Tonto National Forest
Land and Resource Management Plan

Management Indicator Species
Status Report

July 15, 2005
Version 2.0

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Revised 2005

This analysis and report is designed to be a working document. Available information is to be used to evaluate Management Indicator Species population trends and changes from 1985 when the Forest Plan was approved. As new or additional information is acquired, this document will be revised. Version 2.0 is the second edition and was completed in 2005.

I. INTRODUCTION

Purpose of the Report

The purpose of this report is to summarize current knowledge of population and habitat trends for species identified as management indicator species (MIS) for the Tonto National Forest. Population trends need to be monitored as the Forest Plan is implemented, and relationships to habitat changes over time determined (36 CFR 219.19). This is a dynamic document, subject to change as new inventory, monitoring, and habitat information is acquired and evaluated during the life of the Tonto National Forest Plan (Forest Plan, LMP).

Structure of the Report

Information in this report is divided into two main sections. The first section presents regulations pertaining to MIS, data sources for population trends, the MIS selection process, and changes from the 1985 forest-wide baseline in vegetation and habitat. The second section contains abstracts for each MIS which describe Key Habitat Components (KHC's), general habitat requirements, distribution of the species nationally and forest-wide reasons for selection as an MIS, changes from the baseline in vegetation and habitat that may have affected the species, population trends on the Tonto National Forest, and current monitoring techniques and needs for monitoring. These species abstracts will be the basis for future monitoring and change detection. The KHC's provide an abbreviated list of species requirements that should be the focus of surveys and analysis in project activities.

Summary of Regulations

Management guidance for MIS, other wildlife and fish resources, and diversity of plant and animal populations, is found in several key documents. The 1982 National Forest Management Act Regulations (Planning Regulations) at 36 CFR 219 set forth a process for developing, adopting, and revising land and resource management plans for the National Forest System (CFR 219.1), and identify requirements for integrating fish and wildlife resources in Forest Land Management Plans (CFR 219.13 and CFR 219.19). Key provisions for fish and wildlife resources require that fish and wildlife habitat be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area, where a viable population is considered to be one that has the estimated numbers and distribution of individuals to ensure its continued existence is well distributed through the planning area (CFR 219.19). By definition, the planning area is the area covered by a regional guide or forest plan (CFR 219.3). The Planning Regulations require that certain species, whose population changes are believed to indicate the effects of management activities, be selected and evaluated in forest planning alternatives (CFR 219.19). Additionally, the regulations require that the population trends of management indicator species be monitored and relationships to habitat changes determined (CFR 219.19).

Specific management direction for MIS is also found in Forest Service Manual (FSM) 2600. Policy and direction that tiers to CFR 219.19 is provided for MIS for application at the Forest Plan and project levels relative to species selection, habitat analysis, monitoring and evaluation, and other habitat and planning evaluation considerations, in FSM 2620. FSM 2630 provides guidance on improving MIS habitat, and conducting habitat examinations, and project level evaluations for MIS within the project area.

Data Sources

A variety of data sources were used to prepare this document. Key sources, used for a number of species accounts, are summarized below.

Breeding Bird Survey

The Breeding Bird Survey (BBS) is a large-scale, roadside survey of North American birds that is conducted annually. Started in 1966, it has become a major source of standardized data on populations of breeding birds. Routes are established throughout the continental United States and southern Canada, with routes recently initiated in Alaska and northern Mexico. Currently, there are over 4,100 routes that are surveyed by experienced birders every breeding season. These data have been processed on a computer system at the United States Geological Survey (USGS). The p-value indicates the probability that the trend is different from zero. The p-value can range from 1.00 to 0.00. This report considers the data significant when the $p < 0.05$.

The BBS species analyses used the extensive database that appears on the website: http://www.mbr-pwrc.usgs.gov/bbs/bbs.html. Assessments of continental and regional changes in bird populations were made for the periods 1966-2004, and 1994 to 1995 (Peterjohn et al. 1996), and for 1966-1999, 1995-1999, and 1998-1999 (Pardieck and Sauer 2004). Statistical significance is disclosed for changes and trends observed as appropriate. Occasionally, regional summaries or state summaries had significant results for species evaluated for this report. Most individual routes, however, showed too much variability in numbers of birds to show significant trends. These are discussed as to the amount of variability and the casual appearance of decreasing, increasing, or stable trends.

There are three BBS routes on the Forest: Bartlett (Bartlett Reservoir to Seven Springs, Tonto Village (Kohls Ranch to SR 87 via the Control Road), and Aztec Peak (Junction 188/288 to Salome Creek).

Christmas Bird Counts (National Audubon Society)

More than 50,000 observers participate each year in this all-day census of early-winter bird populations. The results of their efforts are compiled into the longest running database in ornithology, representing over a century of unbroken data on trends of early-winter bird populations across the Americas. These data are count data, which represents

population trends, but not population estimates. Data are compiled by the number of birds reported per party hour, to account for increased effort over time. These data are available at the following URL: http://209.177.45.29/birds/cbc/hr/graph.html. No statistical significance is associated with this data set, so casual relationships are described based on graphs of the data. Two Christmas Bird Count Circles are on or in proximity to the Forest: Salt/Verde rivers confluence and Carefree. Where data is available, graphs of regional (Arizona) data are included in the populations section of each MIS.

NatureServe

NatureServe was formed in 1999 as the Association for Biodiversity Information. This occurred when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation. NatureServe works in partnership with 85 independent Natural Heritage programs and Conservation Data Centers that gather scientific information on rare species and ecosystems. NatureServe is accessed at http://www.natureserve.org/explorer (NatureServe Explorer 2002).

NatureServe assigns a conservation rank to each species in their database, which is designated by a whole number from 1 to 5, preceded by a G for Global rank, N for National rank, or S for Subnational rank (i.e., a State rank). The rankings are explained as follows:

1 = critically imperiled.
Typically 5 or fewer occurrences or very few remaining individuals (<1,000) or acres (<2,000, globally only) or linear miles (<10).

2 = imperiled.
Typically 6-20 occurrences or few remaining individuals (1,000-3,000) or acres (2,000-10,000, globally only) or linear miles (10-50).

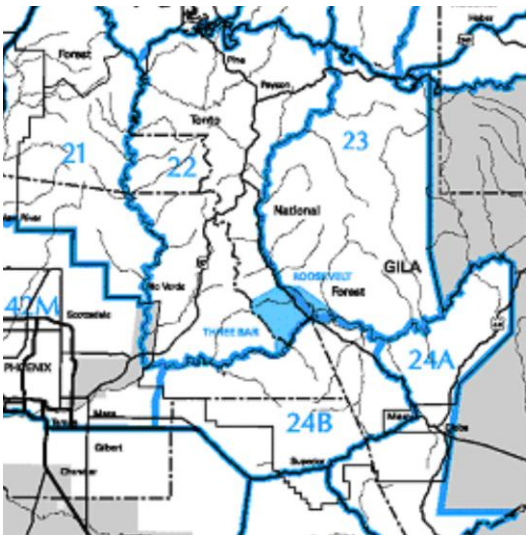
3 = vulnerable to extirpation or extinction.
Typically 21-100 occurrences or between 3,000-10,000 individuals.

4 = apparently secure.
Typically >100 occurrences and >10,000 individuals.

5 = demonstrably widespread, abundant, and secure.
Typically considerably more than 100 occurrences and >10,000 individuals.

In addition, the website summarizes taxonomy, economic attributes, management issues, ecology and life history, authors and contributors, and references.

Arizona Game and Fish Department Data



The Arizona Game and Fish Department (AGFD, Department) is largely responsible for managing wildlife populations, and the Forest Service is responsible for wildlife habitat. Accordingly, the two agencies cooperate on matters relating to wildlife and fish management. The Department collects information on hunted species, and the Tonto relies heavily on this information for evaluating population trends. AGFD data is identified as a primary monitoring method for assessing population status in the Forest Plan monitoring section for turkey, elk, Arizona gray squirrel and Abert's squirrel, (USDA Forest Service 1987b). The Department also collects information on nongame species; the Forest uses this information as well. The AGFD (Arizona Game and Fish Department) reports count data for game species, by Game Management Unit (GMU), annually (AFGD, 2000, 1998, and 1993). The AGFD Game Management Units (GMU) that are on the Tonto National Forest are 21, 22, 23, 24A, and 24B. Several of these GMU's include areas adjacent to the Forest.

Arizona Wildlife and Fisheries Comprehensive Plan (USFS & AGFD, 1990) Data

This Comprehensive Plan was created in 1990 by the USFS and the AGFD to provide a link between the Forest Plan for the TNF and the Arizona Strategic Plan for the AGFD. It contains population estimates for game species from 1985 to 1991.

Forest Service Data and Other Information

Existing Forest Service databases, reports, spreadsheets, and other sources were used as appropriate for information on habitat acres and condition, and MIS species. Literature and information on species and habitats in Forest Service files were consulted and used.

In 2005, forest and AGFD biologists discussed Tonto MIS and identified population trends on the Forest. Game MIS population trends were developed by AGFD Game Managers and Ranger District biologists. Nongame bird MIS population trends were developed by Forest biologists and AGFD bird authorities. Estimate of trends were based on breeding bird blocks, surveys and observations made by AGFD experts and the birding community. MIS trends are presented in Part IV, Table 1.

Other data were compiled for various studies and surveys taking place on the Tonto National Forest. The Tonto National Forest has conducted surveys on various species, and has participated in or funded many of the above surveys and studies. Macro-invertebrate sampling has been conducted every five years at specified sites and sampling has been conducted at additional sites. Data were analyzed and used in this report.

II. FOREST PLAN DEVELOPMENT AND IMPLEMENTATION

Management Indicator Species Selection

Reasons for Selection

The Planning Regulations and the Forest Service Manual require that the reasons for selection of MIS be documented (CFR 219.19, FSM 2620). No documentation was found in the files which describes the selection process or the exact reason for selection of one species over others; however, the paper "Tonto National Forest Proposed Desired Future Conditions and Candidate Management Indicator Species To Monitor Desired Future Conditions" and the Analysis of the Management Situation document (Tonto National Forest 1982a, 1982b) give clues to the process. Desired Future Condition (DFC) for major vegetation types and their components was described and standards and guidelines for achieving the condition(s) were listed. A list of species whose population changes would indicate progress toward or movement away from DFC's in each specific vegetation type was assembled. This species list was reviewed by researchers, biologists, and experts in various state and federal agencies and private organizations and a final list of species was selected based on comments received.

In general, MIS were selected to serve as barometers of management effects on other species with similar habitat requirements (USDA Forest Service 1987a). On the Tonto, MIS were selected which were thought to require, based on literature, one or more KHC that would be specifically affected by proposed land management activities under the Plan. Table 1 lists the species selected and the primary reasons for selection.

TABLE I-1. Primary reasons for selection of management indicator species on the Tonto National Forest and predicted populations trends for the preferred Alternative as described in the 1985 Forest Plan.

Species	Vegetation Type	Indicator of:	Primary Reasons for Selection	Predicted Population Trend
Elk	PP/MC	general forest conditions	Indicates early successional stages, grass, openings, water distribution, road density and disturbance, thermal or hiding cover, and the overall job of wildlife coordination with timber management. Basis for state strategic plan and of economic importance.	Increase
Turkey	PP/MC	Vertical diversity – forest mix	Indicates forest openings, grass, insects for poults and well-distributed waters. Turkeys require a minimum of four roosts per section (large trees in clumps with large lateral limbs on sidehills). Good production requires fair or better range condition with rest-rotation and proper stocking. Indicates good nesting cover near water and open stocking. Indicates good nesting cover near water and open foraging areas.	Increase

Species	Vegetation Type	Indicator of:	Primary Reasons for Selection	Predicted Population Trend
Pygmy Nuthatch	PP/MC	Old growth pine	Requires vertical diversity and specific old growth characteristics in the upper range of the sawtimber stage. Sensitive to silvicultural treatments in old growth.	Increase
Violet-green swallow	PP/MC	Cavity-nesting habitat	Indicates old growth, water and snags.	Increase
Western Bluebird	Pp/mc	Forest openings	May indicate heavy cutting of the conifer type and too many openings in one area.	Increase
Hairy Woodpecker	PP/MC	Snags	Species chosen to indicate the minimum legal compliance standard for snag densities. High densities at upper elevations may indicate insect outbreaks. Primary excavator, utilizing a variety of species snags.	Increase
Goshawk	PP/MC	Vertical diversity	Requires 20% of 5,000 acre management units to be managed for vertical diversity "old growth" characteristics.	Increase
Abert Squirrel	PP/MC	Successional stages of pine	Dependent on pole sized ponderosa pine.	Increase
Ash-throated Flycatcher	P/J	Ground cover	Indicator of grassland modification, public issue.	Increase
Gray Vireo	P/J	Tree density	Sensitive indicator of livestock grazing in wetlands, economically important.	Decrease
Townsend's Solitaire	P/J	Juniper berry production	Probably was designed to measure changes in acreage of mature juniper, although no notes are available on why the species was selected. Species wasn't in final May 1982 list as candidate MIS.	Decrease
Plain Titmouse	P/J	General woodland conditions	Requires old growth characteristics in the pinyon-juniper type. Sensitive indicator of P-J woodland modification, utilizes juniper snags	Decrease
Common Flicker	P/J	Snags	Snag availability and ants.	Increase
Spotted Towhee	P/J	Successional stages of pinyon-juniper	Indicates high, mid-story and shrub densities. Requires mid-successional stages in the pinyon/juniper type.	Increase
Spotted Towhee	chaparral	Shrub density	Indicates overstory composition and crown density. Indicates species diversity.	Increase
Black-chinned Sparrow	chaparral	Shrub diversity	Indicates overstory composition and crown density. Indicates species diversity.	Increase
Savannah Sparrow	desert grassland	Grass species diversity	Species wasn't in final May 1982 list as candidate MIS.	Increase
Horned Lark	desert grassland	Vegetation aspect	Increases with moderate to heavy grazing.	Increase
Black-throated Sparrow	desert-scrub	Shrub diversity	Increases in density as grazing pressure decreases, but this species increases in overgrazed desert grassland.	Increase
Canyon Towhee	desert-scrub	Ground cover	Decreases with overgrazing.	Increase

Species	Vegetation Type	Indicator of:	Primary Reasons for Selection	Predicted Population Trend
Bald Eagle	Low elev. riparian	General riparian	An increase in nesting or winter use along the Salt and Verde Rivers may indicate the riparian condition is improving.	Increase
Bell's Vireo	Low elev. riparian	Well-developed understory	Indicates a well-developed understory	Increase
Summer Tanager	Low elev. riparian	Tall, mature trees	Indicates a good overstory	Increase
Hooded Oriole	Low elev. riparian	Medium-sized Trees	Indicates a good overstory	Increase
Hairy Woodpecker	High elev. Riparian	Snags, cavities	Indicates the snag components	Increase
Arizona Gray Squirrel	High elev. Riparian	General riparian	May indicate alder component	Increase
Warbling Vireo	High elev. Riparian	Tall overstory	Indicates a tall tree overstory	Increase
Western Wood Pewee	High elev. Riparian	Medium overstory	Indicates mid-story	Increase
Common black-hawk	High elev. Riparian	Riparian streamside	Indicates upper elevation riparian in a good condition with perennial stream and fish prey base available.	Increase
Marcro-invertebrates	Aquatic	Water quality	Presence and composition reflects water quality, management practices, permanent water	NA

Forest-wide General Vegetation and Habitat Trends

The Forest Plan contains little information on vegetation communities other than commercial timber lands. The range section of the EIS and Plan contains the only descriptions and acreages of vegetation types for the Forest found in either document and the types are presented in terms of grazing capacity, not habitat. The following tables describe trends in MIS habitat from 1985-2005 as described in the 1985 TNF Plan. See Appendix 2 for tables describing vegetative change.

TABLE I-2. 1985 Reference MIS Habitat/Vegetative types, Tonto National Forest.

Vegetation Type	1985 Forest Plan Acres (Range)	1985 MIS Vegetation Type Acres
Ponderosa Pine Mixed Conifer	283,204	283,204
Pinyon/Juniper	1,155,722	1,155,722
Chaparral	265,480	265,480
Desert Grassland	316,894	316,894
Desertscrub	605,363	774,220
Mesquite	169,857	-

Riparian	35,022	35,022
Other-Pvt-Barren	41,750	12,750
Aquatic – water		29,000
Total Acres	2,873,292	2,873,292

TABLE I-3. 2005 Vegetative trend for MIS in the Ponderosa pine/ mixed conifer habitat type, Tonto National Forest.

Size/Age Class	1985[1] Composition Acres	2005[1] Composition Acres	% Change 1985-2005	1985-2005 PP/MC Vegetation Trend
Grass/Forb/Shrub	2,775 (0.7%)	19,905 (4.7%)	+ 617%	Upward
Seedling/Sapling	15,805 (3.7%)	18,126 (4.3%)	+ 15%	Upward
Poles/Sawtimber (61-80)	380,011 (89.8%)	359,461 (85.4%)	- 5%	Static/ Downward
Immature Sawtimber	17,010 (4%)	16,767 (4%)	- 1%	Static
Mature Sawtimber	7,640 (1.8%)	6,879 (1.6%)	- 11%	Downward
Total Acres	**423,241**	***421,138**	**-0.5%**	**Static**

[1] Acre totals for 1985 and 2005 are higher than table I-2 for several reasons. 1) Only TNF Plan Management Areas 4D and 5D include timber that is inventoried for Size/Age Class and possible timber harvest. Because there are several other Management Areas on TNF that have ponderosa pine/mixed conifer but are not inventoried, they are included in the Poles/Sawtimber (61-80 year class) by default. 2) Mapping technology has improved the last 20 years.

*** 2005 total acres are lower than 1985 acres due to type conversion by road construction and/or wildfire.**

Table I-4. Desert Grassland Trend 1985-2005, Tonto National Forest.

Note: 1985 acreages are taken from the 1985 TNF Plan Management Area descriptions for tables I-4 – I-7 and not the acreages in table I-2.

Desert Grassland Trend Forest-wide	1985 Acres	Current Condition 2005 Acres	Trend
Declining	ND	7,575	
Stable	38,370	31,232	
Upward	ND	171	
Total (s)	38,370	38,978	+ 1.6% (Upward/Static)

Table I-5. Desert Scrub Trend 1985-2005, Tonto National Forest.

Desert Scrub Trend Forest-wide	1985 Acres	Current Condition 2005 Acres	Trend
Declining	ND	212,275	
Stable	909,418	463,336	

Upward	ND	221,160	
Total (s)	909,418	896,771	-1.4% (Downward/Static)

Table I-6. Chaparral/PJ Trend 1985-2005, Tonto National Forest.

Chaparral/Pinyon-Juniper Trend Forest-wide	1985 Acres	Current Condition 2005 Acres	Trend
Declining	ND	102,030	
Stable	1,403,817	818,246	
Upward	ND	49,3710	
Total (s)	1,403,817	1,413,986	+ 0.8% (Static)

Table I-7. Riparian Trend 1985-2005, Tonto National Forest.

*Riparian Trend Forest-wide	Riparian Acres Low Elevation (1,500-3,500 ft.)		Riparian Acres High Elevation (3,500 ft. +)		Total	Trend
	*I-III	IV-VI	I-III	IV-VI		
1985	4,243	26,904	5,782	4,450	41,379	
2005	4,243	26,904	5,782	4,450	41,379**	No Change

ND – No Data

* **Riparian Structural Types** (Higgins and Ohmart 1981): I – tall trees (.20'), dense canopy, multi-storied; II/III – two-storied; similar to I but less dense canopy, paucity of understory; IV – dominated by vegetation below the tree layer, but containing widely spaced mature trees; V – vegetation <15 feet high, few if any mature trees; VI – vegetation <10' high. Acres listed under "V" include categories IV, V, and VI combined. Acres listed under "II/III" include categories I, II, and III combined. Low elevation is below 3,500 feet, high elevation is above 3,500 feet.

The NWI GIS layer was used to produce the 1985 estimate of riparian acres for the Management Indicator Species (MIS) table below. Mapping rules include:

1. An elevation break of 3500 feet was used to separate low from high elevation riparian areas.
2. Riparian areas include all polygons and lines with delineated/mapped riparian vegetation (Rp), and include both scrub-shrub (SS) and forested (FO) types and all delineations of cover types (MQ, CW, SC, MB, JU). According to National Wetland Inventory conventions, vegetation is mapped if cover is 30%.
3. The only wetland polygons included are the palustrine system types that include a vegetation call (PSS or PFO).
4. A width of 30 meters was chosen to provide for two dimensional calculation of acreage for all line segments with mapped riparian vegetation cover. Based on stream channel cross-sections, the average floodprone area sampled is about 60 feet (20 meters). This does not include older riparian vegetation on higher fluvial surfaces (abandoned terraces). Therefore, a 30 meter width was used to calculate acreage for riparian areas.
5. Lines or polygons of perennial streams were no included if they were not labeled as vegetated stream channels.
6. The vegetation information from the NWI GIS layer only allows for vegetation to be classed into two groupings of the original six structural layers defined by Higgins and Ohmart. The table places structural types I, II, III into one group and types IV, V, VI into another.

****Estimate for riparian area acreage (2005)**

There has been no re-mapping effort of current aerial photography, and therefore no way to estimate the riparian acres for 2005. There are no universal or apparent trends that can be summarized for the streams or riparian areas of the Tonto National Forest. Grazing management has remained the same in some places, and changed in others. Other disturbances affecting riparian areas include floods, occurring most recently in 1993 and 1995, and drought and fire. During the drought after 2000, mortality was noted in some riparian areas. Fires may have changed the structure and composition of riparian areas forest-wide.

In terms of total acres for each vegetation type, changes or type conversions from one vegetation type to another type or non-vegetation type have been limited. Changes or reductions in acres have resulted from new highway construction, forest road construction, off-highway vehicle use, Plan 6 Dam Maintenance, campground construction, and repeated wildfires in the desertscrub and Ponderosa Pine/Mixed conifer vegetation types. New highway construction has resulted in the greatest change in acres from vegetated to a non-vegetated cover.

Management Treatments and Other Changes - Seral Stage Interpretations

Changes in vegetation on the TNF due to resource management activities or catastrophic events are successional in nature and have the greatest effect on MIS forest-wide. Little quantitative or qualitative data exist that tracks changes in seral stage or movement toward desired future conditions since 1985. The following section lists major resource management activity categories and ways in which these activities have affected habitat. Currently, the authors have no data on the acres affected or seral stage change by vegetation type for each management activity. However, the above tables represent cumulative changes from timber harvest, prescribed burns, recreation, livestock grazing, mining and wildfire.

1. **Timber Management**

   - Timber management includes both commercial timber and fuelwood sales. Private fuelwood use also falls under this functional area. Timber management activities may include overstory removal and thinning, as well as, road construction/closure, clearing, prescribed burning and similar activities. The number of acres treated by each silvicultural method was not available for inclusion in this report. In general, silvicultural treatments of commercial forest lands have followed management direction in the Forest Plan. TNF Management Areas (MA) 4D and 5D are the only MA's that are inventoried for commercial timber harvest.
   - The overall change in seral stages by vegetation type may be categorized as the following (see table I-2):
     Early Seral – Grass, Forb, Shrub, Seedling, Sapling
     Mid Seral – Poles/Sawtimber and Immature Sawtimber
     Late Seral – Mature Sawtimber
   - The amount of acres treated and the overall change is included in the table in Appendix 2, but not broken out specifically.

2. **Prescribed Burns**
   - The Forests has had an active prescribed burn program since 1985. Treatment has occurred primarily in chaparral, woodland and conifer vegetation associations. Prescribed burning has been used alone and in combination with other treatments, such as fuelwood or timber harvest. Prescribed fire may

change vegetation to an earlier seral stage (chaparral) or change a component within a seral stage (litter, herbaceous, etc.).

- The amount of acres treated and the overall change is included in the table in Appendix 2, but not broken out specifically.

3. Recreation

- Managed recreation activities are usually associated with the development of campgrounds and associated infrastructure and other facilities such as parking lots, boat ramps and toilets. Recreation development on the TNF has been extensive since 1985.
- The amount of acres treated and the overall change is included in the table in Appendix 2, but not broken out specifically.

4. Livestock Grazing

- Numbers of livestock grazing on the Forest have declined dramatically since 1985. Several allotment management plans have been revised, but implementation of these plans is often slow due to funding. Current allotment analysis evaluates capacity and management alternatives attempt to stock to those levels of use. Construction of facilities to manage livestock is no longer a major emphasis because of funding levels. The appearance of drought over the last five+ years has affected range resources and livestock numbers.
- The degree of change in range condition, vegetation component and habitat for MIS is identified in table's I-3-I-5 and is displayed by TNF Management Area in Appendix 2.

5. Lands, Special Uses, Mining

- Four highways that cross the Forest have had major reconstruction and widening since 1985. Two of these highways have gone from two lanes to four with some relocation. Two other highways have been widened and straightened. Acres of vegetation permanently removed have been considerable. Mining operation and special activities have been localized and have not affected significant acreages since 1985.
- The amount of acres treated and the overall change is included in the table in Appendix 2, but not broken out specifically.

6. Wildfire

- Wildfire is usually not considered as a management activity although fire suppression and prevention are. Since 1985, wildfires have had a significant effect on changes in seral stages in all vegetation types on the Forest. Prescribed burn acres are integrated into the tables in Appendix 2 for each vegetation type. The following gives a brief synopsis of fire effects by vegetation type.
    - **Desertscrub:** Wildfires in Sonoran desertscrub cause significant changes in vegetative composition; cacti, paloverde, ironwood and various shrubs are killed by fire. Repeated burns will eliminate these species and will convert the area annual grasses and weeds, bare

ground or similar conditions. The build up of annual grasses during wet periods results in increased wildfire occurrence in this vegetation type.

- **Grassland, Chaparral:** Changes to grassland and chaparral vegetation types from wildfires would be similar to the effects from a prescribed burn. Vegetation is set back to an early seral stage, but generally achieves mature seral stage in a 10 year period.
- **Pinyon/Juniper:** Fires in this vegetation type set back vegetation to an earlier seral stage. Burns are usually in mosaic patterns with numerous unburned patches.
- **Ponderosa Pine:** Wildfires in the ponderosa pine for the most part burn in a mosaic pattern; however, due to extremely dry conditions, the portion of the Chediski Fire on the TNF, killed most of the trees and returned a majority of the area to an early successional stage.

III. MANAGEMENT INDICATOR SPECIES ABSTRACTS

Management Indicator Species Status and Trends

The following section contains an abstract on each MIS. The purpose of these abstracts is to : 1) present information on species status and trends at national, state and forest scales; 2) show forest-wide distribution; 3) relate TNF management activities implemented since 1985 under Forest Plan Standards and Guidelines (S&G's) to habitat trends and MIS; 4) identify Key Habitat Components (KHC's) that appear to be critical to reproduction, forage or other MIS requirements; 5) identify current monitoring techniques for each MIS; and 6) identify the population trend of each species on the forest, if population information is available. The KHC's and monitoring techniques will be used to conduct MIS evaluations of individual projects and attempt to obtain information on populations that are not currently being monitored.

Table I-8. MIS Habitat Trends 1985-2005

MIS Species	1985 Acres	2005 Acres	% Change	Habitat Trend
Elk	423,241	421,138	- 0.5%	Static
Turkey	423,241	421,138	- 0.5%	Static
Pygmy Nuthatch	423,241	421,138	- 0.5%	Static
Violet-green swallow	423,241	421,138	- 0.5%	Static
Western Bluebird	423,241	421,138	- 0.5%	Static
Hairy Woodpecker	423,241	421,138	- 0.5%	Static
Goshawk	423,241	421,138	- 0.5%	Static
Abert Squirrel	423,241	421,138	- 0.5%	Static
Ash-throated Flycatcher	1,403,817	1,413,986	+ 0.8 %	Static
Gray Vireo	1,403,817	1,413,986	+ 0.8 %	Static
Townsend's Solitaire	1,403,817	1,413,986	+ 0.8 %	Static
Plain Titmouse	1,403,817	1,413,986	+ 0.8 %	Static
Common Flicker	1,403,817	1,413,986	+ 0.8 %	Static

MIS Species	1985 Acres	2005 Acres	% Change	Habitat Trend
Spotted (Rufous-sided) Towhee (PJ)	1,403,817	1,413,986	+ 0.8 %	Static
Spotted Towhee (chaparral)	1,403,817	1,413,986	+ 0.8 %	Static
Black-chinned Sparrow	1,403,817	1,413,986	+ 0.8 %	Static
Savannah Sparrow	38,370	38,978	+1.6	Upward/Static
Horned Lark	38,370	38,978	+1.6	Upward/Static
Black-throated Sparrow	909,418	896,771	-1.4%	Downward/Static
Brown (Canyon) Towhee	909,418	896,771	-1.4%	Downward/Static
Bald Eagle	31,147	31,147	NC	NC
Bell's Vireo	31,147	31,147	NC	NC
Summer Tanager	31,147	31,147	NC	NC
Hooded Oriole	31,147	31,147	NC	NC
Hairy Woodpecker	10,232	10,232	NC	NC
Arizona Gray Squirrel	10,232	10,232	NC	NC
Warbling Vireo	10,232	10,232	NC	NC
Western Wood Pewee	10,232	10,232	NC	NC
Common black-hawk	10,232	10,232	NC	NC
Marcro-invertebrates	N/A	N/A	N/A	N/A

1. ELK: Cervus elaphus

MIS Role: General forest conditions in ponderosa pine/mixed conifer

SUMMARY OF KEY HABITAT COMPONENTS

- Forage/Cover between 60:40 and 50:50
- Open road densities < 1/mi^2
- Potable water every 1 mile preferably every ½ mile
- Cover stands should exceed 80 ft^2 of basal area
- Ameliorate forage competition through use of conservative utilization levels and allocation of use

Species Description (from Hoffmeister 1986)

A member of the deer family, the elk lives in close association with the deer. Only the male elk carry antlers which are not palmate. They can spread more than 5 feet. Antlers grow during the summer and are shed in the late winter. The cows (female elk) are smaller than the male and do not have antlers. Mature bulls stand up to 60 inches at the shoulder and may weigh over 700 pounds. Their overall color is brown with head, mane, neck and legs dark brown or blackish. A whitish or tawny colored rump patch is distinctive.

Distribution

When the first European settlers arrived in Arizona, the species of elk encountered was Merriam's elk, found only in the White Mountains. This species was probably extirpated by 1920, being replaced by the nonnative Rocky Mountain or American elk, which was introduced into the state as early as 1913 (Hoffmeister 1986).

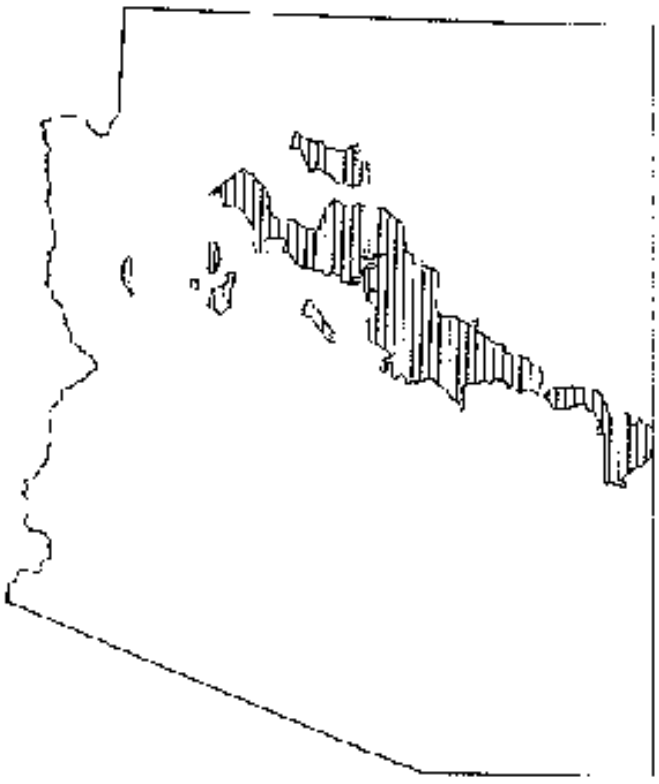
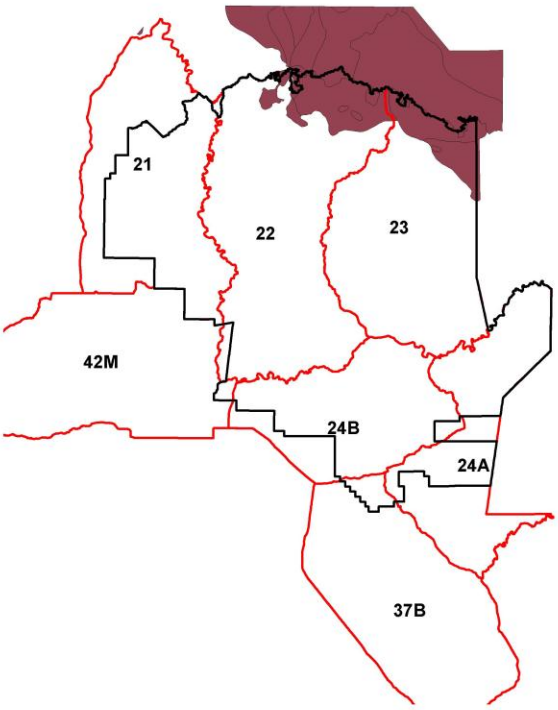


Figure ELK-1: AGFD elk distribution map from www.azfd.com

This is the most common species of elk now found in the interior west.

Presently, elk occupy much of north-central Arizona (Figure ELK-1). On the Tonto National Forest elk are found in the northern portions of Arizona Game and Fish Game management units 21, 22, and 23. Elk management in Region IV is complicated because of the seasonal range overlap between herds from Regions I and II as well as the Fort Apache Indian Reservation (Hanna, *et al.* 1996).

Figure ELK-2: Arizona Game & Fish Department Game Management Units (in red) found on the Tonto National Forest



Habitat

Thomas *et al.* (1979, p. 109) said, "*Optimum…elk habitat is the amount and arrangement of cover and forage areas that result in the maximum possible proper use of the maximum possible area…".* Thomas *et al.* (1988) in developing a habitat-effectiveness model for winter ranges in the Blue Mountains of Oregon identified the following habitat attributes as important: 1) Size and spacing of cover and forage areas; 2) Road density of open roads; 3) Quantity and quality of forage; and 4) The quality of available cover. Armentrout *et al.* (1997) identifies similar management needs but cautions that, because of their (elk and mule deer) complex habitat needs, habitat management should be at the landscape scale and not on individual units. Additionally, desired habitat conditions need to be expressed in relation to the landscapes ecological potential.

Optimum habitat for elk requires cover, which Thomas *et al.* (1979) defined as two types, thermal and hiding. Although some authors have questioned the use of these terms, there is general agreement that elk show a preference for certain stand characteristics as cover (Thomas *et al.* 1988, Towry 1984). Most authors have concluded that management should target a forage-to-cover ratio of 60:40. Brown (1987) suggested that a cover component slightly over 60% might be optimum for Arizona and suggest that management should strive for a 50:50 to 60:40 forage to cover ration. Thomas *et al.* (1988) defined cover as either satisfactory or marginal and stated that if a stand was neither satisfactory nor marginal cover then it was a forage stand. They define satisfactory cover as a stand of coniferous trees 40 feet or greater in height with an average canopy closure of 70% or greater. Marginal cover is defined as a stand of coniferous trees 10 feet tall or taller with an average canopy cover of 40 to 69%. Clary (1972) indicated that optimum forest densities for elk, mule deer and turkeys are between 40 and 80 square feet of basal area per acre (60 in smaller size classes and 70 in the 12-22

inch d.b.h. class). Lower densities do not provide adequate cover and higher densities do not allow adequate herbaceous understory to develop (Severson and Medina 1983). The quality of available cover is important, and is best expressed by what percent of available cover is considered marginal and what percent is satisfactory. Obviously, the higher the amount of satisfactory cover, the better the habitat would be for elk.

Habitat effectiveness for elk is adversely affected by the presence of roads open to vehicular traffic (Thomas *et al.* 1979). Thomas *et al.* (1988) indicated a habitat effectiveness of 0.4 for elk when open road densities are approximately 3 miles per square mile of habitat. Towry (1984) indicated that, miles of road per square mile of habitat should not exceed 1 for primitive road, ½ for secondary, and ¼ for primary roads.

Breeding

Breeding occurs in September. Calves are dropped in May or June after a gestation period of about 8 months (Hoffmeister 1986). Females leave the herd and disperse widely prior to giving birth. Because elk calves are highly susceptible to predation, ground concealment in the form of dense live woody vegetation, tall grass, downed woody debris, or slash piles in close proximity to water and on gentle terrain is probably important (Brown 1987). This period of seclusion lasts between 1 to 3 weeks (Altman 1956, 1963; Knight 1970).

Food Habits

A diverse mosaic of forage conditions is desirable in managing elk populations. Studies indicate that the summer diet comprises 75% of grass/grass-like plants, increasing to 92% in the fall (due to forbs becoming less palatable and declining to 22% in the winter, when snow depth renders many grasses unavailable to elk (Towry 1984). Browse makes up 57% of the winter diet, with Gambel oak being the most prominent (Towry 1984). The quantity and quality of forage available for elk populations is a more appropriate means of determining habitat effectiveness (Thomas *et al.* 1988, Beck *et al.* 1997). Wisdom and Thomas (1995) state that "*On relatively unproductive rangelands of the Great Basin and Desert Southwest, it is likely that cattle use >25% will negatively affect forage conditions for elk, and vice-versa.*" Especially important is the quality of forage available in the fall to store fat reserves for winter and spring forage to replace fat reserves and satisfy gestation requirements. There is some evidence to suggest below normal reproductive success for animals using low-quality summer range (Towry 1984). One measure that Thomas *et al.* (1988) used to measure forage conditions was the percent of forage weight remaining on October 1. Summer migration usually begins in late March and winter migration usually begins in late November. The timing of summer migration is keyed to the green-up of various grasses. Elk prefer to eat grasses, sedges and forbs. At some times of the year, they may eat shrubs, tree leaves, pine needles, acorns and willows.

Another special requirement is the availability of free water. Though this need may be partially met seasonally due to snow or the succulence of the forage consumed, in general distance to potable water is needed every ½ mile (Thomas *et al.* 1979, Towry 1984, Brown 1987).

Tonto National Forest MIS Status

The Tonto National Forest relies on survey data collected by the Arizona Department of Game & Fish (AGFD) for population numbers and trend analysis of all game species {CFR 219.19(6)}. The FLMP specifically states (page 211) that for elk, turkey and Abert's squirrel population trend will be established using AGFD harvest data records, hunter questionnaires, and supplemented by currently acceptable field sampling techniques as necessary. The AGFD uses this data to set harvest regulations and population goals for the species under their jurisdiction.

In the Tonto Forest Land Management Plan (FLMP) elk were selected as a Management Indicator Species for the ponderosa pine and mixed conifer vegetation types (Appendix G, Tonto FLMP) and were considered to be an indicator of general forest conditions.

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the conifer vegetation type was determined to cover approximately 283,200 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired management condition at the end of the fifth period. The most recent analysis indicates the quantity of conifer acres has not changed (- 0.5% forest-wide) although some shifting upon the landscape has occurred. This habitat type is well represented and distributed across two Districts of the Tonto.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for elk are:

1. VSS distribution should reflect the following table [may vary +/- 3%]:

Vegetation Structural Stage			Desired Future Condition	
Description	**Class**	**dbh**	**by %**	**by acres**
Grass-forb/shrub	1	0 to 0.9 "	10%	28,320
Seedling/Sapling	2	1.0 to 4.9 "	10%	28,320
Young Forest	3	5.0 to 11.9 "	20%	56,640
Mid-aged Forest	4	12.0 to 17.9"	20%	56,640
Mature Forest	5	18.0 to 23.9"	20%	56,640
Old Forest	6	> 23.9 "	20%	56,640
				283,200

2. Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover. (Amendment No. 22, 06/05/96, replacement page 40-1)

3. Allow for forage to maximize Threatened and Endangered (T&E) species, management indicator species and emphasis harvest species (page 42).

4. Using Desired Future Condition as a guide, optimize wildlife outputs in all management units by coordination of other resource activities and direct habitat improvement projects (page 42).

5. Provide a minimum of four waters per section in small game and one water per section in big game key areas. (Amendment No. 22, 06/05/96, replacement page 42)

Specific direction is also given for individual management units in the FLMP. Below are some additional guidelines that are of importance to the management of the elk:

1. It also calls for providing 5 acre patches of hiding cover over 10% of an area that is identified as a calving area. (Amendment no. 20, 1/11/95 replacement page - 153)

2. Allotment management plans and rotation schedule will be formulated and implemented to avoid elk displacement from identified calving areas. (Amendment no. 22, 06/05/96 replacement - page 155)

3. Provide openings (2-40 acres in size) on 8% of the tentative suitable ponderosa pine/mixed conifer type. (Amendment no. 22, 06/05/96 replacement - page 155)

4. On those acres suitable for timber harvest strive to achieve a structural diversity similar to the table below (Amendment no. 22, 06/05/96 replacement - page 156):

% of Acres	Age Class	Size Class	Management Indicator Species	Cover Class
8[1/]	0	Permanent Openings	Elk, turkey, western bluebird, violet-green swallo	Forage
13.3	0-20	Regenerated Seedlings	Elk, turkey	Forage
13.3	21-40	Saplings/Poles	Elk, turkey	Forage - Hiding
13.3	41-60[2/]	Poles	Elk	Forage - Hiding
13.3	61-80[2/]	Poles/Sawtimber	Elk, Abert's squirrel	Hiding/Thermal – Forage
13.3	81-100	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird	Thermal

% of Acres	Age Class	Size Class	Management Indicator Species	Cover Class
13.3	101-120	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow	Thermal
10.0	121-180[3/]	Sawtimber/Vertical Diversity	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch	Thermal/Forage
10.0	181-240[3/]	Sawtimber/Vertical Diversity	Elk, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch, goshawk, turkey	Thermal/Forage

[1/] This is percent of tentative suitable lands

[2/] These two age classes comprise the pole timber class in suitable forest land. Thirty-eight percent of the pole acreage will be managed at 120+ BA to meet special wildlife habitat stands.

[3/] These must be mistletoe free stands

This roughly indicates that management should strive for a forage-to-cover ratio of between 60:40 and 70:30.

5. Do not exceed more than 7 miles of arterial and collector roads within 5,000 acres. This is roughly a density of approximately 0.9-miles/square mile or less. (Amendement No. 12 04/10/91 replacement page 159)

The EIS (page 107) indicated that the population estimate for elk in 1983 was 400 animals and that the Forest hoped to increase that to 475 in the first period (end of 1995), or a 19% increase. Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 269) predicted a trend of a 67% increase of elk by the year 2030 (Table 11).

Population Trends

This species is listed as G5, N5, and S5 (NatureServe 2001). This means that the species is considered to be demonstrably widespread, abundant, and secure, globally, nationally (USA), and statewide (AZ).

Because of their primary responsibilities for managing wildlife, the main data source for elk population trend comes from the Arizona Game and Fish Department. The Department utilizes a model to estimate elk populations. This model only provides a rough estimate of numbers and the outputs are best used to estimate population trend, rather than actual numbers (AGFD 1998). For current trend analysis, we have used the total pre-hunt population numbers (bulls, cows, and calves) to display trends to get a picture of total population trend (see Figure Elk-4 and Elk-5). The appropriate comparison to evaluate population trends on the Forest is to use outputs from the Department's population model found in one document, rather than comparing numbers in older documents to recent model outputs.

Figure Elk-4: Estimated adult elk population for Game Management Unit 23

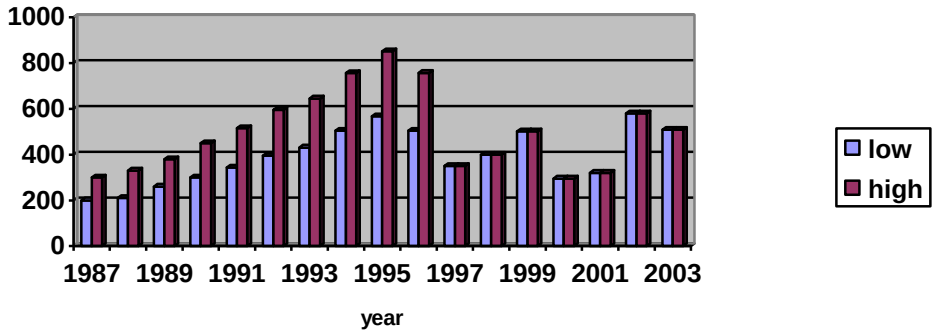
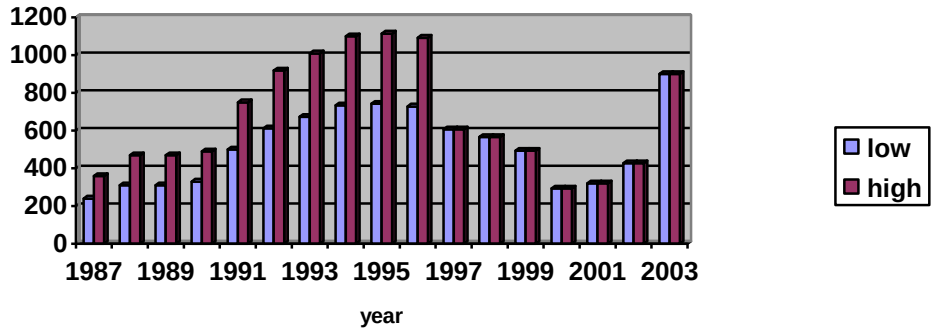


Figure Elk-5: Estimated adult elk population for Game Management Unit 22



Rocky Mountain elk populations have increased in Arizona since their initial introduction in 1913 (AGFD 1989) as well as on the Forest since the early 1980's. As previously mentioned, there are three game management units on the Tonto. In 1987, the estimated pre-hunt population for elk in Region VI was between 440 and 660 and in 1996 it was projected to be between 1233 and 1849 (Hanna, *et al.* 1996). The charts above were developed based on Hanna, *et al.* (1996). As demonstrated above, elk populations peaked in the late 1990's and have apparently stabilized in both Game Units. Information was not available for Unit 21; however this unit does have a small population

of elk. Drought conditions in the last 5 years have likely negatively affected population trends.

In the *Arizona Wildlife and Fisheries Comprehensive Plan* (USDA 1990) the goal was to manage elk populations near habitat potential and to improve habitat to its potential. By 1995 the objective was to show increase habitat capability by 14 percent on National Forest Land. *Wildlife 2006* (AGFD 2001) indicates that statewide objective is to maintain herd numbers between 25,000 and 35,000.

Elk numbers are currently held in check by hunting, both sport and depredation. Habitat in general and conifer vegetation types in specific have not proven to be a limiting factor for population expansion. This leads to speculation that the assumptions made during the FLMP, which led to the selection of elk as an MIS for the conifer type, may not have been correct. Population levels will instead be determined by hunting pressure.

