

Pine Forest



Fort Valley ponderosa pine, photo by ©USDA Forest Service.

Key Habitat Characteristics Profile

Elevational Range ²
6,000 – 9,000 feet
Vegetation Structure ⁶
Open stands of patches of multi-aged pine with grass, forb, or shrub understory
Plant Species Composition ³
Ponderosa pine, aspen, Gambel and netleaf oak, Chihuahua and Apache pines, Douglas fir, white fir
Important Microhabitats ⁶
Some trees with DBH of ≥ 18 ", nearby dense sapling groves; some patches with ≥ 60 -80% canopy cover, nearby water beneficial; patches of aspen on landscape; variety in size-classes of openings; downed large logs (≥ 12 " dbh); presences of snags (≥ 18 " dbh)
Fire Regime ⁷
Frequent, low-intensity underbrush fires
NRCS Major Land Resource Areas
35 Colorado Plateau 38 - Mogollon Transition 39 - AZ & NM Basin & Range Mountains

Conservation Profile

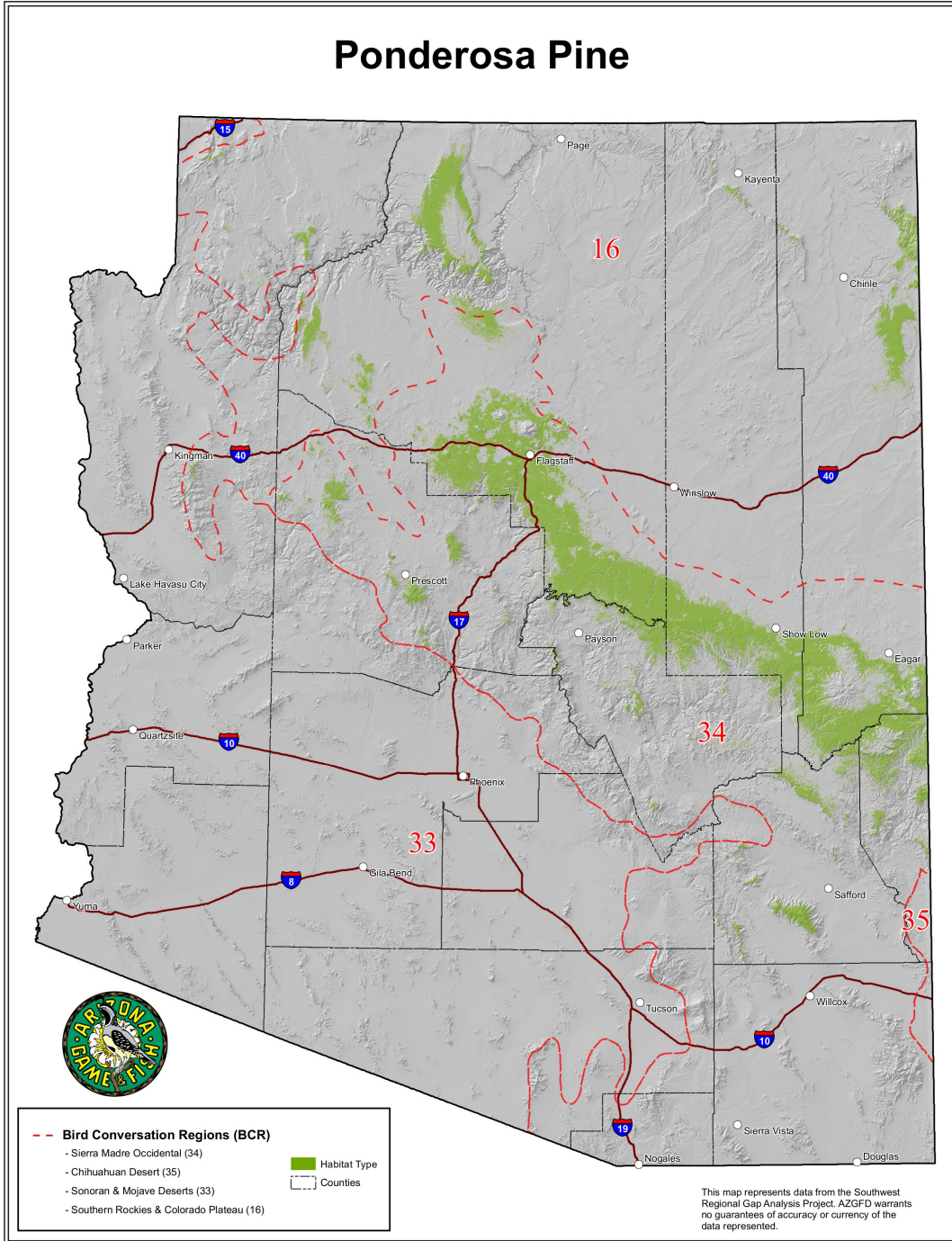
Estimated Cover in Arizona ²	
4,009,653.81 ac 5.49% of state	
Land Ownership Breakdown ²	
Federal	67.86%
Private	4.05%
Tribal	26.72%
State Trust	1.28%
Other	0.09%
Most Important Conservation Concerns	
Unsustainable livestock management Logging/wood harvesting Legacy fire suppression Climate change (droughts, fire)	
Habitat Recovery Time	
Natural via re-seeding: 1-10 years. Development of old growth characteristics: 100+ years	
Vulnerability to Climate Change ^{1,5}	
Vulnerability	Moderate or high
Effects	Tree mortality, crown fires, insect outbreaks
Response	Conversion to juniper woodlands and interior chaparral

