

Mixed Conifer-Aspen Forest



Mixed Conifer-Aspen Forest, photo by @Tice Supplee

Key Habitat Characteristics Profile

Elevational Range ¹
6,000 – 12,500 feet
Vegetation Structure ⁷
Multi-aged stands with mosaic of open canopy patches with shrub understory, small aspen patches, and dense-canopy groves; patch size within forest mosaic vary from 4-12 acre scale or larger, except for openings which may be smaller
Plant Species Composition ²
Montane: Douglas fir, ponderosa pine, Gambel and silverleaf oaks, bigtooth maple, quaking aspen Subalpine: bristlecone pine, Engelmann and blue spruce, aspen, corkbark and white fir, limber pine
Important Microhabitats ⁸
Large dead trees (snags), various-aged aspen, patches with diverse understory shrubs
Fire Regime ¹⁰
Infrequent low-intensity fires (historically)
NRCS Major Land Resource Areas
35 Colorado Plateau 39 - AZ & NM Basin & Range Mountains 41 - SE AZ Basin & Range

Conservation Profile

Estimated Cover in Arizona ¹	
587,535.01 ac .81% of state	
Land Ownership Breakdown ¹	
Federal	74.96%
Private	0.29%
Tribal	24.59%
State	0.13%
Other	0.03%
Most Important Conservation Concerns ^{4, 6}	
Silvicultural practices (even age logging) Fire regime change (lower frequency) Climate change (droughts) Aspen decline syndrome ⁴	
Habitat Recovery Time ⁷	
50 (aspen) – 100 (spruce-fir) years	
Vulnerability to Climate Change ^{6, 9}	
Vulnerability	High
Effects	Conditions too dry and hot for aspen and other tree species
Response	Loss of spruce-fir and aspen forests in Arizona.