In 1985 elk were a popular, but not necessarily widely spread game species. Monitoring elk numbers was considered an index for the extent and health of the conifer vegetation type. Limiting factors at the time of FLMP implementation were believed to be hiding cover and forage. In 2005, we recognize that elk are far more adaptable in Arizona than previously believed, and occupy a wide variety of habitats at all times of the year.

Tonto National Forest Population Trend

On the Tonto National Forest, populations of elk have increased since implementation of the Forest Plan in 1985. Wintering populations have probably exceeded expected increases (Appendix 1) with populations continuing to expand into suitable habitat (see Elk figure 4 and 5 above for data on Game Units that lie on the Tonto National Forest).

Resident elk numbers in Units 22-23 appear to be **stable** at this time. Last fall, 900 and 494 elk were surveyed, respectively, showing a bull to cow ratio of 60:100. The calf crop was 37 calves per 100 cows. Poor calf recruitment over the last several years appears to be a response to the prolonged drought conditions in these Unit's. Portions of Unit 23 in the Canyon Creek area were burned in the Rodeo-Chediski Fire and will have an impact on elk populations there. Other fires have improved winter range and foraging parameters but have reduced thermal, hiding and escape cover. This is reflected in the large increase in the grass/forb/shrub component for the ponderosa pine/mixed conifer habitat type forestwide.

Monitoring Methods

Monitoring of populations will remain the responsibility of AGFD biologists using techniques developed and approved by the Department. This species is an important game species with numbers regulated by the Department and the Arizona Game and Fish Commission. The Forest's role will be to cooperate in providing habitat to meet goals for the species identified in AGFD/TNF comprehensive plans.

LITERATURE CITED

AGFD. 1989. Report to the big game ranching committee. Arizona Game and Fish Department, Phoenix. 15 pp.

AGFD. 1992. Arizona game survey and harvest data summary. Federal Aid Proj. W-53-M-42. Arizona Game and Fish Department, Phoenix.

AGFD. 1992. Arizona elk management operational plan, public review draft. Arizona Game and Fish Department, Phoenix 38pp.

AGFD. 1993. Arizona elk management operational plan, public review draft. Arizona Game and Fish Department, Phoenix 38 pp.

AGFD. 1993. 1993 elk management report Region VI draft. Arizona Game and Fish Department, Mesa.

AGFD. 1998. Arizona Game and Fish Department regional elk management operational plans. Arizona Game and Fish Department, Phoenix 48 pp.

AGFD. 2001. Wildlife 2006- the Arizona Game and Fish Department's wildlife management program strategic plan for the years 2001-2006. Arizona Game and Fish Department, Phoenix. 91pp.

Altman, M. 1956. Patterns of social behavior in big game. Trans. North. Amer. Wildl. Conf. 21:538-545.

_____. 1963. Naturalistic studies of maternal care in moose and elk. Pages 233-253. *in* H.L. Rheingold, ed. Maternal behavior in mammals. John Wiley & Sons, New York.

Armentrout, D.J., G.D. Brackley and R.J. Boyd. 1997. Thinking too small – managing mule deer and elk habitat using ecological sites in the Great Basin. Pages 121-130. *In* deVos, J.C., ed. Proceedings of the 1997 deer/elk workshop, Rio Rico, Arizona. Arizona Game and Fish Dept., Phoenix.

ASNF. 1999. Considerations concerning stocking rates 1999 Allotment management plans. Apache-Sitgreaves National Forests, Southwest Region. Upbl.

ASNF. 1993. Desired future conditions Ari-Pine Resource Area. Apache-Sitgreaves National Forests, Heber and Lakeside Ranger Districts. Upbl.

Beck, J.L., J.T. Flinders, D.R. Nelson, G.L. Clyde, H.D. Smith, and P.J. Hardin. 1997. Diet selection and importance of management indicator species to elk and domestic sheep in a North-central Utah aspen ecosystem. Pages 131-137. *In* deVos, J.C., ed.

Proceedings of the 1997 deer/elk workshop, Rio Rico, Arizona. Arizona Game and Fish Dept., Phoenix.

Brown, R.L. 1987. Effects of timber management practices on elk: A problem analysis report. Research Branch, Arizona Game & Fish Dept., Phoenix. 48pp.

Clary, W.P. 1972. a treatment prescription for improving big game habitat in ponderosa pine forests. Pages 25-28. *In* Proceedings of the 16th annual watershed symp., Phoenix, Az. Arizona Water Commission, Phoenix. 43pp.

Hanna, J., L. Cooper, H. Apfel and D. Carrothers. 1996. Annual elk management operational plan for game management units 22 and 23. Mesa Region, Arizona Game and Fish Department. Draft

Hoffmeister, D.F. 1986. Mammals of Arizona. University of Arizona Press, Tucson, 213-216.

Knight, R.R. 1970. The Sun River elk herd. Wildl. Monogr. No. 23. The Wildlife Society, Washington D.C. 66pp.

Severson, K.E. and A.L. Medina. 1983. Deer and elk habitat management in the Southwest. J. Range Manage. Mon. No. 2. 138 pp.

Thomas, J.W., H. Black, Jr., R.J. Scherzinger, and R.J. Pedersen. 1979. Deer and elk. Pages 104-127. *In* Thomas, J.W., ed. Wildlife habitats in managed forests—the Blue Mountains of Oregon and Washington. USDA, Washington, D.C., Agric. Handb. 553.

Thomas, J.W., D.A. Leckenby, M. Henjum, R.J. Pedersen, and L.D. Bryant. 1988. Habitat-effectiveness index for elk on Blue Mountain winter ranges. USDA Forest Service, PNW Res. Stat., Portland, OR. Gen. Tech. Rep. PNW-GTR-218. 28pp.

Towry, R.K., jr. 1984. Wildlife habitat requirements. pp. 73-210. *In* R.L. Hoover and D.L. Wills, ed. Managing forested lands for wildlife. Colo. Div. of Wildl. in cooperation with USDA For. Serv., Rocky Mount. Reg., Denver, Colo.

USDA. 1990. Arizona wildlife and fisheries comprehensive plan: Tonto National Forest. USDA Forest Serv., Southwest Region and Arizona Game and Fish Department. 21pp.

Wisdom, M.J. and J. W. Thomas. 1995. Elk. Pages 157-181. *in* P.R. Krausman, ed. Rangeland Wildlife. The Soc. Range Mangement, Denver, Colorado.

2. MERRIAM'S TURKEY: *Meleagris gallopavo*

MIS Role: Vertical diversity and forest mix in ponderosa pine and mixed conifer.

SUMMARY OF KEY HABITAT COMPONENTS

- 20% of the Landscape in small openings
- Grazing levels are such that 60% or more seed heads are carried through winter into the spring
- Potable water every 1 mile preferably every ½ mile
- 30 ft^2 of Oak > 5" drc
- Acres of VSS 4, 5 and 6
- Trees per acre > 20" dbh
- 20% managed for old growth

Species Description (from Sibley 200)

The turkey is a large ground dwelling bird. It has a small head, round wings and a long tail. The head is unfeathered, bluish with a red neck. Males have a larger head with a wattle at the throat, caruncled forehead and a projection behind the bill. The plumage is dark on the breast, belly and upper back with iridescent bronze and green wings, the male having more iridescent plumage.

Southwestern populations have tail and upper tail coverts tipped white or pale buff, creating a different appearance from the darker, rufous-tipped Eastern birds

Distribution

Local resident from central Arizona and central Colorado to northern Iowa, central Michigan, southern New Hampshire and southwestern Maine south to southern Texas, the Gulf Coast and Florida (DeGraff *et al.* 1991)(Figure TURK-1).Figure TURK-2 shows that n Arizona the turkey is found scattered throughout the State. in most areas where ponderosa pine occurs. On the Tonto National Forest Turkeys are found in Game Management Units 22, 23, and 24A (Figure TURK-3).

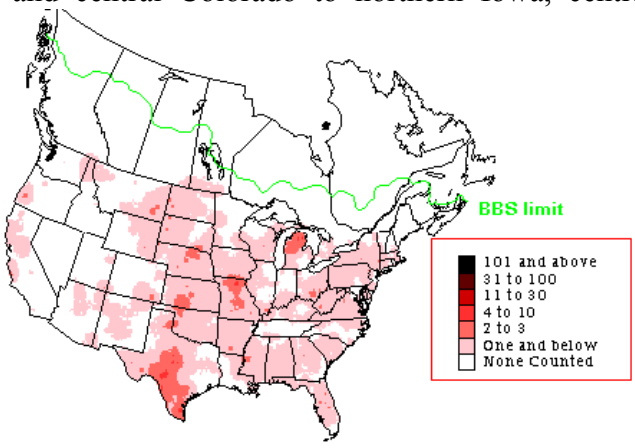


Figure TURK-1: Distribution in North America based on breeding bird surveys. .

Habitat

Figure TURK-2. Merriam turkey distribution in Arizona (AGFD website).

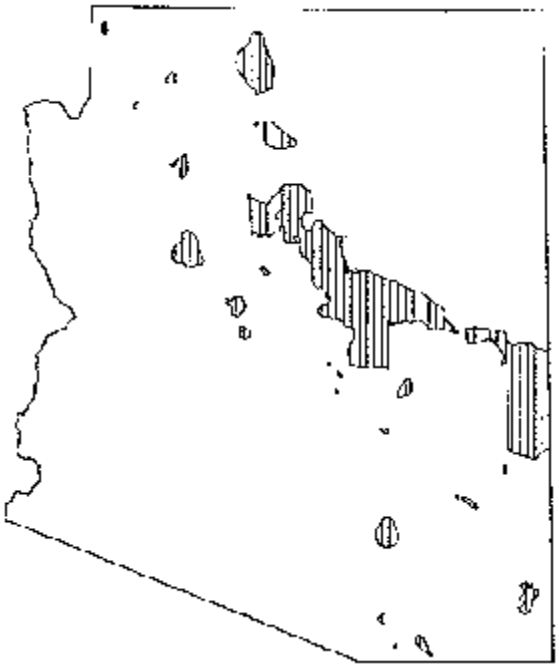
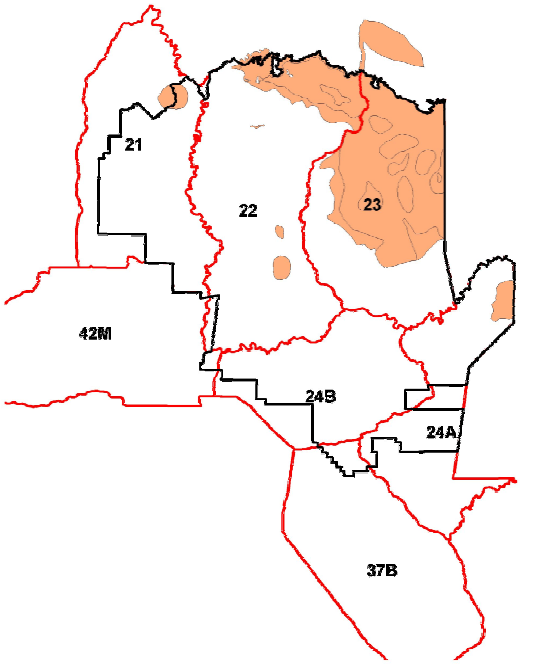


Figure TURK-3: Turkey distribution and Arizona Game & Fish Department Game Management Units (in red) found on the Tonto National Forest



On the Tonto National Forest one of the goals for this species is to manage the populations near habitat potential and to maintain or improve habitat to its potential (USDA 1990). This goal is carried over into *Wildlife 2000*, with an increased emphasis on contiguous medium and high quality habitats. Habitats for turkey's can be broken into breeding, nesting, brood rearing, roosting and winter habitats (Hoffman *et al*. 1993). Each of these is important in determining the overall health of the turkey population. As pointed out by Hoffman *et al.* (1993), habitat management for turkeys must involve 1) preservation of existing habitats, including maintaining diversity and protecting corridors and buffer zones to prevent habitat isolation and 2) careful manipulation of habitats to enhance carrying capacity.

Habitats used by this species include ponderosa pine, ponderosa pine/gambel oak, and pinyon/juniper. Wakeling (1991) felt that turkeys would inhabit any vegetation type as long as an adequate food base and habitat structure was present. Rumble and Anderson (1995) found in the Black Hills that ponderosa pine with high canopy covers were more important as winter habitat than initially thought. They attributed this to pine seed being a preferred winter food in the Black Hills. As winter habitat, they felt that importance increased with increased canopy cover and increased structural stage. As summer habitats, they found the reverse true for ponderosa pine. Since turkey diets in the summer are mostly seeds and leaves and an inverse relationship occurs between canopy cover and

understory production, higher turkey use was associated with canopy covers less than 40%.

Timber and grazing management practices appear to directly alter turkey habitat. Turkeys tend to select areas with high cover values and clumpy distributions. They may use large areas of more uniformed tree distribution with less cover value, but at a higher risk of predation due to reduced escape cover. Wakeling (1991) suggested the following in managing turkey habitat:

- Timber treatments that improve within stand diversity, retain clumpy characteristics, and maintain high cover values will provide suitable turkey habitat.

- Stand size should be less than 20 acres and should differ by at least 30-ft2/acre basal area and average DBH of 4 inches.

- Large down logs and culls from logging should be left in the forest.

- Turkeys require tall herbaceous vegetation for nesting and brood rearing. Grazing levels that result in low herbaceous cover directly influence the suitability of habitat.

- Turkeys rely on grass seed during fall and early winter. Grazing levels on winter range can influence winter survival by reducing forage availability.

- Regardless of the grazing source, levels that reduce herbaceous cover below 10 inches on nesting and brood range, or remove more than 60% of the seed heads on winter range, probably reduce the productivity and survival of turkeys.

Hoffman *et al.* (1993) provides considerable detail regarding management of the landscape for wild turkeys. Below summarizes some of these recommendations, many of which are similar in nature to what has been previously mentioned.

Ponderosa pine habitats:

- Manage for- 20% openings
- 25% stands > 100 ft^2 BA/acre of which 15% should exceed 130 ft^2
- 20% stands > 80-100 ft^2 BA/acre
- 35% stands > 50-80 ft^2 BA/acre
- Stands that are less than 100 ft^2 BA/acre should not be located immediately adjacent to openings. Additionally if environmental conditions preclude attaining these goals, this does not necessarily discount the area as turkey habitat.

Oak habitats:

- Oaks growing in arborescent form should be maintained in a patchy distribution at basal areas of 30 ft^2 per acre or more.

- Conifer stands adjacent to oak stands should be maintained at basal areas > 30 ft^2 per acre.

- Because of their potential to produce mast, all mature oaks should be protected. Thickets of shrub growing oaks, especially adjacent to openings, should be protected for their value as nesting and escape cover.

Pinyon-juniper habitats:

- Management should be directed at maintaining mature stands with varying degrees of canopy closure:
    - Canopy closures in excess of 40% furnish seeds and berries and provide cover.
    - Canopy closures of less than 40% contain more understory vegetation that adds to the forage base for turkeys.
    - Canopy closures in excess of 70% contain virtually no grasses, forbs or shrubs.
    - The best PJ stands for turkeys are those that are mixed with or are adjacent to ponderosa pine stringers.

- Openings:
    - Openings are extremely important to turkeys. This habitat component is an important source of invertebrates, which are critical to the proper growth and development of turkey poults. They are also used for year-round feeding and springtime breeding. They become even more important if adequate forage is not available under the forest canopy.

- Roost Sites:
    - Manage for roost sites rather than individual roost trees. These sites ideally are located on easterly aspects on the upper 1/3 of slopes, encompass ¼ acre or more, exceed 80 ft^2 BA/acre, and include at least 5 mature trees with a minimum dbh of 20 inches. Management should stress protection of current roost sites.

- Water developments:
    - Free-standing water should be available on every square mile to ensure utilization of all suitable habitats.

- Grazing management:
    - Proper grazing management is imperative to maintaining good turkey habitat. The value of intensively grazed habitats that are not periodically rested is greatly diminished. Ideally 800 pounds/acre of

standing herbaceous biomass greater than 10 inches in height should be maintained within openings to provide cover and food for poults.

- Roads:
  - High road densities and frequent use by people can cause turkeys to abandon some habitats. Roads should be eliminated from meadows where possible.

- Recreational development:
  - Placement of recreational developments near openings, riparian areas, roosting sites, or other key habitats should be avoided.

Breeding

Turkeys nest in slight depressions on dry ground. The nest is usually found at the base of a tree, beneath a bush, or under a log. Nests are usually near water and close to strutting grounds. The onset of breeding is heralded by the commencement of gobbling as the temperatures warm in the spring. Gobbling may start late in February and early March. With a second peak of gobbling occurring in early May. Toms may continue to gobble into June. Hens mate once and may fertilize all of the 8 to 12 eggs from one union. Incubation takes 28 days. The hen does not begin to incubate until all the eggs are laid and all the eggs hatch within a single day. The young are capable of moving from the nest soon after hatching. The hens and poults spend the rest of the summer eating, loafing, and gaining weight. As winter approaches hens and poults begin to form flocks with other hens and poults. These become winter flocks. These flocks winter as high up on the mountain as snow permits. The cycle begins again in the spring.

Food Habits

Wakeling (1991) felt that diversity of mast and forage species are probably the most essential items for any range to support turkeys. Hoffman *et al.* (1993) indicated that although turkeys are highly selective feeders, they use many different food items depending upon availability. For example, pine seeds and acorns comprise 80-90% of their diet when available; however grasses are the most dependable and consistently used food source.

Our habitat studies have also taught us much. Nesting habitat was identified as dense, clumped cover on steep slopes with greater than average overhead cover. Steep slopes (>50%) and horizontal screening cover may be the 2 characteristics most important to nesting turkeys. Feeding habitat for hens with broods was comprised of small (<0.25 ac) openings within the forest, with greater herbaceous species richness than surrounding sites. These sites were frequently interspersed within close proximity of dense pole stands that might exceed 140 ft2/ac basal area. These dense sites were used for loafing (mid- day resting) by hens and broods. Loafing and feeding complexes were also important to hens without poults. Loafing habitat became substantially less important

during winter. Feeding sites were dominated by mast-producing trees, generally Gambel oaks and alligator junipers, although ponderosa or pinyon pine might also provide substantial food sources. Acorns were probably preferred, but juniper berries provide a stable, if less favored, food source in many Arizona habitats.

(Wakeling, 2002 www.azgfd.com/frames/fishwild/idx_papr.htm)

Tonto MIS Status

In the Tonto Forest Land Management Plan (FLMP) Merriam's Turkey was selected as a Management Indicator Species for the ponderosa pine and mixed conifer vegetation types (Appendix G, Tonto FLMP) and was considered to be an indicator of vertical diversity and the general forest mix.

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the conifer vegetation type was determined to cover approximately 283,200 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired management condition at the end of the fifth period. This habitat type is well represented and distributed across two Districts of the Tonto.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for turkey are:

1. VSS distribution should reflect the following table [may vary +/- 3%]:

Vegetation Structural Stage			Desired Future Condition	
Description	**Class**	**dbh**	**by %**	**by acres**
Grass-forb/shrub	1	0 to 0.9 "	10%	28,320
Seedling/Sapling	2	1.0 to 4.9 "	10%	28,320
Young Forest	3	5.0 to 11.9 "	20%	56,640
Mid-aged Forest	4	12.0 to 17.9"	20%	56,640
Mature Forest	5	18.0 to 23.9"	20%	56,640
Old Forest	6	> 23.9 "	20%	56,640
Total				283,200

2. Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover. (Amendment No. 22, 06/05/96, replacement page 40-1)

3. Allow for forage to maximize Threatened and Endangered (T&E) species, management indicator species and emphasis harvest species. (Page 42)

4. Using Desired Future Condition as a guide, optimize wildlife outputs in all management units by coordination of other resource activities and direct habitat improvement projects. (page 42)

5. Provide a minimum of four waters per section in small game and one water per section in big game key areas. (Amendment No. 22, 06/05/96, replacement page 42)

6. Mixed Conifer: leave at least 3 snags, 5 downed logs and 10-15 tons of woody debris per acre.

7. Ponderosa Pine: leave at least 2 snags, 3 downed logs and 10-15 tons of woody debris per acre.

8. Retain key forest components such as oak

Specific direction is also given for individual management units in the FLMP. Below are some additional guidelines that are of importance to the management of the turkey:

1. Plan a minimum of one slash pile or unlopped top per acre within ½ mile of water for turkey nesting cover. (Amendment no. 20, 1/11/95 replacement page -153)

2. Maintain pine stringers in good habitat condition as prime areas for turkey roosting. (Amendment no. 22, 06/05/96 replacement - page 154)

3. Maintain a minimum average of 4 roosts/section on turkey winter range, averaging 20 usable trees and at least 80 basal area. Usable trees are opened crowned with large horizontal branches at least 18" dbh. (Amendment no. 22, 06/05/96 replacement - page 155)

4. Maintain a minimum average of tow roosts/section on turkey summer range, averaging 8-12 usable trees and at least 80 basal area. (Amendment no. 22, 06/05/96 replacement - page 155)

5. Provide openings (2-40 acres in size) on 8% of the tentative suitable ponderosa pine/mixed conifer type. (Amendment no. 22, 06/05/96 replacement - page 155)

6. Management units (5,000 acres) will be managed so that they have 20% of the area with old growth characteristics (age classes 121-240 years). These will be 50 acre stands averaging 12 trees/acre that are more than 20" dbh with an overall basal area in trees > 10" dbh over 80 ft^2. Ten tons/acre of down woody material in logs > 12" in diameter is desirable. (Amendment no. 22, 06/05/96 replacement - page 155)

7. On those acres suitable for timber harvest strive to achieve a structural diversity similar to the table below (Amendment no. 22, 06/05/96 replacement - page 156):

% of Acres	Age Class	Size Class	Management Indicator Species	Cover Class
8[1/]	0	Permanent Openings	Elk, turkey, western bluebird, violet-green swallow	Forage
13.3	0-20	Regenerated Seedlings	Elk, turkey	Forage
13.3	21-40	Saplings/Poles	Elk, turkey	Forage - Hiding
13.3	41-60[2/]	Poles	Elk	Forage - Hiding
13.3	61-80[2/]	Poles/Sawtimber	Elk, Abert's squirrel	Hiding/Thermal – Forage
13.3	81-100	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird	Thermal
13.3	101-120	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow	Thermal
10.0	121-180[3/]	Sawtimber/Vertical Diversity	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch	Thermal/Forage
10.0	181-240[3/]	Sawtimber/Vertical Diversity	Elk, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch, goshawk, turkey	Thermal/Forage

[1/] This is percent of tentative suitable lands

[2/] These two age classes comprise the pole timber class in suitable forest land. Thirty-eight percent of the pole acreage will be managed at 120+ BA to meet special wildlife habitat stands.

[3/] These must be mistletoe free stands

This roughly indicates that management should strive for a forage-to-cover ratio of between 60:40 and 70:30.

8. Do not exceed more than 7 miles of arterial and collector roads within 5,000 acres. This is roughly a density of approximately 0.9-miles/square mile or less. (Amendment No. 12 04/10/91 replacement page 159)

The EIS (page 107) indicated that the population estimate for turkey in 1983 was 1,250 animals and that the Forest hoped to increase that to 1,350 in the first period (end of 1995), or a 1% increase. Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 269) predicted a trend of a 103% increase of turkey by the year 2030 (Table 11).

Population Trends

BBS data (Sauer et al., 2001) for the Western BBS region from 1966-2000 shows a highly significant (p = 0.00), ***positive*** population trend of 29.3% per year (See Figure TURK-4). There is no BBS trend data presented for this species in Arizona. This data is only presented for regions with at least 14 samples.

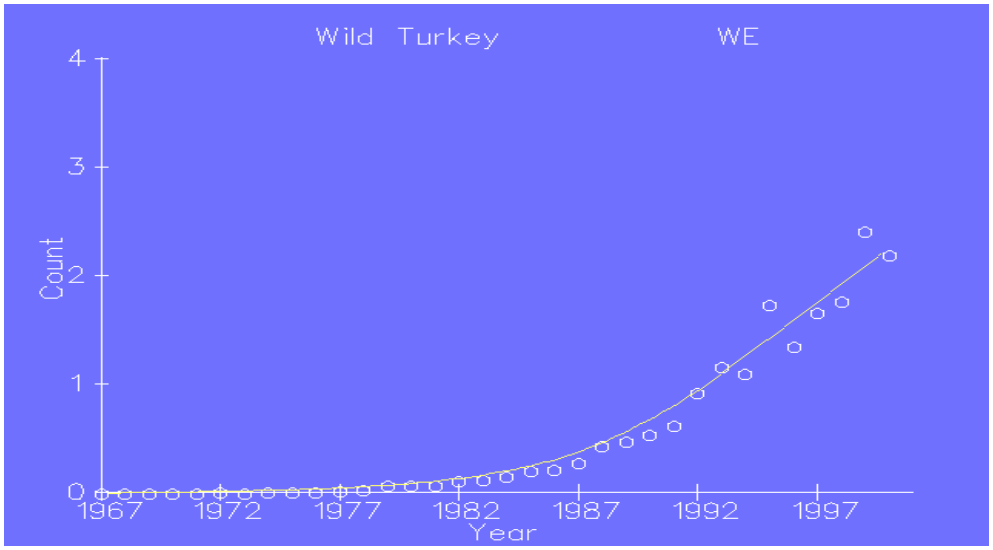
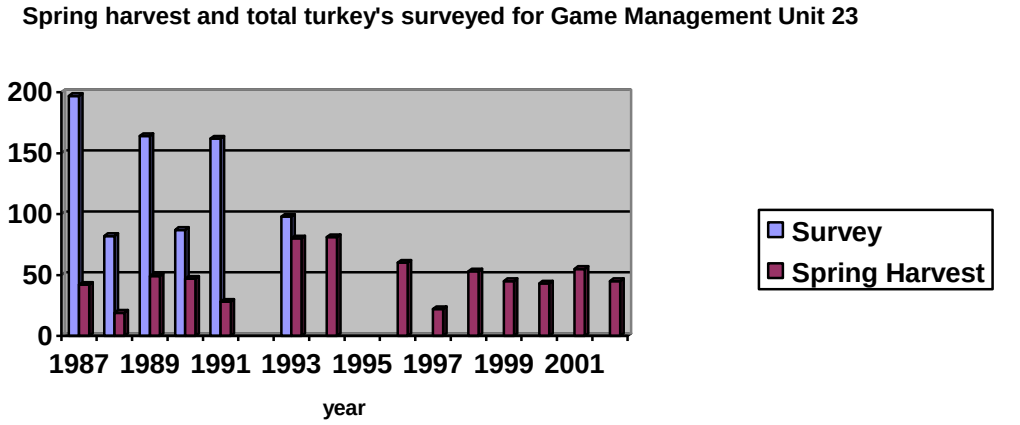
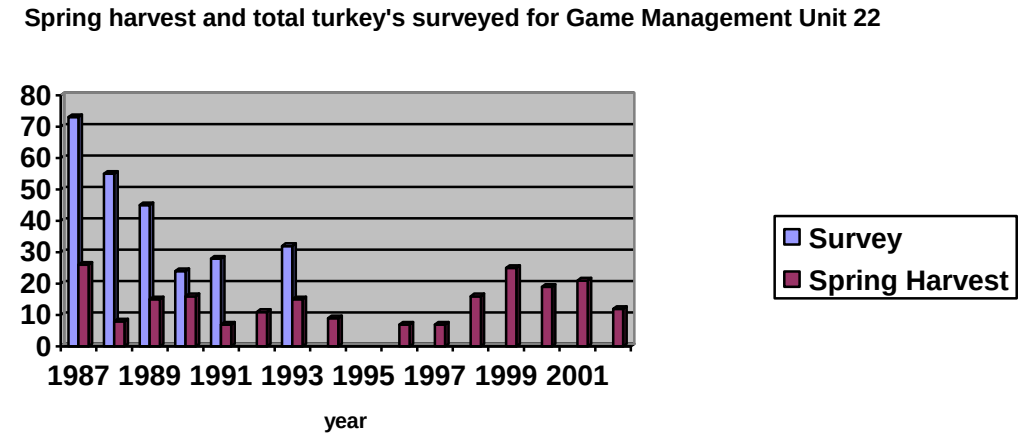


Figure TURK-4: Turkey population trend data for the Western BBS region from BBS data (Sauer et al., 2001).

Because of their primary responsibilities for managing wildlife, the main data source for turkey population trend comes from the Arizona Game and Fish Department. The Department conducted survey routes for turkey until 1993, after which this methodolgy was abandoned. By the early 90's, the turkey population was dropping. Consequently, standard survey procedures used by AGFD did not provide good data because of the low number of observations along survey routes. For current trend analysis, we have used the total numbers (toms, hens, and poults) surveyed between 1987 and 1993 and spring harvest data for spring to get a picture of total population trend for each Game Management Unit on TNF.





In the *Arizona Wildlife and Fisheries Comprehensive Plan* (USDA 1990) the goal was to manage turkey populations near habitat potential and to improve habitat to its potential. By 1995 the objective was to show an increase in habitat capability of 12 percent on National Forest Land. *Wildlife 2006* (AGFD 2001) indicates that statewide objective is to maintain turkey numbers by maintaining existing high quality habitat, with an emphasis on contiguous medium and high quality habitat.

In 1985 turkey were a popular, but not necessarily widely spread game species. Populations are influenced by weather (Wakeling 1991). For the most part turkey numbers are currently held in check by hunting, both sport and depredation.

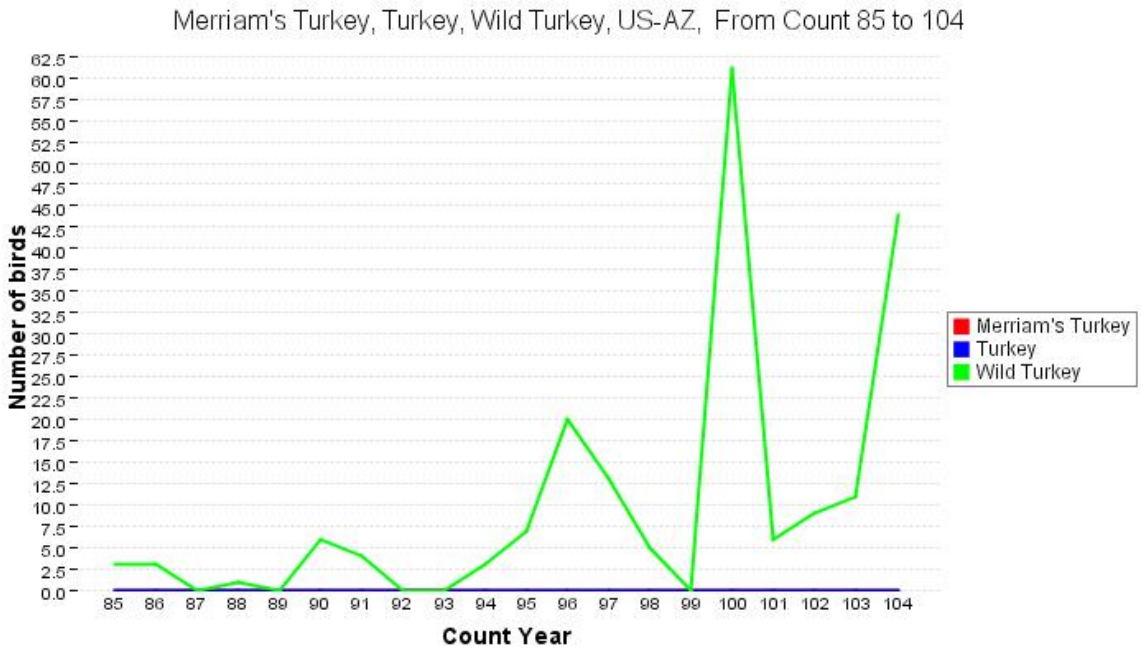
Tonto National Forest Population Trends

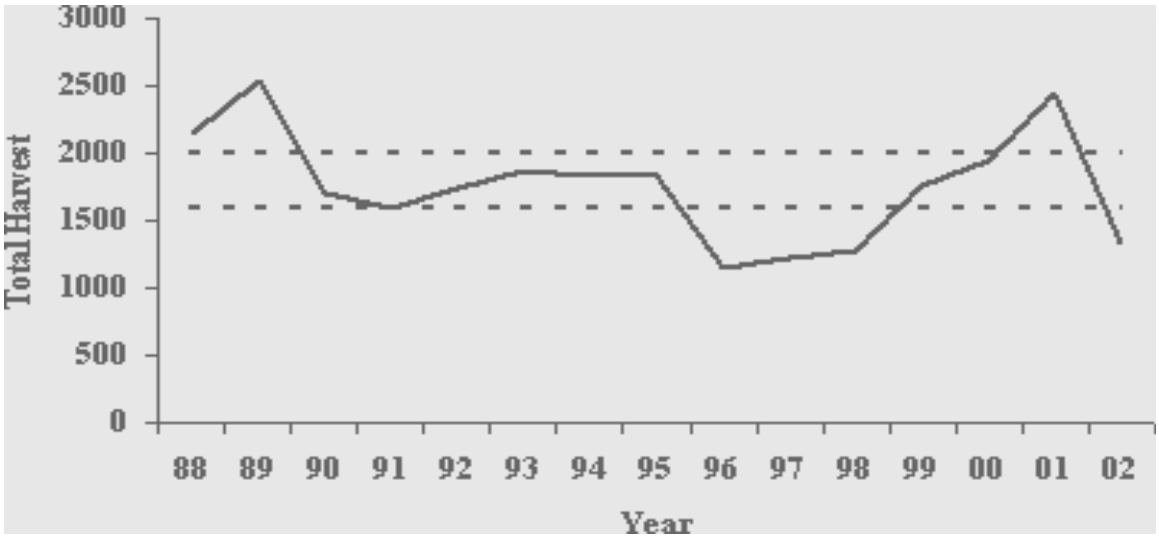
Merriam turkey populations increased after 1985, but have decreased overall since their peak due to drought. (Appendix 1). See above graphs for harvest trends for Game Units 22 and 23 that comprise the majority of occupied habitat on the Tonto National Forest. Turkey numbers in Unit 22 are small compared with other turkey units in the state. The turkey population in Unit 22 is really driven by poult production because the population is so small relatively speaking. Poor poult production can really limit the number of birds

available to hunt for the fall hunts. As a result, turkey tag numbers have gone up and down throughout the last decade in response to good and bad years of poult production.

Turkey numbers in Unit 23 fluctuate from year to year depending on a number of factors; most importantly is the poult hatch and survival up to the hunt. Last summer Unit 23 surveys revealed 4.5 poults per hen, which is above average. Total turkey observations were above average compared to previous years. Although poult survival was high last summer poult survival this summer is expected to be low due to extended drought conditions throughout Unit 23 and the state. Portions of Unit 23 in the Canyon Creek area were burned in the Rodeo-Chediski Fire and will have an impact on turkey populations there.

Other Statewide data suggests (see graph below) that effects of drought may have contributed to recent declines (5-year trend), but may be improving with wetter weather patterns that improved the herbaceous component and forage/cover parameters for poults (Christmas Bird Counts 2005, Count 85-104 equates to 1985-2004).





Total Harvest for State of Arizona – Wild Turkey 1988-2002 (Wakeling 2003)

Based on BBS, AZGFD harvest data, Audubon data and habitat trends in the ponderosa pine/mixed conifer vegetation type, Merriam's turkey population trend appear to be **stable** on the Tonto National Forest. There is insufficient information to display any relationship between changes in habitat trend and fluctuations in population changes.

Monitoring Methods

Monitoring of populations for Merriam's turkey will remain the responsibility of AGFD biologists using techniques developed and approved by the Department. This species is an important game species with numbers regulated by the Department and the Arizona Game and Fish Commission. The Forest's role will be to cooperate in providing habitat to meet goals for the species identified in AGFD/TNF comprehensive plans.

Literature Cited

DeGraaf, R.M., V.E. Scott, R.H. Hamre, L. Ernst and S.H. Anderson, ed. 1991. Forest and Rangeland Birds of the United States Natural History and Habitat Use. USDA Forest Serv. Agr. Handbook 688, 625 pp.

Hoffman, R.W., H.G. Shaw, M.A. Rumble, B.F. Wakeling, C.M. Mollohan, S.D. Schemnitz, R. Engle-Wilson, and D.A. Hengel. 1993. Management guidelines for Merriam's wild turkeys. Colorado Division of Wildlife. Division Rept. 18. 24 pp.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc [July 5, 2005]

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Rumble, M.A. and S.H. Anderson. 1995. Evaluating the habitat capability model for Merriam's turkeys. Res. Pap. RM-320. Fort Collins, CO: USDA, Forest Serv., Rocky Mtn. Exp. Sta.. 8pp.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 196602000. Version 2001.2. USGS Patuxent Wildlife Research Center. Laurel, MD. www.mbr-pwrc.usgs.gov/bbs/bbs.html

USDA. 1990. Arizona wildlife and fisheries comprehensive plan: Apache-Sitgreaves National Forest. USDA Forest Serv., Southwest Region and Arizona Game and Fish Department.

Wakeling, B.F. 1991. Population and nesting characteristics of Merriam's turkey along the Mogollon Rim, Arizona. Arizona Game Fish Dept., Tech. Rept. No. 7. 48pp.

Wakeling, B.F. 2003. Game Branch, Arizona Game and Fish Department, Phoenix, AZ. E-mail communication to Noel Fletcher, biologist, USDA Forest Service, Prescott NF. December, 2003.

3. ABERT'S SQUIRREL: *Sciurus aberti*

MIS Role: Successional stages in ponderosa pine

SUMMARY OF KEY HABITAT COMPONENTS (Reynolds *et.al.* 1992)

- mature to old forest with interlocking crowns are important for nesting
- large diameter, mature trees are important for cone production
- canopy greater than 60% necessary for fungi production
- snags may be used for nesting
- logs and woody debris important for food substrate and cover
- travel corridors with interlocking crowns are travel and escape corridors; large openings are detrimental

Species Description

Abert's squirrel is a large squirrel with tufted or tasseled ears, a tail with a white underside, and gray sides with a black stripe between a white underbelly (Hoffmeister 1986).

Distribution

In Arizona, nearly all extensive stands of ponderosa pine support these squirrels (Hoffmeister 1986). Figure 1 shows the distribution of the species in relation to the TNF (AGFD 2002). On the TNF, this squirrel is limited in its distribution to the ponderosa pine forest (Figure 2), but it may be found in oak and pinyon-juniper woodland types, in close proximity to ponderosa pine.

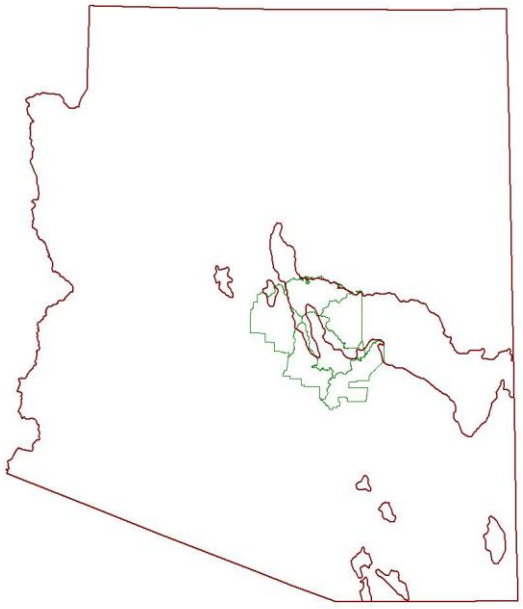


Figure 1. Distribution of Abert's squirrel in Ariaona.

Habitat

The best squirrel habitat has some mature ponderosa pine trees with canopy cover exceeding 60%. Mature trees often produce the most cones, and abundant truffle foods are often associated with young pine stands with canopy cover greater than 65%. Patton (1984) and States *et al*. (1988) agree that prime habitat for this species comprises stands containing a combination of tree age-classes whose size, density, and grouping provide

Figure 2. Distribution of Abert's squirrel on the TNF.

all the necessary seasonal foods, cover and nesting sites needed. According to Towry (1984), ideal habitat for this squirrel in Colorado is uneven-aged stands of ponderosa pine having the following characteristics:

- 11 to 36 inch dbh
- 200 stems per acre
- 150 to 200 square feet of basal area
- Canopy closure greater than 80% with interlocking crowns
- Crowns are 30 to 50 feet above the forest floor
- These characteristics are found in stands 1 to 2 acres in size
- Ground cover of 80% or greater of litter

Folliott (1990 p. 107) states, "Diverse silvicultural treatments that create a mosaic of habitats seem ideal for a variety of wildlife species in southwestern ponderosa pine forests and should meet multiple-use objectives. It was suggested that effects of logging operations on this species could be mitigated by 1) retaining "a large percentage" of trees 12-19 inches dbh greater than 45 feet tall; 2) leaving undisturbed a radius of 150 feet around nests for nesting and feeding and 3) minimize piling and burning of logging slash as this destroys the litter layer and the microclimate necessary for fungi production. Dodd *et.al*. (1998) found strong relationships between interlocking canopy trees and squirrel recruitment and basal area for all trees and squirrel fitness. Their research suggests that forest management practices that focus on intensive, widespread thinning will adversely affect tassel-eared squirrels. Reynolds *et.al.* (1992) indicated that large openings which require the squirrel for long distances on the ground might be detrimental and increase mortality. Leaving travel corridors with interlocking crowns was suggested as a mitigation measure.

Breeding

Home ranges for this species have been reported that vary from 6 acres up to 35 acres. Towry (1984) indicated that for Colorado a minimum viable population would consist of 30 squirrels requiring 429 acres of optimal habitat. Nests are commonly constructed of sticks, 16 to 90 feet above ground in branches of large, mature ponderosa pines. It will also use cavities and witch's broom. Nests built for reproduction are also used as resting cover throughout the year (Towry 1984). Characteristics of trees used for nesting are essentially the same as those used for feeding (Ffolliott 1990).

Food Habits

Since the Abert's squirrel does not hibernate in winter a dependable year-round source of food is essential for its survival (Towry 1984).This squirrels diet consists of a high degree of items associated with ponderosa pine. Up to 98% of the summer/fall diet comprises hypogeous fungi (truffles), associated with mid-aged forest with relatively high canopy covers, in Arizona. Apical buds, staminate cones, and seeds of ponderosa pine are also important food items, especially in winter. A symbiotic relationship exists between fungi, pines, and the Abert squirrel. These squirrels disperse the spores of hypogeous

fungi, increase nutrient cycling through their feeding habits, and exert selective pressure on ponderosa pine genetics. This squirrel does not cache food for the winter as other squirrels do, instead feeding on the inner bark (phloem) of subterminal twigs during adverse weather conditions. Though a mainstay, it has been shown that diets dominated by inner bark during the adverse weather conditions led to reduced squirrel survival. In areas where high densities of oak occur, their diet may include up to 40% acorns during the fall. "Feed-trees" tend to be between 8 and 16 inches in diameter, with "over-mature" ponderosa pine being considered "poor" squirrel habitat. Free water is not essential for this species but in Colorado, higher squirrel densities occurred adjacent to water, indicating that water availability may be beneficial.

Tonto National Forest MIS Status

In the Tonto Forest Land Management Plan (FLMP) Abert's squirrel was selected as a Management Indicator Species of successional stages within ponderosa pine vegetation type (Appendix G, Tonto FLMP). Since other MIS were used as indicators of mature and old growth ponderosa pine, the Abert's squirrel was selected because dense pole stands are provide an important forage component for the species.

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the conifer vegetation type was determined to cover approximately 283,200 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired management condition at the end of the fifth period. The most recent analysis indicates the quantity of conifer acres has not changed although some shifting upon the landscape has occurred. This habitat type is well represented and distributed across two Districts of the Tonto.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for Abert's squirrel are:

1. Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover. (Amendment No. 22, 06/05/96, replacement page 40-1)

2. Allow for forage to maximize Threatened and Endangered (T&E) species, management indicator species and emphasis harvest species. (page 42)

3. Using Desired Future Condition as a guide, optimize wildlife outputs in all management units by coordination of other resource activities and direct habitat improvement projects. (page 42)

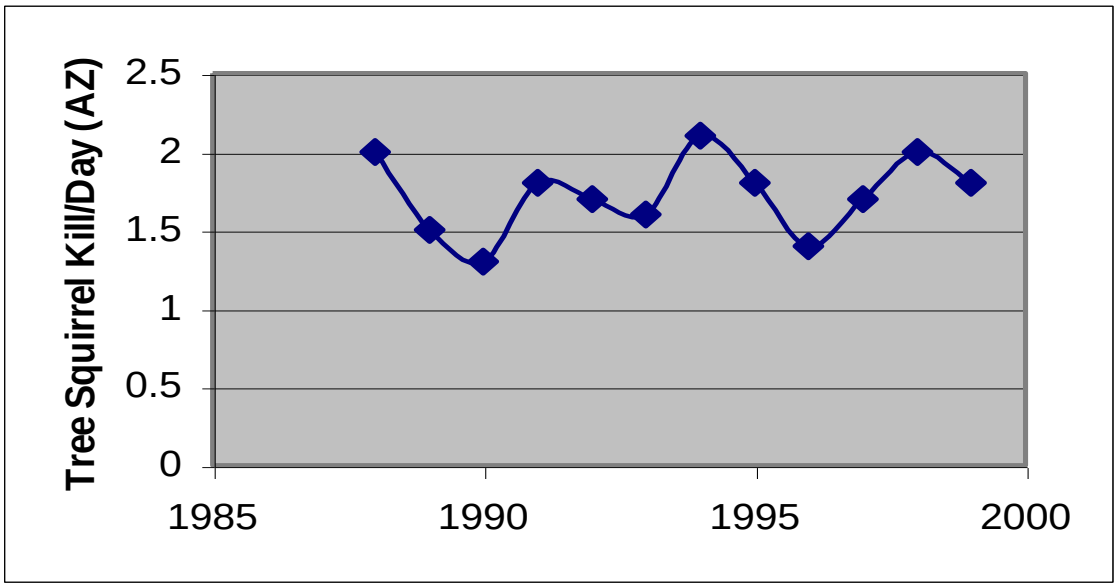
4. Provide a minimum of four waters per section in small game and one water per section in big game key areas. (Amendment No. 22, 06/05/96, replacement page 42)

Page 107 of the EIS indicates that implementation of the Forest Plan would improve the species status on 281,000 acres. Page 108 predicted that populations would increase. The Arizona Wildlife and Fisheries Comprehensive Plan, Tonto National Forest (AGFD and USFS 1990) states a goal of maintaining the population over 50 percent of its potential habitat.

Population Trends

The data compiled from AGFD surveys for the state of Arizona shows some variability, but an overall stable trend for number of squirrels killed per hunter day from 1988-1999 (Figure 3) (Arizona Game and Fish Department 2001a). Currently, the AGFD uses hunter harvest information game surveys rather than survey count data for tree squirrels. For small game populations, the Department does not quantify populations, since breeding populations are unaffected by hunting, and because determining the size of small game population is very difficult (Arizona Game and Fish Department 2001a). Dodd et al. (1998) have recently developed a reliable density index to estimate squirrel populations.