Bird Relationships Profile

Representative Bird Species with Accounts
Northern Goshawk Flammulated Owl Williamson's Sapsucker Olive-sided Flycatcher Olive Warbler
Other Associated Breeding Bird Species ⁴
Northern Pygmy Owl, Mexican Whip-poor-will, Broad-tailed Hummingbird, Acorn Woodpecker, Northern Flicker, Hairy Woodpecker, Western Wood-pewee, Greater Pewee, Dusky Flycatcher, Cordilleran Flycatcher, Plumbeous Vireo, Warbling Vireo, Steller's Jay, Purple Martin, Violet-green Swallow, White-breasted Nuthatch, Pygmy Nuthatch, Brown Creeper, Western Bluebird, Hermit Thrush, American Robin, Virginia's Warbler, Yellow-rumped Warbler, Grace's Warbler, Painted Redstart, Hepatic Tanager, Western Tanager, Dark-eyed Junco, Red Crossbill, Pine Siskin
AZ Stewardship Responsibility ²
None



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Habitat Codes Included in Pine Forest

Arizona Breeding Bird Atlas

- FPO, FMP

USGS Southwestern ReGAP

- Southern Rocky Mountain Ponderosa Pine Woodland



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General Information

Habitat Importance

Ponderosa pine forests are home to several species of birds that specialize in this community, and many others that use it in addition to other habitat types. While the canopy cover is mostly composed of ponderosa pine, a high plant species diversity both across vegetation layers and the landscape is critical for birds. Vertical and horizontal structural components (i.e. snags, downed logs, varying age-classes and diameter-size trees) are significant drivers of biodiversity. Several bird species require relatively large, uninterrupted patches of pine forest, including the wide-ranging species Northern Goshawk, Flammulated Owl, and Williamson’s Sapsucker. Other habitat-associated species, such as Pinyon Jay, depend on the seed crops produced by healthy stands.

Distribution in Arizona

Most of the ponderosa pine zone in Arizona occurs along the Mogollon Rim at 6,000 to 9,000 feet in elevation, although it also occurs in spots at the right elevational zone in the rest of the state, such as southeastern Arizona sky islands, the Chuska and White mountains, and along the north rim of Grand Canyon.

Habitat Description

The historic condition of ponderosa pine forests is described as open stands with an abundant understory layer of grasses, forbs, and shrubs. Understory species can include Gambel or netleaf oak, aspen, locust, and fir or juniper species. Fairly frequent low-intensity wildfires maintained this condition. With fire suppression and harvesting of large commercial sawtimber, stand structure changed to denser canopies of younger trees and lower plant diversity. These conditions lead to crown fires that result in even-aged stands that are less suitable than patchy stands of various ages. Current conditions largely include a mix of dense, even-aged stands that are at-risk for crown fires, stands that have been harvested or thinned to some level of historic density through restoration treatments, and expanses of moderately- to severely-burned areas. This is a fundamental shift from historic conditions. However, large-scale, collaboratively-driven restoration treatments such as the Four Forest Restoration Initiative show promise in returning to historical parameters.



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Conservation Concerns and Management Actions

Threats Assessment

This table is organized by Salafsky et al.'s (2008) standard lexicon for threats classifications. Threat level is based on expert opinion of Arizona avian biologists and reviewers. We considered the full lexicon but include only medium and high threats in this account.

Threat	Details	Threat Level
Agriculture: <ul style="list-style-type: none"> Livestock farming and ranching 	<ul style="list-style-type: none"> Unsustainable livestock management removes herbaceous groundcover 	Medium
Biological Resource Use: <ul style="list-style-type: none"> Logging and wood harvesting 	<ul style="list-style-type: none"> Harvest does not consider biological requirements 	High
Natural System Modifications: <ul style="list-style-type: none"> Fire and fire suppression 	<ul style="list-style-type: none"> Fire suppression allows build up of fuels Wildland-urban interface complicates managing natural fires. Smoke impacts to air quality Large, catastrophic fires 	High
Climate Change: <ul style="list-style-type: none"> Ecosystem encroachment Changes in precipitation and hydrological regimes (drought) 	<ul style="list-style-type: none"> Habitat post fire or timber harvest may not return to Ponderosa Pine Droughts increase risk of catastrophic or unnatural fire and insect outbreaks 	High

In the following section, we provide more detail about threats, including recommended management actions. Threats with similar recommended actions are grouped.

