Habitat:

Late-successional forest in patches >100 ha (250 ac) with moderately open canopy cover (20-60%), <40% shrub cover, and >4 snags/ha (1.6 snags/ac) >46 cm (18 in) dbh with >2.5 snags/ha (1 snag/ac) >71 cm (28 in) dbh..

WILLIAMSON'S SAPSUCKER

(Sphyrapicus thyroideus)

Population Status and Trends: BBS trend data indicates non-significant stable to increasing trends in the Great Basin, but substantial non-significant declining trends in the Northern Rockies.[1]

Bird Conservation Region	Annual % Change	
	1966-2010	2000-2010
Great Basin	0.91	2.37
Northern Rockies	-1.61	-5.90
Northern Pacific Rainforest	NA	NA

Nest Location and Timing: Nest in cavities they excavate at variable heights 3-18 m (10-55 ft) above ground. Nesting occurs primarily from mid-April through early July.

Breeding Range in Ponderosa Pine Habitats: Distributed throughout ponderosa pine habitat in the Pacific Northwest except the Klamath Mountains ecoregion of southwest Oregon and portions of the northern Rockies ecoregion in northeast Washington and northern Idaho.

Comments: Long-distance Migrant. Williamson's Sapsucker uses moderately open to closed canopy ponderosa pine and mixed conifer forest where there are large snags and an open understory with low shrub cover. Populations occur in both unmanaged and partially harvested forest. They feed on the sap and phloem from small holes they drill in trees. Ants are a large part of their diet, though they also consume damaging insects such as the spruce budworm that periodically defoliate Douglas-fir and true firs.

Ponderosa Pine Habitat Conditions/Relationships:

Great Basin

- in ponderosa pine and mixed ponderosa pine/conifer forests in the Cascade Mountains of north-central Washington, mean nest tree dbh 69.6 cm (27.4 in) and nest height 15.6 m (51.1 ft); highest proportion of nest trees (59%) in decay stage 1 (live trees with initial decay), few were ponderosa pine, and mean amount of bark remaining 90%; half of nests in unmanaged stands characterized by dense forest conditions (mean 66% canopy cover) with a large number of snags (mean 5.4/ha [2.2/ac], >53 cm [21 in] dbh)[14]

Greg Homel, Natural Elements Productions

Northern Rockies

- in Blue Mountains of northeast Oregon, mean dbh of nest trees 60.9 cm (24 in); preferred snags in decay class 2.[13]

Optimal Ponderosa Pine Breeding Habitat: Moderately open to closed forest (30-80% canopy cover), <40% shrub cover, with >4 hard snags/ha (>1.6 snags/ac) >46 cm (18 in) dbh, with >1 snag/ha (0.40 snag/ac) >71 cm dbh (28 in dbh).

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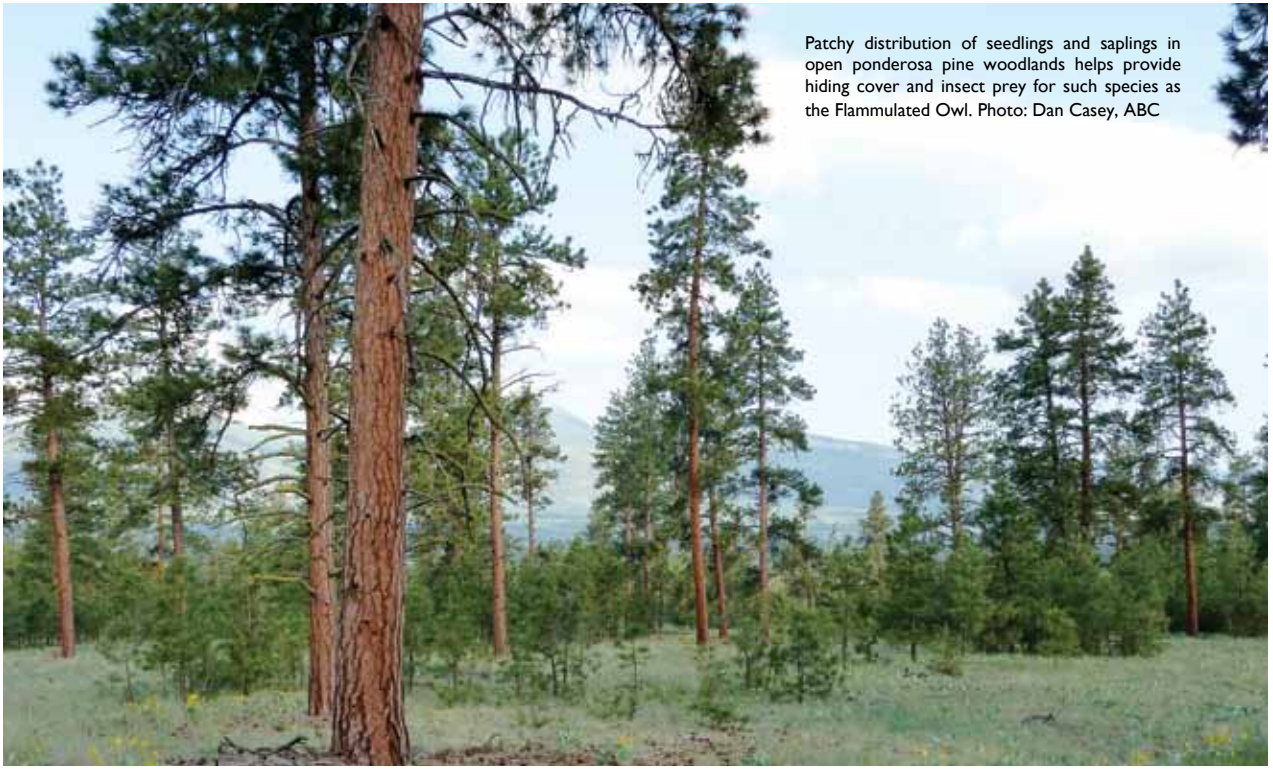
Retention/recruitment of broken-topped dead and dying trees is an important management consideration in ponderosa pine stands. Photo: Dan Casey, ABC



Patchy distribution of seedlings and saplings in open ponderosa pine woodlands helps provide hiding cover and insect prey for such species as the Flammulated Owl. Photo: Dan Casey, ABC

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