Figure 3. Tree squirrel harvest in Arizona.



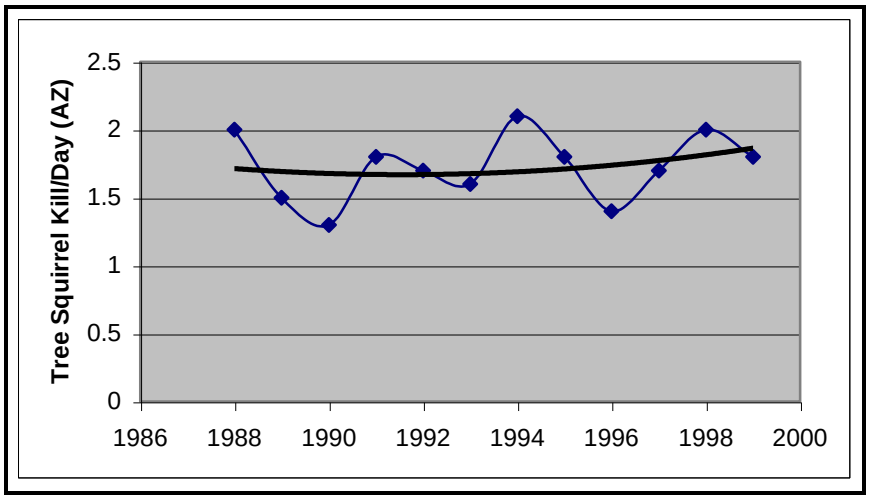
Populations of Abert's squirrels fluctuate both in the short- and long-term (Pearson 1950, Keith 1965, Farentinos 1972, J.Hall 1981). Factors causing these fluctuations are not clear. Predation, immigration, quantity and quality of food, timber harvest, tree density and age, sylvatic plague, and winter snow cover have all been suggested (Stephenson and Brown 1980).

Tonto National Forest Population Trends

Population trend for Abert squirrel on the TNF based on AGFD surveys indicates

increases in some parts of the forest and decreases in others. On TNF there are three Game Units that have viable populations of Abert squirrel and are hunted. With the warmer than average temperatures for the past several winter's squirrel numbers are good. Abert squirrel can be found throughout the pine covered portion of Game Unit 22, 23, and to a limited extent, 24A (AZGF 2004).

In addition, the data compiled from AGFD surveys for Arizona also shows a stable to increasing trend from 1988-1999 (below). AGFD game surveys do not have survey count data for tree squirrels, just hunter harvest information. The data for tree squirrels includes red squirrels, but the vast majority of the tree squirrels harvested are tassel-eared squirrels (Dodd, 2002).



Tree squirrel harvest by hunters in Arizona (AGFD, 1993, 1998, and 2000).

However, more recent information shows tassel-eared squirrel populations in the southwest to be quite depressed from several years of drought conditions that have reduced juvenile recruitment. This was exacerbated by substantial snow-induced mortality during 2001-2002. Densities from the North Kaibab, Camp Navajo, and northern New Mexico are all low. Figure 3.11.2 shows 3 years of monitoring at 8 sites in southern Utah. This situation is indicative of the current status of tassel-eared squirrels across the southwest (Dodd 2003).

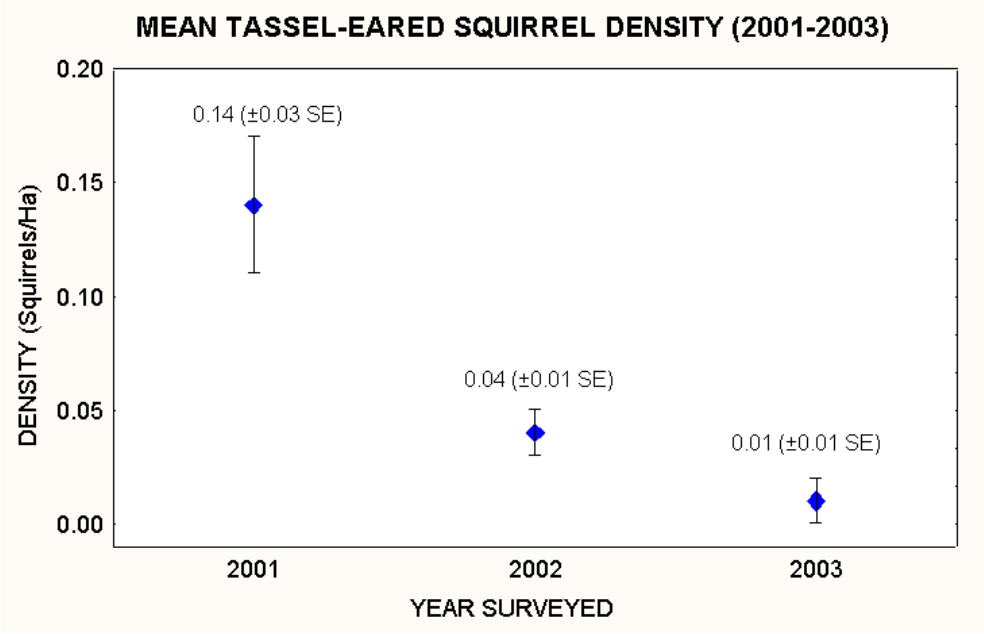


Figure 3.11.2 Mean density of Tassel-eared squirrels in southern Utah (Pederson 2003).

Population numbers of *S. aberti* appear to fluctuate widely over time and space but there is no danger of extinction. Population cycles may be related to cyclic variation in the biomass of the pine seed crops (Mejia 2001). There is no data specific to the TNF but based on drought conditions and sub-optimal habitat conditions, population trends are likely similar to the rest of the southwest and are in a **declining** trend.

Monitoring Methods

Monitoring of populations for the Arizona gray squirrel will remain the responsibility of AGFD biologists using techniques developed and approved by the Department. This species is an important game species with numbers regulated by the Department and the Arizona Game and Fish Commission. The Forest's role will be to cooperate in providing habitat to meet goals for the species identified in AGFD/TNF comprehensive plans. Dodd et al. (1998) have recently developed a reliable density index to estimate squirrel populations.

Literature Cited

AGFD. 2001. Wildlife 2006; The Arizona Game and Fish Department's Wildlife Management Program Strategic Plan for the Years 2001-2006. January 22, 2001. 96 pp. www.azgfd.com.

AGFD. 2002. Distribution of tassel-eared squirrels in Arizona. GIS coverage. AGFD. Phoenix.

Arizona Game and Fish Department. 1993, 1998, 2000 and 2004. Arizona Game Survey and Harvest Data Summary. Phoenix, AZ

AGFD and USFS. 1990. Arizona wildlife and fisheries comprehensive plan, Tonto National Forest. US Forest Serv., SW Region, Albuquerque. p 19.

Dodd, N.L, S.S. Rosenstock, C.R. Miller, and R.E. Schweinsburg. 1998. Tassel-eared squirrel population dynamics in Arizona: index techniques and relationships to habitat condition. Arizona Game and Fish Department Technical Report #27, Phoenix, AZ. 49pp.

Dodd, Norris. 2002. Wildlife biologist, Arizona Game and Fish Department. E-mail communication with Noel Fletcher, biologist, USDA Forest Service, Prescott NF. February 2002.

Dodd, Norris. 2003. Wildlife biologist, Arizona Game and Fish Department. E-mail communication with Noel Fletcher, biologist, USDA Forest Service, Prescott NF. December 2003.

Farentinos, R.C. 1972. Observations on the ecology of the tassel-eared squirrel. The Journal of Wildlife Management. 36(4): 1234-1239.

Ffolliott, P.F. 1990. Small game habitat use in southwestern ponderosa pine forests. Pages 107-117. *in* Krausman, P.R. and N.S. Smith, eds., Managing wildlife in the southwest. Ariz. Chap. The Wildl. Soc., Phoenix, Arizona.

Hall, J.H. 1981. The mammals of North America, Second ed. New York: John Wiley and Sons. 1: 1-600.

Hoffmeister, D.F. 1986. Mammals of Arizona. U. of AZ Press. Tucson. 744pp.

Keith, J.O. 1965. The Abert squirrel and its dependence on ponderosa pine. Ecology 46: 150-163.

Mejia, Joseph R. 2001. University of Michigan. Museum of Zoology. Animal Diversity Web. Sciurus aberti (Abert's Squirrel): Narrative

Patton, D.R. 1984. A model to evaluate Abert squirrel habitat in uneven-aged ponderosa pine. Wildl. Soc. Bull. 12:408-414.

Pearson, G.A. 1950. Management of ponderosa pine in the southwest as developed by research and experimental practices. Washington, D.C.; US Dept Agri. Monog.. 6. 218p.

Pederson, J. 2003. Mean tassel-eared squirrel density. Received graphic in e-mail from Norris Dodd, December 12, 2003.

Reynolds, R.T., R.T. Graham, M.H. Riser; and others. 1992. Management recommendations for the northern goshawk in the southwestern United States. USDA For. Serv., Rocky Mtn. Exp. Stat., Gen. Tech. Rep. RM-217. 90 pp.

States, J.S., W.S. Gaud, A.W. Sylvester, and W.J. Austin. 1988. Foraging patterns of tassel-eared squirrels in selected ponderosa pine stands. Pages 425-431. *in* Sarzo et al., eds. Management of amphibians, reptiles and small mammals in North America; proceedings of a symposium. USDA For. Serv. Gent Tech. Rept. RM-166.

Stephenson, R.L. and D.E. Brown. 1980. Snow cover as a factor influencing mortality of Abert's squirrel. The Journal of Wildlife Management. 44(4): 951-955.

Towry, R.K., jr. 1984. Wildlife habitat requirements. pp. 73-210. In R.L. Hoover and D.L. Wills, ed, Managing forested lands for wildlife. Colo. Div. of Wildl. in cooperation with USDA For. Serv., Rocky Mount. Reg., Denver, Colo.

4. ARIZONA GRAY SQUIRREL: *Sciurus arizonensis*

MIS Role: General forest conditions in high elevation riparian.

SUMMARY OF KEY HABITAT COMPONENTS

- Dense broadleaf communities of riparian deciduous forest (=acres of structural Type 1 Riparian Areas).
- Uplands with tall oaks, including Gambel (*Quercus gambelii*) and/or Emory oaks (*Q. emoryi*).
- For nest sites: Oaks and/or deciduous riparian trees such as Arizona sycamore (*Platanus wrightii*), box elder (*Acer negundo*), Arizona alder (*Alnus oblongifolia*), Arizona ash (*Fraxinus velutina*), Arizona walnut (*Juglans major*) and others.

Species Description

Underparts white; ears without tufts; heads, back and sides gray mottled with brown; tops of feet gray; tail bordered with white; sexes similar.

Distribution

The southern and western slopes of the Mogollon Plateau and north of Sedona, Coconino County, to Blue, Greenlee County, and many isolated mountain ranges to the south, including Prescott's, Bradshaw's, Pine Mountain, Mazatzals, Sierra Anchas, Santa Catalinas, Rincons, Santa Ritas, Atascosas, and Chiricahua mountains (Hoffmeister 1986).

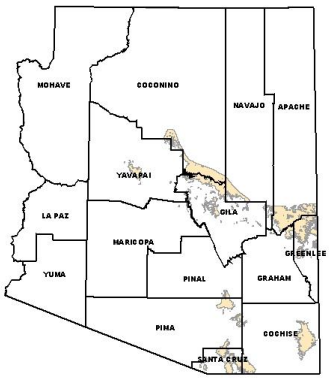


Figure AGSQ-1: Arizona distribution of the Arizona gray squirrel (AGFD 2002).

Habitat

The presence of large evergreen oaks (*Q. arizonica*, *Q. emoryi* and *Q. grisea*), while not always conspicuous, appears universal throughout the range. Arizona oak, along with Gambel oak, provide sources of mast, cavities and nest platforms. The understory may be herbaceous and luxuriant or present a barren appearance (Best and Reidel 1995). Also very important are riparian deciduous or mixed forests (Hoffmeister 1986). Smaller trees, including alligator juniper (*Juniperus deppeana*), piñon pine (*Pinus edulis*, *P. cembroides*), Arizona cypress (*Cupressus arizonica*), cherry *(Prunus*) and hackberry (*Celtis reticulata*) seasonally provide mast or facilitate arboreal movement. Wild grape (*Vitis arizonica*), Virginia creeper (*Parthenocissus inserta*) and other vies may be on the trees; scarlet sumac (*Rhus glabra*) often provides a low-midstory aspect.

Nests: Arizona gray squirrels inhabit hollows in deciduous trees (Mearns 1907; Monson 1972) and also build conspicuous leaf nests that in winter, at least, may be occupied by more than one adult (Hoffmeister 1986). If suitable den sites are not available, a squirrel will build a covered bolus nest - dome shaped and constructed of branches and leaves in a tree. It is used as a nursery as well as a home. Squirrels may have several leaf nests or none, depending on the availability of den trees. For summer use, they build a flat, platform-type structure used for resting. Nest trees are >12 meters tall and the nests are 9-30 meters above the ground, usually at the fork of two or more substantial branches or in a crotch formed by the trunk and a major branch. In central Arizona, there is a tendency for squirrels to choose the south or southwest side of the tree (Best and Riedel 1995)

Breeding

The onset of breeding activity in the Arizona gray squirrel is correlated with flower emergence and flower parts in the diet. An increase in breeding capability has been observed as early as January and February with the flowering of manzanita (*Arctostaphylos* spp.) However, estrus for most occurs in April and early May. Embryos are present from January through June, with most pregnant females (57%) in May and June. Litter size ranges from two to four (Brown 1984).

Food Habits

Favorite foods are acorns, ponderosa pine seeds, and green walnuts (Monson 1972). Fungi, both subterranean and emergent species, also are important year-round. Flower parts may contain vitamin A and others that stimulate reproductive activity. In late autumn, juniper berries (*Juniperus*), hackberries (*Celtis*), mistletoe (*Arceuthobium*), and fungi are taken, but walnuts and acorns remain the mainstay of the diet (Brown 1984). This species may be important as a disperser of tree seeds and the spores of mycorrhizal fungi.

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP) on wildlife habitat and species diversity. Arizona gray squirrel was selected as a Management Indicator Species for general riparian condition of High Elevation (>3,000 feet) Riparian (USDA Forest Service 1985).

<u>High Elevation Riparian (>3000')</u>

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for Arizona gray squirrel includes:

1. Rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage.

2. Coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030. Type 1 characteristically contains tall trees > 20 feet high with the highest layer forming somewhat of a closed canopy. Substantial vegetation is also present in the two lower layers (shrub and grass layer).

Specific direction also is given for individual management units in the FLMP. Below are some additional guidelines that are of importance to the management of the Arizona gray squirrel:

1. The oak component of the conifer type and the encinal oak type will be maintained.

2. Manage the oak component to maximize an optimum mix of mast and browse to accomplish wildlife objectives.

3. Where snags are not present they will be provided by leaving 2-3 trees from regeneration cuts to become potential snags.

Population Trends

In Mexico, *S. arizonensis* has suffered severe habitat loss due to logging and the clearing of forests for agricultural use. The squirrel is rare in Mexico and is considered a threatened species in that country. (Best and Riedel 1995)

Predicted population trends for the Tonto's MIS species are shown in the FLMP, Amendment 22, Appendix K, Table 11, page 269, 6/5/96. For the Arizona gray squirrel, an increase of 400% is expected by the year 2030.

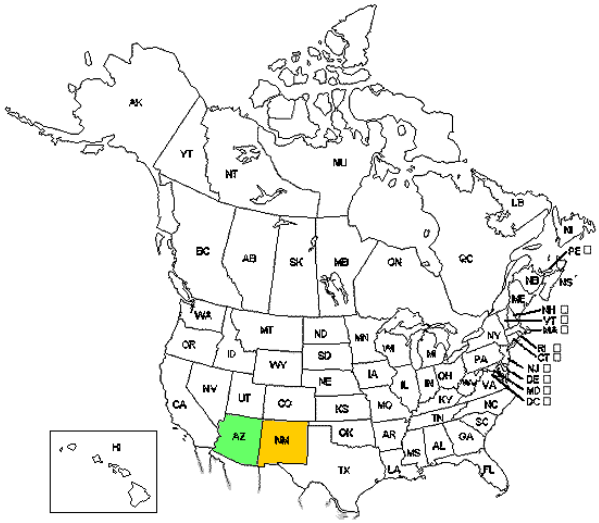


Figure AZGS-2: Population status of Arizona gray squirrels in Arizona and New Mexico, showing a Stable status for Arizona and

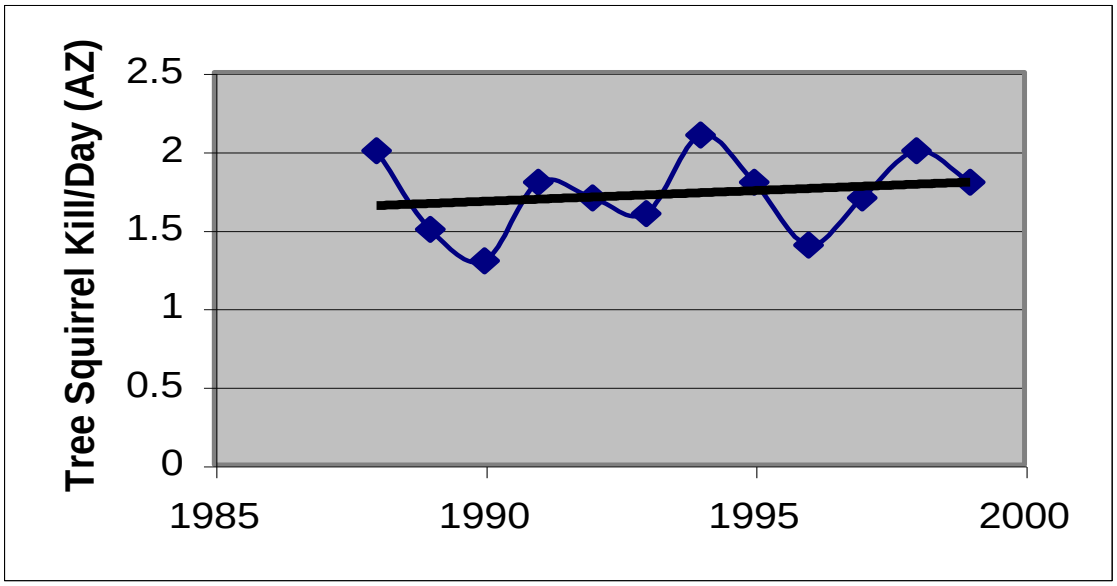
No population trends are available for the forest. As with other squirrels and small game species, populations of gray squirrels fluctuate over the short- and long-term. The data compiled from AGFD surveys for the state of Arizona shows some variability, but an overall stable trend for number of squirrels killed per hunter day from 1988-1999 (Figure 3) (Arizona Game and Fish Department 2001a). Currently, the AGFD uses hunter harvest information game surveys rather than survey count data for tree squirrels. For small game populations, the Department does not quantify populations, since breeding populations are unaffected by hunting, and because determining the size of small a game population is very difficult (Arizona Game and Fish Department 2001a).

Dodd et al. (1998) have recently developed a reliable density index to estimate squirrel populations.

Tonto National Forest Population Trends

Gray squirrels can be found on TNF in Game Units 22, 23, and 24A where they are limited to pines, mixed hardwoods and high elevation riparian habitats. Population trend for the gray squirrel on the TNF appears to be **stable** based on Statewide AGFD hunter harvest information and apparent trends in high elevation riparian habitat. Population trend at the TNF level is not conducted by AZGFD due to difficulties in surveying this species.

Figure 3. Tree squirrel harvest in Arizona 1985-2000.



Monitoring Methods

Monitoring of populations for the Arizona gray squirrel will remain the responsibility of AGFD biologists using techniques developed and approved by the Department. This species is an important game species with numbers regulated by the Department and the Arizona Game and Fish Commission. The Forest's role will be to cooperate in providing habitat to meet goals for the species identified in AGFD/TNF comprehensive plans. Dodd et al. (1998) have recently developed a reliable density index to estimate squirrel populations.

Literature cited:

Arizona Wildlife and Ecology website (http://arizonawildlife.net)

Best, T.L. and S. Riedel. 1995. *Sciurus arizonensis*. Mammalian Species 496, pp. 1-5, 4 figs. American Society of Mammalogists (http://www.mammalsociety.org)

Brown, D.E. 1984. Arizona's Tree Squirrels. Arizona Game and Fish Department, Phoenix, 114 pp.

Hoffmeister, D.F. 1986. Mammals of Arizona. University of Arizona Press, 602 pp. Tucson.

Mearns, E.A. 1907. Mammals of the Mexican boundary of the United States: a descriptive catalogue of the species of mammals occurring in that region; with a general summary of the natural history, and a list of trees. Bulletin of the United States National Museum, 56:1-530.

Monson, G. 1972. Unique birds and mammals of the Coronado National Forest. USDA Forest Service, Government Printing Office, Washington, D.C., 81 pp.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, Virginia, USA: NatureServe. Available: http://www.natureserve.org (Accessed: September 5, 2002).

5. BALD EAGLE: *Haliaeetus leucocephalus*

MIS Role: General conditions in low elevation riparian.

SUMMARY OF KEY HABITAT COMPONENTS

- Mature or over-mature Freemont cottonwoods along major rivers, streams or reservoirs, or ledges, cliffs or pinnacles along major rivers, or old growth ponderosa pine uphill from reservoirs or major rivers for nesting
- A reliable supply of fish
- Relative isolation, free from frequent human disturbances

Species Description

The adult plumage of the bald eagle is well known. At five years of age, they typically have a completely white head and tail, cream-colored eye and yellow beak. The body is brown, with yellow feet and legs and black talons. Some Arizona eagles keep a brown mottling on the crown of the head and tail until their seventh year (Driscoll 1999). Sub-adult plumage is highly varied starting out very dark the first year and progressing through various shades of lightening until the fifth year.

Distribution

The bald eagle is ranges throughout North America. In Arizona, the species breeds in the central part of the state primarily along major river systems such as the Salt, Verde, Gila, Agua Fria and Bill Williams's rivers. A few nest territories have been established upslope of major water bodies or rivers in old growth ponderosa pines. Nesting at these sites have been marginally successful. An influx of winter migrants occurs during midwinter. On the Tonto, bald eagles nest along the Verde and Salt rivers, and Tonto Creek. Forty-three nest territories were recorded in Arizona in 2001/2002. On the TNF, Wintering bald eagles have been observed in the Canyon Creek area and around lakes and rivers at lower elevations.

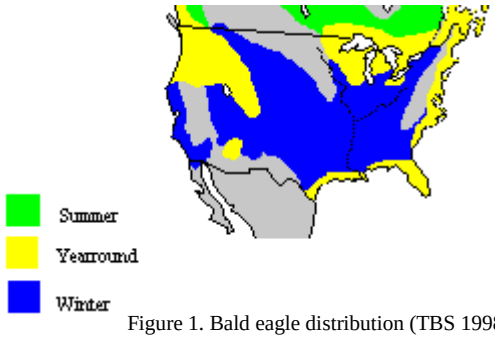


Figure 1. Bald eagle distribution (TBS 1998)

Habitat

The bald eagle is a riparian dependent species, closely associated with and dependent on river systems and associated reservoirs.

Foraging

Eagles diet consists primarily of fish and they forage in selected riffles and pools in rivers and at specific sites on reservoirs where fish may spawn or other conditions provide a seasonal abundance of fish. They are opportunistic feeders eating anything that is easy to catch. Fish are the primary component in their diet, but they will also eat birds, amphibians, reptiles, small mammals and carrion. Commonly eaten fish include native suckers, catfish, bass, and crappie.

Breeding

Nests are usually constructed in mature cottonwoods, cliffs/ledges, and pinnacles. Eagles have also used juniper, pine, sycamore, and snags. Arizona bald eagles breed earlier in the year than their northern counterparts. One to three eggs are laid from December to March and take 35 days to hatch. Average productivity rates 0.78 young per occupied breeding area is lower than the average of .96 for North America. Eaglets fledge at approximately 12 weeks (May and June) and are almost completely dependent on the adults until they migrate north, about 45 days after fledging. Territory density is dependent on availability of nest sites and the abundance of food. Nesting densities are the highest in the state on the Verde from Bartlett Reservoir to the Salt River confluence.

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. The bald eagle was selected as a Management Indicator Species for low elevation riparian health, Appendix G, Tonto National Forest Plan (USDA Forest Service 1985). The bald eagle is also federally-listed as Threatened.

Riparian Streamside Standards and Guidelines and Other Measures

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the riparian vegetation type was determined to cover approximately 35,022 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired management condition at the end of the fifth period. The most recent analysis indicates the quantity of riparian acres has not changed although some shifting upon the landscape has occurred.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for the common black-hawk include:

1. rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage.

2. coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030. Type 1 characteristically contains tall trees > 20 feet high with the highest layer forming somewhat of a

closed canopy. Substantial vegetation is also present in the two lower layers (shrub and grass layer).

Additionally, in 1997, the Forest Supervisor provided direction which clarified the above standards. Standards for riparian vegetation utilization, bank alteration and other grazing related practices were established (Johnson and Ross 1997). These standards require (as a minimum):

1. less than 50% utilization on current years growth on woody vegetation less than five feet in height.

2. less than 50% utilization on herbaceous vegetation.

3. less than 20% bank alteration.

4. Monitor utilization standards under the key area concept.

5. Not salting within ¼ mile; winter grazing is preferred.

Refinements to these standards, including use of height/weight curves for deergrass and a finalized Forest monitoring protocol (Johnson and McBride 2002) provide further direction in riparian streamside management. As grazing allotments go through the environmental analysis process, utilization standards in riparian areas are further reduced below maximum acceptable levels to meet MIS, ESA, watershed, riparian or other objectives.

Other forest-wide Riparian Management Practices:

1. Forest-wide Riparian Monitoring Team – this team usually conducts midseason and end of season monitoring on key riparian areas on most grazing allotments on the Forest.
2. Forest Drought Policy development and implementation – establishes trigger for evaluating range conditions on the forest based on long-term rainfall. Most livestock were removed from the forest in 2002 due to drought conditions.
3. Bald Eagle Closures – three "no entry" closures currently exist at bald eagle nest territories. These territories receive extremely high recreation use and closures are necessary to prevent excessive disturbance which often results in nest failure.
4. Nestwatch Program participation – this program is supported by the Forest and the Southwest Bald Eagle Management Committee (SWBEMC) members. It posts watchers at nest locations to deter human-related disturbances, document eagle activity, and initiate rescue calls when nestlings fall from the nest or other emergencies happen. The SWBEMC also sponsors survey and nest occupancy flights and supports public education about eagles.

The Plan predicts an increase in bald eagle populations due to an emphasis on improved riparian management and progression of riparian vegetation toward Type 1 stands**.** Since

Forest Plan implementation, the slow rate of change in livestock grazing management practices to achieve riparian improvement, large scouring events in 1993 and 1995, and severe drought conditions, it is unlikely that any progress has been made in achieving any upward trend in riparian condition. The loss of many mature cottonwoods along Tonto Creek due to drought typifies a continuing trend in loss of this KHC. Little replacement by saplings is occurring on the major drainages of the TNF.

Population

Based on bald eagle survey information, at least 20 nesting territories are estimated to occur on the Forest in 2005. This is an increase of seven territories since 1985 (AGFD 2002b). This represents almost 50% of the statewide population.

The increase in bald eagles is not due to improvement in riparian habitat quality, but in efforts by a number of agencies, tribes and the public to help the bald eagle. At present, the population is increasing and will probably continue to increase because of continued management actions.

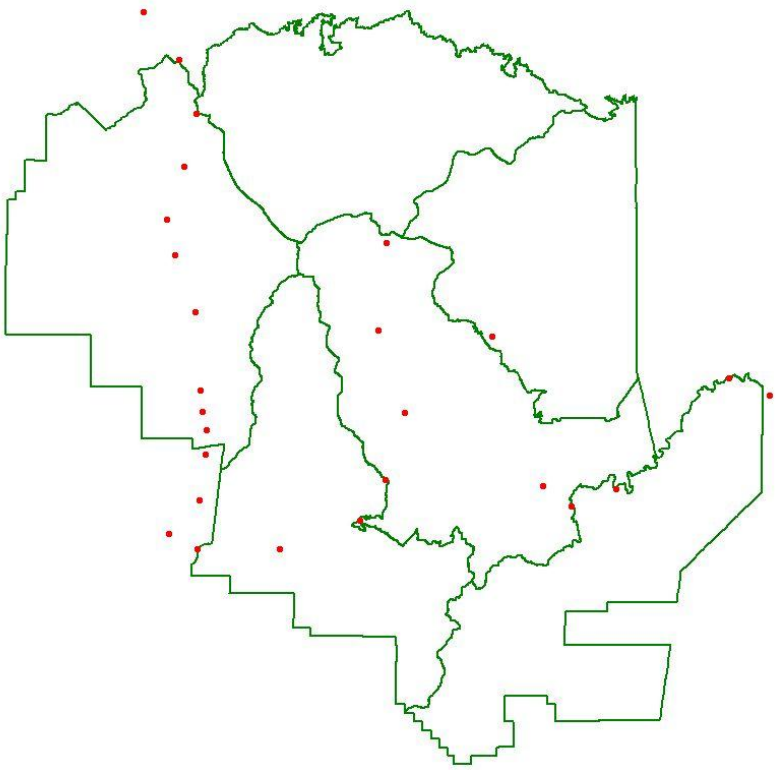
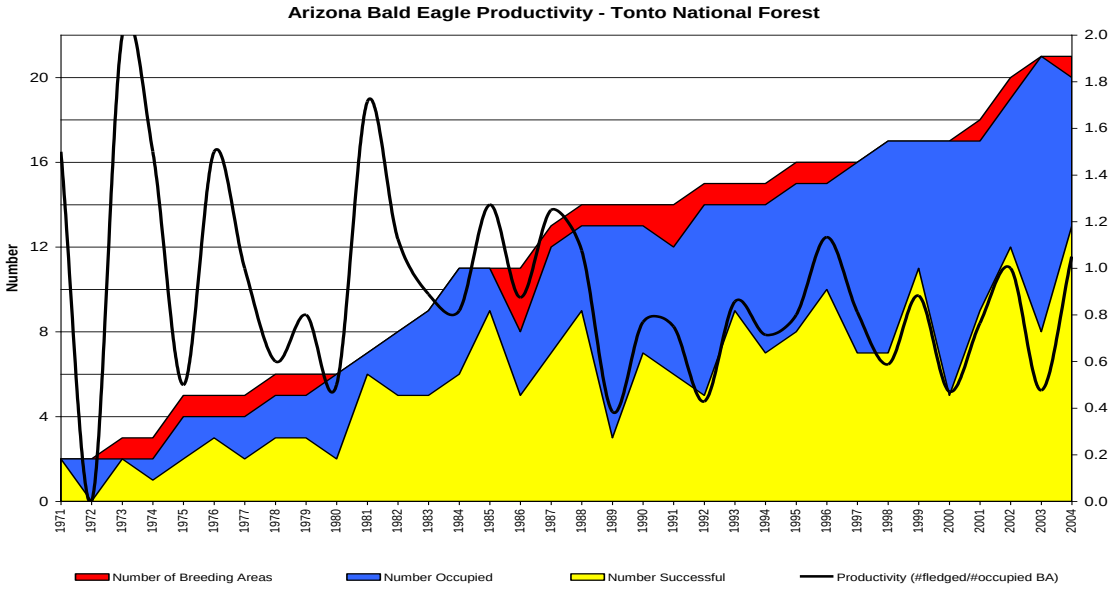


Figure 2. Bald eagle nest territories on or adjacent to the Tonto National Forest.

The large cottonwoods that the species uses for nesting, unlike the eagle, are still declining. The eagle appears to be able to adapt to other nest sites and loss of large cottonwoods may not result in a foreseeable decline in eagle populations.

Tonto National Forest Population Trend

Population trend for the species on the Tonto National Forest is **stable/upward**, but may be reaching, or have reached, a peak as competition for suitable nest sites increase. The table below describes population trend from 1971-present (AZGFD 2005).



Monitoring Methods

Monitoring will continue under the direction of the Southwest Bald Eagle Management Committee and AGFD. The TNF will continue to support monitoring efforts for this species through funding and other efforts.

LITERATURE CITATIONS

AGFD. 2002a. Arizona Game and Fish Department website.

AGFD. 2002b. Bald eagle survey report. AGFD, Phoenix.

AGFD. 2005. Bald eagle survey report. AGFD, Phoenix

Driscoll, J. 1999. Draft - Conservation assessment and strategy for the bald eagle in Arizona –. Az. Game and Fish Dept. pp 3-7.

Johnson, J.L. and W.M. Ross. 1997. Riparian standards and guidelines, Tonto National Forest. FS whitepaper. 2pp.

Johnson, J.L. and K. McBride. 2002. Riparian monitoring protocol, Tonto National Forest. FS whitepaper.. 5pp.

Thayer Birding Software (TBS). 1998. The Birds of North America. Thayer Birding Software.CDROM. V. 2.5.

6. COMMON BLACK-HAWK: *Buteogallus anthracinus*

MIS Role: Streamside conditions in high elevation riparian.

SUMMARY OF KEY HABITAT COMPONENTS

- Cottonwood-willow vegetation type in Low Elevation Riparian areas (<1,200 m elev.) and cottonwood-willow and mixed broadleaf vegetation types in High Elevation Riparian areas (>1,100 m elev.).
- Isolated groves of mature broadleaf trees rather than single mature trees along perennial streams for nesting
- Low branches, downed trees, exposed roots, and prominent rocks are important for hunting perches.
- A reliable supply of riparian associated vertebrate and invertebrate prey
- Aquatic vertebrates and reptiles are primary prey but a diverse array of prey species may be necessary.

Species Description

The genus is typified by medium to large hawks with broad, rounded wings of moderate length, and a medium-length tail (Brown and Amadon 1968). Adult plumage is a uniform slate black with a glaucous cast to the neck, back and breast; the tail has a uniform white band across it, narrow white terminal band and varying degrees of mottling at the base. The white band is visible dorsally which helps distinguish it from the zone-tailed hawk. The cere and basal half of the bill is yellow, the terminal half is black, the iris is dark brown, and the tarsi and toes are yellow (Friedman 1950, Schnell 1979).

Distribution

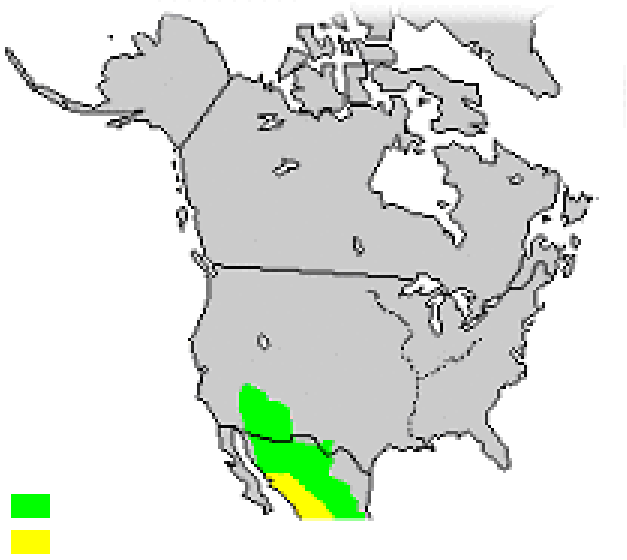


Figure CBHA-1. Common black-hawk seasonal range.(TBS 1998)

The common black-hawk is a neo-tropical raptor. It is a permanent resident in the tropics from southern Mexico to northern South America. A migratory population breeds as far north as southern Utah, Arizona, southwest New Mexico, and western Texas in the U.S., and Sonora and Chihuahua in Mexico. The extensive loss and alteration of riparian habitat during the early and mid-1900's suggests that the number of nesting goshawks has declined throughout the species range in the southwestern U.S. (Hubbard 1965, Snyder and Snyder 1975, Porter and White 1977, Schnell 1994). The breeding population in the

U.S. in the mid 1970's was about 220-250 pairs; most (80-90%) of the pairs nested in Arizona (Schnell et al. 1988), primarily along the tributaries of the Bill Williams and Virgin River, streams draining the Mogollon Rim especially tributaries to the Salt and Verde Rivers, and the upper tribs and main stems in the Gila River drainage. The common black-hawk in the southwestern U.S. is dependent upon riparian communities for nest trees and prey. The trophic position of the common black-hawk and its habitat affiliation within riparian communities suggest it may serve as an indicator of healthy mature riparian systems (Boal and Mannan 1996).

The common black-hawk nests throughout the Tonto primarily along major drainages with stands of gallery-type riparian forests. Figure CBHA-2 shows the results of Breeding Bird Atlas Survey to date on the Tonto National Forest. The data is depicted as points, which in reality represent "atlas blocks" established at the beginning of the atlas survey work, to obtain adequate sampling of the various habitat biomes within the State. Data from these breeding bird blocks compare favorably with HDMS records (AGFD 2002) shown in Figure CBHA-3.

FigureCBHA-2. Common black-hawk occurrences in breeding bird blocks, Tonto National Forest

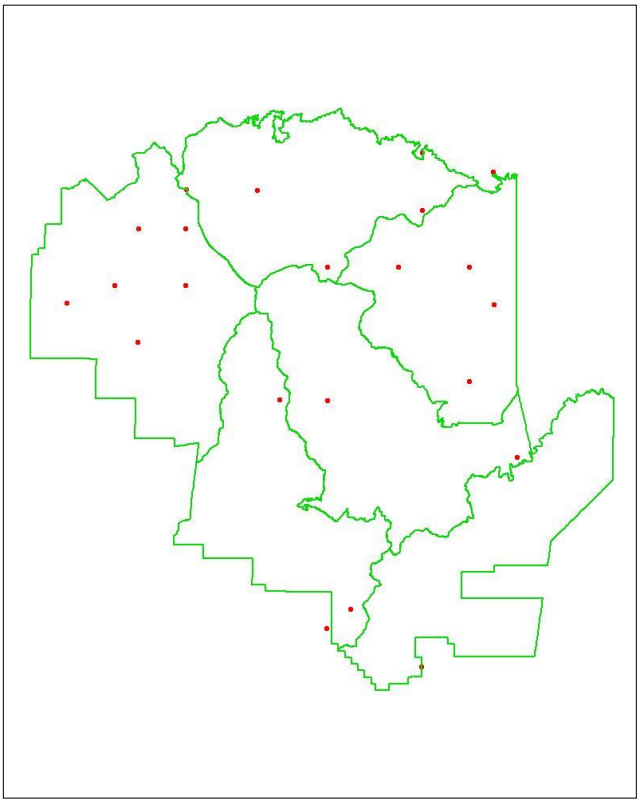
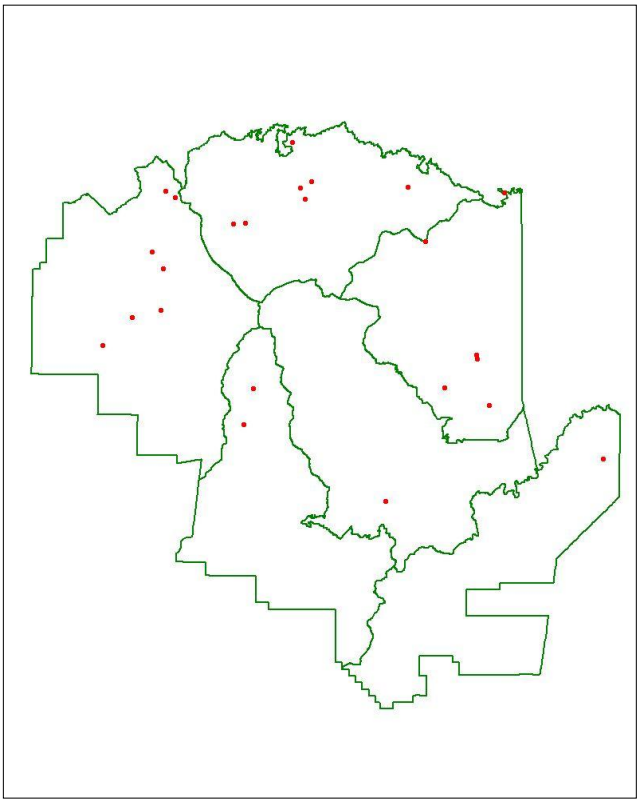


Figure CBHA-3. Common black-hawk nest territory observations, Tonto National Forest



Habitat

On the Tonto National Forest, the common black-hawk is an "obligate riparian nester." It is generally dependent on mature broadleaf trees along perennial streams for nest sites (Porter and White 1977, Schnell et al. 1988), although a few nests are situated along intermittent watercourses where small impoundments may persist through the breeding season (Schnell et al. 1988). A reliable supply of riparian associated vertebrate and invertebrate prey is also required for successful nesting (Snyder in Murphy 1978, Millsap 1981). Its nesting territories are restricted to, and disjunct within, riparian communities (Millsap 1981). Riparian communities (Brown et al. 1980) in which the species is found include the cottonwood-willow series (1224.53) of the Sonoran Riparian Deciduous Forest (<1,200 m elev.), the cottonwood-willow series (1223.21) and mixed broadleaf series (1223.22) of the Interior Southwestern Riparian Deciduous Forest (1,100-1,800 m elev.), and the cottonwood-willow series (1222.31) and mixed broadleaf series (1222.32) of the Rocky Mountain Riparian Deciduous Forest (1,700-2,300 m elev.) (Boal and Mannan 1996).

Foraging

Foraging areas are generally characterized as areas with surface water less than 30 cm deep interspersed with riffles, runs, and pools (Schnell et al. 1988). Low branches, downed trees, exposed roots, and prominent rocks are important for hunting perches (Schnell et al. 1988, Snyder and Snyder 1991). Aquatic vertebrates and reptiles form the majority of the common black-hawks diet (Millsap 1981, Schnell 1994, Glinski and Ohmart in Schnell 1994), but a diverse array of prey species may be a necessary component of suitable habitat. Millsap (1981) found common black-hawks were absent from areas that supported one taxon of known prey but lacked others. Diets also fluctuate from season to season as prey availability changes (Schnell 1994). Among vertebrate prey, at least eight species of fish, four species of amphibians, 14 species of reptiles, 12 species of birds, and seven species of mammals have been identified as black-hawk prey. Common black-hawks select the most available prey in riparian communities (Schnell 1994). They are generally sit and wait predators, perching on a low branch, or rock, then making short swooping or pouncing capture attempts when a prey item is detected (Schnell 1979, CWB). They occasionally forage by wading into water to stalk prey (Schnell 1979).

Breeding

Millsap (1981) found large trees and high tree densities characterized common black-hawk nest sites in cottonwood-willow communities. Cottonwoods (*Populus* spp.) (79%) and sycamore (*Platanus wrightii*) (11%) are the predominant tree species used for nests in Arizona and New Mexico (Millsap 1981, Schnell 1994, Scovill 1995). Cliff-nesting by the species is rare (Fowler 1903, Brown in Schnell 1994). Stick platform nests are usually built ≥15 m above ground in large, mature trees that are close to surface water. The nests are usually constructed in a crotch of the main trunk but are occasionally built on side branches. Old nests are often rebuilt, and nests of other species may be used (Schnell 1994). Schnell (1994) found daily direct exposure to sunlight was 4-20% among nests; however, nests in dead sections of tree have little protection from the sun.

Nesting densities have been reported as 0.33/km of stream in northern Sonora (Roderiguez-Estrella and Brown 1991), 0.4/km of stream at Aravaipa Canyon, Arizona (Schnell 1994), and 1.3/km^2 in west-central Arizona (Millsap 1981). The amount of area a hawk will range over often correlates with the abundance and proximity of prey (Newton 1979). Low nest densities also may result from a lack of woodland stands with suitable nest trees.

Foraging

Common black-hawks are migratory only in the northern portions of their range. They arrive on their breeding grounds from early March through early April. As with most migratory raptor populations (Newton 1979), males tend to arrive on the breeding grounds first. The latest autumn sighting is 24 October at Aravaipa Canyon (Schnell et al. 1988). Common black-hawks are generally believed to migrate solitarily along riparian corridors, but may also migrate along ridgelines.

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. The common black-hawk was selected as a Management Indicator Species for riparian streamsides, Appendix G, Tonto (USDA Forest Service 1985).

Riparian Streamside Standards and Guidelines and Other Measures

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the riparian vegetation type was determined to cover approximately 35,022 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired management condition at the end of the fifth period. The most recent analysis indicates the quantity of riparian acres has not changed although some shifting upon the landscape has occurred.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for the common black-hawk include:

1. rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage.

2. coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030. Type 1 characteristically contains tall trees > 20 feet high with the highest layer forming somewhat of a closed canopy. Substantial vegetation is also present in the two lower layers (shrub and grass layer).

Additionally, in 1997, the Forest Supervisor provided direction which clarified the above standards. Standards for riparian vegetation utilization, bank alteration and other grazing related practices were established (Johnson and Ross 1997). These standards require (as a minimum):

1. less than 50% utilization on current years growth on woody vegetation less than five feet in height.

2. less than 50% utilization on herbaceous vegetation.

3. less than 20% bank alteration.

4. Monitor utilization standards under the key area concept.

5. Not salting within ¼ mile; winter grazing is preferred.

Refinements to these standards, including use of height/weight curves for deergrass and a finalized Forest monitoring protocol (Johnson and McBride 2002) provide further direction in riparian streamside management. As grazing allotments go through the environmental analysis process, utilization standards in riparian areas are further reduced below maximum acceptable levels to meet MIS, ESA, watershed, riparian or other objectives.

Other forest-wide Riparian Management Practices:

1. Forest-wide Riparian Monitoring Team – this team usually conducts midseason and end of season monitoring on key riparian areas on most grazing allotments on the Forest.
2. Forest Drought Policy development and implementation – establishes trigger for evaluating range conditions on the forest based on long-term rainfall. Most livestock were removed from the forest in 2002 due to drought conditions.

The Plan predicts an increase in common black-hawk populations due to an emphasis on improved riparian management and progression of riparian vegetation toward Type 1 stands**.** Since Forest Plan implementation, the slow rate of change in livestock grazing management practices to achieve riparian improvement, large scouring events in 1993 and 1995, and large acreages of high elevation riparian vegetation destroyed by wildfire and severed drought conditions, it is unlikely that any progress has been made in achieving any upward trend in riparian condition. At best trend is stable, but may be declining.

Population

Based on the direct observation data from breeding bird blocks, HDMS and observations by Forest biologists, at least 40 nesting territories are estimated to occur on the Forest in

2005. The BBS routes and CBC areas are not suitable for detecting the species or determining trends in populations.

The migrant common black-hawk population is limited by the availability of suitable riparian habitat. The migrant population is thought to be self-sustaining (Snyder and Snyder 1991, Schnell 1994). Estimates of historic population size for migrant common black-hawks are not available; most historical information is in anecdotal form. A survey in the mid-1970's suggest 220-250 pairs of common black-hawks nest in the southwestern U.S. (Schnell et. al. 1988). Currently, 183 nest territories are known in Arizona, New Mexico, and Utah. Most of the available information is occupancy data only and has been collected sporadically. Long term monitoring at Aravaipa Canyon, Arizona (Schnell 1994) and an increase from 3-4 territories to 9 territories along Bonita Creek, Arizona (A. Bamman, pers. commun.) suggests that the population is at least stable. However, Aravaipa Canyon and Bonita Creek are protected areas with sub-populations of the migrant common black-hawk population; extrapolations of trends in these areas to the entire population may not be valid.