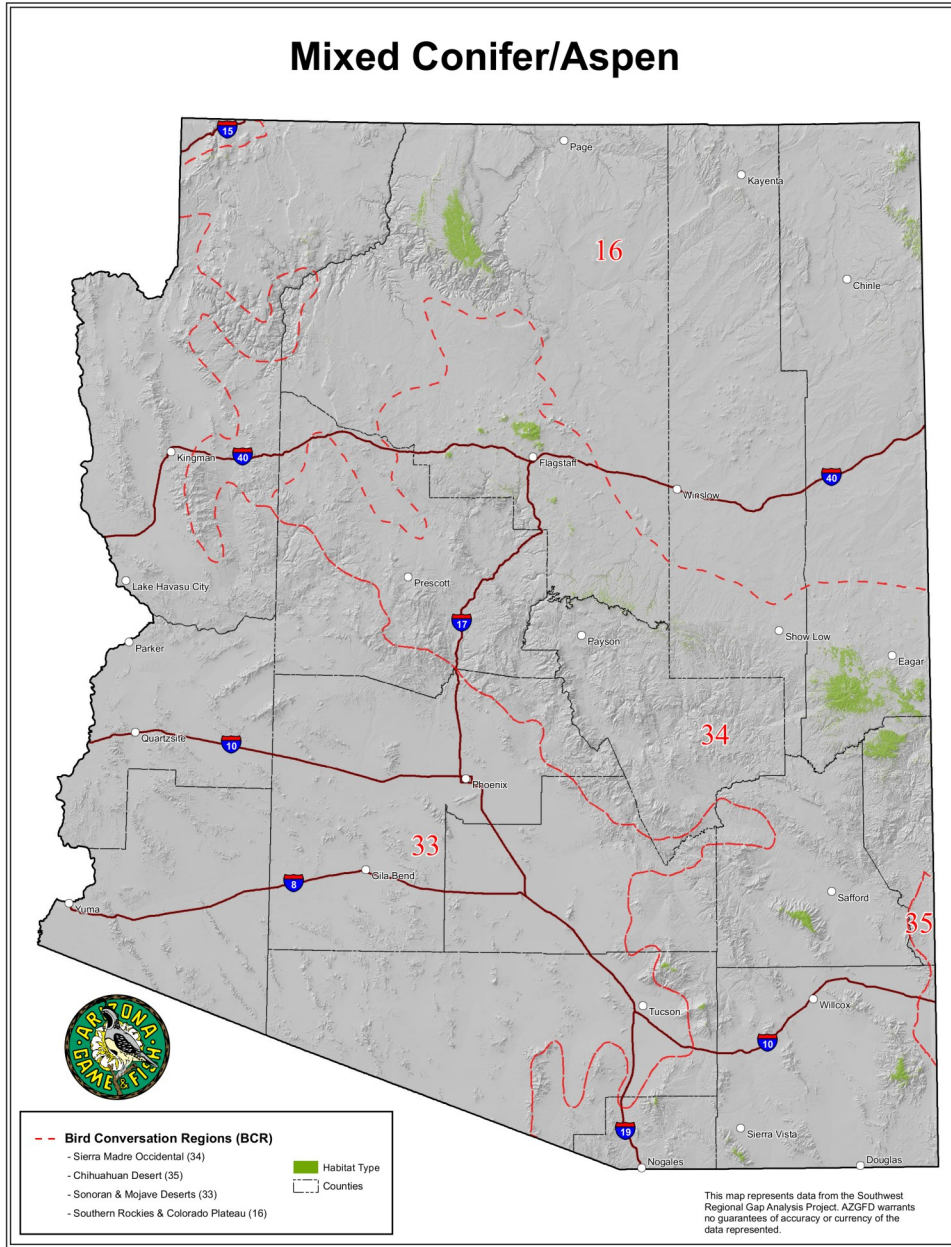
Bird Relationships Profile

Representative Bird Species with Accounts
Dusky Grouse, Band-tailed Pigeon, Red-naped Sapsucker, Olive-sided Flycatcher, Canada Jay, Red-faced Warbler, Yellow-eyed Junco
Other Associated Breeding Bird Species ³
Wild Turkey, Sharp-shinned Hawk, Northern Saw-whet Owl, Mexican Spotted Owl, Mexican Whip-poor-will, Broad-tailed Hummingbird, Williamson's Sapsucker, Downy Woodpecker, American Three-toed Woodpecker, Dusky Flycatcher, Cordilleran Flycatcher, Warbling Vireo, Clark's Nutcracker, Tree Swallow, Violet-green Swallow, Mountain Chickadee, Red-breasted Nuthatch, Brown Creeper, House Wren, Golden-crowned Kinglet, Ruby-crowned Kinglet, Townsend's Solitaire, Hermit Thrush, Orange-crowned Warbler, Virginia's Warbler, Yellow-rumped Warbler, Black-throated Gray Warbler, Hepatic Tanager, Western Tanager, Pine Siskin, Evening Grosbeak, Pine Grosbeak
AZ Stewardship Responsibility ¹
Rivoli's Hummingbird, Yellow-eyed Junco

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Habitat Codes Included in Mixed Conifer-Aspen Forest

Arizona Breeding Bird Atlas

- FSC, FMM, FMA

USGS Southwestern ReGAP

- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
- Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland
- Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland
- Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland
- Madrean Upper Montane Conifer-Oak Forest and Woodland
- Rocky Mountain Aspen Forest and Woodland
- Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland (SF Peaks)



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General Information

Habitat Importance

The forested landscapes of Arizona consist primarily of mixed conifers that support among the richest bird communities of the state. Due to its heterogeneity in stand ages, types, and densities, species with widely varying natural histories nest in this habitat type, including cavity nesters such as sapsuckers, woodpeckers, and Flammulated Owl, insectivores such as Olive-sided Flycatcher, swifts, and swallows, and frugivores such as Canada Jay and Dusky Grouse. The key element in maintaining this diversity is a fire regime that maintains the natural mosaic of patches within the forest and affords a diversity of plant composition, age, and density across the landscape.

Distribution in Arizona

Mixed conifer forests are primarily found in the northern half of Arizona, where they are concentrated in the Mogollon Rim, the White Mountains, the San Francisco Peaks, and the Kaibab Plateau. Below the Mogollon Rim, conifer forests are largely restricted to sky islands, isolated mountain ranges with forest cover at high elevations.

Habitat Description

Mature mixed conifer forests have a high canopy cover with relatively little undergrowth. Wet areas often support aspen and other deciduous trees and shrubs. Several bird species that use this system, such as sapsuckers, Yellow-eyed Juncos, and various hummingbird species, require a deciduous component in the landscape. In the montane zone, multiple bird species specialize on ponderosa pine, which plays an important role as the primary canopy tree. Open mature stands interspersed with stands of different ages, densities, and understory cover are most suitable for these birds. Understory species that are particularly suitable for birds include gooseberries, currants, Arizona rose, mountain and roundleaf snowberry, and Arizona and bearberry honeysuckle (Brown 1994).



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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
Biological Resource Use: <ul style="list-style-type: none"> Logging and wood harvesting 	<ul style="list-style-type: none"> Especially even-age logging resulting in monotypic forest 	High
Natural System Modifications: <ul style="list-style-type: none"> Fire and fire suppression 	<ul style="list-style-type: none"> Heavy fuel loads from fire suppression Disrupted natural fire cycle 	High
Climate Change: <ul style="list-style-type: none"> Ecosystem encroachment Changes in precipitation and hydrological regimes (drought) 	<ul style="list-style-type: none"> Drought weakening aspen and leads to increased fire mortality Loss of high elevation spruce-fir and aspen stands 	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 bird species reviewed to create this account, the primary conservation concerns for the conifer forest habitat type include climate change (drought), change in fire regimes, and silvicultural practices and wood-cutting. Because several bird species specialize on aspen, we also include aspen death syndrome as a high-priority conservation issue.