Based on the habitat needs of the five representative species considered to create this account, fire suppression and changes in fire regimes, climate change, and silvicultural practices or wood-cutting are the primary conservation concerns for ponderosa pine as bird habitat.

Agriculture:

- Livestock farming and ranching

Unsustainable livestock grazing in Northern Goshawk home ranges reduces vegetation that supports a healthy prey base.

Recommended Actions:

1. Monitor livestock levels and seasonal use dates as outlined in the Management Recommendations for the Northern Goshawk in Southwestern United States document (Reynolds et al. 1992).



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Biological Resource Use:

- Logging and wood harvesting

Most active forest management plans in effect today are based on ecological restoration principles that focus treatments on small-diameter thinning and the increased use of managed fire subsequent to thinning treatments. Treatments should include connectivity (movement and habitat corridors) between islands of untreated, denser habitat that may provide more old-growth characteristics. There is some concern that salvage logging removes dead standing trees that provide substrates for cavity nesting birds. In addition, restoration treatments and Burned Area Emergency Recovery Plans should include retention of high-quality snags for cavity-dependent species such as Williamson's Sapsucker and Flammulated Owl. Treatments should include uneven age management of forest stands, retention of horizontal and vertical structural diversity, and promotion of mixed-species overstory (in appropriate vegetation types) and understory.

Recommended Actions:

1. Track and monitor bird population and habitat impacts under continuing landscape-scale restoration treatments (i.e. Four Forest Restoration Initiative) that focus on reducing small-diameter tree densities and increasing the use of managed fire.
2. Promote silvicultural and wood-cutting practices that protect viability of ponderosa pine stands, particularly in the vicinity of aspen stands, and which retain large snags, especially where they occur in groups, as well as multiple age-classes of ponderosa pine and other conifers.
3. Manage for groups of aspen stands of different age classes in larger forest complexes to ensure continual availability of older trees and snags (>12" dbh) for nesting, particularly in drainage bottoms.
4. Determine effects of different logging practices on nesting Olive Warblers.
5. Until research becomes available on specific habitat requirements of Olive Warblers and their responses to silvicultural practices, encourage forest stewardship in areas occupied by Olive Warbler that favors retention of healthy pine trees that may serve as nesting and foraging substrates.
6. In areas occupied by Flammulated Owls, encourage fire management and silvicultural practices that maintain (or create) horizontal diversity in tree and shrub species, various age classes and tree densities. Manage for retention of oaks, particularly large (≥ 12 " diameter) Gambel oak.
7. Use silviculture and prescribed fires to restore currently unoccupied areas within the range of Flammulated Owls may restore to suitable breeding habitat.

Natural System Modifications:

- Fire and fire suppression

Frequent low-intensity fires historically maintained open ponderosa pine stands with mature trees that resisted ground vegetation fires. Such fires cleared out seedlings, and fire suppression has led to conifer infill in many historically open woodlands, making them vulnerable to crown fires. These can lead to even-aged stands, which are less suitable to birds. They may even contribute to stand-converting fires in areas where other trees, shrubs, or early-successional plants compete with ponderosa pine.

Recommended Actions:

1. Develop forest restoration plans that reduce the chances of crown fires in old-growth stands. This may involve mechanical thinning, development of fire breaks, managed fires, and/or reduction of understory woody plants while retaining the nature of an old-growth stand within Northern Goshawk nesting areas.



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2. Determine Olive Warbler population responses to fire.
3. Evaluate aspen stands in the northeastern region of the state for signs of conifer encroachment; develop a fire management plan to restore aspen recruitment, including the option of prescribed fires.

Climate Change:

- Ecosystem encroachment
- Changes in precipitation and hydrological regimes (drought)

Ponderosa pine forests and other coniferous forests are vulnerable to prolonged droughts that may result in tree mortality, insect outbreaks, and increased crown fire risk. In addition, aspen stands are often associated with mesic soils and tree mortality and risk of Aspen Death Syndrome increase when the clones are stressed from droughts.

Recommended Actions:

1. Develop forest restoration plans that identify stronghold areas for current populations in Arizona of the five representative birds species (see species accounts) for more targeted conservation planning.
2. Develop a monitoring plan that takes into account the possibility of bird population responses to climate change, including retreat to northern latitudes and high elevations.
3. Develop a climate change oriented monitoring program for aspen stands and montane riparian areas.

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