Common black-hawks have a low reproductive rate compared to other similar sized buteos (Schnell in Newton 1979, Millsap 1981, Schnell 1994). Reported clutch sizes in Arizona are 1.93 and 1.65, with fledging rates of 1.31 and 0.98 (Millsap 1981, Schnell 1994), respectively. Common black-hawks may have strong nest site fidelity (Schnell 1994, CWB). Thus, the effects of lower than normal reproduction or nesting failures may not manifest for several years, especially if nest monitoring continues to be sporadic. In a Conservation Assessment prepared for the Tonto National Forest, Boal and Mannan (1996) determined that the species appears to be stable in the Southwest. The rehabilitation and protection of many riparian areas has made the common black-hawk population more secure, but it is at risk of a reversal of such management policies. Further degradation of riparian habitat would be detrimental to the species and place the population at increased risk.

Tonto National Forest Population Trend

At least one known territory in the headwaters of Canyon Creek was lost during the Chediski Fire in 2002. It is also likely that one or more nest territories were lost in the Dude Fire, which burned several drainages under the Mogollon Rim. The drought appears to be killing large numbers of mature/over-mature cottonwoods on Tonto Creek and may be affecting perennial water and prey on other streams. No specific surveys have been conducted on the Forest to locate active common black-hawk nests. However, MIS surveys in 2003 on the Tonto Basin District detected common black-hawks on 3 different survey points on Hardt Creek.

No monitoring has been conducted by Forest personnel to determine reproductive success or long-term nest territory fidelity.

Monitoring of raptor species can be conducted during the breeding season, the migration and the winter season. The primary methods employed include Breeding Bird Surveys

(BBS), Christmas Bird Counts (CBC), nest surveys, raptor migration counts, roadside counts, feeder watches, and roost counts. Of the most popular survey methods, BBS are ineffectual in monitoring/determining population trend in Common black-hawks. Despite 3,700 BBS routes in the continental U.S., Common black-hawks are not even included in the list of species for which trend analysis is available (Sauer et al. 2000).

There is no published data for nesting densities in the southern, year round part of their range, but migrant Common black-hawks were reported to nest at densities of 0.40 pairs/km in Aravaipa Canyon, Arizona just south of the Tonto National Forest (Schneel 1994).

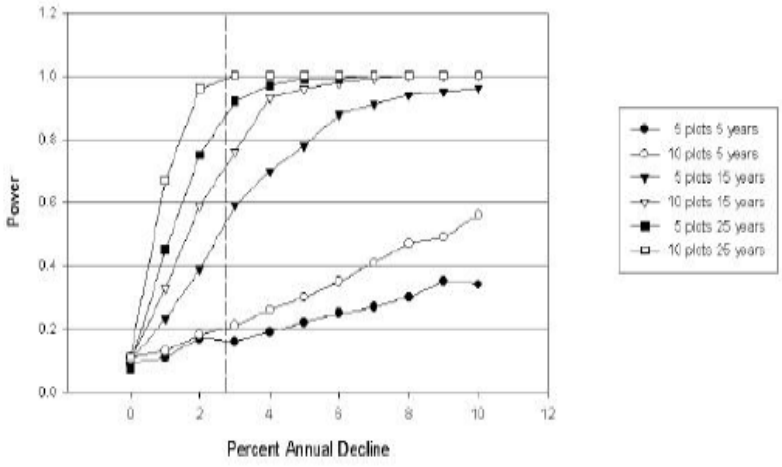


Figure 3. Results of power simulations for breeding area sampling to estimate trends in abundance of breeding Common Black-Hawks in the southwestern United States and northern Mexico. Power curves are constructed using program MONITOR based on 500 simulations. Dashed vertical line indicates an annual rate of decline equivalent to a 50% population decline over a 25- year period.

Loss of preferred riparian gallery woodland and silting of foraging drainages due to extensive wildfires is likely contributing to a **declining** population trend.

Monitoring Methods

The breeding season may be the most favorable period for monitoring black-hawks, at least in the migrant range. They perform very conspicuous courtship displays and are quite vocal during the courtship period. Further, their habitat requirements limit the search area when surveying for the species. Although they are less conspicuous during the incubation period, they become more conspicuous near their nests during the nestling stage when they make frequent trips to and from the nest and become defensive of the nest area. Also, some individuals will respond to vocal imitations of their common call so broadcast surveys may be a viable method of nest location. (Boal 2002).

Surveys should recheck known nest sites during the breeding season. Fledging success should be monitored, at least for a portion of the population.

LITERATURE CITED

Boal, C.W. and R.W. Mannan. 1996. Conservation assessment for the common black-hawk (*Buteogallus anthracinus*). Final report to the USDA Forest Service, Tonto National Forest, P.O. No. 43-8180-5-0271. 76pp.

Boal, C.W. No Date. (Draft) Strategies for monitoring Common black-hawk populations in North America. 12pp.

Brown, D.E., C.H. Lowe, and C.P. Pase. 1980. A digital systematic classification for ecosystems with an illustrated summary of the natural vegetation of North America. U.S. Dept. Agric. For. Serv. Gen. Tech. Rep. RM-73. Ft. Collins, CO.

Brown, L., and D. Amadon. 1968. Eagles, hawks and falcons of the world, vol. 2. MacGraw-Hill Book Co., New York.

Friedman, H. 1950. Birds of North and Middle America, Falconiformes. U. S. Natl. Mus. Bull. 50, Part XI.

Fowler, F.H. 1903. Stray notes from southern Arizona. Condor 5:68-71.

Hubbard, J.P. 1965. Bad days for the black hawk. Aud. Field Notes 19:474.

Johnson, J.L. and W.M. Ross. 1997. Tonto National Forest riparian standards and guidelines, additional direction. Tonto NF memo.

Johnson, J.L. and K. McBride. 2002. Tonto National Forest monitoring protocol. Tonto NF white paper.

Millsap, B.A. 1981. Distributional status of falconiformes in westcentral Arizona--with notes on ecology, reporductive success, and management. U.S. Dep. Interior, Bureau of Land Management, Tech. Note 355. 102pp.

Murphy, J. 1978. Management considerations for some western hawks. Trans. N. Amer. Wildl. and Nat. Res. Conf. 43:241-251.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explor - er.

Newton, I. 1979. Population ecology of raptors. Buteo Books, Vermillion, SD.

Porter, R.D., and C.M. White. 1977. Status of some rare and lesser known hawks in western United States. Pages 39-57 in R.D. Chancellor, ed., Proc. World Conference on Birds of Prey, Vienna. International Council for Bird Preservation.

Rodriguez-Estrella, R., and B.T. Brown. 1990. Density and habitat use of raptors along the Rio Bavispe and Rio Yaqui, Sonora, Mexico. Raptor Res. 24:47-55.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966-2004. Version 2001.2. USGS Patuxent Wildlife Research Center. Laurel, MD. www.mbr-pwrc.usgs.gov/bbs/bbs.html

Schnell, J.H. 1979. Black hawk (Buteogallus anthracinus). Tech Note TN-329. U.S. Dept. Interior, Bureau Land Management, Denver, CO.

Schnell, J.H. 1994. Common black-hawk (*Buteogallus anthracinus*). *In* The Birds of North America, No. 122 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Schnell, J.H., R.L. Glinski, and H.A. Snyder. 1988. Common black-hawk. Pages 65-70 in R.L. Glinski, B.G. Pendleton, M.B. Moss, M.N. LeFranc, Jr., B.A. Millsap, and S.W. Hoffman, eds., Proc. southwest raptor management symposium and workshop. Natl. Wildl. Fed., Sci. Tech. Ser. No 11., Washington, D.C.

Scoville, J. 1995. The occurrence of common black hawks (*Buteogallus anthracinus*) and zone-tailed hawks (*Buteo albonotatus*) within the Clifton Ranger District. Final Report to the Apache-Sitgreaves National Forest, U.S. Forest Service. 14pp.

Snyder, N.F.R., and H.A. Snyder. 1975. Raptors in range habitat. Pages 190-209 in D.R. Smith, tech. coord., Proc. Symposium on management of forest and range habitats for nongame birds. U.S. Dep. Agric., For. Serv. Gen. Tech. Rep. WO-1.

Thayer Birding Software (TBS). 1998. The Birds of North America. Thayer Birding Software.CDROM. V. 2.5.

USDA Forest Service. 1985. Tonto National Forest plan. Southwestern Region, Albq., NM. p 249.

7. ASH-THROATED FLYCATCHER: *Myiarchus tyrannulus*

MIS Role: Ground cover in the pinyon/juniper type**.**

SUMMARY OF KEY HABITAT COMPONENTS

- Secondary cavities
- Open habitats
- Habitat Generalist~desert scrub, pinyon-juniper, ponderosa pine

Species Description

Ash-throated flycatchers are habitat generalists. They have grayish-brown heads and upperparts, a white throat, pale gray breast, and a pale yellowish belly and undertail coverts. They have two white wing bars and rufous coloration on the tail, a stout, black bill and black legs and feet. Length averages 8.5 inches and wingspan averages 14.0 inches (Alsop III 2001).

Distribution

The breeding areas for ash-throated flycatchers range from Kansas, Oklahoma, and Wyoming in the central U.S. to the west coast according to the NatureServe Explorer

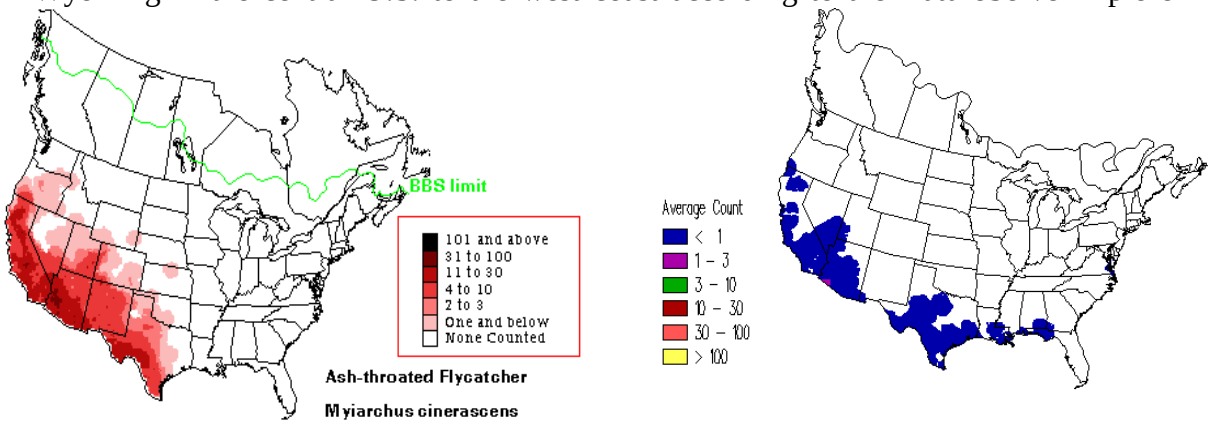


Figure ATFL-1. Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts

website (2001), which can be found at: http://www.natureserve.org/explorer/ranking.htm. They are long-distance migrants in most of their U.S. range, and are resident throughout the year in southeastern California, central Arizona, and parts of Mexico. Winter migrants range from northern Baja, southeastern California, and central Arizona, south into mainland Mexico, El Salvador, and casually into Costa Rica (Terres 1980) during the non-breeding season.

Habitat

Ash-throated flycatchers inhabit elevations ranging from desert scrub below sea level to mountain regions of oak and pinion-juniper (*Pinus edulis-Juniperus* spp.) of more than 9,000 feet (AOU 1983, Ehrlich, et al. 1988). Forest types most associated with ash-throated flycatchers in Arizona are ponderosa pine (*Pinus ponderosa*) and piñon- juniper; (Scott and Patton 1989). This species breeds in scrub, chaparral, and open and riparian woodlands, especially in oak (*Quercus* spp.) and piñon – juniper.

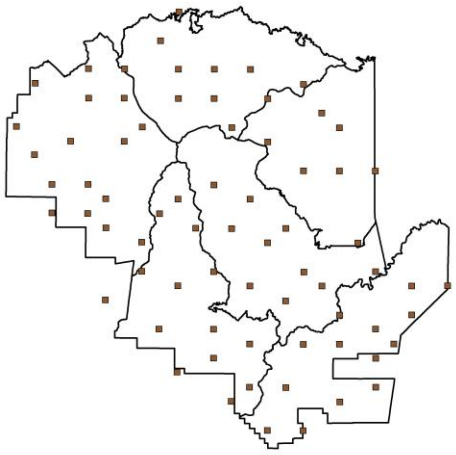


Figure ATFL-2: Block locations where breeding ash-throated flycatcher were found- based on Arizona Breeding Bird Atlas.

In Arizona, this species consists of both year-round residents and winter migrants. Provided there are open habitats, ash-throated flycatchers can be found anywhere on the Tonto National Forest, from Sonoran desert scrub to ponderosa pine forests. Ash-throated flycatchers are common in agricultural areas, golf courses, and parks (Pollock, Tonto National Forest unpubl.).

Breeding

Ash-throated flycatchers' main breeding season runs from May to June in Arizona. They are considered cavity nesters, using natural cavities such as old woodpecker holes in dead or dying trees, holes in fence posts, old cactus wren nests (Bailey and Niedrach 1965, Harrison 1979, Terres 1980), or bluebird nest boxes (Alsop III 2001), anywhere from 3 to 20 feet above ground (Ehrlich et al. 1988). They lay an average of 4 to 5 eggs. Incubation takes an average of 15 days, and the young fledge in another 14 to16 days (Ehrlich et al. 1988). These flycatchers can have more than one clutch per year (Alsop III 2001).

Food Habits

Prey consists mainly of a variety of insects, some fruit, berries, small lizards, spiders (Alsop III 2001), bees and wasps, ants caterpillars, moths, and grasshoppers (Pollock unpubl. 2002). The ash-throated flycatcher hawks for prey, perching and then hovering and dropping down, or sallies from a perch to catch prey in flight (ibid.).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. The Tonto FLMP (Appendix G) designated the ash-throated flycatcher as a Management Indicator Species for ground cover in the piñon – juniper woodland vegetation type (USDA Forest Service 1985). In 2000, the Tonto National Forest and the Arizona Game & Fish Department conducted a review of the Forest's MIS species. In that process, it was felt that the ash-throated flycatcher was not a particularly good indicator of ground cover for the piñon – juniper vegetation type, since it doesn't forage or nest on the ground, and it uses a wide variety of habitat other than simply piñon – juniper. It was suggested that perhaps a better indicator of ground cover in the piñon – juniper habitat type would have been the gray flycatcher Pollock, Tonto National Forest unpubl.). In appendix K of the FLMP, pinyon-juniper acreage was listed as 265,480.

Population Trends

The Global Heritage Status for ash-throated flycatchers is G-5, being demonstrably widespread and secure throughout their range. They are increasing on a global basis, within their range, according to NatureServe Explorer website (2001) which can be reached at: http://www.natureserve.org/explorer. In the U.S., they are listed as N5B, 4N4, meaning that this species' rank ranges from nationally secure, widespread, and abundant, to apparently secure in some areas. In Arizona, this species is listed as S5, being demonstrably widespread, abundant, and secure (ibid.). "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (ibid.).

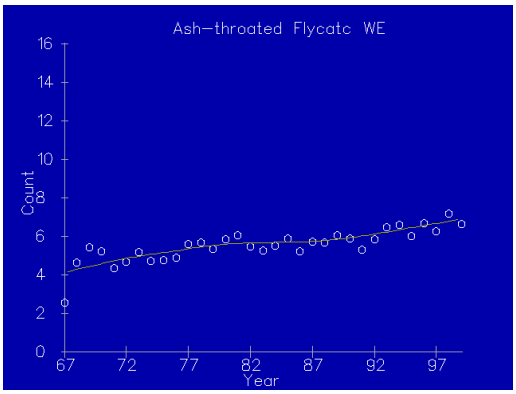


Figure ATFL-3. Ash-throated flycatcher trends for the years 1968 to 1998 in the Western BBS region. (Sauer et al. 2001)

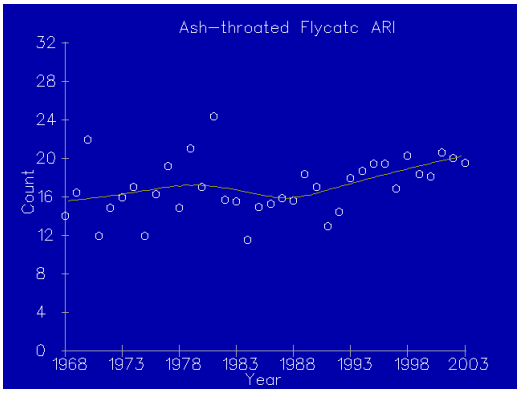


Figure ATFL-4. Ash-throated flycatcher trends for the years 1968 to 2003 in Arizona. (Sauer et al. 2004)

North American Breeding Bird Survey (BBS) data indicates a significant population increase in the western North America from 1966 to 1989 (ibid., Figure ATFL-3). BBS survey data from 1968 to 2003 indicates a non-significant increase of 1.0+ percent, over 70 routes surveyed in Arizona. Refer to Figure ATFL-4 for a graph provided by the

USGS Patuxtent Wildlife Research Center website (Sauer et al. 2004) for ash-throated flycatcher trends for the years 1968 to 2003 in Arizona.

Tonto National Forest Population Trend

Two current BBS transects on the TNF indicate that this species is commonly counted during survey efforts. In addition, regionally this species continues to expand or remain at current levels according to the National Audubon Society 2005. Number of birds detected during surveys appears to have stabilized after 2000-2001 to present (Figure 5). Transects conducted in 2003 on the Tonto Basin District indicate that this species was observed 256 times over approximately 20 visits at thirteen predetermined points (Plank 2005). Based on this data it appears that this species is **stable** on the TNF.

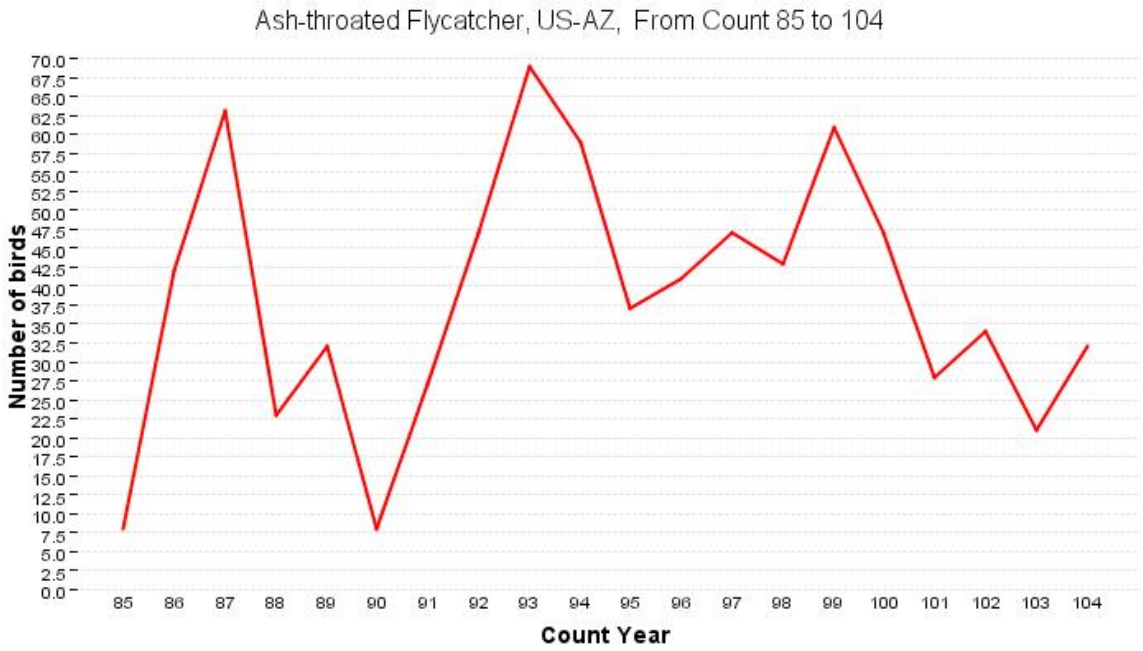


Figure 5. Ash-throated flycatcher population trend for the Arizona region 1985-2004 (National Audubon 2005)

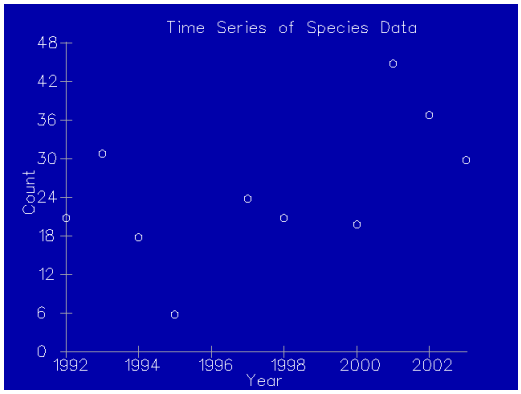


Figure 6. Ash-throated flycatcher population trend for the Bartlett Reservoir BBS route 1992-2003.

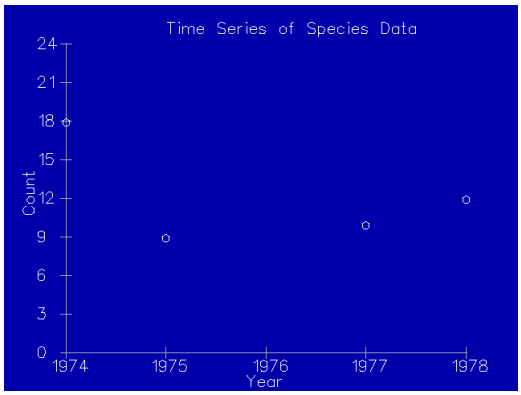


Figure 7. Ash-throated flycatcher population trend for the Aztec Peak BBS route 1974-78.

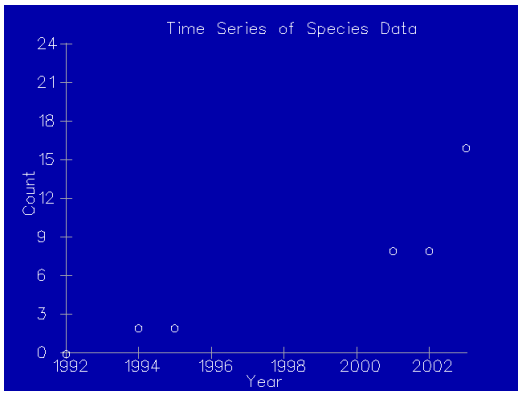


Figure 8. Ash-throated flycatcher population trend for the Tonto Village BBS route 1992-2003.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

American Ornithologists' Union (AOU), Committee on Classification and Nomenclature. 1983. Check-list of North American birds, 6th edition. American Ornithologists' Union, Allen Press, Inc. Lawrence, KS

Bailey, A. M. and R. J. Niedrach. 1965. Birds of the Colorado. Denver Museum of Natural History.

Ehrlich, P.R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc, New York.

Harrison, C. 1979. A field guide to the nests, eggs, and nestlings of North American birds. Collins Publ. Cleveland, OH.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington DC.

National Audubon Society (2005). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Pollock, D. A. unpubl. Tonto National Forest Management Indicator Species (MIS). USDA Forest Service, Tonto National Forest, Region 3. Payson, AZ.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Scott, V. E., and D. R. Patton. 1989. Cavity-nesting birds of Arizona and New Mexico Forests. USDA Forest Service Gen. Tech. Report RM-10. Reprinted by the Arizona Wildlife Foundation, AZ.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, Publ. New York.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

8. BLACK-CHINNED SPARROW: *Spizella atrogularis*

MIS Role: Shrub density in chaparral

SUMMARY OF KEY HABITAT COMPONENTS

- Brush 3-6.5 ft tall
- Very dense brush of mixed species interspersed with scattered tall shrubs
- Young stands with openings and passageways in brush
- Desert scrub and washes for winter habitat

Species Description

This is a small, slender, species that lacks wing bars. Length is approximately 5.75 inches, and wingspan is 9 inches. The plumage appears gray overall, with a reddish-brown back with black streaks, reddish-brown wings, and a long, dark tail (Alsop III 2001). Sexes are dimorphic; the male's breeding plumage includes a black upper throat and chin, extending upward onto the lores and above the bill. The female has duller, restricted black on the face and chin. Juveniles have a paler crown, and underparts are lightly streaked with a brownish wash (ibid.).

Habitat

The black-chinned sparrow is common in arid brushlands throughout the southwestern U.S. and south-central Mexico (Tenney 1997). They are found in portions of California (Garrett and Dunn 1981), Baja, Mexico (Wauer and Ligon 1974), southern Nevada

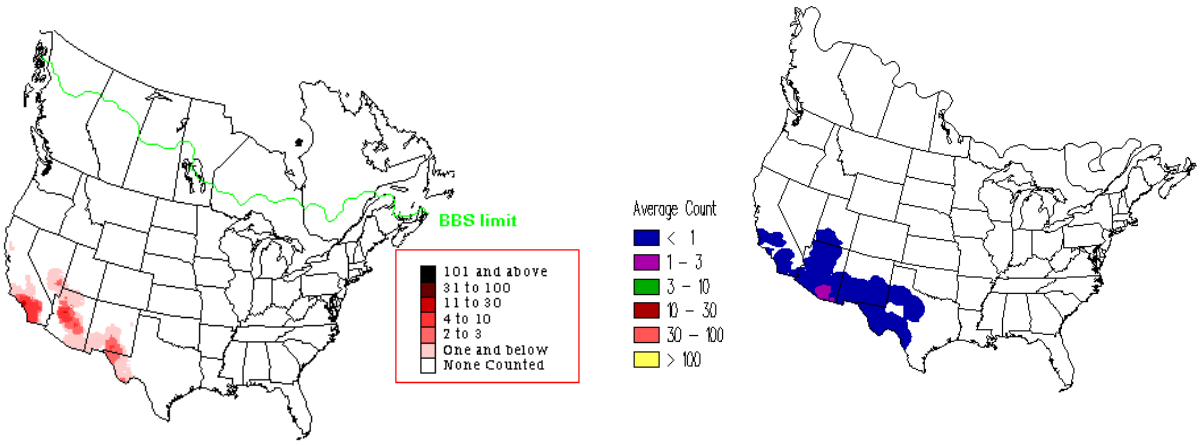


Figure BCSP-1. Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts. (Sauer *et.al.* 2001)

(Alcorn 1988), southwestern Utah, northwest, the Upper Sonoran desert zone from the northwest to east-central Arizona (Monson and Phillips 1981, AZ Breeding Bird Atlas unpubl.), central and southwestern New Mexico (Hubbard 1978), westernmost Texas (Texas Breeding Bird Atlas unpubl.), and south into central Mexico (Walters 1983, Behle et al. 1985). Their winter range includes southeastern Arizona, southwestern New

Mexico, and west Texas, and south into central Mexico (American Orthinologists' Union 1983, Tenney 1997).

The black-chinned sparrow is thought to be well distributed on the Tonto National Forest. Arizona began a breeding bird atlas in the early 1990's. Figure BCSP-2 shows the results of this effort to date on the Tonto National Forest.

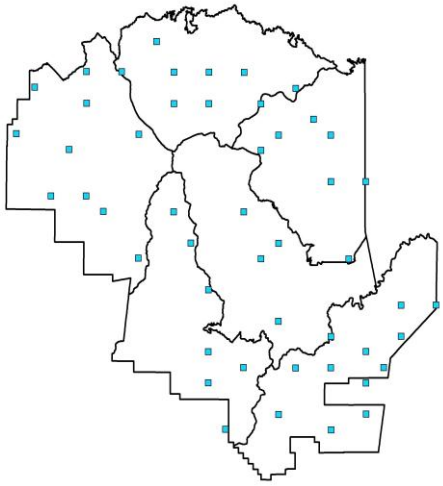


Figure BCSP-2: Block locations where breeding black-chinned sparrow were found- based on Arizona Breeding Bird Atlas.

Habitat

During the summer, this species prefers rocky slopes of mixed chaparral, arid scrub, or sagebrush, from near sea level to almost 8,200 feet in elevation (Tenney 1997). The brush inhabited by black-chinned sparrows is usually 3 to 6.5 feet tall. Very dense, mixed shrub species interspersed with scattered tall shrubs or trees and rocky outcrops on slight to steep slopes are preferred (Shuford 1993, Burridge 1995, Tenney 1997). Black-chinned sparrows prefer young stands with openings through the brush, and avoid overgrown stands. In montane chaparral, this species is associated with C*eanothus* spp. and scrub oak (*Quercus turbinella*) dominated habitats (Grinnell and Miller 1944). Habitat quality may benefit with recurrent fires, dependent on the vegetation type and region (Tenney 1997).

They are fairly common and widespread in the Tonto Basin and Prescott regions of northwest and central Arizona, mainly in chaparral dominated by scrub oak (Phillips et al. 1964). They are also found in Arizona in manzanita (*Arctostaphylos pungens*; Tenney 1997), and they are uncommon and local in chaparral and piñon–juniper (*Pinus edulis-Juniperus* spp.) woodland in southeastern Arizona (Davis and Russell 1995). This species is a partial migrant; moving down-slope or south into desert scrub and dry washes in the winter (Tenney 1997).

Breeding

Breeding season peak activity lasts from mid-May through mid-July for black-chinned sparrows, throughout their range (Tenney 1997). Their nests are usually located from 1.5 to 3 feet above ground (Ehrlich et al. 1988), placed near the center of dense shrubs and well-concealed (Tenney 1997). Nests are compact, but loosely constructed open cups of dried grasses, with finer materials on the inside of the cup (ibid.). Average clutch size is 2 to 4 eggs (Harrison 1979). Incubation lasts 12 to 13 days (Wheelock 1910), and young leave the nest 10 days after hatching (ibid.). They are rarely parasitized by brown-headed cowbirds, the dwarf race (*Molothrus ater obscurus*; Freidman 1963).

Foraging

The main prey items of black-chinned sparrows are adult and larval insects (Weathers 1983). During the winter food consists mainly of the seeds of grasses and forbs (Oberholser 1974, Tenney 1997). These sparrows forage on brushy slopes under and within the dense shrub canopy, in piñon, juniper, coffeeberry (*Garrya wrightii*), sagebrush (*Artemisia* spp.), ephedra (*Ephedra* spp.), and chamise (*Atriplex* spp.) chaparral (Newman 1968, Weathers 1983, Tenney 1997). They glean insects from inside shrubs and on the ground (Weathers 1983). During the winter in southern Arizona, they feed on grass seeds, including spangletop (*Leptochloa dubia*) and side oats grama (*Bouteloua curtipendula*) either alone or in groups, and occasionally in flocks of mixed species.

Tonto National Forest Management Indicator Species

Management Indicator Species were selected to adequately monitor the effects of implementation of the Proposed Action in the FLMP, on wildlife habitat and species diversity. Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto National FLMP (USDA Forest Service 1985), the black-chinned sparrow was selected as a Management Indicator Species for the chaparral vegetative type (Appendix G, Tonto FLMP) as an indicator of shrub diversity. There were 1,155,722 acres of chaparral when the FLMP was amended in 1990 (Amendment 22 pg 268).

Management direction of the chaparral vegetative type can be found in individual management units of the FLMP as follows.

1. Manage the chaparral type to emphasize the production of whitetail deer (Amendment 2, page 68-1, Amendment 20 replacement page 87, pg 114, Amendment 20 pg 140, pg 166).

2. Manage the chaparral type on a 30 year prescribed fire rotation on those sites managed intensively for forage production and water yield (Amendment 22 replacement pg 69 and 88, pg 114, pg 166).

3. Use of approved herbicides on a selective basis where brush encroachment is clearly inhibiting forage production for wildlife and domestic livestock (Amendment 22, replacement pg 88, pg 114).

4. Seeding and prescribed burning in chaparral at the rate of 1/30 of vegetative type each year on those sites managed for forage production and increased water yield (pg 141).

5. These prescriptions may benefit the black-chinned sparrow by increasing shrub density and retaining a diversity of size and age classes of chaparral.

Population Trends

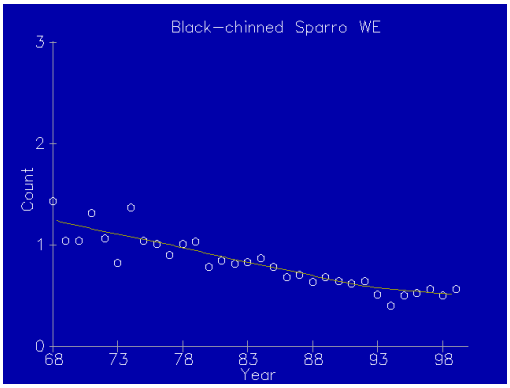


Figure BCSP-3. Black-chinned sparrow trends for the years 1968 to 1998 in the Western Region. USGS Patuxtent Wildlife Research Center website (2001; http://www.mbr-wrc.usgs.gov/bbs/bbs.html).

Heavy grazing on wintering grounds in the southwestern U.S. and northern Mexico have reduced and degraded grasses and forb vegetation, and this may impact winter foraging habitat (DeSante and George 1994, Tenney 1997). The population has declined in southern California in conjunction with extensive mining and the use of bike trails and other off-road vehicles (Johnson and Cicero 1985). Black-chinned sparrows are ranked with a Global Heritage Status of G5, being common and moderately widespread, or widespread with spotty distribution, throughout their range on the NatureServe Explorer website (2001), which can be found at: http://www.natureserve.org/explor- er /ranking.htm. In the U.S. they are ranked as N5, being widespread and common throughout their range. In Arizona, they are ranked as S5, being also widespread and common within the state (ibid.). "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001). The TLMP predicted an upward trend of black-chinned sparrows based on management (amendment 22, pg 269).

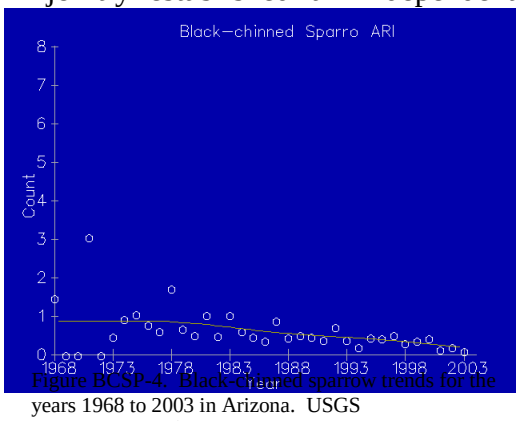


Figure BCSP-4. Black-chinned sparrow trends for the years 1968 to 2003 in Arizona. USGS Patuxtent Wildlife Research Center website (2004; http://www.mbr-wrc.usgs.gov/bbs/bbs.html).

Breeding Bird Survey (BBS) data show steep and significant population declines for the western BBS region, of –6.7 percent per year, over 47 survey routes (Figure BCSP-3). Declines have been especially noted in California, possibly due to mining, off-road vehicles, and overgrazing (Tenney 1997). "In contrast to the BBS data, winter Christmas Bird Counts (CBC) show a moderate but significant increase of 1.7 percent …The highest winter abundance occurs in southern Arizona (2.4 percent per year; 22 survey routes)." (Sauer et al. 1996). In Arizona for the years 1966 to 2003, the BBS trend showed a non-significant decline of –0.8 percent, over 10 survey routes. Refer to Figure BCSP-4 for a graph provided by the USGS Patuxtent Wildlife Research Center website (Sauer et al. 2003).

Tonto National Forest Population Trend

Two current BBS routes on TNF include Bartlett Reservoir and Tonto Village. Both routes have documented this species but appear to be at low densities. Regionally this species continues to expand or remain at current levels. Number of birds detected during

statewide Christmas Bird Count surveys appears to have stabilized after 2000-2001 to present (Figure 5). On TNF in 2003, this species was detected approximately 75 times over 13 different dates on several transects on the Tonto Basin Ranger District (Plank 2005). Because shrub densities have remained quite static or increased since 1985 this species population is considered to be **stable.**

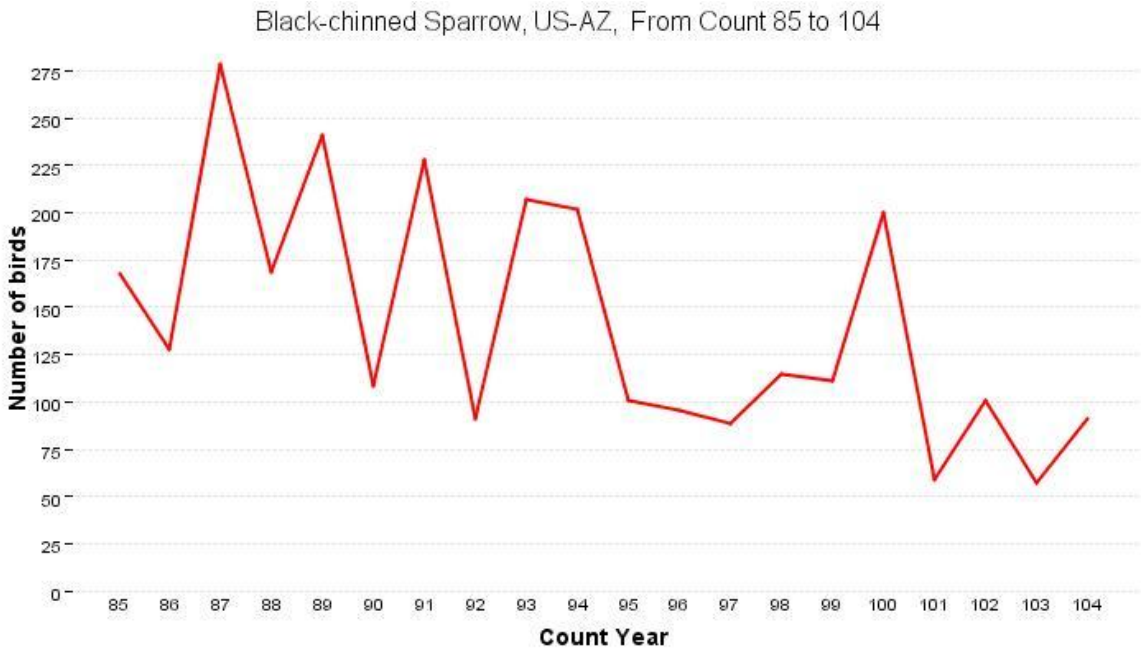


Figure 5. Black-chinned sparrow population trend for the Arizona region 1985-2004 (National Audubon Society 2005)

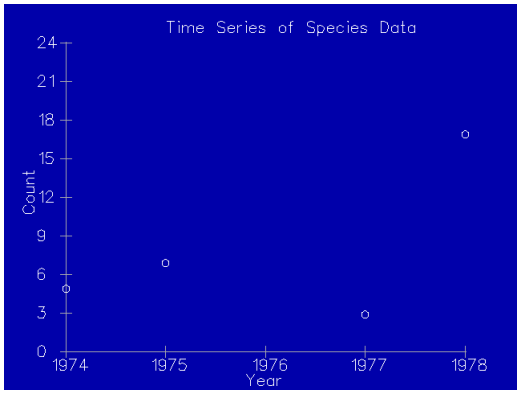


Figure 6. Black-chinned sparrow population trend for the Aztec Peak BBS Route 1974-1978.

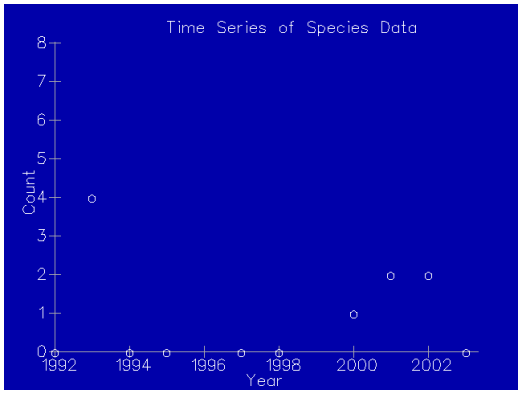


Figure 7. Black-chinned sparrow population trend for the Bartlett Reservoir BBS Route 1992-2003.

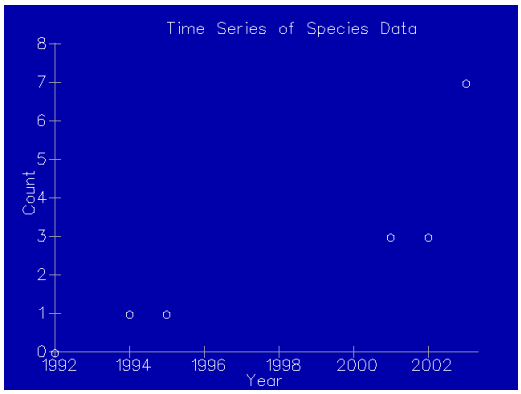


Figure 8. Black-chinned sparrow population trend for the Tonto Village BBS Route 1992-2003.

Literature Cited

Alcorn, J. R. 1988. The birds of Nevada. Fairview West Publ., Fallon, NV. *In* C. R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

American Ornithologists' Union (AOU), Committee on Classification and Nomenclature. 1983. Check-list of Birds. Sixth Edition, American Ornithologists' Union, Allen Press, Inc., Lawrence, KS.

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

Behle, W. H., E. D. Sorensen, and C. M. White. 1985. Utah birds: a revised checklist. Utah Mus. Nat. Hist. Occ. Publ. No. 4. *In* C. R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Burridge, B. 1995. Sonoma County breeding bird atlas: detailed maps and accounts for our nesting birds. Madrone Audubon Society, Santa Rosa, CA. *In* C R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Davis, W. A., and S. M. Russell. 1995. Finding birds in southeast Arizona. Tucson Audubon Society, Tucson, AZ.

DeSante, D. F., and T. L. George. 1994. Population trends in the landbirds of western North America. Stud. Avian Biol. 15:173-189. *In* C. R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc, New York.

Friedman, H. 1963. Host relations of the parasitic cowbird. U.S. Natl. Mus. Bull. No. 233. *In* C. R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Garrett, K., and J. Dunn. 1981. Birds of southern California. Los Angeles Audubon Soc. Los Angeles, CA. *In* C. R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Grinnell, J., and A. H. Miller 1944. Distribution of the birds of California. Pacific Coast Avifauna 27. *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA.

Harrison, H. H. 1979. A field guide to western birds' nests. Houghton Mifflin, Boston, MA.

Hubbard, J. P. 1978. Revised checklist of the birds of New Mexico. New Mexico Ornithol. Soc. Publ. No. 6. *In* C. R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Johnson, N. K., and C. Cicero. 1985. The breeding avifauna of San Benito Mountain, California: evidence for a change over a half-century. West. Birds 16:1-23

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

Monson, G., and A. R. Phillips. 1981. Annotated checklist of the birds of Arizona. Univ. of Arizona Press, Tucson, AZ.

National Audubon Society (2005). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Newman, J. D. 1968. Arizona black-chinned sparrow. Pp 1241 – 1246 *In* Life Histories of cardinals, grosbeaks, buntings, towhees, finches, sparrows, and their allies (O. L. Austin, Jr., ed). U.S. Nat. Mus. Bull. 237.

Oberholser, H. C. 1974. The bird life of Texas. Univ. of Texas Press, Austin, TX. .

C. R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Phillips, A., J. Marshll, and G. Monson. 1964. The birds of Arizona. Univ. of Arizona Press, Tucson, AZ.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Sauer, J. R., J. E. Hines, G. Gough, I. Thomas, and B. G. Peterjohn. 1997. The North American Breeding Bird Surveys and Analysis. Version 96.3 Online. Patuxtent Wildlife Research Center, Laurel, MD. Available: http://www.mbr.nbs.gov/bbs/bbs.html.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Shuford, W. D. 1993. The Marin County breeding bird atlas: a distributional and natural history of coastal California. California Avifauna Series No. 1. Bushtit Brooks,

Bolinas, CA. *In* C. R. Tenney. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Tenney, C. R. 1997. Black-chinned sparrow (*Spizella atrogularis*). *In* The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Walters, R. E., ed. 1983. Utah bird distribution: latilong study 1983. Utah Div. Wildl. Res., Salt Lake City, UT. *In* Tenney, C. R. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Wauer, R. H., and J. D. Ligon. 1974. Distributional relations of breeding avifauna of four southwestern mountain ranges. Transcactions of the sypmposium on the biological resources of the Chiricahua desert region, U.S. and Mexico: Sul Ross State Univ., Nat. Park Service 1977: 567-573. *In* Tenney, C. R. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Weathers, W. 1983. Birds of southern California's deep canyon. Univ. of California Press, Berkeley and Los Angeles, CA.

Wheelock, I. G. 1910. Birds of California. A. C. McClurg and Co., Chicago, IL. *In* Tenney, C. R. 1997. Black-chinned sparrow (*Spizella atrogularis*). The Birds of North America, No. 270 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

9. BLACK-THROATED SPARROW: *Amphispiza bilineata*

MIS Role: Shrub density in desertscrub.

SUMMARY OF KEY HABITAT COMPONENTS

- Occurs primarily in desert-scrub with a preference for rocky uplands, mesquite, yucca, and cacti
- Prefers < 25% vegetative cover
- Vegetative density appears to be more important than vegetation type
- Closely associated with creosote bush throughout southern range
- Eats primarily insects and seed depending on time of year

Species Description

The black-throated sparrows has a brownish-gray back and head, and wings; a dark tail with white trim on the outer tail feathers. The face patter is a distinctive face patter with a wide white eyebrow and mustache line and a black cheek, throat. Length averages 5.5 inches, and wingspan averages 8.5 inches (Alsop III 2001). Sexes are similar in appearance, although males are slightly larger than females. Juveniles (observed June through October in the U.S.) resemble adults in facial pattern, but lack the black breast, being white on the chin and throat, and white on the breast, with darker streaks and spots (Johnson et al. 2002).