Biological Resource Use:

- Logging and wood harvesting

Silvicultural practices that emphasize even-aged stands, monotypic tree densities, and the removal of dead trees reduce habitat quality for birds. This is particularly true for Olive-sided Flycatchers and other forest-obligate birds, which prefer a horizontal landscape diversity of different-density forest patches and clearings. Dead trees provide important nest sites for cavity-nesting birds.

Recommended Actions:

- Develop a comprehensive forest harvest management plan with the goal of maintaining landscape-scale diversity in the forest community, including retaining snags, multi-aged stands of trees, and varied densities of understory components on the landscape.
- Where urban areas are near conifer forests, educate the public on how wood-gathering impacts bird habitats.

Natural System Modifications:

- Fire and fire suppression
- Other ecosystem modifications (Aspen decline syndrome)



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Historically, fire played a key role in maintaining diversity of forest stands across the landscape in terms of plant composition, stand ages, and densities. Over the past century, fire suppression has caused loss of aspen stands, changes in canopy density, simplification of the tree community, and higher risk of catastrophic fires.

Recent evidence suggests that western aspen clones can experience catastrophic loss from disease and sudden mortality. While this is well-documented throughout the region, the current status of Arizona aspen stands is unknown. Climate change is one of the suspected causes of aspen decline, and with prolonged droughts predicted from climate models, aspen and other deciduous woodlands interspersed with coniferous forests are likely threatened. Due to several bird species' close association with aspen, learning about the causes of aspen die-offs is critically important for conservation planning.

Recommended Actions:

1. Develop a comprehensive fire management plan with the goal of maintaining landscape-scale diversity in the forest community, including a patchiness of stands in terms of species composition, age, and density.
2. Manage fuel loads to avoid catastrophic fires while maintaining berry-producing shrubs and oaks.
3. Limit prescribed burns in areas where berry-producing shrubs such as manzanita and madrone could be negatively affected.
4. To support key habitat features for Olive-sided Flycatchers, use fire and logging practices to create a mosaic of small patches of snags within larger areas of mature trees. Allow fairly small-scale, high-intensity fires that kill mature trees in areas that are occupied by Olive-sided Flycatchers, and leave snags standing. Retain small groves of live trees that may survive the fire, as these are key habitat features for Olive-sided Flycatchers.
5. Work with fuel management specialists to determine the risk of catastrophic fires in the areas occupied by Yellow-eyed Juncos.
6. Manage for groups of aspen stands of different age classes in larger forest complexes to ensure continual availability of older and larger trees and snags (> 12 inches DBH) for nesting.
7. Allow heavily impacted stands to recover by excluding wild and domestic ungulates, implementing grazing rest periods, and conducting conifer thinning.
8. Actively manage recreational uses in areas that are popular to people. Provide alternate shade structures, construct new trails, re-route existing trails outside of aspen stands, and discourage carving on tree trunks to minimize impacts to aspen recruitment and mature trees.

Climate Change:

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

Mixed conifer forests occur at the highest elevations in Arizona and are therefore naturally vulnerable to gradual stand losses to a warming climate. Prolonged droughts can also lead to increased tree mortality, which increases the risk of catastrophic, stand-converting fires. Because many deciduous woodland species depend on a mesic environment, prolonged droughts are expected to cause stand losses of this critical habitat component.

Recommended Actions:

1. Strategically plan for the retreat of Dusky Grouse, Red-naped Sapsucker, and Yellow-eyed Junco habitats into higher elevations by protecting riparian and snowmelt areas from degradation due to other land uses.
2. Develop a general climate change monitoring program that quantifies rate of change in a variety of key environmental and vegetation variables. Develop a monitoring program or repeated status assessment for aspen



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- stands and montane riparian areas.
3. Expand bird monitoring or regular population inventory coverage to determine bird population responses to climate change and rate of change. Through inventory, identify and delineate the highest-priority areas for priority bird species in order to prioritize conservation actions.
 4. Delineate and evaluate stand condition in current aspen stands and adjacent deciduous woodlands. Identify the highest-value areas within the ranges of Red-naped Sapsucker and Yellow-eyed Junco for strategic conservation action and monitoring.
 6. Implement forestry strategies that maintain natural and, if necessary, artificial openings.
 7. Promote silvicultural, grazing, and fire management practices that support aspen regeneration.
 8. Determine which other land uses may compound impacts from climate change and explore management options for halting or minimizing them.

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