Distribution

Black-throated sparrows are found throughout the southwestern U.S. and Mexico in arid habitats. They breed locally as far north as eastern Washington and Oregon; and in desert

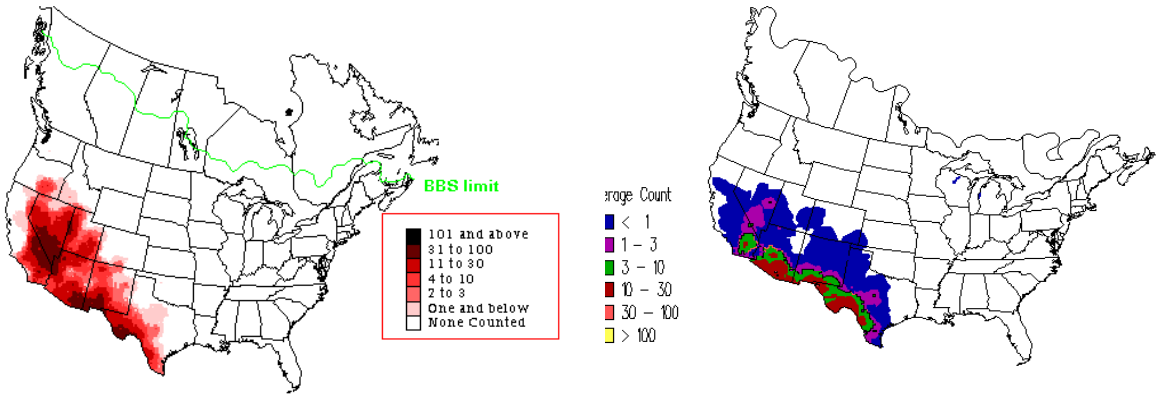


Figure 1 – Black-throated sparrow: Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts. (Sauer *et.al.* 2001)

lowlands throughout Nevada, south and western Utah, possibly in southern Wyoming, western Colorado, southeastern California, most of Arizona, southern New Mexico and Texas, into Baja and central mainland Mexico, in areas that are not forested. The

northern populations migrate south during the non-breeding season, while they are year-round residents in southern California, Arizona, New Mexico, Texas, and Mexico (Johnson et al. 2002). "Winter residents and migrants are found within the breeding range from southeastern California, southern Nevada, southwestern Utah, the southern half of Arizona, southern New Mexico, and Texas, south through the remainder of this species' range" (ibid.).

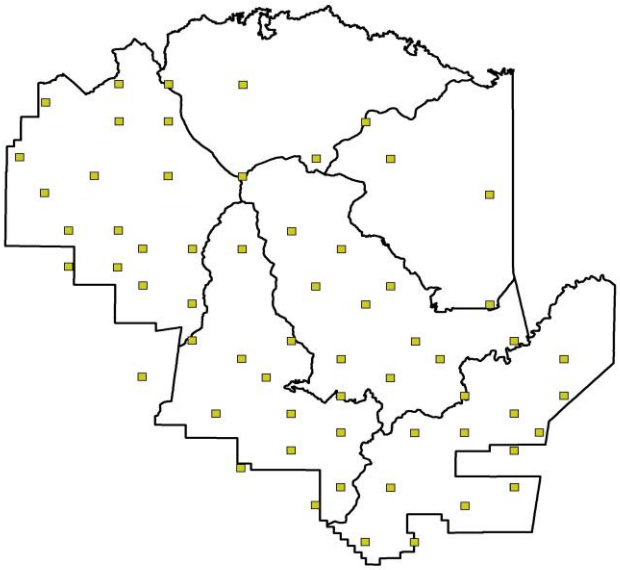


Figure BTSP-2: Block locations where breeding black-throated sparrow were found- based on Arizona Breeding Bird Atlas.

Habitat

This species occurs semi-open habitat with evenly spaced shrubs and trees from approximately 3 to 9 feet tall (Johnson et al. 2002), and especially in rocky uplands in desert scrub (Ehrlich et al. 1988). On the coast, it is found in chaparral (Stokes and Stokes (1996). "Black throated sparrows occur in desert alluvial fans, canyons, washes, flats, badlands, and desert scrub type such as creosote bush (*Larrea tridentata*), ocotillo (*Fouquieria splendens*), cholla (*Opuntia* spp.), mesquite (*Prosopis* spp.), catclaw acacia (*Acacia greggii*), blackbrush (*Coleogyne ramosissima*), sagebrush *(Artemisia* spp.), antelope brush (*purshia tridentata*), and rabbitbrush (*Chrysothammus* spp.), interspersed with taller plants such as Joshua trees (*Yucca brevifolia*), piñon-juniper (*Pinus edulis-Juniperus* spp.), and crucifixion thorn (*Canotia holacantha*)" (Johnson et al. 2002). Desertscrub habitat with less than 25 percent vegetative cover is preferred, and water sources during the dry season are necessary for this species in the southwest (USDA Forest Service 1994). Moderate grazing on a semi-desert grassland in southern Arizona appeared to promote the desert shrub habitat used by this species (Bock et al. 1984). The black-throated sparrow is closely associated with creosote bush throughout its southern range, and vegetation density appears to be more of a factor in habitat selection than specific species (ibid.). Black-throated sparrow population density in a study in creosote-burrobush habitat in California was 7 individuals per 99 acres (Kubik and Remsen 1977). During the non-breeding season, this species can be found in riparian areas, grasslands, and weedy fields, as well as in xeric shrub habitats (AOU 1983, Rising 1996).

Breeding

Black-throated sparrows breed mainly from early April through mid-July throughout their range. Nest-building timing is variable, depending on rainfall, elevation, and food availability (Johnson et al. 2002). In central Arizona, nest building begins in mid-April

(van Riper and Johnson in press). Nesting is triggered by summer rains, but they may begin nesting in early spring in years of adequate winter rainfall (S. Russell, pers. comm. with Johnson et al. 2002). In south-central Arizona, out of 11 nests, 46 percent were built in teddybear cholla (*Opuntia bigelovii*), 27 percent in brittlebrush (*Encelia farinosa*), 18 percent in box thorn (*Lycium andersonii*), and 9 percent in buckhorn cholla (*Opuntia acanthocarpa; Torres 1983*). In central Arizona, of 56 nests, 65 percent were in creosote bush, 29 percent in crucifixion thorn, 2 percent in one-seeded juniper (*Juniperus monospera*), 2 percent in catclaw acacia, and 2 percent in mahonia (*Berberis haematocarpa;* van Riper and Johnson in press).

Nests are loose cups built in cactus or shrubs from ground-level to 2.0 feet above ground (Ehrlich et al. 1988). Nests are loose cups made of course grasses, plant stems, fine branches, weeds, rootlets; usually lined with hair (Delesantro 1978), built in cactus or shrubs from ground-level to 2.0 feet above ground (Ehrlich et al. 1988). Clutches usually consist of 3 to 4 eggs (Banks 1968, Rising 1996). Second clutches are common in years with adequate rainfall and prey items (S. Russell pers. comm. with Johnson et al. 2002). In Arizona, incubation lasts approximately 12 days, and the young fledge in 9.5 days, on average (Johnson and van Riper in press). In a study in the Verde Valley, Arizona, the cowbird parasitism rate for 56 black-throated sparrow nests was 52 percent (Johnson and van Riper in press).

Feeding Habits

During the breeding season, black-throated sparrows prey items include grasshoppers (Acrididae), butterfly and moth (Lepidoptera) larvae, mantids (Mantidae), robber flies (Asilidae, walking sticks (Phasmatidae), and dragonflies (Ansioptera; Johnson et al. 2002). In a study in New Mexico by Zimmer (1993), clutch sizes were lower in a year when grasshoppers were scarce. This species feeds mainly on the ground, taking a variety of insect prey and seeds during breeding season, and seeds such as storksbill (*Erodium* spp.), large grasses (*Schizmus* spp.), small grasses, creosote plant material, and prickly-pear cactus (*Opuntia* spp.; Johnson et al. 2002). They also glean foliage on the lower portions of shrubs and trees and occasionally flush and make short aerial chases to capture prey (Zimmer 1983). During the non-breeding season, this species may forage in mixed flocks (Ehrlich et al. 1988, Rising 1996).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP (USDA Forest Service 1985), the black-throated sparrow was selected as a Management Indicator Species for shrub diversity in the Desertscrub Vegetative Type (Appendix G, Tonto FLMP).

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the mesquite (presumably desert-scrub) vegetation type was determined to cover approximately 169,879 acres on the Tonto. Table 10 in Appendix K of the FLMP

(Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired vegetative condition at the end of the fifth period.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat (desert scrub) for black-throated sparrow include:

1. Manage the desert-scrub type to emphasize production of javelina, Gambel's quail, and mule deer (this emphasis will indirectly maintain sufficient habitat for the black-throated sparrow).
2. Planting or reseeding in some areas may be necessary to restore a seed source
3. In addition to Forest Plan standards and guidelines, desired future conditions for the desert scrub vegetation type include:
4. Manage as a goal to reduce annual invader grasses such as red brome and increase perennial bunch grasses in the plant composition
5. Manage as a goal to increase ground cover and slope protection to reduce erosion rates
6. Manage key jojoba producing areas within this type to maximize production and utilization of beans. Manage livestock on a rest rotation basis to maximize bean production

Population Trends

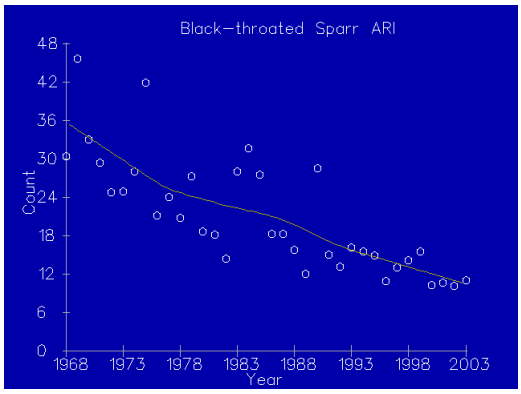


Figure 3 – Black-throated sparrow trend for the years 1968 to 2003 in Arizona. **(Sauer et al. 2004)**

Breeding Bird Survey (BBS) data "suggest the highest average numbers of black-throated sparrows occur in Nevada, Arizona, California, and Utah, where four major deserts, the Great Basin, Sonoran, Chihuahuan, and Mojave deserts, overlap (Johnson et al. 2002). Of these four deserts, the lowest density occurred on the Sonoran Desert. In Arizona, at Organ Pipe National Monument within creosote bush habitat, black-throated sparrow density was 56 individuals per 247 acres (Parker 1986). In the Verde Valley within creosote-brush and crucifixion thorn habitat, densities ranged from 49 individuals per 247 acres in 1995, to 47 individuals per 247 acres in 1996, which was a drought year (Johnson 1997). Drought affects food availability, and black-throated sparrow nesting productivity (i.e. increased morality, smaller clutches, lower density, and fewer breeding attempts per season) and return rates (Martin 1987).

Loss of habitat due to clearing of desert and mesquite for agricultural and residential developments may threaten some populations, since black-throated sparrows do not use urban landscaped vegetation (Emlen 1974, Mills et al. 1989). Both black-throated sparrows and canyon towhees are especially susceptible to urban development and were found in greatly reduced numbers in urban environments, regardless of the use of native vegetation (Mills et al. 1989). Fire suppression in the southwest has allowed shrub species to become thicker and taller, reducing black-throated sparrow habitat (Hastings and Turner 1965) and creating the possibility that high-intensity wildfires could destroy much desert-shrub vegetation (Cooperrider and Wilcove 1995). The spread of cheatgrass (*Bromus tectorum*), which is fire-tolerant, slows or prevents native plants from recovering (Hastings and Turner 1965, Cooperrider and Wilcove 1995). Agricultural and urban areas that enhance cowbird feeding also significantly reduces the reproductive success of black-throated sparrows (Johnson et al. 2002).

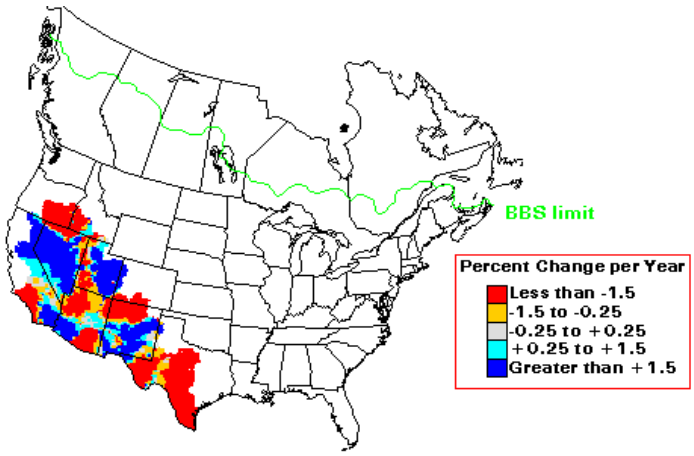


Figure 4 – Black-throated sparrow: Percent change per year for black-throated sparrow counts during breeding bird surveys (Sauer et al., 2001)

Black-throated sparrows are ranked as having a Global Heritage Status of G5, being common, widespread, and abundant, throughout their range, as listed on the NatureServe Explorer website (2001; http://www.natureserve.org/explorer). National Heritage Status is ranked as N5, being common, widespread, and abundant, and in Arizona they are listed as S5, being common, widespread, and secure within the state (ibid.). However, Breeding Bird Survey data shows a nonsignificant decline from 1966 to 2003 of – 3.8 percent for Arizona over 54 survey routes (Sauer et al. 2004). This species is recorded on 151 Christmas Bird Count circles in the U.S. (Sauer et al. 1996). "The desert habitats preferred by the sparrow tend to be fragile and vulnerable to degradation and take a long time to recover from activities such as recreation, off-road vehicle use, heavy grazing, and mining, and are sensitive to ground disturbances such as human traffic, off-road vehicles, or trampling by livestock" (USDA Forest Service 1994, Paige and Ritter 1989). Refer to Figure 3 for a graph provided by the USGS Patuxtent Wildlife Research Center website for black-throated sparrow trends for the years 1968 to 2003 (Sauer et al. 2004).

Overall, data for Arizona, as well as range wide data, suggest that the black-throated sparrow populations are stable, or slightly increasing. Populations may decline on a short-term basis but recover when habitat conditions become more favorable.

Tonto National Forest Population Trend

Only one breeding bird survey route is active on the Tonto National Forest (Bartlett Reservoir). Due to the small sample size for this species the data at this scale is not

adequate to determine trend. In addition to the BBS route, regional Christmas Bird Counts indicate that percent change from year to year is quite static in Arizona.

Due to fire suppression, brush/chaparral densities are increasing Forest-wide and may be increasing available habitat for this species and leading to the **stable** trend. On the Tonto Basin Ranger District in 2003, this species was detected 230 times on 23 different survey dates (Plank 2005).

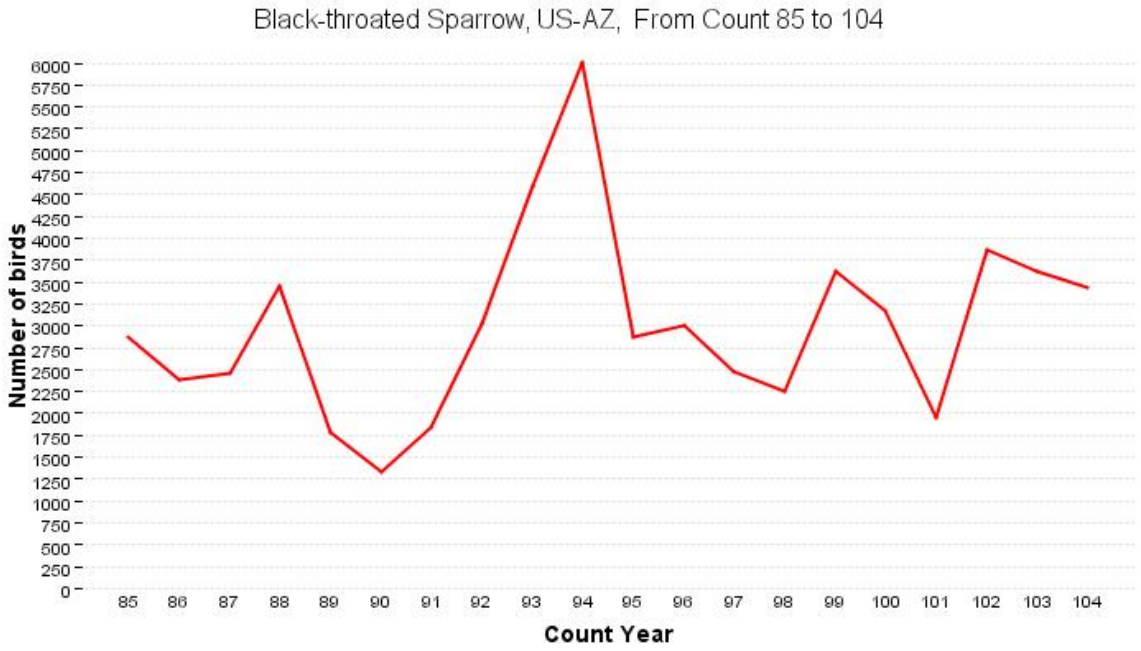


Figure 5. Black-throated sparrow population trend for the Arizona region 1985-2004 (National Audbon Society 2005).

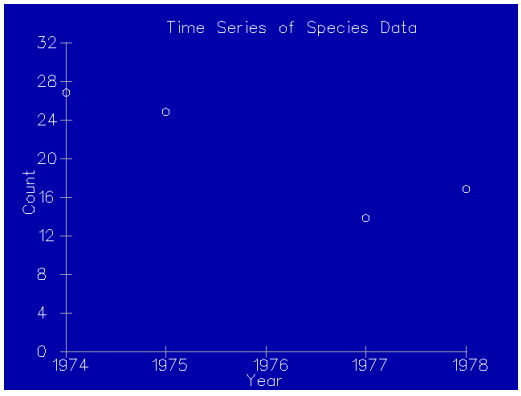


Figure 6. Black-throated sparrow population trend for the Aztec Peak BBS Route 1974-1978.

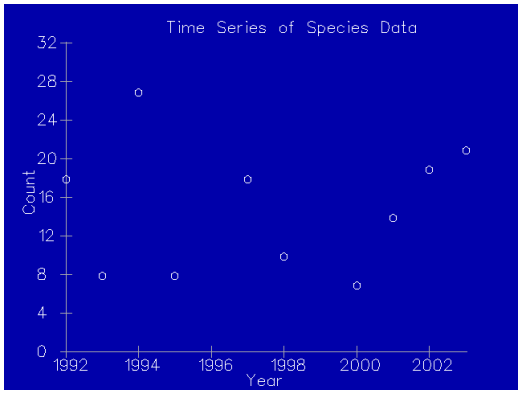


Figure 7. Black-throated sparrow population trend for the Bartlett Reservoir BBS Route 1992-2003.

Recommended Survey Methods

"Black-throated sparrows are easily detected by standard census and monitoring techniques, and are regularly recorded on BBS. Although their song is distinctive, there is high variation within a population and within the repertoire of an individual" (Rising 1996). Males may sing from a visible perch but often may sing while hidden within a bush or on the ground (Heckenlively 1967).

Baseline data specific to the Tonto National forest could be collected using standard point count methodology. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol. The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most efficient and data-rich method of counting birds. This is the preferred method in forested habitats or difficult terrain."

Line transects are another method used to determine an estimate of population trends, if done over a series of years. General information on line transect survey protocol can be found in *Field Guidelines for Using Transects to Sample Nongame Bird Populations* (Mikol 1980). In either survey method, survey points or transects are randomly distributed, stratified by habitat types.

The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda every five

years…Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (USDA Forest Service 1985). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

American Ornithologists' Union (AOU). Committee on Classification and Nomenclature. 1983. Check-list of North American Birds. 6th Edition. American Ornithologists' Union. Allen Press, Inc., Lawrence, KS.

Banks, R. C. 1968. Black-throated sparrow (various subspecies) Pp 990-1004 *In* Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and their allies (O. L Austin, ed). U.S. Natl. Mus. Bull. 237 Pt. 2.

Bock, C. E., J. H. Bock, W. R. Kenney, and V. M. Hawthorne. 1984. Responses of birds, rodents, and vegetation to livestock exclosure in a semidesert grassland site. Journal of Range Manage. Life History Summaries *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe.

Cooperrider, A. Y., and D. S. Wilcove. 1995. Pp 44-45 *In* Defending the desert: conserving biodiversity on BLM lands in the southwest. Environ. Def. Fund, New York. *In* M. J. Johnson, C. van Riper III, and K. M.Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Delesantro, M. C. 1978. The breeding ecology of the black-throated sparrow in southern New Mexico. Master's thesis, New Mexico State Univ., Las Cruces, NM. *In* M. J. Johnson, C. van Riper III, and K. M.Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc, New York.

Emlen, J. T. 1974. An urban bird community in Tucson, Arizona: derivation, structure, regulation. Condor 76:184-197.

Hastings, J. R., and R. M. Turner 1965. The changing mile; an ecological study of vegetation change with time in the lower mile of an arid and semi-arid region. Univ. of Arizona Press, Tucson, AZ.

Heckenlively, D. B. 1967. Role of song in territoriality of black-throated sparrows. Condor 69:429-430.

Johnson, M. J. 1997 Cowbird parasitism of the black-throated sparrow in the Verde Valley of central Arizona. Master's thesis, Northern Arizona Univ., Flagstaff, AZ.

In M. J. Johnson, C. van Riper III, and K. M. Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Johnson, M. J., C. van Riper III, and K. M. Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). *In* The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Kubik, M. R., Jr., and J. V. Remsen, Jr. 1977. Creosote-burrobush desert scrub. Pp. 76-77 *In* W. T. Van Velsnm, ed. Fortieth breeding bird census. American Birds 31:24-93. *In*

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

Mills, G. S., J. B. Dunning, and J. M Bates. 1989. Effects of urbanization on breeding bird community structure in southwestern desert habitats. Condor 91:416-428 *In* M. J. Johnson, C. van Riper III, and K. M. Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Martin, T. E. 1987. Food as a limit on breeding birds: a life history perspective. Annu. Rev. Ecol. Syst. 18:453-487. *In* M. J. Johnson, C. van Riper III, and K. M. Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Parker, K. C. 1986. Partitioning of foraging space and nest sites in a desert shrubland bird community. Am. Midl.. Nat. 115(2):255-267. *In* M. J. Johnson, C. van Riper III, and K. M.Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest

Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Rising, J. D. 1996. A guide to the identification and natural history of the sparrows of the United States and Canada. Academic Press, San Diego, CA. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe.

Sauer, J. R., S. Schwartz, and B. Hoover. 1996. The Christmas Bird Count Home Page. Version 95.1 USGS Biological Resource Division, Patuxtent Wildlife Research Center, Laurel, MD. Online available: http://www.mbr.nbs.gov/bbs/cbc/html.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Stokes, D., and L. Stokes. 1996. Field guide to birds: Western region. Little, Brown, and Co. New York.

Torres, S. G. 1983. Territorial establishment by black-throated sparrows in south-central Arizona. Master's thesis, Univ. of Arizona, Tucson, AZ.

USDA Forest Service, 1994, Neotropical Migratory Bird Reference Book. USDA Forest Service, Pacific Southwest Region.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Van Riper III, C., and M J. Johnson. In press. Black-throated sparrow breeding biology in the Verde Valley of central Arizona. Condor. *In* M. J. Johnson, C. van Riper III, and K. M. Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Zimmer, K. J. 1983. The foraging ecology of nesting black-throated sparrows. Master's thesis, New Mexico State Univ., Las Cruces, NM. *In* M. J. Johnson, C. van Riper III, and K. M. Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

Zimmer, K. J. 1993. Spatial and temporal variation in the breeding and foraging ecology of black-throated sparrows. Ph.D. diss., New Mexico State Univ., Las Cruces, NM. *In* M. J. Johnson, C. van Riper III, and K. M. Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*.). The Birds of North America, No. 637 (A. Poole and F. Gill, eds.). The Birds of North America, Inc. Philadelphia, PA.

10. CANYON TOWHEE: *Pipilo fuscus*

MIS Role: Ground cover in desertscrub

SUMMARY OF KEY HABITAT COMPONENTS

- Found primarily on Tonto in sonoran desert scrub, dry washes, grasslands, mesquite, and sometimes pinyon-juniper and conifer
- Forage on open ground and use shrubs for hiding cover
- Exhibit site fidelity and permanent territories
- Appear to be susceptible to development and fragmentation

Species Description

This is a large, brownish-gray ground sparrow with a rufous crown, a buffy eye ring, a light throat and a band of darker streaks under its throat. It has a dark spot on the chest and a long tail that is dark, with buffy cinnamon undertail coverts (Johnson and Haight 1996, Alsop III 2001). It averages 8.0 inches in length; with an 11 to 11.5 wingspan Sexes are similar in appearance (Alsop III 2001).

Distribution

Canyon towhees are "sedentary, permanent residents of the southwest" (Johnson and Haight 1996). They occur from southeast Colorado (Andrews and Righter 1992), extreme northwest Oklahoma (Baumgartner and Baumgartner 1992), northern New Mexico (Hubbard 1978), central and western Texas (Texas Breeding Bird Atlas unpubl.), central

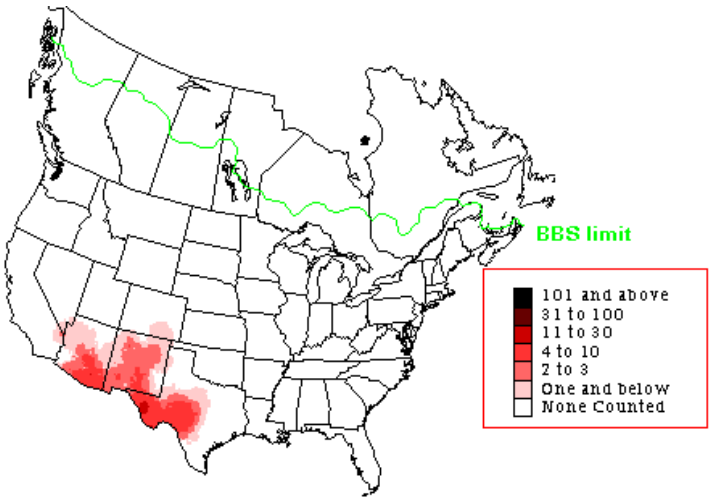


Figure 1 – Canyon towhee: Summer bird distribution in North America based on breeding bird surveys (Sauer 2001)

and western Arizona (Monson and Phillips 1981), south through central Mexico, (Howell and Webb 1995). They do not occur in the hottest deserts of Mexico (Johnson and Haight 1996).

Habitat

This species occurs in a variety of the drier habitats in the southwest, except in heavily urbanized areas. Elevations range from near sea level in Mexico to over 8,000 feet in New Mexico and occasionally in Colorado. They most typically are found in the Upper Sonoran desert grasslands, often in remote, rocky areas with dense shrubs. They also occupy scrub along dry desert washes, desert mesquite in riparian areas, upland desert scrub at lower elevations, plus grasslands with dense stands of chaparral or pine-oak-juniper (P*inus-Quercus-Juniperus* spp.) and some coniferous forest (Johnson and Haight 1996). Miller (1995) reports their occurrence in "canyon mouths and open, rocky canyon walls up to 5,200 feet, with scattered mesquite (*Prosopis* spp.), catclaw (*Acacia* spp.), and barberry (*Berberis* spp.) shrubs. "Canyon towhees prefer open spaces for feeding on bare ground, plus dense shrubs or trees for hiding…in rural areas they can be found around sheds and woodpiles (Marhsall and Johnson 1968). In New Mexico they are reported to occupy riparian vegetation along irrigation ditches, the edges of streams, and irrigated fields near villages (Batchelder 1885). In upland habitats they nest near creeks but not in the creek bottom area (Bendire 1890). This species "appears to be particularly susceptible to the negative effects of development" (Mills et al. 1989). In a suburban Tucson paloverde mixed cactus-desert scrub vegetation area, breeding density was reported as 1 pair per 74 acres (Johnson and Haight 1996); in riparian mesquite-desert scrub vegetation, density was reported as 1 pair per 17.3 acres (Marshall 1960). Density in higher elevation mature oak woodland was 1 pair per 131 acres (Balda 1970). Canyon towhees exhibit site fidelity, inhabiting permanent territories (Marshall 1960).

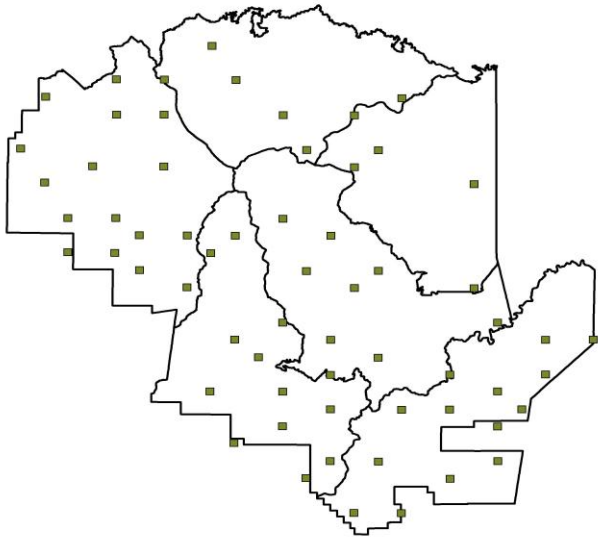


Figure CANT-2: Block locations where breeding canyon towhee were found- based on Arizona Breeding Bird Atlas.

Breeding

According to Marshall (1960), "pairs persist normally for the life of the mates and exist only in conjunction with the holding of a territory." Main breeding activity begins in mid-March and goes through mid-October (Johnson and Haight 1996). They often have

2 to 3 clutches per season in the southwest, often timed for spring and late summer or fall, coinciding with Sonoran Desert bi-modal precipitation periods; winter and summer rains; that are thought to correlate with high insect populations after rains (Marshall 1963). Canyon towhees create bulky cup nests made of stems, grasses, and sticks, and lined with finer materials. They often have plant stems and "garlands of yellow flowers, of daisies or mustard flowers," woven through the nest (Brandt 1951). Nests are usually built inside the thickest parts of a shrub, tree, or vine; usually 3 to 12 feet above ground (Marshall and Johnson 1968). Nest plants used include juniper and piñon pine (*Pinus edulis*) and *Clematis* species in the higher elevations (Bailey and Niedrach 1965). In New Mexico, sagebrush (*Artemisia tridentata*; Jensen 1923, Ligon 1961), cholla cactus (*opuntia* spp), and *Yucca* species (Anthony 1892) are used. At lower elevations or latitudes, Mesquite (*prosopis glandulosa*), paloverde (*Cercidium* spp.), Mexican elderberry (*Sambucus mexicana*), and net leaf hackberry (*Celtis reticulata*; Marshall and Johnson 1968) are often used for nesting. In general, nests are found lower to the ground at higher elevations, and higher at lower elevation sites (Johnson and Haight 1996).

Clutches usually consist of 3 eggs, (range of 2 to 5; Marshall and Johnson 1968). Incubation lasts 11 days on average and the young stay in the nest for 8 to 9 days (Alsop III 2001). Nest parasitism by brown-headed cowbirds (*Molothrus ater* and *M a. obscurus*) is uncommon (Johnson and Haight 1996).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP (USDA Forest Service 1985), the canyon towhee was selected as a Management Indicator Species for ground cover in the Desertscrub Vegetative Type (Appendix G, Tonto FLMP).

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the mesquite (presumably desert-scrub) vegetation type was determined to cover approximately 169,879 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired vegetative condition at the end of the fifth period.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat (desert scrub) for the canyon towhee include:

1. Manage the desert-scrub type to emphasize production of javelina, Gambel's quail, and mule deer (this emphasis will indirectly maintain sufficient habitat for the black-throated sparrow).
2. Planting or reseeding in some areas may be necessary to restore a seed source

In addition to Forest Plan standards and guidelines, desired future conditions for the desert scrub vegetation type include:

1. Manage as a goal to reduce annual invader grasses such as red brome and increase perennial bunch grasses in the plant composition

2. Manage as a goal to increase ground cover and slope protection to reduce erosion rates

3. Manage key jojoba producing areas within this type to maximize production and utilization of beans. Manage livestock on a rest rotation basis to maximize bean production

Population Trends

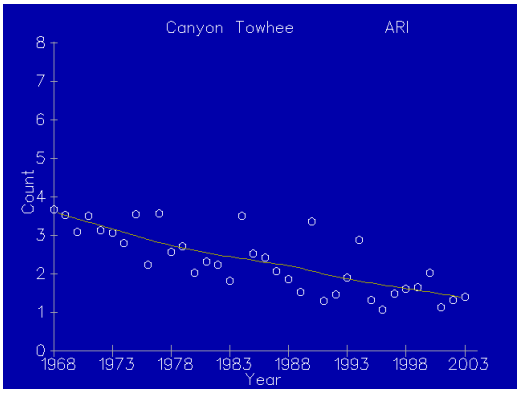


Figure 2: Canyon towhee trends for the years 1968 to 2003 in Arizona. USGS Patuxtent Wildlife Research

According to the NatureServe Explorer website (2001), which can be found at: http://www.natureserve.org/explorer, the Global Heritage Status for canyon towhees is G5, being common, widespread, and abundant. National Heritage Status is ranked as N5B, N5N, being common and widespread in breeding and non-breeding areas. In Arizona, this species is ranked as S5, being common, secure, widespread, and abundant. With a secure global, national, and state ranking, long-term population trends are stable. "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

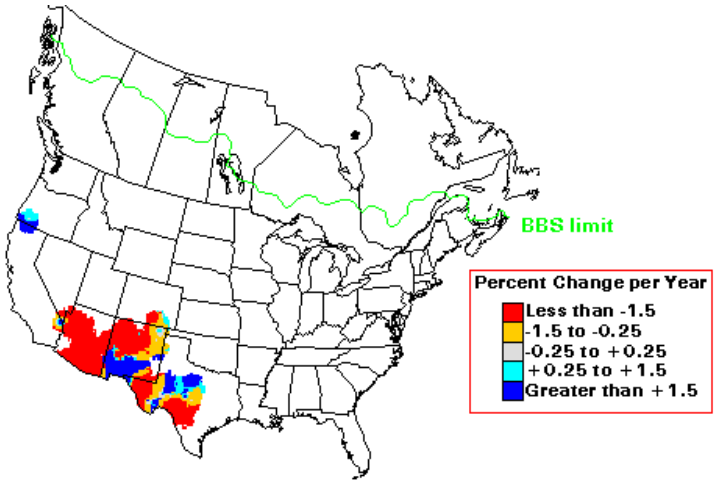


Figure 3 – Canyon Towhee: Percent change per year for canyon towhee during breeding bird surveys (Sauer et al., 2001).

Breeding Bird Survey trend data for the years 1996 to 2003 show a non-significant decrease of -2.6 percent over 24 survey routes (Sauer et al. 2004). Refer to figure 2 for a graph provided by the USGS Patuxtent Wildlife Research Center website for canyon towhees for the years 1968 to 2003 in Arizona.

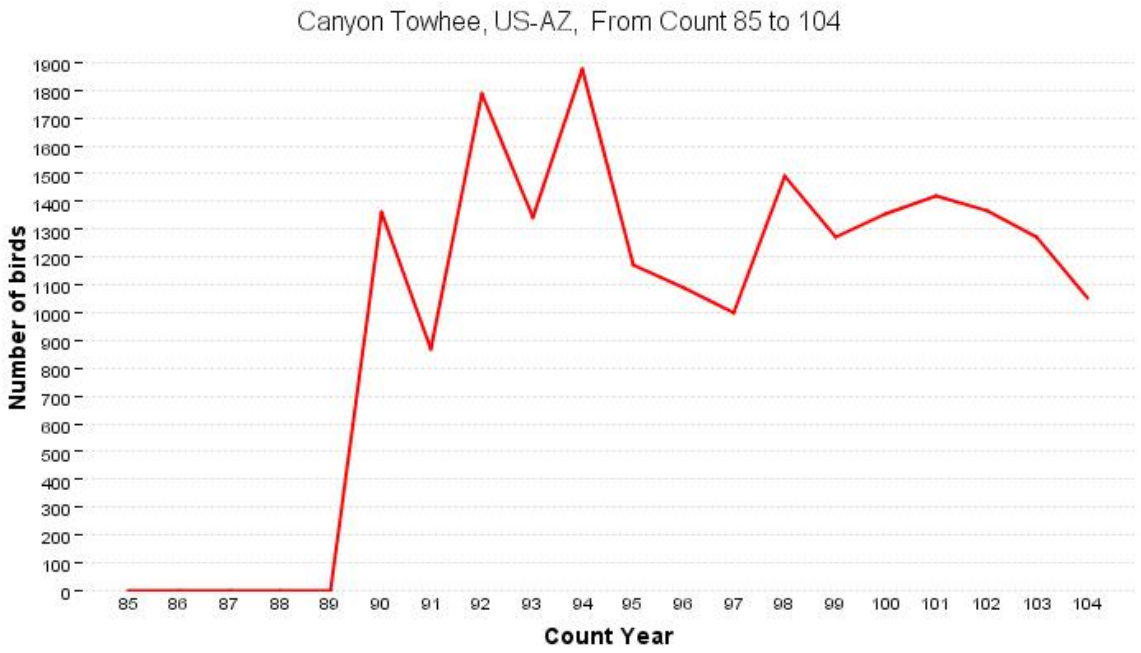
There are three breeding bird survey routes on the Tonto National Forest (ARI-065, ARI-071, ARI-122). However,

because of the small sample size for this species the data at this scale is not adequate to determine trend. As represented in the map below, percent change from year to year is quite static in Arizona

Overall, data for Arizona, as well as range wide data, suggest that the canyon towhee populations are stable, or slightly decreasing. Populations may decline on a short-term basis but recover when habitat conditions become more favorable. The resolution of the data is such that a population trend for the Tonto National Forest is not possible.

Tonto National Forest Population Trend

Data from the Bartlett Reservoir BBS Route suggests that this species is documented each year. Statewide population trends (CBC) indicate that this species numbers are abundant. Due to fire suppression, brush/chaparral densities are increasing Forest-wide and may be increasing available habitat for this species, but are susceptible to wildfire. On the Tonto Basin Ranger District in 2003, this species was documented 86 times on 17 days of survey efforts (Plank 2005). Based on the available information this species population is considered to be **stable**.



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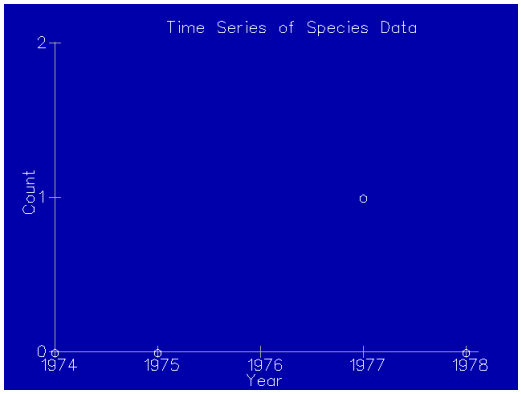

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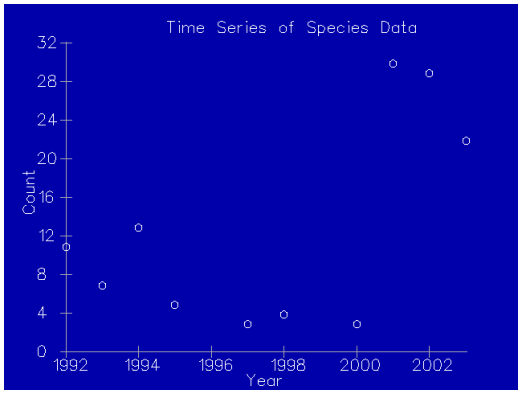

Figure 7. Canyon Towhee population trend for the Bartlett Reservoir BBS Route 1992-2002.

Recommended Survey Methods

This species is often secretive in remote areas, but relatively tame when living around desert foothill homes (Marshall and Johnson 1968). "In the Phoenix, Arizona region, the uncommon, secretive canyon towhee occurs in remote, arid foothills or xeroriparian scrub" (Phillips et al. 1964).

Baseline data specific to the Tonto National forest could be collected using standard point count methodology. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol. The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most

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Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

Andrews, R., and R. Righter. 1992. Colorado birds: a reference to their distribution and habitat. Denver Mus. of Nat. Hist., Denver, CO. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Baily, A. M., and R. J. Niedrach. 1965. Birds of Colorado. Vol. II. Denver Mus. Nat. Hist., Denver, CO. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Balda, R. P. 1970. Effects of spring leaf-fall on composition and density of breeding birds in two southern Arizona woodlands. Condor 72:325-331.

Batchelder, C. F. 1885. Winter notes from New Mexico. Auk 2:233-239. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Baumgartner, F. M., and A. M. Baumgartner. 1992. Oklahoma bird life. Univ. of Oklahoma Press, Norman, OK. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Bendire, C. E. 1890 Notes on *Pipilo fuscus mesoleucus* and *Pipilo aberti*, their habits, nests, and eggs. Auk 7:22-29. *In* R. R. Johnson and L. T. Haight. 1996. Canyon

towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Brandt, H. 1951. Arizona and its bird life. Bird Research Fdn., Cleveland, OH. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Howell, S. N. G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford Univ. Press, New York.

Hubbard, J. P. 1978. Revised check-list of the birds of New Mexico. N. Mex. Ornithol. Soc. Publ. 6. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Jensen, J. K. 1923. Notes on the nesting birds of northern Santa Fe County, New Mexico. Auk 40:452-469.

Johnson, R. R., and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). *In* The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Marshall, J. T. 1960. Interrelations of Abert and brown towhees. Condor 62:49-64.

Marshall, J. T. 1963. Rainy season nesting in Arizona. Proc XIII Intl. Ornithol. Congr.:620-622. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Marshall, J. T., and R. R. Johnson. 1968. *Pipilo fuscus mesoleucus*, canyon brown towhee. Pp. 662-630 *In* Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies (O. L. Austin, Jr., ed.). US Natl. Mus. Bull. 237, Part 2. *In* R. R. Johnson and L. T. Haight. 1996. Canyon towhee (*Pipilo fuscus*). The Birds of North America, No. 264 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington D.C.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

Miller, A. H. 1955. Avifauna of the Sierra del Carmen of Coahuila, Mexico. Condor 57:154-178.

Mills, G. S., J. B. Dunning, Jr., and J. M Bates. 1989. Effects of urbanization on breeding bird community structure in southwestern desert habitats. Condor 19:416-428.

Monson, G., and A. R. Phillips. 1981. Annotated checklist of the birds of Arizona. 2nd ed. Univ. Of Arizona Press, Tucson, AZ.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Phillips, A. R., J. T. Marshall, Jr., and G. Monson. 1964. The birds of Arizona. Univ. of Arizona Press, Tucson, AZ.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Sauer, J. R., S. Schwartz, and B. Hoover. 1996. The Christmas Bird Count Home Page. Version 95.1 USGS Biological Resource Division, Patuxtent Wildlife Research Center, Laurel, MD. Online available: http://www.mbr.nbs.gov/bbs/cbc/html.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

11. GRAY VIREO: *Vireo vicinior*

MIS Role: Tree density in pinyon/juniper.

SUMMARY OF KEY HABITAT COMPONENTS

- Large juniper or chaparral with scattered trees
- Extensive shrubland or scattered shrubs among piñon – juniper woodlands
- Mature or late in post-fire succession shrublands
- Shrub cover continuous and dense, between 1.0 and 5.0 feet tall

Species Description

The gray vireo is well camouflaged, being darker gray above and lighter gray below, with a faint eye ring and two faint wingbars. Its length is 5.5 inches and wingspan is 8.75 inches. It flits through the underbrush in arid regions of the southwestern U.S. It is distinguished from other vireos by its tendency to flick its tail like a gnatcatcher (Alsop III 2001). Males and females look alike, while juveniles can be distinguished by plumage with a brownish wash and relatively distinct wingbars (Pyle 1997)

Distribution

Gray vireos occur on their breeding range in central and western New Mexico, southeastern Utah, southern Colorado, southwestern Texas, southern Nevada, in disjunct areas in southern California, and in the mountains in Baja, Mexico. In Arizona, their breeding range includes areas east of the Sonoran Desert, from the mountains of Mohave County; the Bradshaw Mountains, Yavapai County, and Cochise County, north AZ Breeding Bird Atlas unpubl.). Their wintering range includes all but the northwestern part of Baja California Sur (Howell and Webb 1995), locally in southwestern Arizona, Kofa Mountains, Yuma County, and occasionally Tucson, Pinal County (Monson and Phillips 1981, Phillips 1991), coastal and lowland desert scrub in portions of Sonora, Mexico (Russell and

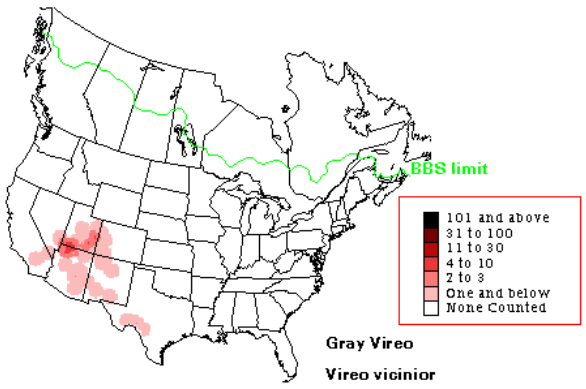


Figure GRVI-1: Summer bird distribution in North America based on breeding bird surveys.(Sauer *et.al.* 2001)

Monson 1998), and in the Big Bend region of southwestern Texas (Graber1961, Barlow and Wauer 1971).

It is thought that to be well distributed on the Tonto National Forest. Arizona began a breeding bird atlas in the early 90's. Figure GRVI-2 shows the results of this effort.

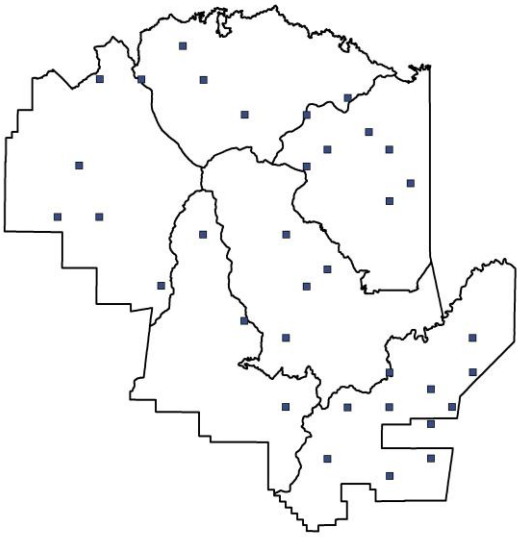


Figure GRVI-2: Block locations where breeding gray vireo were found- based on Arizona Breeding Bird Atlas.

Habitat

Habitat for gray vireos consists mainly in arid thorn scrub, chaparral, and piñon–juniper (*Pinus edulis-Juniperus* spp.) or oak (*Quercus* spp.) – scrub associations and/or chaparral in hot, arid mountains and high plains scrubland (Barlow et al. 1999). In Arizona and New Mexico they occur in chaparral – juniper and dwarf conifer species, as well as sites with Graves's oaks (*Quercus gravesii*), mixed piñon, and madrone (*Arbutus* spp.) (ibid.). Gray vireos in Arizona frequent juniper habitats of the Upper Sonoran Zone and mesquite (*Prosopis* spp.), usually preferring large juniper or chaparral with scattered trees (Phillips 1964). They require either extensive shrubland or scattered shrubs among piñon – juniper woodlands. They may prefer shrublands that are mature or late in post-fire succession (USDA Forest Service 1994). Shrub cover that is continuous and dense between 1.0 and 5.0 feet tall is a common habitat factor (Grinnell and Miller 1994). In Arizona, and Texas, territories were near a water supply available during at least part of the breeding season (Barlow 1977).

Breeding

Gray vireos' arrival time on their breeding grounds depends on latitude. In central Arizona, north, they arrive approximately early to late-April. The main breeding activity for gray vireos lasts from approximately mid-May to Mid-august for the majority of individuals (Barlow et al. 1999). Gray vireo nests are rounded, deep cup shapes, suspended from a forked twig, from the terminal or later forks, usually 2 to 6 feet above ground (Ehrlich et al. 1988). Average clutch size is 3 to 5 eggs (ibid.). Incubation lasts for 12 to 14 days (Hutchings and Leukering unpubl.) and fledging occurs in 13 to 14 days. Both adults sit on the eggs, but only the female incubates (Barlow et al. 1999). Two clutches may be raised during one breeding season (ibid.). Gray vireos are frequently parasitized by cowbirds (Hannah 1944, Barlow et al. 1999).

Food Habits

This species forages on the insides of thickets, by gleaning prey from foliage and branches, stalking prey within shrubs, or hawking stationary prey (Barlow et al. 1999). The main prey taken is arthropods, including large grasshoppers, cicadas, and caterpillars; although in the winter, prey appears to vary by region (ibid.).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto National Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto National Forest Land Management Plan (USDA Forest Service 1985), the gray vireo was selected as a Management Indicator Species (Appendix G, Tonto FLMP) for tree density in the piñon–juniper woodland type.

In appendix K of the FLMP, pinyon-juniper acreage was listed as 265,480. Management direction of the pinyon-juniper vegetation type can be found in individual management units of the FLMP as follows.

1. Landscapes outside of Goshawk PFA's Woodlands: Manage for even age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape. Provide for reserve trees, snags, and down woody debris (Amendment 22 pg 40-11).
2. Within PFA's and nesting areas: Maintain existing canopy cover levels of woodland (Amendment 22 pg 40-12).
3. Manage the pinyon-juniper type to emphasize the production of mule deer (Amendment 2 page 68-1).
4. Integrate habitat needs through prescribed fires within fire suppression objectives (Amendment 2 page 68-1).
5. Manage the pinyon-juniper type in a sustained yield evenflow basis. Horizontal diversity will be provided by a mix of successional stages within 5000 acre management units. Ten percent of the type will be maintained as permanent openings with suitable ground cover for specific site conditions. Powerlines, natural openings, or meadows count toward the standard. Where natural openings or powerlines do not meet this standard openings will be created. The scheduling of fuelwood harvest will produce a distribution of successional stages as follows (Amendment 22 replacement pg 69):

    - Permanent Openings (2-40 acres) 10%
    - Fresh cut areas (0-20 years) 10%
    - Immature (20-100 years and 3-6" dbh) 40%
    - Mature (100-175+years and 6-11"dbh) 40%

6. Provide a ration of 60%:40% forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas (Amendment 22 replacement pg 69)
7. Design the fuelwood harvest blocks in the woodland type in irregular shapes less than 40 acres and less than 600 feet across (Amendment 11 Pg 70).
8. In the pinyon-juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore seed source (Amendment 11 Pg 70).
9. Achieve a savannah condition in the pinyon-juniper type by leaving a minimum of 40 large juniper trees per 40 acre cut block (Amendment 11 Pg 70).
10. Maintain a minimum of 100 snags per 100 acres. A preferred 12" dbh and 20 feet tall over at least 50% of the pinyon-juniper type (Amendment 11 Pg 70).
11. The silvicultural prescription is even-aged management under the shelterwood method with pinyon uncut and 40 large juniper trees left per 40 acre cut block (Amendment 11 Pg 70).
12. Brush disposal will be consistent with wildlife objectives (Amendment 11 Pg 70).
13. Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement (Pg 71).
14. In the pinyon juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer wintering areas (Amendment 20 replacement page 87).
15. Planting may be necessary in some areas to restore a seed source (Amendment 20 replacement page 87).
16. Integrate habitat needs through prescribed fire within fire suppression objectives (Pg 87-1).
17. Maintenance performed on revegetation acres as determined in Allotment Management Plans to retain optimum forage production (Pg141).
18. Other woodland species (pinyon, cypress, oak, and other junipers) will be harvested using the individual tree selection method (Amendment 22 replacement page 142).

Given the complexity of the above prescriptions it is difficult to determine the net effect on the gray vireo. The expected future condition in the TLMP is decreased occurrence and densities of gray vireo. Prescriptions that encourage dense, continuous shrubs in the pinyon-juniper will increase the habitat for the gray vireo. Many of the prescriptions will create a more open savannah like habitat that could decrease key habitat components for the vireo.

Population Trends

"Threats and the reasons for range contractions are largely unknown. Piñon – juniper woodlands are subject to grazing and clearing to increase grassland, mesquite and desert scrub habitats are grazed and cleared for development, and chaparral habitats have undergone extensive conversion in urban areas in southern California… Habitat fragmentation or the presence of livestock facilitate brown-headed cowbird parasitism" (NatureServe Explorer website: 2001: http://www.natureserve.org/explorer/ranking.htm). "NatureServe and the Heritage Natural Network was formed in 1999 as the Association

for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (ibid.).

The Global Heritage Status for gray vireos is G-4 in data provided on the NatureServe Explorer website (2001), which indicates this species is considered apparently secure across its range. This species was listed in September, 1995, as a migratory, nongame songbird whose current status was of management concern in the southwest and Great Plains/Rocky Mountain regions (US Fish & Wildlife Service 1995). It was assigned a conservation priority rating of 21 out of a possible 30 points on the Partners in Flight Watchlist (http://www.audubon.org/bird/watch/gvi/gvi.htm), which indicates that the population status of the species needs to be better monitored than in the past (Barlow et al. 1999).

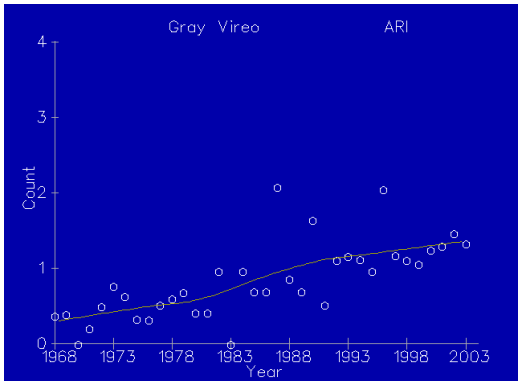


Figure GRVI-3. Gray vireo trends for the years 1968 to 2003 in Arizona. (Sauer et al. 2004).

North American Breeding Bird Surveys (BBS) indicate a non-significant (p=0.27) population increase in Arizona of 5.1 percent from 1966 to 2003 over 9 survey routes on the USGS Patuxtent Wildlife Research Center website (Figure GRVI-3, Sauer et al. 2004). The USGS warns that the data for this trend may be deficient due to very low abundance, very small samples, or high imprecision. The trend for the Western BBS region also indicates an increase of 5.1 percent (p=0.09, n=31, figure GRVI-4). However, the NatureServe Explorer website (2001) reports a steep decline of –2.6 percent per year, in Arizona for the years 1966 to 1996 (53 survey routes). Refer to Figure GRVI-3 for a graph provided by the USGS Patuxtent Wildlife Research Center website (ibid.) for gray vireo trends for the years 1968 to 2003 in Arizona.

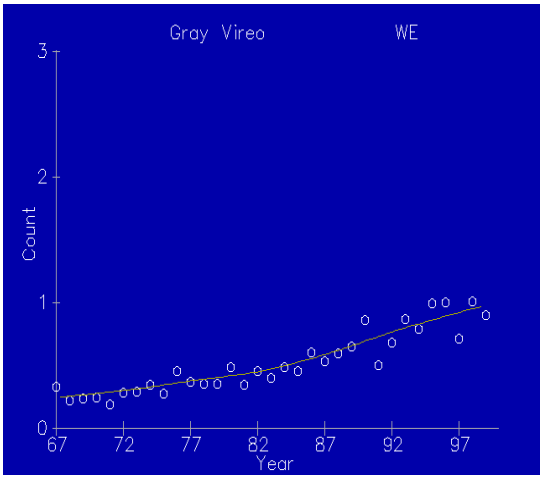


Figure GRVI-4. Gray vireo trends for the years 1968 to 1998 in Western Region. (Sauer et al. 2001).

In 1999 an expert opinion panel composed biologists knowledgeable of forest conditions used the most current scientific information to conclude that the gray vireo population was stable (Appendix A).

Tonto National Forest Population Trend

Two current BBS routes suggest that this species is uncommon under established survey routes (see Figure 7 and 8). Statewide CBC surveys also indicate that this species is uncommon (Figure 5). On the Tonto Basin Ranger District in 2003, gray vireos were documented 54 times on 14 different dates (Plank 2005). However, based on regional data population trends it appears that this species population is **declining** due to drought related effects to habitat.

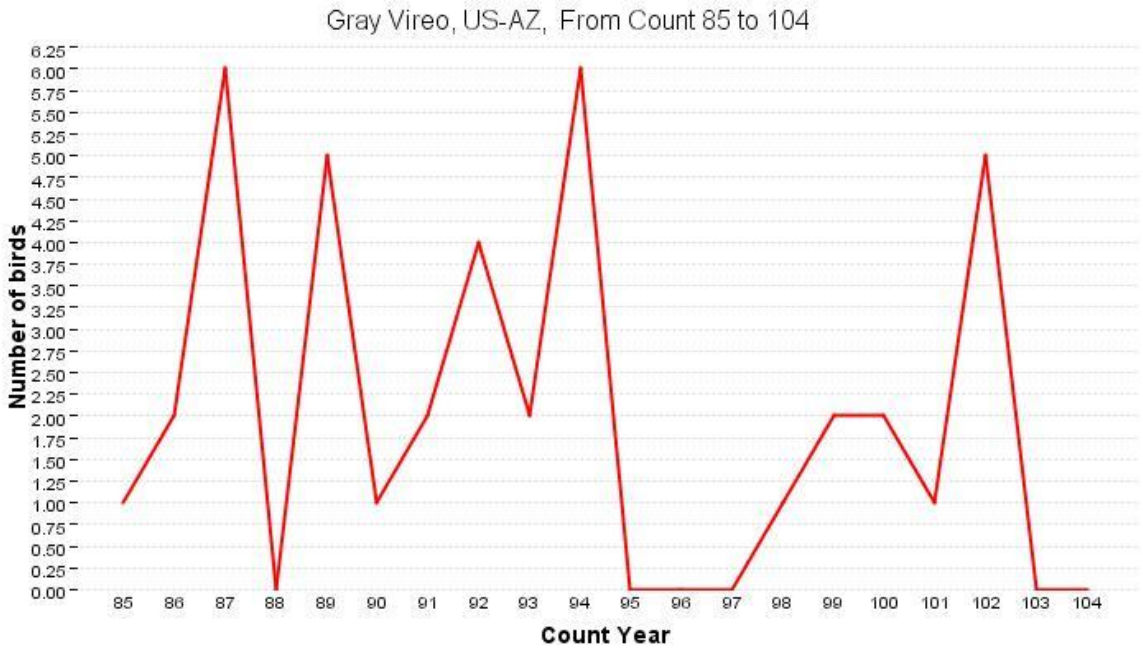


Figure 5. Gray vireo population trend for the Arizona region 1985-2004 (National Audubob Society 2005).

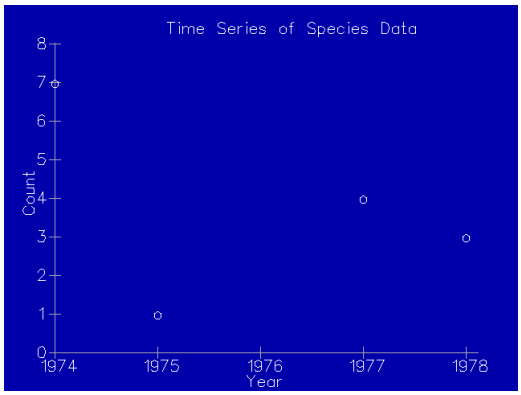


Figure 6. Gray vireo population trend for the Aztec Peak BBS route 1974-1978.

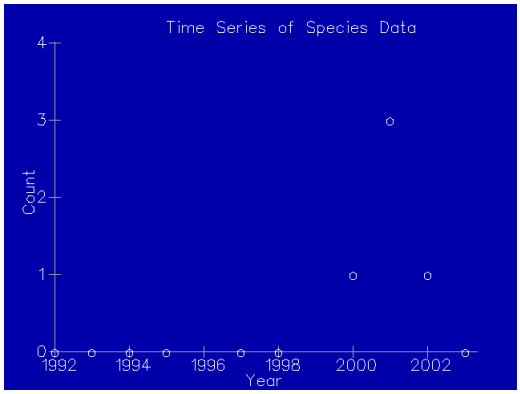


Figure 7. Gray vireo population trend for the Bartlett Reservoir BBS route 1992-2003.

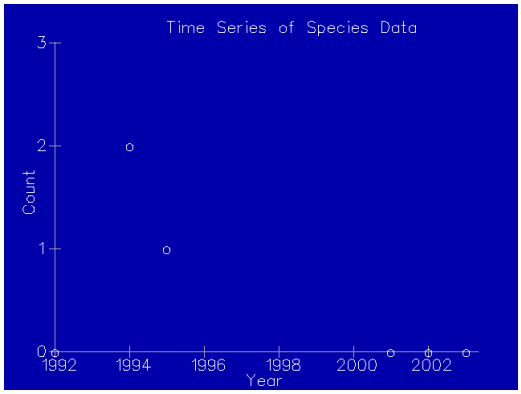


Figure 8. Gray vireo population trend for the Tonto Village BBS route 1992-2003.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

Barlow, J. C. 1977. Effects of habitat attrition on vireo distribution and population density in the northern Chihuahua Desert. Pages 591- 596 *In J. C.* Barlow, S. N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). The birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Barlow, J. C., S. N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). *In* The birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Barlow, J. C., and R. H. Wauer. 1971. The gray vireo (*Vireo vicinior* Coues; Aves: Vireonidae) wintering in the Big Bend region, west Texas. Can. J. Zool. 49:953-955 *In* J. C. Barlow, S. N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). The Birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Ehrlich, P.R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc, New York.

Graber, J. W. 1961. Distribution, habitat requirements, and life history of the black-capped vireo (*Vireo atricapillus*). Ecol. Monogr. 31:314-336. *In* J. C. Barlow, N.

Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). The Birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Grinnell, J., and A. H. Miller. 1944. Distribution of the birds of California. Pacific Coast Avifauna 27. *In* USDA Forest Service 1994. Neotropical Migratory Bird Reference Book. USDA Forest Service, Pacific Southwest Region.

Grinnell, J. and H. S. Swarth. 1913. An account of the birds and mammals of the San Jacinto area of southern California Pacific Coast Avifauna. No. 27. *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA.

Hanna, W. C. 1944. The gray vireo as a victim of the cowbird. Condor 46:244.

Howell, S. N. G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford Univ. Press, New York. *In* J. C. Barlow, N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). The Birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Hutchings, S., and T. Leukering. unpubl. manuscript. Nesting ecology and behavior of the gray vireo in western Colorado. *In* J. C. Barlow, S. N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). The birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

Monson, G. and A. R. Phillips. 1981. Annotated checklist of the birds of Arizona. 2nd ed. Univ. of Arizona Press, Tucson, AZ.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Phillips, A. R. 1991. The known birds of North and Middle America. Part II. Allan R. Phillips, Denver, CO. *In* J. C. Barlow, S. N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). The birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA

Phillips, A., J. Marshall, and G. Monson. 1964. The birds of Arizona. The Univ. of Arizona Press, Tucson, AZ.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Pyle, P. 1997. Identification guide to North American passerines Part 1. Slate Creek Press, Bolinas, CA. *In* J. C. Barlow, S. N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). The birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Russell, S. M., and G. Monson. 1998. Birds of Sonora. Univ. of Arizona Press, Tucson, AZ.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

USDA Forest Service. 1994. Neotropical migratory bird reference book. USDA Forest Service, Pacific Southwest Region. *In* J. C. Barlow, S. N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). The birds of North America, No. 447 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

12. HAIRY WOODPECKER: *Picoides villosus*

MIS Role: Snags and cavities in ponderosa pine/mixed conifer and high elevation riparian.

SUMMARY OF KEY HABITAT COMPONENTS

- Preferable snags are at least 15" dbh and 49 feet tall
- Snag densities of at least 0.8/acre in order to maintain 40% of habitat capability.
- Snag densities should exceed 2/acre for optimum populations
- Maintain adequate amounts of Course Woody Debris (CWD) – 2 downed logs/acre
- Acres of structural Type 1 Riparian Areas
- Trees retained for snag recruitment

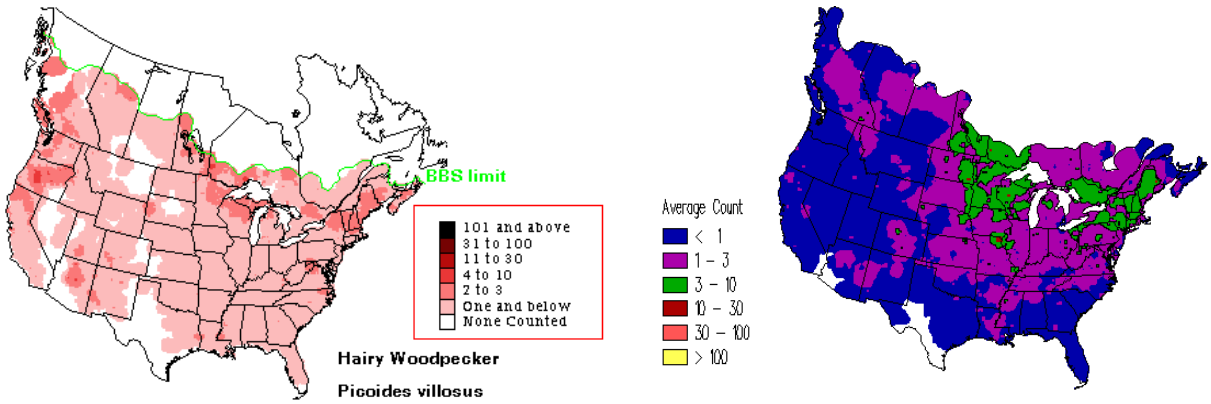
Species Description (from Stokes and Stokes 1999)

Hairy woodpeckers are very similar to downy woodpeckers. The Hairy woodpecker, at 9 inches is the largest of the two. Both have a white back and white underparts; white spotted black wings; black-and-white-streaked faces. Males have red on nape; females have not red. The Hairy woodpecker, unlike the downy woodpecker, has a bill that is almost as long as the head and the outer tail feathers are all white.

Distribution

The Hairy woodpecker is widely distributed, being found from southern Alaska and Canada south to Central America and the Bahamas. It is found throughout most of North America. The far northern populations are somewhat migratory (Stokes and Stokes 1999; DeGraff *et al.* 1991) moving south in the winter.

Figure HAWO-1: Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts.



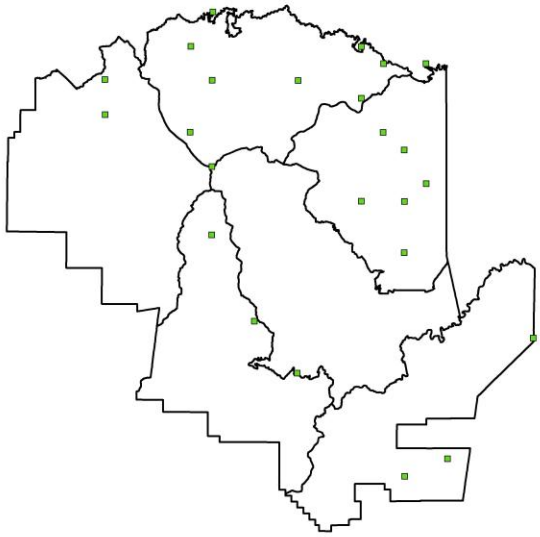


Figure HAWO-2: Block locations where breeding hairy woodpeckers were found- based on Arizona Breeding Bird Atlas.

It is thought to be well distributed on the Tonto National Forest also. Arizona began a breeding bird atlas in the early 90's. Figure HAWO-2 below shows the results of this effort to date on the Tonto National Forest. The data is depicted as points, which in reality represent "atlas blocks" established at the beginning of the atlas survey work, to obtain adequate sampling of the various habitat biomes within the State.

Habitat

Hairy woodpeckers are year round residents of nearly all forest types found in Arizona. It is not closely associated with any single tree species or species group. It is usually found in forests containing some element of coniferous trees and in open rather than dense timber (Larrison and Sonnenberg 1968). Thomas *et al*. (1979) indicated that this species is found in pine and mixed conifer habitat types in the Blue Mountains of Oregon. Maser *et al*. (1986) also stated that it uses western juniper habitat type in Oregon. Mills *et al.* (1995) in the Black Hills found this species in all structural stages of ponderosa pine equally suitable habitat providing that snags were present. They also indicated that moderate to open canopy covers were preferred. This species is often found in abundance in burns and stands of dead trees (Koplin 1967). Sousa (1987) reported that in Iowa, the minimum width of a riparian forest that supported a breeding population of this species was 40 meters.

The Hairy woodpecker uses cavities for roosting and winter cover (Sousa 1987). Males normally excavate the cavities in which a single individual sleeps (Stiles and Skutch 1989). Szaro and Balda (1982) found hairy woodpeckers in all types of harvested stands except clear-cuts. Management activities that affect availability of snags have the greatest impact on this species. This includes timber harvest, fuelwood removal, intense surface fires; even-aged management, short stand rotation, and removal of cull trees (future snags). Basically then, habitat management for this species must focus on providing large snags and/or cull trees as well as downed logs and woody debris.

Reynolds *et al.* (1992) provided habitat management recommendations for this species, indicating that it was somewhat of a forest generalist utilizing VSS 3 to 6 as long as snags are present. They give 15 inch dbh and 60 feet high as the average for nesting trees and 17 inch dbh and 30 feet high as the average for foraging trees.

Breeding

It has been found to nest in aspen, fir, cottonwood and pine, and seems to prefer relatively open situations rather than dense timber stands (Scott *et al*. 1977), often using the same nest year after year. Minimum diameter for nesting appears to be approximately 10 inches dbh. Again, the cavity is normally excavated by the male in a live or dead tree between 15 and 18 m [49 to 59 feet] above ground (Sousa 1987). Nest trees averaged about 15 inches dbh in Colorado, 18 inches in California, and 37 inches in Oregon (Sousa 1987). Hairy woodpeckers usually excavate a new nest hole each year.

Territory size has been reported as being between 6-24 acres (Raphael and White 1984). Thomas *et al*. (1979) based on unpublished data stated that for the Blue Mountains of Oregon this species had a nesting territory of 25 acres, indicating that the maximum number of pairs per 100 acres would be four. Maser *et al*. (1986), gave territory sizes of 4 acres for PJ and pine, and 3 acres for aspen. Thomas *et al*. (1979) suggested that to maintain at least 40% of the maximum potential population of hairy woodpeckers, an average of 0.72 snags >= 10 inches dbh per acre would have to occur. Mills *et al.* (1995) indicated that snag size or density might be more important than vegetative structural stages for predicting hairy woodpecker abundance. Menasco (1983) indicated that, for the Tonto, maintaining 1.8 snags/acre would be needed to maintain a population of 4 pairs/100 acres. He also calculated that to maintain such a snag density would require the retention of 6 trees/acre. Sousa (1987) on the other hand indicates that for optimal reproduction, snag density should be over 2 snags per acre- which may not be adequate for foraging.

Food Habits

Hairy woodpeckers prefer to feed on insects associated with dead and diseased trees. It forages on a wide variety of tree species, both living and dead. Bladwin (1968) describes it as a fugitive feeder; moving quickly through the forest to new food sources. Almost 80% of their diet consists of animal matter; with beetles (both adult and larvae), ants and caterpillars being the most frequently eaten items. Wood boring beetles removed from dead and diseased trees are an important source of food (DeGraff *et al.* 1991). This diet is supplemented with fruit, acorns, and other nuts (Kilham 1968). Stallcup (1968) found that in the fall and winter, hairy woodpeckers spent more than 60% of their time foraging on seeds of cones on the upper crowns of ponderosa pine. Baldwin (1968) reported that this species commonly feeds on fallen wood in early spring taking advantage of insects that were protected by winter's snow. Reynolds *et al.* (1992) indicates that downed logs and woody debris are important as a source of insects.

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. Hairy woodpecker was selected as a Management Indicator Species for the ponderosa pine and mixed conifer vegetation types (Appendix G, Tonto FLMP) and high eleveation (>3,000 feet) riparian- specifically the snag habitat component (USDA Forest Service 1985).

Ponderosa pine/mixed conifer

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the conifer vegetation type was determined to cover approximately 283,200 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired management condition at the end of the fifth period. This habitat type is well represented and distributed across two Districts of the Tonto.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for hairy woodpecker include:

1. rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage.

2. coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030. Type 1 characteristically contains tall trees > 20 feet high with the highest layer forming somewhat of a closed canopy. Substantial vegetation is also present in the two lower layers (shrub and grass layer).

3. VSS distribution should reflect the following table [may vary +/- 3%]:

Vegetation Structural Stage			Desired Future Condition	
Description	**Class**	**dbh**	**by %**	**by acres**
Grass-forb/shrub	1	0 to 0.9 "	10%	28,320
Seedling/Sapling	2	1.0 to 4.9 "	10%	28,320
Young Forest	3	5.0 to 11.9 "	20%	56,640
Mid-aged Forest	4	12.0 to 17.9"	20%	56,640
Mature Forest	5	18.0 to 23.9"	20%	56,640
Old Forest	6	> 23.9 "	20%	56,640
Total				283,200

- Mixed Conifer: leave at least 3 snags, 5 downed logs and 10-15 tons of woody debris per acre.

- Ponderosa Pine: leave at least 2 snags, 3 downed logs and 10-15 tons of woody debris per acre.

- A preferred snag is 18” in diameter and 30 feet tall

- Retain key forest components such as oak

Specific direction is also given for individual management units in the FLMP. Below are some additional guidelines that are of importance to the management of the Hairy woodpecker:

1. On those acres suitable for timber harvest strive to achieve a structural diversity similar to the table below (Amendment no. 22, 06/05/96 replacement - page 156, 210):

% of Acres	Age Class	Size Class	Management Indicator Species	Cover Class
8[1/]	0	Permanent Openings	Elk, turkey, western bluebird, violet-green swallo	Forage
13.3	0-20	Regenerated Seedlings	Elk, turkey	Forage
13.3	21-40	Saplings/Poles	Elk, turkey	Forage - Hiding
13.3	41-60[2/]	Poles	Elk	Forage - Hiding
13.3	61-80[2/]	Poles/Sawtimber	Elk, Abert's squirrel	Hiding/Thermal – Forage
13.3	81-100	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird	Thermal
13.3	101-120	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow	Thermal
10.0	121-180[3/]	Sawtimber/Vertical Diversity	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch	Thermal/Forage
10.0	181-240[3/]	Sawtimber/Vertical Diversity	Elk, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch, goshawk, turkey	Thermal/Forage

1/ This is percent of tentative suitable lands

2/ These two age classes comprise the pole timber class in suitable forest land. Thirty-eight percent of the pole acreage will be managed at 120+ BA to meet special wildlife habitat stands.

3/ These must be mistletoe free stands

2. The oak component of the conifer type and the encinal oak type will be maintained. (Amendment no. 22, 06/05/96 replacement - page 154)

3. Management units (5,000 acres) will be managed so that they have 20% of the area with old growth characteristics (age classes 121-240 years). These will be 50 acre stands averaging 12 trees/acre that are more than 20" dbh with an overall basal area in trees > 10" dbh over 80 ft^2. Ten tons/acre of down woody material in logs > 12" in diameter is desirable. (Amendment no. 22, 06/05/96 replacement - page 155)

4. Manage the oak component to maximize an optimum mix of mast and browse to accomplish wildlife objectives. (Amendment no. 22, 06/05/96 replacement - page 157)

5. Where snags are not present they will be provided by leaving 2-3 trees from regeneration cuts to become potential snags. (Amendment no. 22, 06/05/96 replacement - page 157)

Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 269) predicted a slight increase of populations (10%) by the year 2030 (Table 11) for the pine/mixed conifer and substantial increase in population for riparian by 2030.

Population:

According to the Nature Serve Explorer website (2001), which can be found at: http://www.natureserve.org/explorer the following range-wide, national, and state rankings have been established for the Hairy woodpecker:

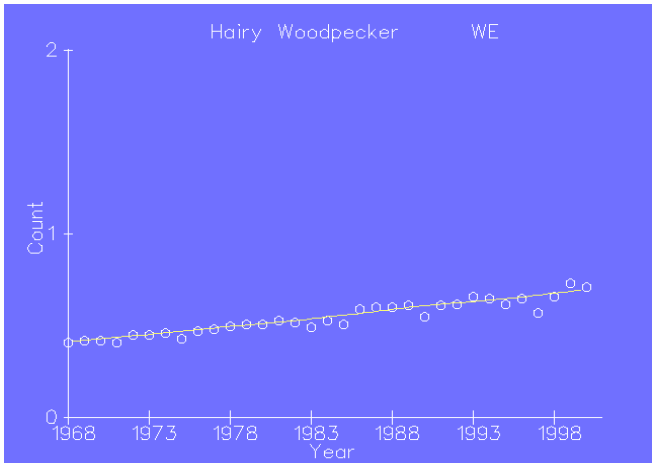


Figure HAWO-2: Hairy woodpecker population trend data for the Western BBS region from BBS data (Sauer et al., 2001).

Throughout its range, the hairy woodpecker is listed as G5, (i.e., globally secure and common, widespread, and abundant) although it may be rare in parts of its range, particularly on the periphery. It is not vulnerable in most of its range.

Species with this rank typically occur in more than 100 localities, and there are more than 10,000 individuals.

Within the United States, it is listed as N5, that is, it is secure and common, widespread, and abundant. In Arizona, the hairy woodpecker is listed as S5 (i.e., secure, common, widespread, and abundant). `

The Arizona Partners in Flight Prioritization Ranking for the hairy woodpecker is 16, based on intermediate distributions and moderate threats on the breeding and wintering ranges. Birds with scores of 20 or higher were selected initially for consideration as priority species. With a score of 16, the hairy woodpecker is of low concern (Latta et al. 1999).

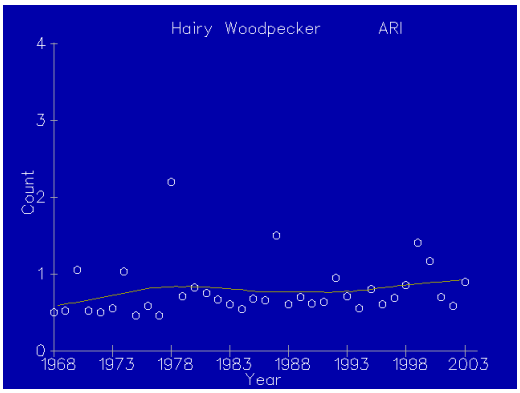


Figure HAWO-3: Hairy woodpecker population trend data for Arizona from BBS data 1968-2003 (Sauer et al., 2004).

BBS data (Sauer et al., 2004) for Arizona from 1966-2003 shows a non-significant (p = 0.58), positive population trend of 1.5% per year (Figure HAWO-3). This suggests that the population may be ***stable*** in Arizona. However, BBS data for the Western BBS region for 1966-2000 shows a significant (p = 0.01), ***positive*** trend of 1.9% per year (Figure HAWO-2).

Overall, data for Arizona, as well as range-wide data, suggest that hairy woodpecker populations are stable, or slightly increasing, on a long-range scale. Minor population decreases occur on a short-term scale (one to three years), but are generally followed by a recovery.

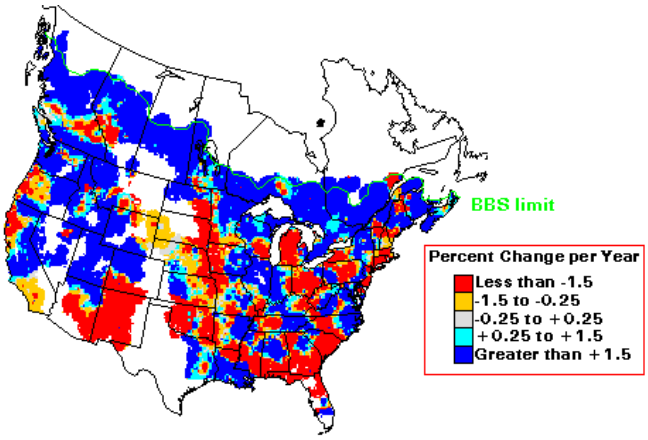


Figure HAWO-4: Percent change per year for Hairy woodpecker counts during breeding bird surveys (Sauer et al., 2001).

Tonto National Forest Population Trend

Potentially, due to large fires and high number of acres killed by bark beetles in 2002, hairy woodpecker populations should increase significantly due to the availability of snags and nesting sites. The Tonto Village BBS Route is the only transect on the Forest that is located in Hairy woodpecker habitat and documentation is consistent, but low. Statewide CBC suggests that population trends remain relatively unchanged since 1985. In 2003 on the Tonto Basin Ranger District, Hairy woodpeckers were detected 12 times on 7 different dates (Plank 2005). Populations are considered **stable** on TNF.

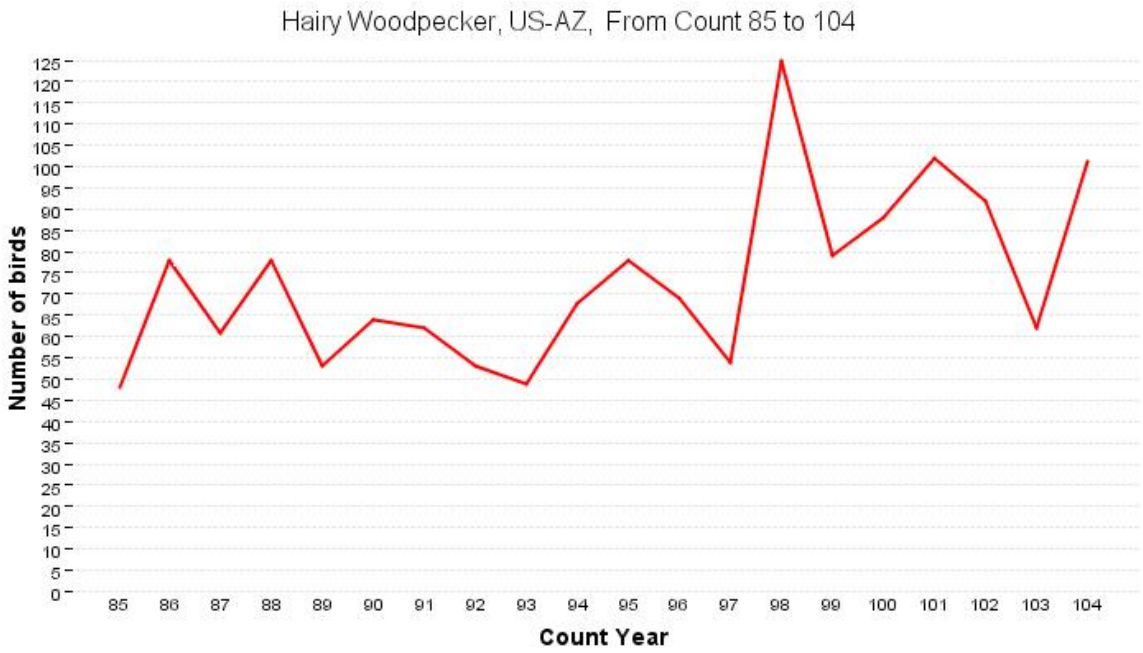


Figure 5. Hairy woodpecker population trend for the Arizona region 1985-2004 (National Audubon Society 2005).

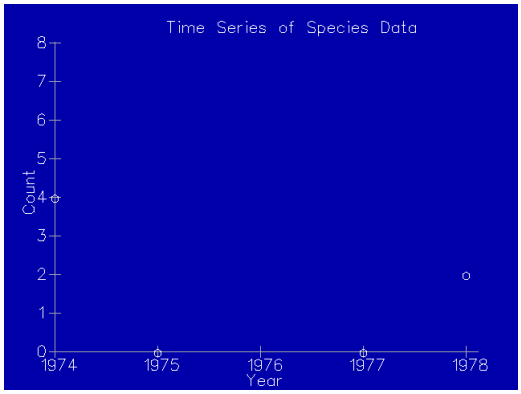


Figure 6. Hairy woodpecker population trend for the Aztec Peak BBS Route 1974-1978.

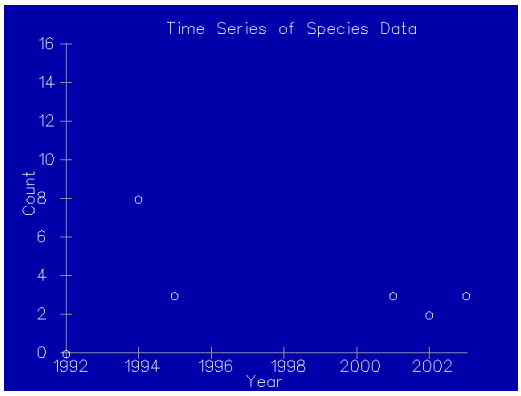


Figure 7. Hairy woodpecker population trend for the Tonto Village BBS Route 1992-2003.

Literature Cited

Baldwin, P.H. 1968. Predator-prey relationships of birds and spruce beetles. Proc. North Central Branch, Entomol. Soc. America 23:90-99.

DeGraaf, R.M., V.E. Scott, R.H. Hamre, L. Ernst and S.H. Anderson, ed. 1991. Forest and Rangeland Birds of the United States Natural History and Habitat Use. USDA Forest Serv. Agr. Handbook 688, 625 pp.

Kilham, L. 1968. Reproductive behavior of hairy woodpeckers: II. Nesting and habitat. Wilson Bull. 80:286-305.

Koplin, J.R. 1967. Predatory and energetic relation of woodpeckers to engelmann spruce beetle. PhD Thesis, Colorado State Univ., 187 pp.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Larrison, E.J. and K.G. Sonnenberg. 1968. Washington birds: their location and identification. Seattle Audubon Soc., Seattle. 258 pp.

Maser, C., J.W. Thomas, and R.G. Anderson. 1986. Widlife habitats in managed rangelands- The Great Basin of southeastern Oregon the relationship of terrestrial vertebrates to plant communities, part 2, appendices.

Menasco, K.A. 1983. Providing snag habitat for the future. Pages 205-210. *in* Davis *et al.*, tech. Eds. Snag habitat management: proceedings of the symposium. USDA For. Serv., Gen. Tech. Rept. RM-99.

Mills, T.R., M.A. Rumble, and L.D. Flake. 1995. Evaluation of habitat capability model for non-game birds in the Black Hills, South Dakota. USDA For. Ser., Rocky Mtn. Forest and Range Exp. Sta. Res. Paper RM-RP-323. 30 pp.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Reynolds, R.T., R.T. Graham, M.H. Riser; and others. 1992. Management recommendations for the northern goshawk in the southwestern United States. USDA For. Serv., Rocky Mtn. Exp. Stat., Gen. Tech. Rep. RM-217. 90 pp.

Raphael, M.C. and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. J. Wildl. Monogr. 86. 66pp.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966-2004. Version 2001.2. USGS Patuxent Wildlife Research Center. Laurel, MD. www.mbr-pwrc.usgs.gov/bbs/bbs.html

Scott, V.E., K.E. Evans, D.R. Patton, and C.P. Stone. 1977. Cavity-nesting birds of North American forests. U.S.D.A., Agric. Handb. 511. 112pp.

Sousa, P. 1987. Habitat suitability index models: hairy woodpecker. U.S. Fish and Wildlife Serv. Biol. Rep. 82: 19pp.

Stokes, D., and L. Stokes. 1996. Field guide to the birds: Western region. Little, Brown, and Co., New York.

Stallcup, P.L. 1968. Spatio-temporal relationships of nuthatches and woodpeckers in ponderosa pine forests of Colorado. Ecol. 49(5):831-843.

Szaro, R.C., and R.P. Balda. 1982. Selection and monitoring of avian indicator species: an example from a ponderosa pine forest in the southwest. USDA For. Serv. Gen. Tech. Rep. RM-89. 7 pp.

Thomas, J.W., R.G. Anderson, C. Maser, and E.L. Bull. 1979. Snags. Pages 60-77. *in* J.W. Thomas, ed. Wildlife habitats in managed forests, the Blue Mountains of Oregon and Washington. USDA For. Serv. Agric. Handb. 553, Washington, D.C.

13. HORNED LARK: *Eremophila alpestris*

MIS Role: Vegetation aspect in desert grassland.

SUMMARY OF KEY HABITAT COMPONENTS

- Prefers open, barren country year-round
- Indicator of reductions in shrub and grass cover
- Avoids forests and wetlands
- May respond positively to grazing or wildfire
- Occurs from sea level to 4,000 meters

Species Description

Horned larks have distinctive facial marks; a black line running downward from bill to cheek, horn-like black tufts and a yellow to whitish band around the forehead. Their wings and backs are streaked brown, the breast and belly are whitish, and there is a black bib under the throat. In flight, these birds show white underparts, including wing linings, and a black tail with whitish outer tail feathers (Alsop III 2001). Males are distinctly larger than females, with more pronounced "horns, while females are duller in color and lack the black crown" (ibid.). The brown colors on horned larks varies geographically, being lighter colored in the drier parts of western North America and darker in the northeastern area where it is cooler and moister (Beason 1995). Juvenal plumage on the upperparts varies from light gray to nearly black, depending on the race (ibid.). The average length is 7 to 8 inches, and wingspan ranges from 12.5 to 14 inches (Alsop III 2001).

Distribution

This species is a common, widespread bird whose distribution is "holarctic, from the Arctic south to central Asia and Mexico with outlying populations in Morocco and Colombia" (Beason 1995). They are found from sea level to elevations of over 13,000 feet. Horned Larks live year-round throughout most of the U.S., excluding the southeast, and occur in Alaska and portions of Canada during breeding season, migrating south in the winter. They are an open country bird and are not found in heavily forested areas. Most populations at higher elevations move to lower elevations during the winter (ibid.). *E. a. occidentalis* breeds from northern Arizona to central New Mexico and is a darker colored race than that found in eastern New Mexico and northern Colorado. *E. a. adusta* occurs south of *E. a. occidentalis*, in the grasslands of southern Arizona and New

Mexico. The *E. a. adusta* is smaller and has more reddish upperparts than the *E. a.*

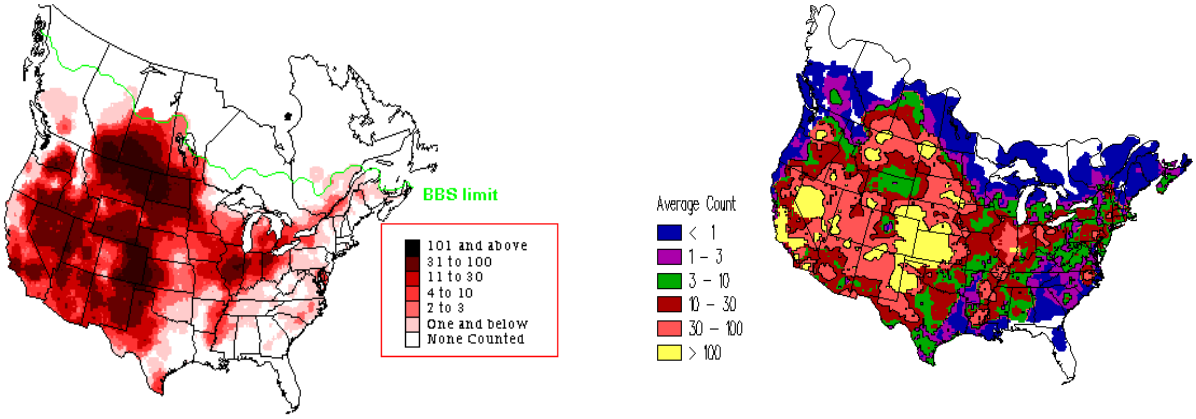


Figure 1 - Horned Lark : Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts.

occidentalis race (ibid.).

Habitat

Horned larks inhabit open ground with low vegetation; barren lands such as short, sparsely vegetated prairies, deserts, brushy flats, bare ground, areas scattered with low shrubs, desert playas, roadsides, row-crop stubble in agricultural lands (Forbes 1907, Cox 1958, Graber and Graber 1963, Beason 1970, AOU 1983), and alpine habitat (Beason 1995). "They prefer bare ground to grasses that are taller than a few centimeters" (Verbeek 1967, Cannings and Threlfall 1981, Beason 1995). Their breeding habitat is not usually associated with any specific vegetation type (Bigelow 1902, Behle 1942, Bent 1942, Beason and Franks 1974, With and Webb 1993). In areas grazed by livestock, numbers of horned larks are greatest in the heavily grazed areas, and are one of the most abundant bird species found in grazed areas (Kantrud and Kologiski 1983, Bock and Webb 1984). "Highest population densities coincide with the greatest amount of bare ground" (Beason 1995). Territories in shadscale (*Atriplex confertifolia*) in Nevada ranged from 1.3 to 1.5 individuals per 2.47 acres (Medin 1990). Block locations where breeding horned larks are likely to occur are not available at this time, but are generally located in open, low stubble, herbaceous habitats.

Breeding

Pair formation in non-migratory populations, such as those in Arizona, begins in January, when the males begin to establish territories and sing. Most breeding activity throughout the horned larks' range occurs from mid-March through early July (Beason 1995). Nests are shallow cups dug by the females, lined with courser plant materials on the outside, such as grass, small roots, shredded cornstalks; and are lined with finer materials such as down, fur, feathers, etc. (Pickwell 1931, Sutton and Parmelee 1955, Beason and Franks

1974, Verbeek 1967). Females often use a variety of items suck as dirt clods, corncobs, cow dung, or pebbles to "pave" beside the nest, on the soil excavated from the nest cavity

Food Habits

Diet includes grass and forb seeds, insects fed mostly to young or before breeding or molting, and spiders (Ehrlich et al. 1988, Beason 1995). Horned larks forage mainly on bare ground or in short vegetation, by gleaning food as they walk, or by chasing and catching small insects that they flush out (Beason 1995). They are also reported to dig up larvae and worms with their beaks or pry them out of weed clumps or the base of corn plants (McAtee 1905, Pickwell 1931). The main insects taken are grasshoppers (Orthoptera), beetles (Coleoptera), and Lepidopteran larvae (Pickwell 1931, Beason 1970, Wiens and Rotenberry 1979). Paired males and females often feed together during the breeding season.

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP (USDA Forest Service 1985), the horned lark was selected as a Management Indicator Species for the vegetative aspect of the Desert Grassland Vegetative Type (Appendix G, Tonto FLMP). The most recent analysis indicates that the quantity of desert grassland varies with elevation, drought, and grazing pressure. This habitat type is well represented and distributed across the Tonto with a majority of habitat at lower elevations.

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the desert vegetation type was determined to cover approximately 605,363 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired vegetative condition at the end of the fifth period.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for horned lark include:

1. Manage suitable rangelands at Level A, B, C or D. Rangeland in less than satisfactory condition will be treated with improved grazing management

2. Integrate habitat needs through prescribed fire with fire suppression objectives

3. Improve range condition in management areas that are unsatisfactory

4. Achieve a savannah condition in the pinyon-juniper type by leaving a minimum of 40 mature trees per 40 acre cut block

In addition to Forest Plan standards and guidelines, desired future conditions for the Desert Grassland Vegetative type include:

1. Maintain a minimum of 30% ground cover regardless of plant species composition

2. Strive for a 60:40 ratio of cool and warm season grasses

3. Have all allotments under proper stocking with approved Allotment Management Plans that defines improved management and proper grazing systems

Population Trends

According to the NatureServe Explorer website (2001), which can be found at: http://www.natureserve.org/explorer, the Global Heritage Status for horned larks is G5, being common, widespread, and abundant. National Heritage Status is ranked as N5B, N5N, being common and widespread. In Arizona, this species is ranked as S5, being common, secure, widespread, and abundant. With a secure global, national, and state ranking, long-term population trends are stable. "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

Breeding Bird Survey trend data for the years 1996 to 2003 show a non-significant decrease of -2.8 percent over 46 survey routes (Sauer et al. 2004). Refer to figure 2 for a graph provided by the USGS Patuxtent Wildlife Research Center website for horned larks for the years 1968 to 2003 in Arizona.

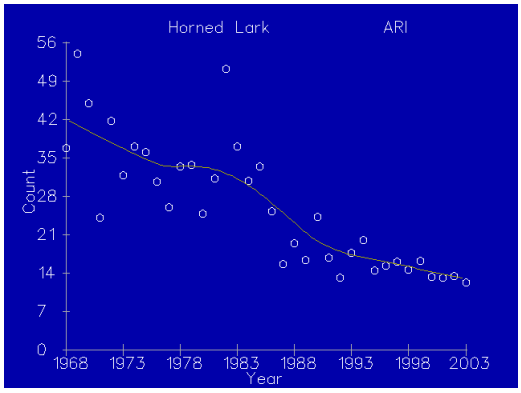


Figure 2: Horned lark trends for the years 1968 to 2003 in Arizona. (Sauer et al. 2004.).

Statistically horned larks have declined approximately 2.8% in Arizona since BBS data collection was initiated in 1968. However, the downward trend is probably more associated with natural factors such as drought or changes in succession. Generally

speaking this species is more likely increasing on the Tonto due to its preference for barren landscapes and open habitat types.

Tonto National Forest Population Trend

This species is not documented on any BBS routes on the Forest due to the location of transects. Arizona statewide trends have remained relatively static since the 1990's. Based on this statewide information, it is likely that TNF populations are similar to the rest of the state and have declined from 1985 populations but are currently **stable**.

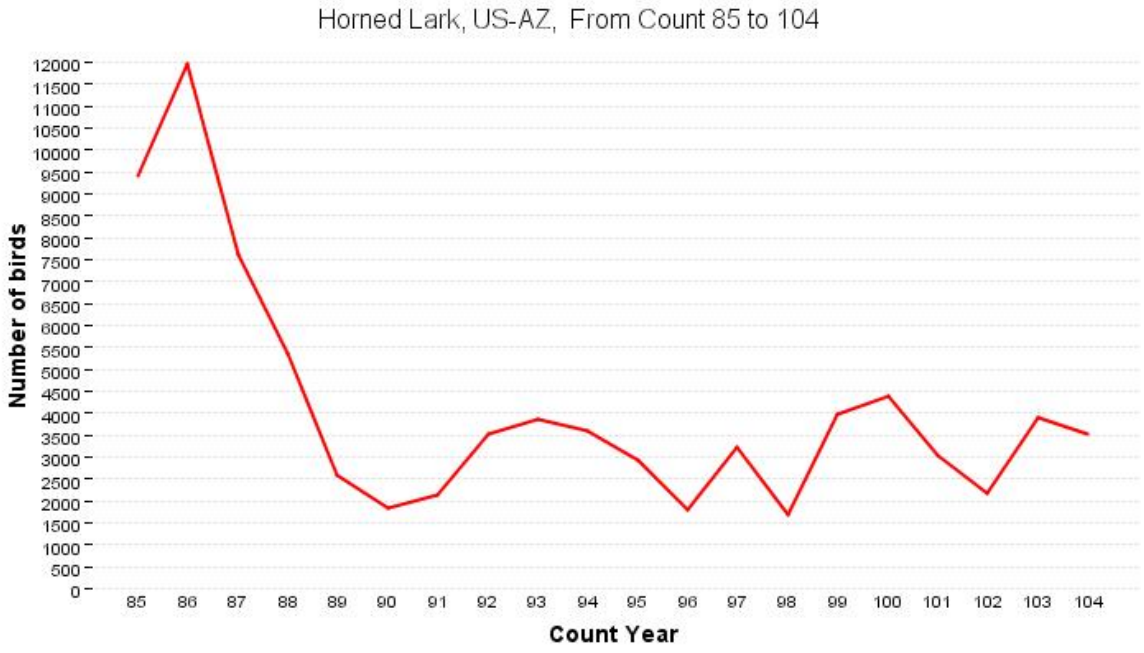


Figure 5. Horned lark population trend for the Arizona region 1985-2004 (National Audubon Society 2004).

Recommended Survey Methods

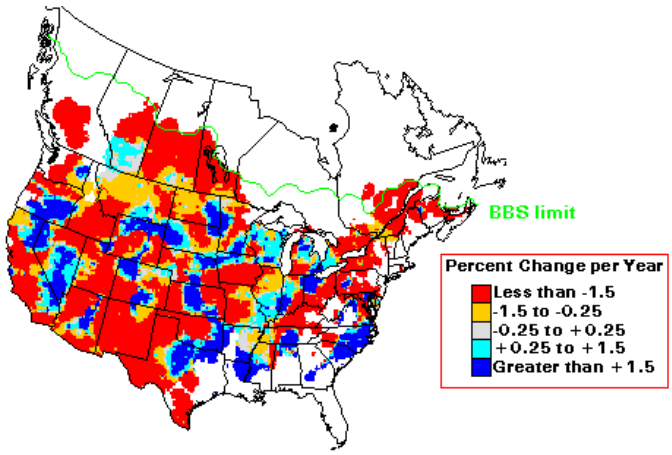


Figure 3 – Horned Lark: Percent change per year for Horned Lark counts during breeding bird surveys (Sauer et al., 2001)

Baseline data specific to the Tonto National forest could be collected using standard point count methodology for the grassland species chosen to indicate grass species diversity. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol. The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed

over a series of several years. This method provides only a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most efficient and data-rich method of counting birds. This is the preferred method in forested habitats or difficult terrain."

Line transects are another method used to determine an estimate of population trends, if done over a series of years. General information on line transect survey protocol can be found in *Field Guidelines for Using Transects to Sample Nongame Bird Populations* (Mikol 1980). In either survey method, survey points or transects are randomly distributed, stratified by habitat types.

The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda" every five years." "Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (USDA Forest Service 1985). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

American Ornithologists' Union (AOU), Committee on Classification and Nomenclature. 1983. Check-list of North American Birds. 6th ed. American Ornithologists; Union, Allen Press, Inc., Lawrence, KS.

Beason, R. C. 1970. The annual cycle of the Prairie horned lark in west-central Illinois. Master's theses, Western Illinois Univ., Macomb, IL. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Beason, R. C. 1995. Horned lark (*Eremophila alpestris*). *In* The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Beason, R. C., and E. C. Franks. 1974. Breeding behavior of the horned lark. Auk 91:65-74.

Behle, W. H. 1942. Distribution and variation of the horned larks of western North America. Univ. Calif. Publ. Zool. 46:205-316. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Bent, A. C. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. U.S. Natl. Mus. Bull. 179. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Bigelow, H. B. 1902. Birds of the northeastern coast of Labrador. Auk 19:24-31. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Bock, C. E. and B. Webb. 1984. Birds as grazing indicator species in southeastern Arizona. J. Wildl. Manage. 48:1045-1049.

Cannings, R. J. 1981. Notes on the nesting of horned larks (*Eremophila alpestris*) on the Chilcotin Plateau of British Columbia, Canada. Murrelet 62:21-23. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Cannings, R. J., and W. Threlfall. 1981. Horned lark (*Eremophila alpestris*) breeding biology at Cape St. Marys, Newfoundland, Canada. Wilson Bull. 93:519-530

Corman, T., Arizona Game and Fish Dept., Nongame Branch. July 17, 2002. Personal communication with Janine Spencer.

Cox, G. W. 1958. A comparison of wintering bird populations in three open field types in central Ohio. Ohio J. Sci. 58:189-193. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

DuBois, A. D. 1935. Nests of horned larks and longspurs on a Montana prairie. Condor 37:56-72. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc, New York.

Forbes, S. A. 1907. An ornithological cross-section of Illinois in autumn. Bull. Ill. State Lab. Nat. Hist. 7:305-336. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Graber, R. R., and J. W. Graber. 1963. A comparative study of bird populations in Illinois, 1906-1909 and 1956-1958. Ill. Nat. Hist. Surv. Bull. 28:383-528. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Kantrud, H. A., and R. L. Kologiski. 1983. Avian associations of the northern Great Plains grasslands. J. Biogeogr. 10:331-350.

McAtee, W. Wl. 1905. The horned larks and their relation to agriculture. USDA Biol. Surv. Bull. 23:1-37. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Medin, D. E. 1990. Birds of shadscale (*Atriplex confertifolia*) habitat in east central Nevada. Great Basin Nat. 50:295-298. *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

Mousley, H. 1916. The breeding of the prairie horned lark at Hatley, Stanstead Co., Quebec. Auk 33:261-286. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

Pickwell, G. B. 1931. The prairie horned lark. St. Louis Acad. Sci. Trans. 27:1-153. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Sutton, G. M. and D. F. Parmlee. 1955. Nesting of the horned lark on Baffin Island. Bird-Banding 26:1-19. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Verbeek, N. A. M. 1967. Breeding biology and ecology of the horned lark in alpine tundra. Wilson bull. 79:208-218.

Wiens, J. A., and J. T. Rotenberry. 1979. Diet niche relationships among North American grassland and shrubsteppe birds. Oecologia 42:253-292. *In* R. C. Beason. 1995. Horned lark (*Eremophila alpestris*). The Birds of North America No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.

With, K. A., and D. R. Webb. 1993. Microclimate of ground nests: the relative importance of radiative cover and wind breaks for three grassland species. Condor 95:401-413.

14. JUNIPER TITMOUSE: *Baeolophus ridgwayi*

MIS Role: General woodland conditions in pinyon/ juniper

SUMMARY OF KEY HABITAT COMPONENTS

- Late seral stage pinyon-juniper woodlands with large old junipers
- Canopy cover less than 30%-40%
- 63-154 trees per acre
- Secondary cavities
- Dense foliage for roosting

Species Description

The juniper titmouse is a medium sized *Parus,* 5.75 inches long with a 9 inch wingspan, weighing 6 oz (Sibley 2000). It has medium gray upperparts, medium gray to grayish-white underparts and a small cresst (Cicero 2000). Males and females are similar in coloration but males are slighty larger (Cicero 2000). The Juniper Titmouse was formerly the Plain Titmouse (Cicero 2000). The species was separated into the Oak Titmouse and the Juniper Timouse in 1997 based on geographic and genetic traits (Cicero 2000). Most of the studies providing information on habitat and natural history are based on the Oak Titmouse. Less is known about the Juniper titmouse.

Distribution

The range of the Juniper Titmouse extends from the eastern slope of the Sierra Nevada eastward across most of Utah, Arizona, New Mexico and into western and southern Colorado (Colorado Partners in Flight 2000).

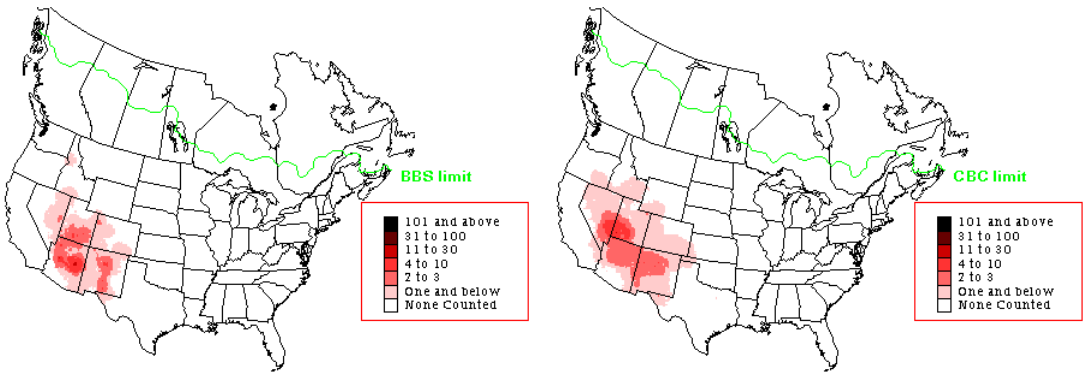


Figure JUTI-1: Summer Bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas Bird Counts

Arizona began a breeding bird atlas in the early 90's. Figure JUTI-2 shows the results of this effort. There were few sightings of the titmouse. In the Tonto National Forest Proposed "Desired Future Conditions" and candidate "Management Indicator Species" to

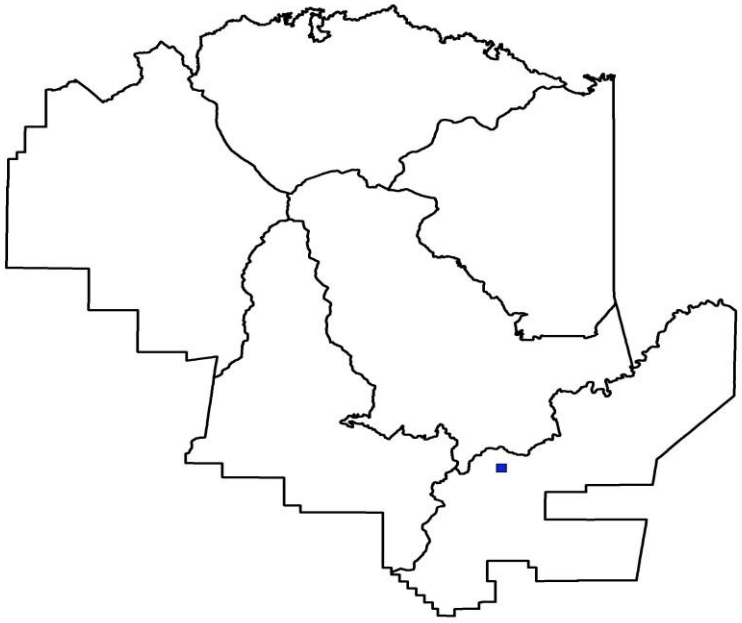


Figure JUTI-2: Block locations where breeding juniper titmouse were found- based on Arizona Breeding Bird Atlas.

Monitor Desired Future Conditions (1982) it was suggested that the titmouse "may be hard to census because it is quiet and unobvious."

Habitat

The juniper titmouse is most often associated with late-succession pinyon-juniper with open canopies and associated riparian woodlands. It can be found in all structural stages within the PJ, but old growth PJ appears to be the primary nesting habitat utilized (Towry 1984). Studies in Arizona (LaRue 1994, Masters 1979) have indicated that breeding titmice utilize PJ stands with canopy cover less than 30% and densities between 63 and 154 trees/acre. Towry (1984) indicated that the most important pinyon-juniper structural stage for this species was structural stage 4 with a canopy cover of <40%.. This VSS class provides the requirements needed for both feeding and reproduction. As noted above, this species utilizes most all the structural stages found in the PJ, but the least beneficial for this species are those that are extremely dense (canopy cover > 70%). Management for this species is therefore tied to the extent of mature PJ present on the area and, to the condition of the hardwood species within associated riparian areas.

Breeding

The Juniper Titmouse forms permanent pair bonds in its first year. Males and females defend territories year round. Breeding season peak activity lasts from April through May (Cicero 2000). This species is an obligate secondary cavity nester, requiring either natural cavities or abandoned holes of primary cavity nesters (Scott et al.1977). Nest boxes are readily used as are crevices found in twisted trunks of late seral stage junipers (Cicero 2000). Latta *et al.* (1999) reported that of 13 nests found in Arizona, 79% were in junipers. The nests are generally 3-10 feet above ground and the birds often partially excavate the hole (Colorado Partners in Flight 2000). The hole is filled with grass, moss, hair and shredded bark (Cicero 2000). Six or seven eggs are the most common clutch size and the eggs are incubated 14-16 days. The territory size of the titmouse ranges between 3.3 to 12.5 acres, indicating the need to manage for 125 acres of late-succession PJ to maintain a minimum viable population estimated at 20 birds (Towry, 1984). Management

for this species is therefore tied to the extent of old growth PJ present on the area and, to the condition of the hardwood species within associated riparian areas.

Food Habits

The majority of the titmouse's diet consists of caterpillars, beetles, ants, spiders, flies, fruits and seeds (DeGraff et al. 1991). Balda (1987) indicated that this species was a "major pine seed" predator. They forage on the ground in areas where ground cover and understory are thin (Colorado Partners in Flight 2000). They are gleaners, foraging on insects from the bark of small branches within the cavity (Ibid). They hoard large seeds such as juniper, pinyon and acorn that make up most of their winter diet (Christman 2001).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto National Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto National Forest Land Management Plan (USDA Forest Service 1985), the juniper titmouse was selected as a Management Indicator Species (Appendix G, Tonto FLMP) for general woodland conditions in the piñon– juniper woodland type.

In appendix K of the FLMP, pinyon-juniper acreage was listed as 265,480. Management direction of the pinyon-juniper vegetation type can be found in individual management units of the FLMP as follows.

1. Landscapes outside of Goshawk PFA's Woodlands: Manage for even age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape. Provide for reserve trees, snags, and down woody debris (Amendment 22 pg 40-11).
2. Within PFA's and nesting areas: Maintain existing canopy cover levels of woodland (Amendment 22 pg 40-12).
3. Manage the pinyon-juniper type to emphasize the production of mule deer (Amendment 2 page 68-1).
4. Integrate habitat needs through prescribed fires within fire suppression objectives (Amendment 2 page 68-1).
5. Manage the pinyon-juniper type in a sustained yield evenflow basis. Horizontal diversity will be provided by a mix of successional stages within 5000 acre management units. Ten percent of the type will be maintained as permanent openings with suitable ground cover for specific site conditions. Powerlines, natural openings, or meadows count toward the standard. Where natural openings or powerlines do not meet this standard openings will be created. The scheduling of fuelwood harvest will produce a distribution of successional stages as follows (Amendment 22 replacement pg 69):

1. Permanent Openings (2-40 acres) 10%
2. Fresh cut areas (0-20 years) 10%
3. Immature (20-100 years and 3-6" dbh) 40%
4. Mature (100-175+years and 6-11"dbh) 40%

6. Provide a ration of 60%:40% forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas (Amendment 22 replacement pg 69)
7. Design the fuelwood harvest blocks in the woodland type in irregular shapes less than 40 acres and less than 600 feet across (Amendment 11 Pg 70).
8. In the pinyon-juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore seed source (Amendment 11 Pg 70).
9. Achieve a savannah like condition in the pinyon-juniper type by leaving a minimum of 40 large juniper trees per 40 acre cut block (Amendment 11 Pg 70).
10. Maintain a minimum of 100 snags per 100 acres. A preferred 12" dbh and 20 feet tall over at least 50% of the pinyon-juniper type (Amendment 11 Pg 70).
11. The silvicultural prescription is even-aged management under the shelterwood method with pinyon uncut and 40 large juniper trees left per 40 acre cut block (Amendment 11 Pg 70).
12. Brush disposal will be consistent with wildlife objectives (Amendment 11 Pg 70).
13. Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement (Pg 71).
14. In the pinyon juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer wintering areas (Amendment 20 replacement page 87).
15. Planting may be necessary in some areas to restore a seed source (Amendment 20 replacement page 87).
16. Integrate habitat needs through prescribed fire within fire suppression objectives (Pg 87-1).
17. Maintenance performed on revegetation acres as determined in Allotment Management Plans to retain optimum forage production (Pg141).
18. Other woodland species (pinyon, cypress, oak, and other junipers) will be harvested using the individual tree selection method (Amendment 22 replacement page 142).

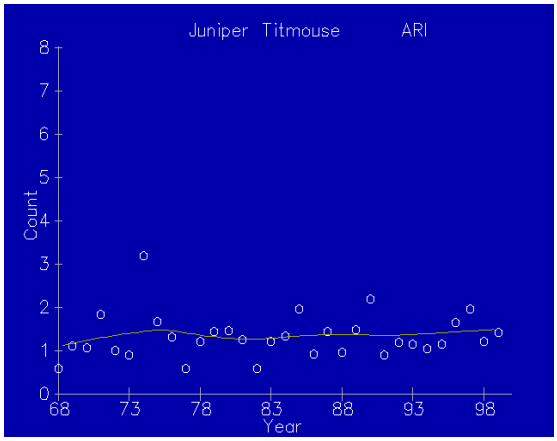


Figure JUTI 3. Juniper titmouse population trend data for the Western Region from BBS data (Sauer et al 2000).

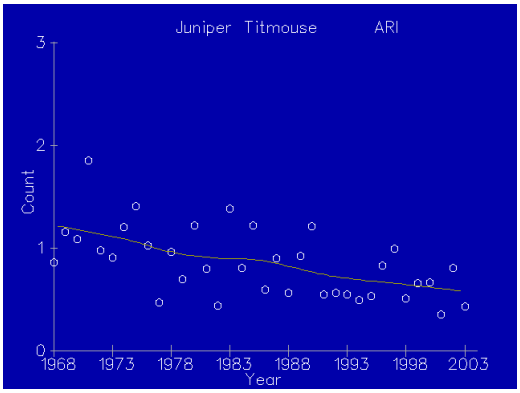


Figure JUTI 4. Juniper titmouse population trend data for Arizona from BBS data 1968-2003 (Sauer et al 2004).

Population trends

Nature Serve Explorer ranks the Juniper Titmouse as G5, N5, and S5 by (2001). These rankings illustrates that it is secure, common, widespread and abundant globally, nationally and statewide according to Nature Serve data.

BBS data (Sauer et al 2004) for Arizona from 1966-2003 shows a non-significant (p=0.87, n=20) upward trend of 0.1% per year (Figure JUTI 3). Results of the western region BBS from 1966-1999 show an insignificant (p= 0.95, n=86) downward trend of -0.2% (Figure JUTI 4). These trends indicate the Juniper Titmouse is stable.

The Arizona Partners in Flight Prioritization Ranking for the juniper titmouse is 16, based on intermediate distributions and moderate threats on the breeding and wintering ranges. Birds with scores of 20 or higher were selected initially for consideration as priority species. With a score of 16 the juniper titmouse is of low concern (Latta et al. 1999).

Tonto National Forest Population Trend

Two BBS routes indicate that this species is documented at very low densities on the Forest (see figure 7 and 8). Statewide the species is documented regularly on CBC surveys from 1997-present (figure 5). In 2003 on the Tonto Basin District this species was documented 4 times on two transects (Plank 2005). Habitat conditions for the Pinyon-Juniper habitat type remain relatively static since 1985 and therefore populations on TNF are considered **stable**.

Figure 5. Juniper titmouse population trend for the Arizona region 1985-2004 (National Audubon Society 2005)

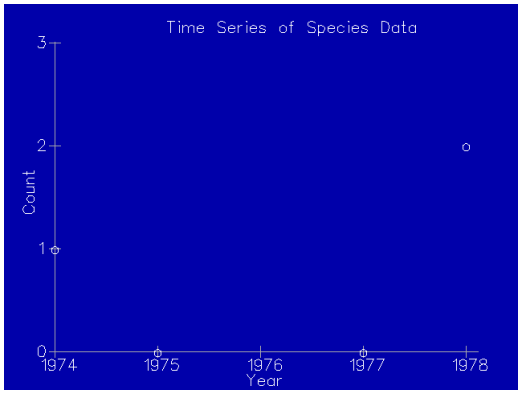


Figure 6. Juniper titmouse population trend for the Aztec Peak BBS Route 1974-1978.

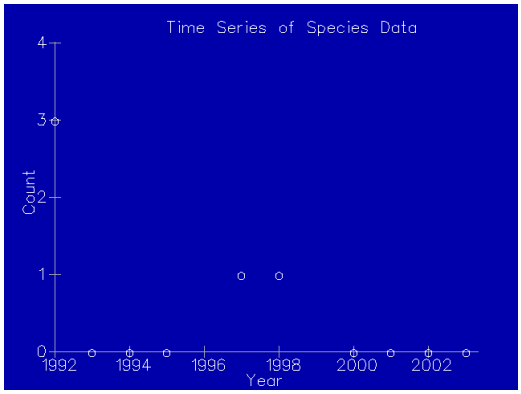


Figure 7. Juniper titmouse population trend for the Bartlett Reservoir BBS Route 1992-2003.

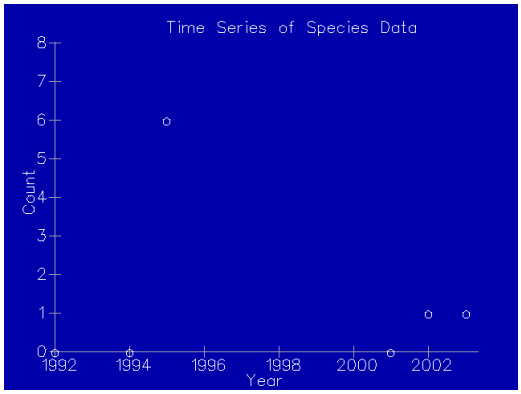


Figure 8. Juniper titmouse population trend for the Tonto Village BBS Route 1992-2003.

Literature Cited

Cicero, C. 2000. Oak Titmouse, Juniper Titmouse. The Birds of North America, No. 485 (Poole and Gill, eds.) The birds of North America, Inc., Philadelphia, Pa.

Christman, B. J., 2001. Factors influencing pair territoriality in the juniper titmouse. Condor 103:361-369.

Colorado Partners in Flight, 2000, http://rmb.wantjava.com/bcp/phy87/pj/juti.jsp.

DeGraaf, R.M., V.E. Scott, R.H. Hamre, L. Ernst and S.H. Anderson, ed. 1991. Forest and Rangeland Birds of the United States Natural History and Habitat Use. USDA Forest Serv. Agr. Handbook 688, 625 pp.

Balda, R.P. and N. Masters. 1980. Avian communities in the pinyon-juniper woodland: a descriptive analysis. Pages 146-169. *in* R.M. DeGraff and N.G. Tilghman, Compilers. Workshop Proc. of Management of western forests and grasslands for nongame birds. USDA For. Serv. Gen. Tech. Rep. INT-86, Ogden, UT.

Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona partners in flight bird conservation plan. Version 1.0. Arizona Game and Fish Dept., Phoenix. Nongame and Endangered Wildl. Prog. Tech. Rept. 142

LaRue, C.T. 1994. Birds of northern Black Mesa, Navajo County, Arizona. Great Basin Naturalist Vol. 54 No.1.

Masters, N.L. 1979. Breeding birds of pinyon-juniper woodland in north central Arizona. M.S. Thesis. Dept. Bio. Sci., Northern Arizona University, Flagstaff. 78 pp.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Scott, V.E., K.E. Evans, D.R. Patton, and C.P. Stone. 1977. Cavity-nesting birds of North American forests. U.S.D.A., Agric. Handb. 511. 112pp.

Sibley, D. A. 2000. The Sibley Guide to Birds. Alfred A. Knopfs, publs. Chanticleer, Inc., New York, New York.

Towry, R.K., jr. 1984. Wildlife habitat requirements. pp. 73-210. In R.L. Hoover and D.L. Wills, ed, Managing forested lands for wildlife. Colo. Div. of Wildl. in cooperation with USDA For. Serv., Rocky Mount. Reg., Denver, Colo.

USDA Forest Service, 1982. Tonto National Forest Proposed "Desired Future Conditions" and candidate "Management Indicator Species" to Monitor Desired Future Conditions.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

15. NORTHERN GOSHAWK: *Accipiter gentiles*

MIS Role: Vertical diversity in ponderosa pine/mixed conifer

SUMMARY OF KEY HABITAT COMPONENTS

- 40% of the forested landscape in large trees (greater than 18 inches dbh; Vegetation Structural Stage [VSS] 5 and 6)
- ponderosa pine habitat: Leave at least 2 snags and 3 logs/acre.
- Leave one group of reserve trees/acre (3-5/group) if opening is >1 acre.
- Mixed conifer habitat: Leave at least 3 snags and 5 logs/acre.
- Leave one group of reserve trees/acre (3-5/group) if opening is >1 acre.

Species Description (based on Sibley 2000)

The northern goshawk is the largest and bulkiest of the accipiters. Adults appear whitish below, bluish-gray above with a bold white stripe (supercilium) above the eye. Juveniles are buff colored overall with thick, spotty streaks below and bold white supercilium. The colorings of an adult male and female Northern Goshawk range from slate blue-gray to black. Their backs, wing tops and heads are usually dark and their undersides are white with fine gray horizontal barring. Their tails are light gray with three or four dark bands.

Reynolds et al. (1992) conducted a literature search in order to describe the life history of the northern goshawk and develop guidelines regarding their management in the Southwest. Unless otherwise noted, the following description relies on this work.

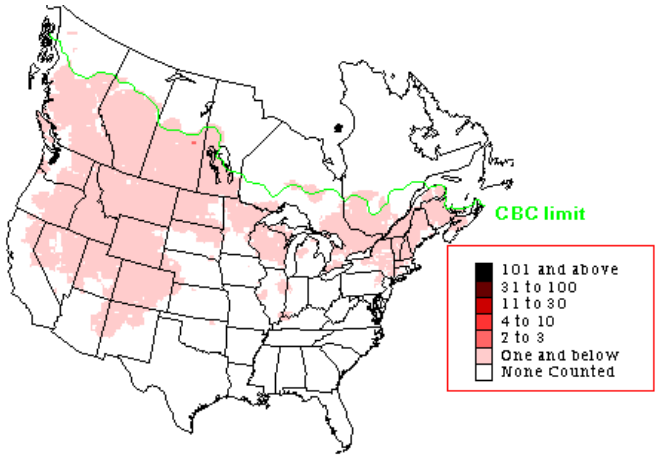


Figure NOGO-1: Northern Goshawk distribution in North America based on Christmas bird counts (Sauer 2001)

Distribution

The northern goshawk (Accipiter gentilis) occurs throughout the northern hemisphere in forest and woodland, where they feed on a variety of mammalian and avian prey (Palmer 1988). In North America it ranges from western central Alaska and the Yukon territories in the north, to the mountains of northwestern and western Mexico. It is typically not found in the southeastern states of the United States (Clark et al. 1987; Johnsgard 1990).

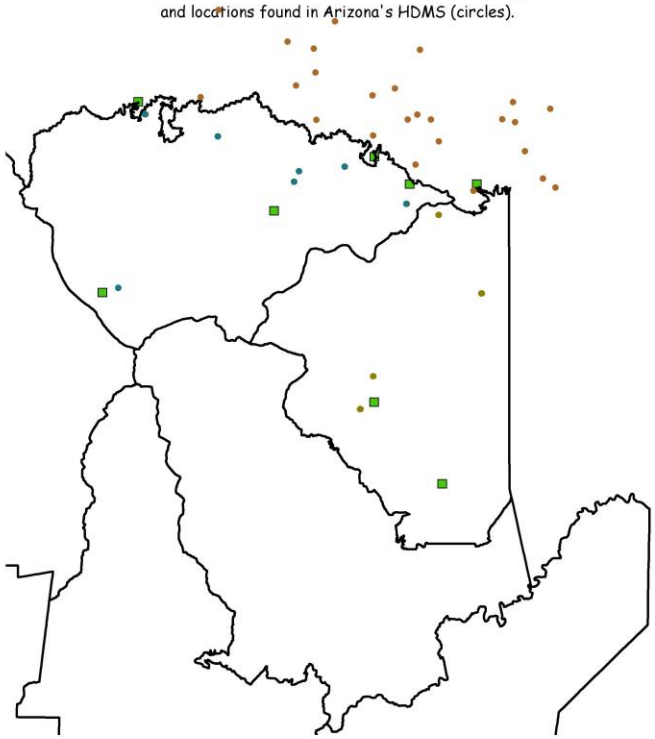


Figure NOGO-2: Block locations (squares) where breeding northern goshawk were found- based on Arizona Breeding Bird Atlas, and locations found in Arizona's HDMS (circles).

Goshawks are found throughout the pine type in Arizona. The highest density of known breeding goshawks occurs on the North Kaibab Ranger District of the Kaibab National Forest. It is thought to be well distributed within the pine habitat on the Tonto National Forest. Arizona began a breeding bird atlas in the early 90's. Figure NOGO-2 below shows the results of this effort to date on the Tonto National Forest. The data is depicted as points, which in reality represent "atlas blocks" established at the beginning of the atlas survey work, to obtain adequate sampling of the various habitat biomes within the State. Additionally Figure NOGO-2 displays sightings from Arizona Game and Fish Department Heritage Datat Management Systems

Breeding

A mating pair of Northern Goshawk begins to prepare their nest as early as two months before egg laying. Typically, the nest is located in an older forest, near the trunk of a medium to large tree and near openings in the forest such as roads, swamps and meadows. Their nests are usually about one meter (39.4 inches) in diameter and one-half to one meter (19.7 to 39.4 inches) in height and are made of dead twigs, lined with leafy green twigs or bunches of conifer needles and pieces of bark.

The typical clutch size is two to three eggs, which are laid in two to three day intervals. The eggs are rough textured, bluish-white in color and measure 59x45 millimeters (2.3 x 1.8 inches) in size. The clutch begins to hatch within 36 to 41 days of laying. Incubation of the eggs is primarily the female's job, but occasionally the male will take her place to allow the female to hunt and eat.

After the clutch has hatched, the female will not leave the nesting area until the nestlings are 25 days old. During this time the male is the primary provider of food for the female and her nestlings. When the nestlings reach 25 days the female will leave them and hunt with the male (Johnsgard 1990; Baicich et al. 1997).

When the nestling Goshawk reaches 35 to 42 days old, he will begin to move to the nearby branches of the tree. Soon after this practice flights begin to occur. Often the fledglings participate in "play" which is thought to allow them to practice hunting skills which will be needed throughout their lives. The young Goshawks do not become fully independent of their parents until they are 70 to 80 days old.

Most Goshawk populations are sedentary and they typically remain in their nesting areas throughout their lives. Only the Goshawks that breed in the north and northwestern parts of North America are migratory. They fly south during the winter months and then return to their nesting areas in the spring.

Male and female Goshawks typically maintain a life-long pair bond and only upon death will they seek out a new mate. Goshawks are highly territorial and a mating pair will advertise their nesting territory by performing an elaborate aerial display before and during nest construction and/or repair. If their nesting area is encroached upon, they will defend it fiercely (Johnsgard 1990).

The TNF has 13 known breeding areas which have been monitored (Table NOGO-1) sporadically since 1991. Two other sites are suspected to have breeding activity but as of yet, this has not been confirmed.

Table NOGO-1: Tonto National Forest northern goshawk monitoring history**.**

Territory Name	Territory Number	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Robert's Draw	120401	O-2Y	O-2Y	P	O-3Y	O-2Y	O-NU	0-1Y	O-NF	MNR	MNR	NI	IM-NR	IM-NR	
Pine Creek	120402	O-2Y	MNR	NI	P	MNR	NI	P	MNR	P	NI	NI	IM-NR	NI	O-NU
Hunter Creek	120403	P-NU	P	NI	P	O-NF	NI	MNR	MNR	NI	MNR	NI	IM-NR	NI	
Broad Draw	120404	NI	NI	NI	O-NU	MNR	MNR	MNR	MNR	NI	MNR	NI	IM-NR	IM-NR	
Upper Tonto	120405	NI	NI	NI	O, NU	P	MNR	MNR	MNR	MNR	MNR	NI	IM-NR	NI	
Erosion Tank	120406	NI	NI	NI	O-NU	F	MNR	MNR	MNR	NI	NI	MNR	IM-NR	NI	
Colcord Estates	120502	NI	O-NU	P	O-2Y	0-3Y	P	O-2Y	O-3Y	0-1Y	P-NU	NI	IM-NR	IM-NR	
Salt Log Canyon	120503	NI	NI	NI	O, 1Y	MNR	P	MNR	MNR	NI	MNR	NI	IM-NR	P	
Jim Sam Butte	120501	NI	O-2Y	NI	MNR	MNR	MNR	MNR	NI	NI	NI	NI	NI	NI	
Strawberry	120407	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0-2Y
Mill Creek	120201	NI	NI	NI	NI	NI	NI	NI	NI	NI	0-2Y	NI	NI	NI	NI
Russell Gulch	120202	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	0-2Y
Pioneer Pass	120203	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	O-NU

LEGEND
O= Pair Occupancy inferred or confirmed
M= Male inferred or confirmed
F= Female inferred or confirmed
P= Presence of a single goshawk inferred or confirmed sex unknown

Y= Number of young fledged
YD= Number of young found dead
NI= No Information
NU= Nesting status undetermined
NY= Nesting status undetermined, no young produced
NN= Non-nesting/Non-reproduction confirmed
NA= Nest Abandoned
NF= Nest Failed
A= Absence or Unoccupied
IM-NR= Informally monitored - no response or location

Habitat

The goshawk breeds in coniferous, deciduous, and mixed forests throughout much of North America. It is a habitat generalist that uses a variety of forest types, forest ages, structural conditions, and successional stages. Goshawks typically nest in larger trees that occur in clumps with fairly closed canopies, and forage over large areas to prey on a wide variety of small- to medium-sized birds and mammals. Fourteen species have been identified as particularly important in the diets of goshawks in the Southwest. Prey species known to occur within the project include American robin, Steller's jay, band-tailed pigeons, mourning doves, northern flicker, cottontail rabbits, red squirrel and Abert's squirrel.

Principal cover types used by the goshawk in the Southwest are ponderosa pine (74%), mixed-species (23%), and spruce-fir (3%). Juvenile goshawks that were radio-tagged have been found to forage in the pinyon-juniper woodland types shortly after fledging (Ingraldi and MacVean 1995). They nest in mature and old-growth forests, but use a variety of forest conditions to raise their young and forage. Reynolds et al. (1992) described the desired conditions for Post-fledging Family Areas (PFAs), where fledged young are raised, as having 60% of the area in the three older size classes (12"-18", 18"-24", and 24"+ - approximately 20% in each class), referred to as Vegetation Structural Stages (VSS) 4, 5, and 6, respectively. The remaining 40% of the PFA is desired to have 20% in the VSS 3 (5"-12") size class, 10% in the VSS 2 (1"-5") size class, and 10% in the VSS 1 (0"-1") size class. The same distributions are desired for goshawk foraging habitat. The Forest Service in Region 3 has been using the goshawk management recommendations developed by Reynolds *et al*. (1992) as Forest Plan standards and guidelines since 1996. Stands where there is room to pursue prey in and below the canopy is preferred for nesting (Fisher 1986). Goshawks populations may be diminished in stands with a very dense understory because of limited visibility, restricted flight, and greater opportunities for prey to escape (Reynolds *et al.* 1992). On the TNF, nests are most often constructed in large ponderosa pine trees, and occasionally in large Douglas fir trees.

Threats to the goshawk include habitat fragmentation of both breeding and wintering forest habitats as a result of timber harvesting (Reynolds et al. 1992). Short-term effects of human disturbance including nest failure have been documented for birds of prey like the goshawk and it is conceivable that these short-term effects can lead to long-term community changes such as changes in breeding density and species composition within a given community (e.g., Anderson et al. 1990).

Food Habits

The Northern Goshawk is carnivorous and consumes birds, mammals, invertebrates and reptiles of moderate to large size with prey weighing up to one-half as much as itself. The content of an individual Goshawks diet depends upon the environment in which that Goshawk lives and the hawk's preference. Their average diet consists of 21 to 59 percent mammals, 18 to 69 percent birds with the remaining percentages being made up of reptiles and invertebrates. Some of the goshawk's common prey include snow-shoe hares *Lepus americanus*, red squirrels *Tamiasciurus hudsonicus*, ground squirrels *Spermophilus undulatus*, spruce grouse *Dendragapus canadensis*, ruffed grouse *Bonasa umbellus*, and blue grouse *Dendragapus obscurus* (Johnsgard 1990).

Tonto National Forest MIS Status

In the Tonto Forest Land Management Plan (FLMP) northern goshawk was selected as a Management Indicator Species of vertical diversity within ponderosa pine/mixed conifer vegetation type (Appendix G, Tonto FLMP).

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the conifer vegetation type was determined to cover approximately 283,200 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired management condition at the end of the fifth period. This habitat type is well represented and distributed across two Districts of the Tonto.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for goshawk are:

1. Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover. (Amendment No. 22, 06/05/96, replacement page 40-1)

2. Allow for forage to maximize Threatened and Endangered (T&E) species, management indicator species and emphasis harvest species. (page 42)

3. VSS distribution should reflect the following table [may vary +/- 3%]:

Vegetation Structural Stage			Desired Future Condition	
Description	**Class**	**dbh**	**by %**	**by acres**
Grass-forb/shrub	1	0 to 0.9 "	10%	28,320
Seedling/Sapling	2	1.0 to 4.9 "	10%	28,320
Young Forest	3	5.0 to 11.9 "	20%	56,640
Mid-aged Forest	4	12.0 to 17.9"	20%	56,640
Mature Forest	5	18.0 to 23.9"	20%	56,640

Old Forest	6	> 23.9 "	20%	56,640
Total				283,200

4. Mixed Conifer: leave at least 3 snags, 5 downed logs and 10-15 tons of woody debris per acre.

5. Ponderosa Pine: leave at least 2 snags, 3 downed logs and 10-15 tons of woody debris per acre.

6. A preferred snag is 18" in diameter and 30 feet tall

7. Retain key forest components such as oak

8. Using Desired Future Condition as a guide, optimize wildlife outputs in all management units by coordination of other resource activities and direct habitat improvement projects. (page 42)

Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 269) predicted a trend of a 20% increase of goshawk by the year 2030 (Table 11).

Population Trends

The goshawk in the Southwest has been the center of much controversy. It was originally petitioned for listing, west of the 100th meridian in 1991. The initial finding of the Fish and Wildlife Service, June 25, 1992, was that insufficient information was presented to indicate that listing might be warranted. This decision was litigated resulting in the agency being ordered to reconsider their decision. On June 6, 1996 the Service issued a new finding, vacating the June 25th, 1992 decision (USFWS 1996). This finding again determined that insufficient information was presented to indicate that listing might be warranted. In 1997, the Service issued a new decision that "*due to court remands and the need to complete a thorough status review of this controversial species*" vacated the June 1996 decision and initiated a 12-month status review (USFWS 1997). This status review was completed in 1998 (USFWS 1998) and determined that "*listing this population as endangered or threatened is not warranted.*"

BBS data (Sauer et al., 2004) for Arizona from 1966-2002 shows a significant (p = 0.03), ***positive*** population trend of 32.3% per year (Figure NOGO-3).

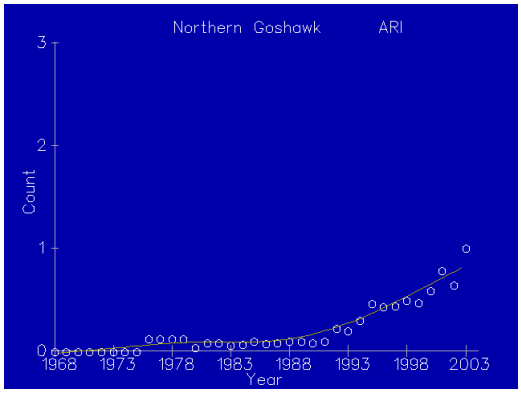


Figure NOGO-3: Goshawk population trend data for Arizona from BBS data 1968-2003 (Sauer et al., 2004).

Tonto National Forest Population Trend

Forest Service biologists, technicians, contract biologists, and Arizona Game and Fish biologists have conducted surveys for this species on the Forest utilizing the protocol developed by Kennedy and Stahlecker (1991) for the Southwestern Region of the Forest Service. Inventory survey forms, maps and reports are maintained at District Offices. At present the Forest has established 13 management territories based on these surveys, but other data on population status is not available. Large stand replacing fires since 1985 in the ponderosa pine/mixed conifer habitat type is likely contributing to **declining** habitat and population trends for this species.

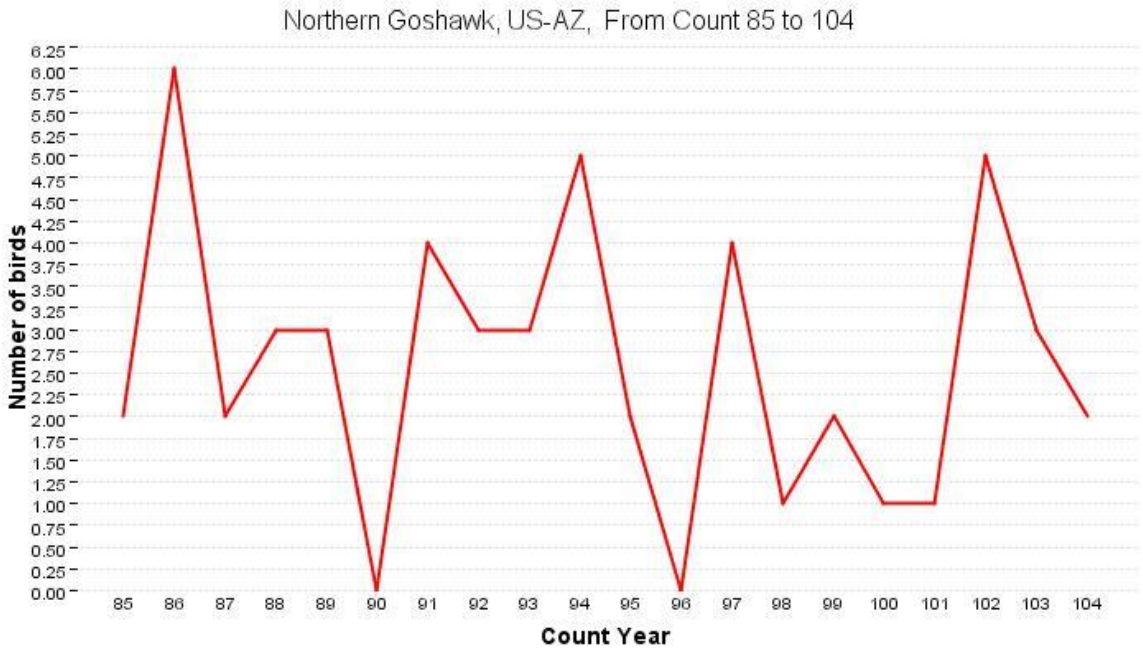


Figure 4. Northern Goshawk population trend for the Arizona region 1985-2004 (National Audubon Society 2005)

Literature Cited

Anderson, D.E., O.J. Rongstad, and W.R. Mytton. 1990. Home-range changes in raptors exposed to increased human activity levels in southeastern Colorado. Wildl. Soc. Bull. 18(2):134-142.

Baicich, Paul J. and Colin J.O. Harrison. 1997. A Guide to the Nests, Eggs and Nestlings of North American Birds. Academic Press Limited, San Diego.

Clark, W. S. and B. K. Wheeler. 1987. Peterson Field Guides, Hawks. Houghton Mifflin Company, Boston

Fisher, D.L. 1986. Daily activity patterns and habitat use of *Accipiter* hawks in Utah. Provo, Utah: Brigham Young Univ. Ph.D. dissertation.

Ingraldi, M.F. 1998. Population biology of northern goshawks in east-central Arizona. Nongame and Endangered Wildlife Program Tech. Rep. 133. Arizona Game and Fish Department, Phoenix.

Ingraldi, M.F. and S.R. MacVean. 1995. Demography of northern goshawks in east-central Arizona: 1994 progress report. Nongame and Endangered Wildlife Program Tech. Rep. 66. Arizona Game and Fish Department, Phoenix.

Ingraldi, M.F. and S.R. MacVean. 1994. Demography of northern goshawks in central Arizona final report for IIPAM Heritage Grant I93034. Nongame and Endangered Wildlife Program Tech. Rep. 45. Arizona Game and Fish Department, Phoenix.

Ingraldi, M.F. and S.R. MacVean. 1994a (revised 1995). Nest-site selection by northern goshawks in a ponderosa pine forest in east-central Arizona. Nongame and Endangered Wildlife Program Tech. Rep. 47. Arizona Game and Fish Department, Phoenix.

Johnsgard, P. A. 1990. Hawks, Eagles, & Falcons of North America. Smithsonian Institution Press, Washington

Kennedy, P.l. and D. W. Stahlecker. 1991. Broadcast of calls of the northern goshawk: their effectiveness and their use in inventory and long-term monitoring programs. USDA For. Serv., Southwest Region, Albuquerque.

Lang, P.A. 1994. Spatial analyses of northern goshawk ponderosa pine nest site habitat in east-central Arizona. Northern Arizona University. 92p. M.S. Thesis.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Palmer, R.S. 1988. Handbook of North American Birds. Volume 4. Sponsored by the Smithsonian Institution. Yeale Univ. Press, New Haven, 433 pp.

Reynolds, R. T., R. T. Graham, H. M. Reiser and others. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rep. RM-217. Ft. Collins, CO, USDA For. Serv., Rocky Mount. For. Range Exp. Sta. 90 pp.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966-2004. Version 2001.2. USGS Patuxent Wildlife Research Center. Laurel, MD. www.mbr-pwrc.usgs.gov/bbs/bbs.html

Sibley, D.A. 2000. The sibley guide to birds. National Audubon Soc. Alfred Knopff, Inc., New York. 545pp.

USFWS. 1996. Endangered and threatened wildlife an plants; 90 day finding on a petition to list the northern goshawk in the contiguous United States west of the 100th meridian. Federal Register 62:50892-50896.

USFWS. 1997. Endangered and threatened wildlife an plants; 90 day finding for a petition to list the northern goshawk in the Western United States. Federal Register 61:28834-28835.

USFWS. 1998. Endangered and threatened wildlife an plants; Notice of 12 month finding for a petition to list the northern goshawk in the contiguous United States west of the 100th meridian. Federal Register 63:35183-35184.

16. NORTHERN FLICKER: *Colaptes auratus*

MIS Role: Snag component in pinyon/juniper

SUMMARY OF KEY HABITAT COMPONENTS

- Snags (deciduous or coniferous)
- Ants
- Open areas for foraging

Species Description

The northern flicker is a large bird with a long slightly downcurved bill (Sibley 2000). It is readily identifiable by the white rump, the barred brown back, and the black patch across the chest (Peterson Field Guide online, 2002). "Two different-looking forms occur: "Yellow-shafted" Flicker (east and north) and "Red-shafted" Flicker (west). A third form, the Gilded Flicker (*Colaptes chrysoides*) of the southwestern deserts, is now considered a separate species, per the July, 1995 American Ornithologists' Union Check-list of North American Birds" (Peterson Field Guide online, 2000). The Northern Flicker is large, 12.5" long, with a 20" wingspan (Sibley 2000).

Distribution

The Northern Flicker ranges from the tree limit in Alaska and Canada south to Nicaragua (Peterson Field Guide online, 2002).

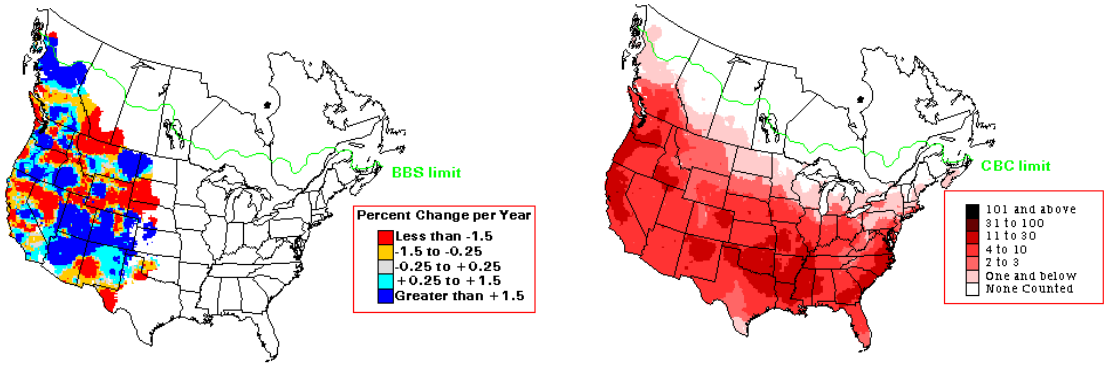


Figure NOFL-1: Summer Bird distribution of the Red-Shafted Flicker (left) in North America based on breeding bird surveys and winter distribution of the Northern Flicker (right) based on Christmas Bird Counts

The Northern Flicker is considered well distributed on the Tonto National Forest. Arizona began a breeding bird atlas in the early 90's. Figure NOFL-2 shows the results of this effort.

Habitat

The Northern Flicker is a habitat generalist, inhabiting woodlands, savannas, and forest edges (Moore 1995). It does well in human habitats breeding in urban, suburban and rural environments (Ibid). It can be found in "open forests both deciduous and coniferous, open woodlands, open areas with scattered trees and snags, riparian woodlands, pine-oak associations, and parks" (Nature Serve 2001).

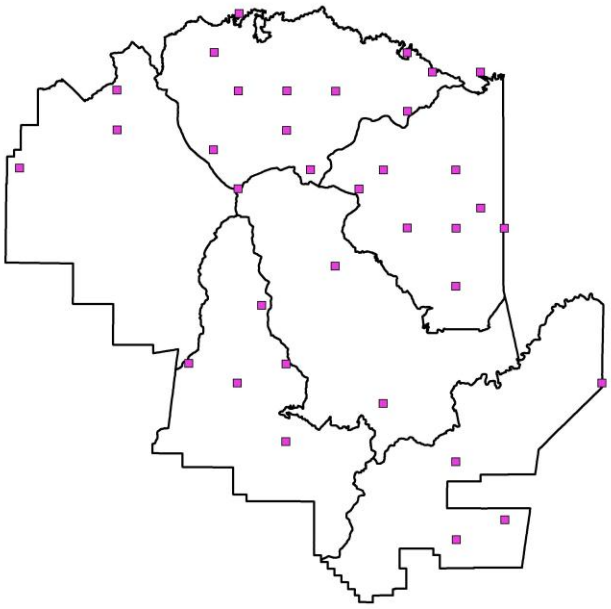


Figure NOFL-2: Block locations where breeding northern flicker were found- based on Arizona Breeding Bird Atlas.

Breeding

The flicker is a primary cavity nester creating nest holes in dead tree trucks, stumps, dead tops of live trees (Nature Serve 2001). Human structures such as buildings or poles may also be used (Ibid.) The nest cavity is excavated by both sexes and is generally found 6 to 20 feet above ground, with wood chips for nest material (Peterson Field Guide online, 2000). Clutch size is 5-8 eggs or sometimes 3-12 with males and females incubating for 11-16 days (Ibid.). Young are able to leave the nest about a month after hatching (Ibid.).

Food Habits

The Northern Flicker spends much of its time on the ground foraging for its primary food source, ants (Peterson Field Guide Online, 2002). It also eats beetle larvae, termites, caterpillars, other insects and a variety of berries, seeds and nuts (Ibid.).

Tonto National Forest MIS status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto National Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto National Forest Land Management Plan (USDA Forest Service 1985), the Northern Flicker was selected as a Management Indicator Species (Appendix G, Tonto FLMP) for snags conditions in the piñon–juniper woodland type. A panel of biologists knowledgeable of forest conditions suggested that the Juniper Titmouse may be a better indicator of snags in the vegetation type (Appendix A). In appendix K of the FLMP, pinyon-juniper acreage was listed as 265,480.

In appendix K of the FLMP, pinyon-juniper acreage was listed as 265,480. Management direction of the pinyon-juniper vegetation type can be found in individual management units of the FLMP as follows.

1. Landscapes outside of Goshawk PFA's Woodlands: Manage for even age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape. Provide for reserve trees, snags, and down woody debris (Amendment 22 pg 40-11).
2. Within PFA's and nesting areas: Maintain existing canopy cover levels of woodland (Amendment 22 pg 40-12).
3. Manage the pinyon-juniper type to emphasize the production of mule deer (Amendment 2 page 68-1).
4. Integrate habitat needs through prescribed fires within fire suppression objectives (Amendment 2 page 68-1).
5. Manage the pinyon-juniper type in a sustained yield evenflow basis. Horizontal diversity will be provided by a mix of successional stages within 5000 acre management units. Ten percent of the type will be maintained as permanent openings with suitable ground cover for specific site conditions. Powerlines, natural openings, or meadows count toward the standard. Where natural openings or powerlines do not meet this standard openings will be created. The scheduling of fuelwood harvest will produce a distribution of successional stages as follows (Amendment 22 replacement pg 69):

    - Permanent Openings (2-40 acres) 10%
    - Fresh cut areas (0-20 years) 10%
    - Immature (20-100 years and 3-6" dbh) 40%
    - Mature (100-175+years and 6-11"dbh) 40%

6. Provide a ration of 60%:40% forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas (Amendment 22 replacement pg 69)
7. Design the fuelwood harvest blocks in the woodland type in irregular shapes less than 40 acres and less than 600 feet across (Amendment 11 Pg 70).
8. In the pinyon-juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore seed source (Amendment 11 Pg 70).
9. Achieve a savannah like condition in the pinyon-juniper type by leaving a minimum of 40 large juniper trees per 40 acre cut block (Amendment 11 Pg 70).
10. Maintain a minimum of 100 snags per 100 acres. A preferred 12" dbh and 20 feet tall over at least 50% of the pinyon-juniper type (Amendment 11 Pg 70).
11. The silvicultural prescription is even-aged management under the shelterwood method with pinyon uncut and 40 large juniper trees left per 40 acre cut block (Amendment 11 Pg 70).
12. Brush disposal will be consistent with wildlife objectives (Amendment 11 Pg 70).

13. Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement (Pg 71).
14. In the pinyon juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer wintering areas (Amendment 20 replacement page 87).
15. Planting may be necessary in some areas to restore a seed source (Amendment 20 replacement page 87).
16. Integrate habitat needs through prescribed fire within fire suppression objectives (Pg 87-1).
17. Maintenance performed on revegetation acres as determined in Allotment Management Plans to retain optimum forage production (Pg141).
18. Other woodland species (pinyon, cypress, oak, and other junipers) will be harvested using the individual tree selection method (Amendment 22 replacement page 142).

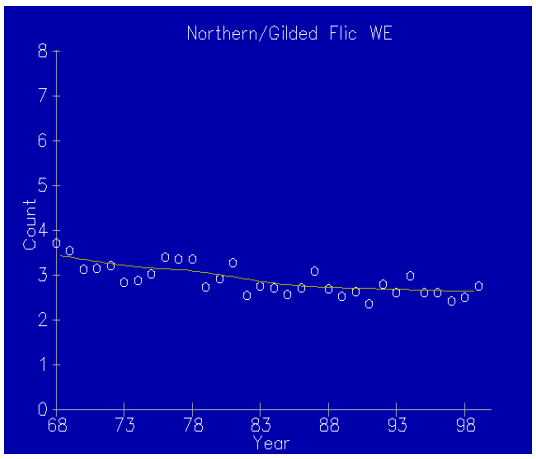


Figure NOFL-3. Northern Flicker (combining gilded and northern) trends for the years 1968 to 1998 in the Western BBS region. (Sauer et.al 2001)

Population Trends

In Arizona for the years 1966 to 2003, the BBS trend showed a non-significant increase of 0.6% over 50 survey routes (p=0.6). Refer to Figure NOFL-4 for a graph provided by the USGS Patuxtent Wildlife Research Center website (Sauer et al. 2001). Breeding Bird Survey (BBS) data show a non significant population decrease for the western BBS region, of –0.8 percent per year, over 869 survey routes (p=0.1, Figure BCSP-3). However, throughout its range the Northern Flicker (combined with the Gilded Flicker due to recent taxonomic changes) shows a significant (p<0.05) decrease of -2.3% (Sauer et al. 2000). Decreasing snag density during timber harvest in ponderosa pine forests has been shown to decrease the number of cavity-nesting flickers/acre (p<0.05, Scott and Oldemeyer, 1983).

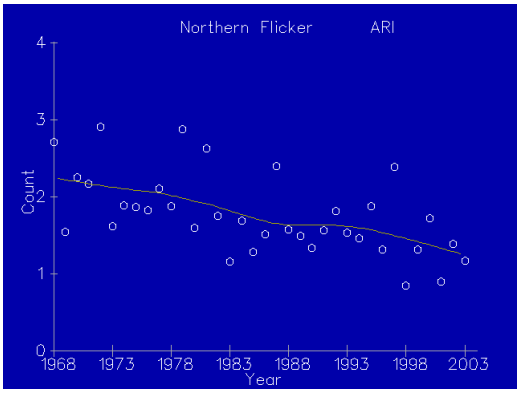


Figure NOFL-4. Northern Flicker trends for the years 1968 to 2003 in the Arizona region (Sauer et al 2004).

The Northern Flicker is ranked G5, N5, and S5 by Nature Serve Explorer (2001). These rankings illustrates that it is secure, common, widespread and abundant globally, nationally and statewide according to Nature Serve data.

The Arizona Partners in Flight Prioritization Ranking for the Northern Flicker is 16, based on intermediate distributions and moderate threats on the breeding and wintering ranges. Birds with scores of 20 or higher were selected initially for consideration as

priority species. With a score of 15 the Northern Flicker is of low concern (Latta et al. 1999).

Tonto National Forest Population Trend

There are three BBS routes on the Tonto National Forest; Bartlett Reservoir, Tonto Village and Aztec Peak. Figure 4 and 5 depict survey results for the years applicable since the Forest Plan was completed. Survey results for Aztec Peak are included, although the dates of the surveys are prior to the completion of the Forest Plan.

Drought conditions the last several years have increased the number of dead standing trees that are used for cavity nests and will likely improve nesting success and the snag component. Based on this information, populations on the TNF are considered **stable**.

Survey route(s) for Tonto National Forest:

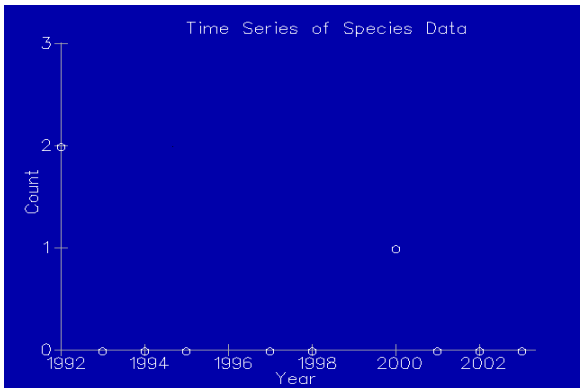


Figure 4. Northern flicker population trend for the Bartlett BBS route 1992-2003.

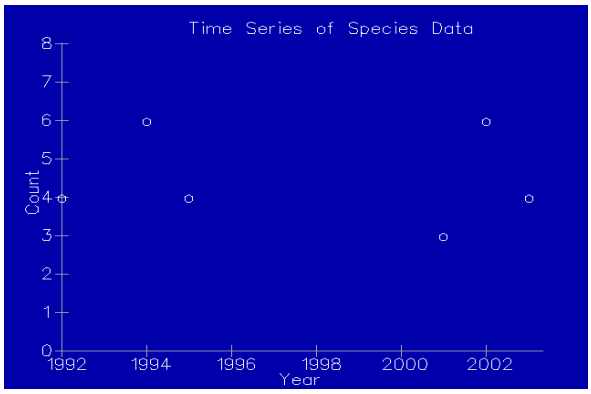


Figure 5. Northern flicker population trend for the Tonto Village BBS route 1992-2002.

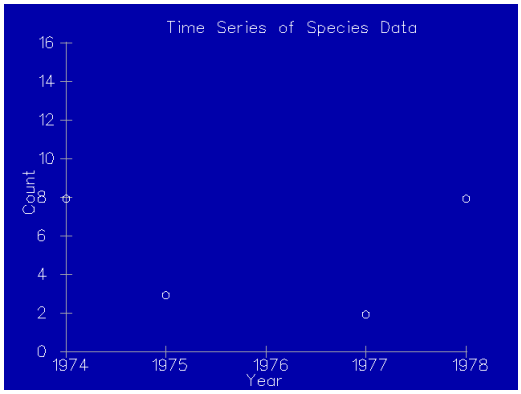


Figure 6. Northern flicker population trend for the Aztec Peak BBS route 1974-78.

Literature Cited

Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona partners in flight bird conservation plan. Version 1.0. Arizona Game and Fish Dept., Phoenix. Nongame and Endangered Wildl. Prog. Tech. Rept. 142

Moore, W. S. 1995. Northern Flicker (Colaptes auratus). The Birds of North America, No. 166, (Poole and Gill, eds.) The Birds of North America, Inc., Philadelphia, Pa.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Peterson Field Guide online. 2002 http://www.petersononline.com/birds/month/nofl/.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Scott, V. E. and J. L. Oldemeyer. 1983. Cavity-nesting bird requirements and response to snag cutting in ponderosa pine. *In* Snag Habitat Management: Proceedings of the Symposium. USDA Forest Service, General Technical Report RM-99, 19-23.

Sibley, D. A. 2000. The Sibley Guide to Birds. Alfred A. Knopfs, publs. Chanticleer, Inc., New York, New York.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

17. PYGMY NUTHATCH: *Sitta pygmaea*

MIS Role: Old growth component in ponderosa pine/mixed conifer

SUMMARY OF KEY HABITAT COMPONENTS

- Soft snags at least 12" dbh and 30 feet tall
- Snag densities of at least 1/acre
- Trees retained for snag recruitment
- Acres of VSS 4,5,6 and Canopy Covers > 40%

Species Description (from Stokes and Stokes 1999)

The pygmy nuthatch is a small (4 ¼ ") grayish bird, with a straight thin bill. It is most often associated with ponderosa pine and travels in small flocks. It has a grayish-brown cap bordered by a darker eyeline. The back is blue-gray with a buff belly. At close range a dull white spot may be seen on the nape.

Distribution

Pygmy nuthatches are restricted to the western portion of the United States. It is also found in the western part of Canada.

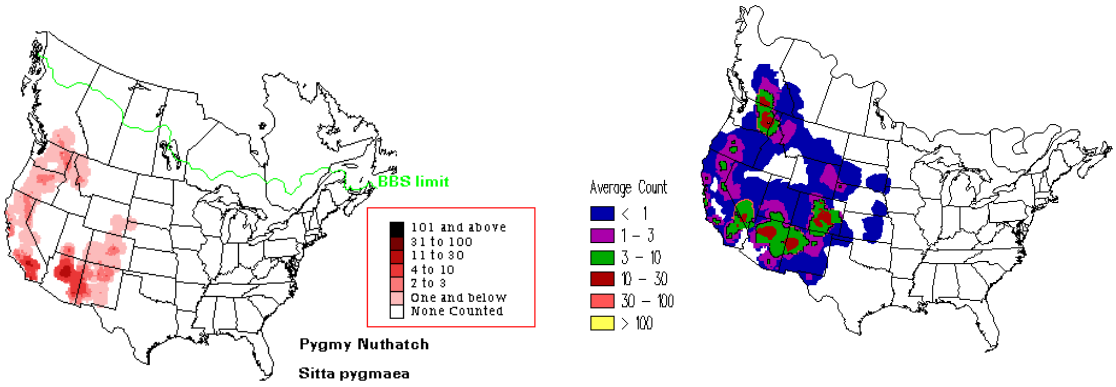


Figure PYNU-1: Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts.

It is thought to be well distributed on the Tonto National Forest also. Arizona began a breeding bird atlas in the early 90's. Figure PYNU-2 below shows the results of this effort to date on the Tonto National Forest. The data is depicted as points, which in reality represent "atlas blocks" established at the beginning of the atlas survey work, to obtain adequate sampling of the various habitat biomes within the State.

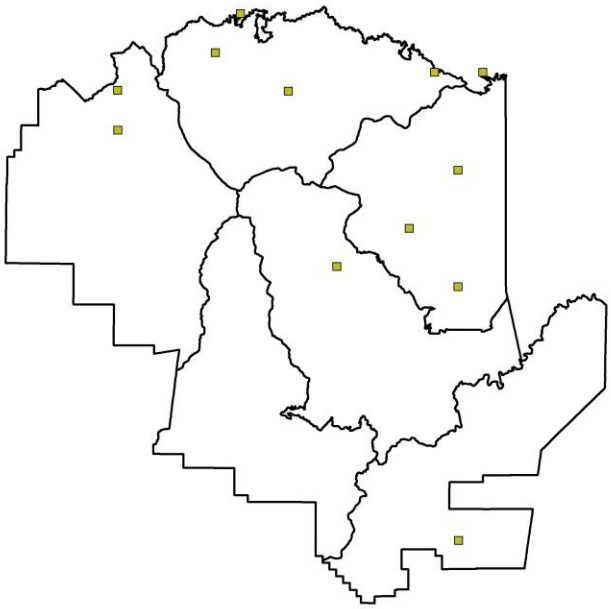


Figure PYNU-2: Block locations where breeding pygmy nuthatches were found- based on Arizona Breeding Bird Atlas.

Habitat

The pygmy nuthatch is the smallest of the North American nuthatches. It is gregarious by nature and is found primarily in mature and old-growth ponderosa pine forest (Towry 1984) and lightly disturbed areas (Hall *et al*. 1997), preferring open parklike forests (Degraff et al. 1991). It has also been reported as using pinyon/juniper woodlands (Phillips *et al*. 1984), aspen and cottonwoods (Thomas *et al*. 1979). It is considered a secondary cavity nester, relying on natural cavities or those created by other birds (Towry 1984).

Szaro and Balda (1979) detected this species in lower abundance in irregular strip shelterwood cut areas and severely thinned areas. Hutto *et al*. (1993), Hejl *et al*. (1995), and Hall *et al*. (1997) all list five studies in which the pygmy nuthatch was listed as less abundant in logged forests than unlogged forests. Franzeb (1977) also indicated that this species was less abundant in logged versus unlogged areas of mixed conifer. However, Szaro and Balda (1979) and Szaro and Balda (1982) documented pygmy nuthatch abundances that were higher in treated areas than untreated control areas. Rosenstock (1996) found this species most abundant where 40-50% of the basal area comprises VSS class 6; canopy covers in excess of 40%, with large snags in excess of 1 per acre. Towry (1984) indicated that though this species can use a wide variety of habitat types, the preferred habitat is ponderosa pine and riparian, preferring structural stages of 4A or greater.

Miller and Benedict (1994) predict that not enough large trees remain on the great majority of the landscape to provide recruitment snags for maintaining cavity-nesting birds in the future.

Breeding

Scott (1977) found 27 nests in ponderosa pine snags and only 2 in aspen. Paine and Martin (1995) found almost an equal preference between ponderosa pine and aspen snags. Thomas *et al.* (1979) indicates that this species needs a minimum of a 12-inch dbh soft snag 30 feet tall for nesting. Cunningham *et al*. (1980) found that though this species definitely prefers snags, where this habitat attribute has been drastically reduced it may use oaks or live pine trees.

Szaro and Balda (1979) documented a 3-year average of 13.5 breeding pairs/100 acres in lightly cut ponderosa pine stands compared with 14 breeding pairs/100 acres in control stands. The prescription analyzed was basically the following:

- Trees <10" d.b.h.: thin to growing stock level (GSL) of 60 sq. ft./acre of basal area
- Trees ≥12" d.b.h.: thin to 70 sq. ft./ac of basal area

Towry (1984) indicated that breeding territories in Colorado averaged 3 acres, and as such, it would take 75 acres to support what they assumed to be a minimum viable population of 25 breeding pairs. Raphael and White (1984) indicated that maximum densities for this species would be approximately 36 pairs/100 acres, which would require 1.08 suitable snags/acre.

Food Habits

The pygmy nuthatch gleans insects from the outer branches of mature trees. Its diet consists of 20% seeds (primarily coniferous) and 80% animal matter; primarily wasp, spittle insects, ants, beetles and caterpillars (Towry 1984). It feeds by hopping along tree trunks and branches, often hanging upside down.

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. The Pygmy nuthatch was selected as a Management Indicator Species for the ponderosa pine and mixed conifer vegetation types (Appendix G, Tonto FLMP)- specifically the old growth component (USDA Forest Service 1985).

Ponderosa pine/mixed conifer

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the conifer vegetation type was determined to cover approximately 283,200 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired management condition at the end of the fifth period. The most recent analysis indicates the quantity of conifer acres has not changed although some shifting upon the landscape has occurred. This habitat type is well represented and distributed across two Districts of the Tonto.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for pygmy nuthatch include:

1. Ponderosa Pine: leave at least 2 snags, 3 downed logs and 10-15 tons of woody debris per acre.

2. A preferred snag is 18" in diameter and 30 feet tall

3. Retain key forest components such as oak

4. VSS distribution should reflect the following table [may vary +/- 3%]:

Vegetation Structural Stage			Desired Future Condition	
Description	**Class**	**dbh**	**by %**	**by acres**
Grass-forb/shrub	1	0 to 0.9 "	10%	28,320
Seedling/Sapling	2	1.0 to 4.9 "	10%	28,320
Young Forest	3	5.0 to 11.9 "	20%	56,640
Mid-aged Forest	4	12.0 to 17.9"	20%	56,640
Mature Forest	5	18.0 to 23.9"	20%	56,640
Old Forest	6	> 23.9 "	20%	56,640
Total				283,200

Specific direction is also given for individual management units in the FLMP. Below are some additional guidelines that are of importance to the management of the pygmy nuthatch:

2. On those acres suitable for timber harvest strive to achieve a structural diversity similar to the table below (Amendment no. 22, 06/05/96 replacement - page 156, 210):

% of Acres	Age Class	Size Class	Management Indicator Species	Cover Class
8[1/]	0	Permanent Openings	Elk, turkey, western bluebird, violet-green swallow	Forage
13.3	0-20	Regenerated Seedlings	Elk, turkey	Forage
13.3	21-40	Saplings/Poles	Elk, turkey	Forage - Hiding
13.3	41-60[2/]	Poles	Elk	Forage - Hiding
13.3	61-80[2/]	Poles/Sawtimber	Elk, Abert's squirrel	Hiding/Thermal – Forage
13.3	81-100	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird	Thermal

% of Acres	Age Class	Size Class	Management Indicator Species	Cover Class
13.3	101-120	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow	Thermal
10.0	121-180[3/]	Sawtimber/Vertical Diversity	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch	Thermal/Forage
10.0	181-240[3/]	Sawtimber/Vertical Diversity	Elk, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch, goshawk, turkey	Thermal/Forage

[1/] This is percent of tentative suitable lands

[2/] These two age classes comprise the pole timber class in suitable forest land. Thirty-eight percent of the pole acreage will be managed at 120+ BA to meet special wildlife habitat stands.

[3/] These must be mistletoe free stands

3. The oak component of the conifer type and the encinal oak type will be maintained.

4. Manage the oak component to maximize an optimum mix of mast and browse to accomplish wildlife objectives.

5. Where snags are not present they will be provided by leaving 2-3 trees from regeneration cuts to become potential snags.

Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 269) predicted a slight increase of populations (40%) by the year 2030 (Table 11) for the pine/mixed conifer by 2030.

Population Trends

The Global Heritage Status Rank is G5 for this species and the National Heritage Status Rank is N5. The status for Arizona is considered secure. (NatureServe Explorer 2001)

Nationwide, Breeding Bird Surveys (Peterjohn et al. 1996, Pardieck and Sauer 2000) indicate an overall stable population in pygmy nuthatches between 1966 and 1999.

However, a significant decrease occurred in 1993 to 1994, and a significant increase occurred in 1998 to 1999. Regionally (AZ, CO, NM, UT), the trend is shown to be stable between 1985 and 2000 (Sauer et al. 2001). Breeding bird survey data compiled for the state indicate overall a stable trend from 1966 through 2003. The data indicates that the overall population increased from 1966 through 1979, and was overall stable between 1980 and 2000 (Sauer et al 2001). From this data, the authors produced trend maps representing changes from 1966 to 1996. These maps are a result of the author's best guess of population change for the species, based on Breeding Bird Surveys. They estimate that pygmy nuthatch experienced a +0.25 to +1.5 percent change per year for much of the habitat in Arizona. This includes the area of the Tonto National Forest.

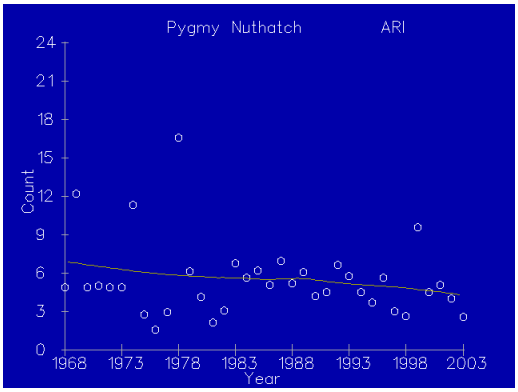


Figure PYNU-3. Pygmy nuthatch population trend data for Arizona from BBS data 1968-2003 (Sauer et al., 2004).

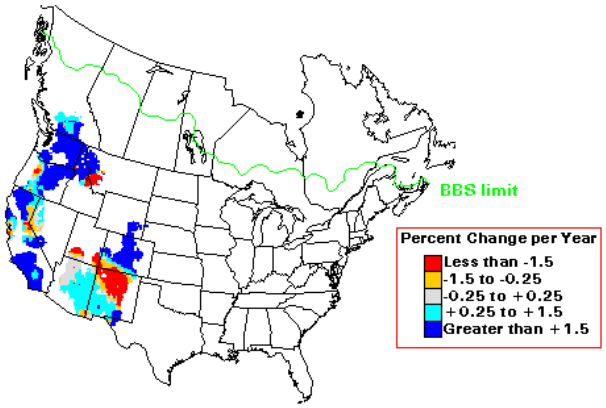


Figure 4 – Pygmy Nuthatch: Percent change per year for Horned Lark counts during breeding bird surveys (Sauer et al., 2001)

Breeding Bird Survey data from 1966 to 1999 for Arizona indicated a long-term downward trend in numbers of pygmy nuthatches detected (Hall *et al*. 1997). A more recent analysis of BBS data (Sauer et al., 2001) for Arizona from 1966-2003 shows a highly non-significant (p = 0.91), positive population trend of 0.3% per year (Figure PYNU-3). All of the BBS data for larger regions that include Arizona also shows non-significant, small (<1%) positive trends, with statistical outliers. Therefore, this data suggests that the population may be ***stable*** at each regional level.

The Arizona Partners in Flight Prioritization Ranking for the pygmy nuthatch is 21, based on intermediate distributions and moderate threats on the breeding and wintering ranges. Birds with scores of 20 or higher were selected initially for consideration as priority species; however, the pygmy nuthatch was not selected as a habitat representative (Latta et al. 1999).

An evaluation of six studies from the period of 1975 through 1996 also indicates that there is a long-term stable trend in population for the pygmy nuthatch (Overturf 1979, Szaro and Balda 1979, Horton and Mannan 1988, Rosenstock 1996).

Overall, data for Arizona, as well as range-wide data, suggest that pygmy nuthatches are stable, on a long-range scale. Minor population decreases occur on a short-term scale (one to three years), but are generally followed by a recovery.

Tonto National Forest Population Trend

The Tonto Village BBS route is the only route that includes habitat for the Pygmy nuthatch. Figure 5 depicts survey results and population trend for this route. CBC survey results for the state of Arizona indicate that population trend is stable. Due to modest declines in old growth timber stands in the ponderosa pine/mixed conifer habitat type, populations on the TNF are considered to be **declining**.

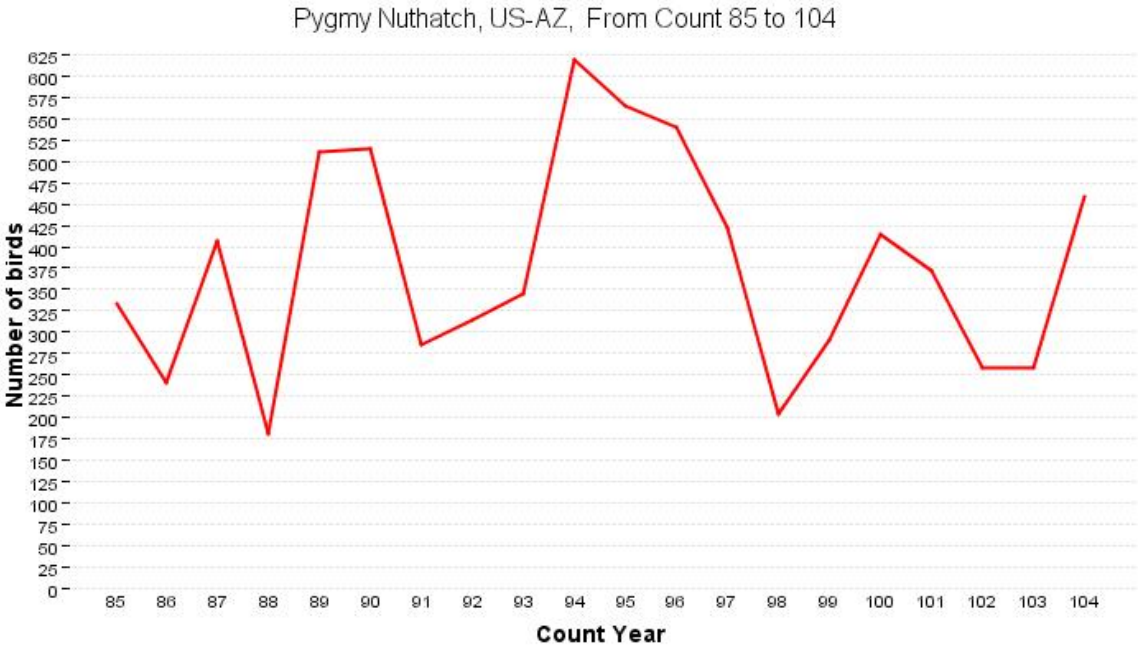


Figure 4. Pygmy nuthatch population trend for the Arizona region 1985-2004 (National Audubon Society 2005).

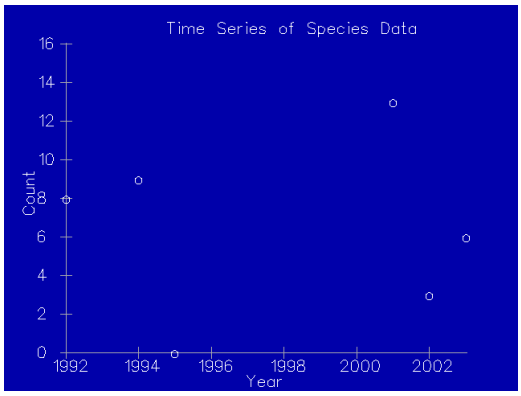


Figure 5. Pygmy nuthatch population trend for the Tonto Village BBS route 1992-2003.

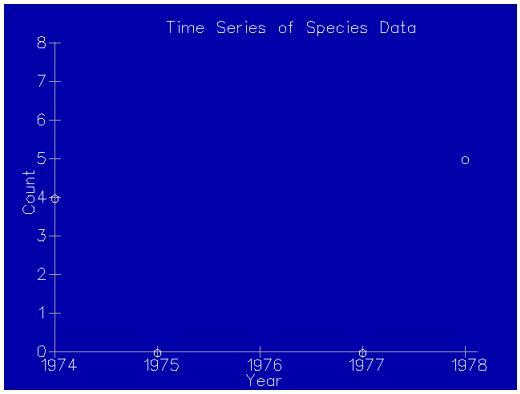


Figure 6. Pygmy nuthatch population trend for the Aztec Peak BBS route 1974-1978.

Literature Cited

Cunningham, J.B., R.P. Balda, and W.S. Gaud. 1980. Selection and use of snags by secondary cavity-nesting birds of the ponderosa pine forest. USDA For. Serv. Res. Pap. RM-222. 15pp

DeGraaf, R.M., V.E. Scott, R.H. Hamre, L. Ernst and S.H. Anderson, ed. 1991. Forest and Rangeland Birds of the United States Natural History and Habitat Use. USDA Forest Serv. Agr. Handbook 688, 625 pp.

Franzeb, K.E. 1977. Bird population changes after timber harvesting of a mixed confier forest in Arizona. USDA For. Serv. Res. Pap. RM-184 26pp.

Hall, L.S., M.L. Morrison, and W.M. Block. 1997. Songbird status and roles. Pages 69-88 in W.M. Block and D.M. Finch, eds. Songbird ecology in Southwestern ponderosa pine forests: a literature review. 152 pp.

Hejl, S.J., R.L. Hutto, C.R. Preston, and D.M. Finch. 1995. Effects of silvicultural treatments in the Rocky Mountains. Pages 55-84. *In* T.E. Marin and D.M. Finch, eds. Ecology and management of neotropical migratory birds. Oxford Univ. Press, Oxford, UK.

Horton, S.P. and R.W. Mannan. 1988. Effects of prescribed fire on snags and cavity nesting birds in southeastern Arizona pine forests. Wildlife Society Builletin 16:37-44.

Hutto, R.L., S.J. Heijl, C.R. Preston, and D.M. Finch. 1993. Effects of silvicultural treatments on forest birds in the Rocky Mountains: implications and management recommendations. Pages 386-391. *In* D.M. Finch and P. W. Stangel, eds. Status and management of neotropical migratory birds. Rocky Mt. For. And Range Exp. Sta., USDA For. Serv. Gen. Tech. Rep. RM-229.

Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona Partners in Flight Bird Conservation Plan. Version 1.0. Nongame and Endangered Wildlife Program Technical Report 142. Arizona Game and Fish Department, Phoenix, Arizona.

Miller, R., and C. Benedict. 1994. Arizona game and Fish Department Snag Recruitment and Longevity Model. Paper presented at the joint meeting of the Arizona and New Mexico Chapters of the Wildlife Society, February 4-5, 1994.

Mills, T.R., M.A. Rumble, and L.D. Flake. 1995. Evaluation of habitat capability model for non-game birds in the Black Hills, South Dakota. USDA For. Ser., Rocky Mtn. Forest and Range Exp. Sta. Res. Paper RM-RP-323. 30 pp.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

Overturf, J.H. 1979. The effects of forest fire on breeding bird populations of ponderosa pine forests of northern Arizona. M.S. thesis. Northern Arizona University, Flagstaff, AZ. 108 pp.

Paine, C.R. and T.E. Martin. 1995. Nesting and habitat selection in cavity-nesting birds. Final Project Rept., Apache-Sitgreaves National Forests, Challenge Cost-Share Agreement No. 0301-93-045. Springerville, AZ.

Pardieck, K.L. and J.R. Sauer. 2000. The 1995-1999 Summary of the North American Breeding Bird Survey. Bird Populations 5: 30-48.

Phillips, A., J. Marshall, and G. Monson. 1964. The birds of Arizona. Univ. Arizona Press., Tucson.

Peterjohn, B.G., J.R. Sauer, and W.A. Link. 1996. The 1994 and 1995 Summary of the North American Breeding Bird Survey. Bird Populations 3:48-66.

Raphael, M.C. and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. J. Wildl. Monogr. 86. 66pp.

Rosenstock, S.S. 1996. Habitat relationships of breeding birds in northern Arizona ponderosa pine and pine-oak forests. Ariz. Game and Fish Dep. Tech. Rep. 23, Phoenix. 53pp.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966-2004. Version 2001.2. USGS Patuxent Wildlife Research Center. Laurel, MD. www.mbr-pwrc.usgs.gov/bbs/bbs.html

Scott, V.E., K.E. Evans, D.R. Patton, and C.P. Stone. 1977. Cavity-nesting birds of North American forests. U.S.D.A., Agric. Handb. 511. 112pp.

Szaro, R.C., and R.P. Balda. 1979. Effects of harvesting ponderosa pine on nongame bird populations. Rocky Mtn. For. and Rge. Exp. Sta. Res. Paper RM-212. 8 pp.

Szaro, R.C., and R.P. Balda. 1982. Selection and monitoring of avian indicator species: an example from a ponderosa pine forest in the southwest. USDA For. Serv. Gen. Tech. Rep. RM-89. 7 pp.

Thomas, J.W., R.G. Anderson, C. Maser, and E.L. Bull. 1979. Snags. Pages 60-77. *in* J.W. Thomas, ed. Wildlife habitats in managed forests, the Blue Mountains of Oregon and Washington. USDA For. Serv. Agric. Handb. 553, Washington, D.C.

Towry, R.K., jr. 1984. Wildlife habitat requirements. pp. 73-210. In R.L. Hoover and D.L. Wills, ed, Managing forested lands for wildlife. Colo. Div. of Wildl. in cooperation with USDA For. Serv., Rocky Mount. Reg., Denver, Colo.

18. HOODED ORIOLE: *Icterus cucullatus*

MIS Role: Medium-sized trees in low elevation riparian**.**

SUMMARY OF KEY HABITAT COMPONENTS

- Restore and maintain an overstory component of medium sized riparian trees (15-25') at desert springs and seeps.
- Restore and maintain an overstory component of medium sized riparian trees in areas where they occur along intermittent low elevation riparian streams.
- Maintain dense patches of medium sized trees, in addition to scattered trees, to reduce cowbird parasitism.
- Restore potential sycamore vegetation types where they occur throughout the forest.

Species Description

Male hooded orioles are orange-yellow colored, with a black face and throat, black wings with two white wingbars, a long black tail, and a thin, slightly down-turned bill (Stokes and Stokes 1996, Alsop III 2001, Pleasants and Albano 2001). Females are olive green and yellow, and gray wings with two white wingbars. Immature males have coloration

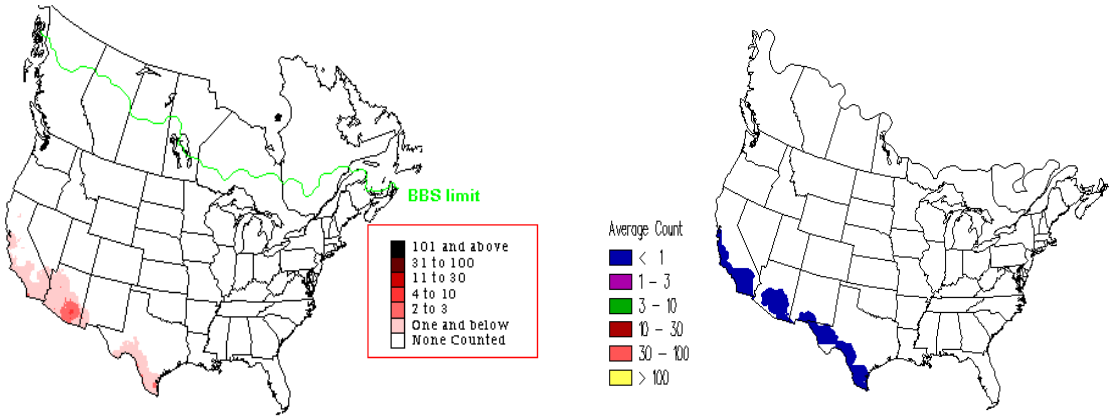


Figure HOOR-1: Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts.(Sauer et.al. 2001)

similar to the females, but with some black on the face and throat. Immature females look like adult females (Pleasants and Albano 2001). The average length of adults is 7 to 8 inches, and the wingspan is 11.25 to 12 inches (Alsop III 2001).

Distribution

The breeding range of hooded orioles includes most of western and southern California (Garrett and Dunn 1981, Small 1994, Jaramillo and Burke 1999), southern Nevada (T. Floyd, pers. comm. with Pleasants and Albano 2001), the southwestern-most portion of Utah (Behle et al. 1985), central and southern Arizona, excluding the southwest corner of the state (AZ Breeding Bird Atlas unpubl.), southwestern New Mexico (Hubbard 1978, B. Zimmer per. comm. with Pleasants and Albano 2001), in portions of Texas (Rappole and Blacklock 1994, Texas Breeding Bird Atlas unpubl.), Baja (Wilbur 1987), western and northeastern Mexico, south into Belize (Pleasants and Albano 2001). "Since about 1940, their breeding range has expanded to include the Virgin River Valley and Beaver Dam Wash in the extreme northwestern part of Arizona [and southwestern Utah]" (ibid.). They winter in Mexico throughout most of Baja, and locally in the southwestern U.S., mostly near feeders (Garrett and Dunn 1981, Monson and Phillips 1981, Rosenberg et al. 1991). The winter range of migrating birds overlaps with the permanent range of the non-migratory birds (Binford 1989).

This species appears to be well distributed on the Tonto N. F. Arizona began a breeding bird atlas in the early 90's. Figure HOOR-2 below shows the results of this effort to date on the Forest. The points on map represent "atlas blocks" (areas) within which, an HOOR was sighted. Atlas blocks are relatively large survey areas that were established at the beginning of the atlas survey work to insure adequate sampling of the various biomes within the state.

Habitat

Hooded orioles occupy areas with "scattered trees, including desert oases, especially those with palm, and riparian areas with cottonwoods (*Populus* spp.), willows (*Salix* spp.), or sycamores (*Platanus* spp.)" (Pleasants and Albano 2001). In the United States, their breeding range has expanded due to planting *Washingtonia* and *Sabal* palms, and nests in suburban areas (Udvardy 1977, Harrison 1979). They can be found in orchards, open woods, and wetlands (Stokes and Stokes 1996). In Mexico and Texas they also breed in mesquite (*Prosopis* spp.), arid scrub (Pleasants and Albano 2001). Where winter migrants and permanent residents overlap in range, "habitat appears similar to that used for breeding: villages, forest edge, and savanna at elevations up to 6,560 feet" (Binford 1989).

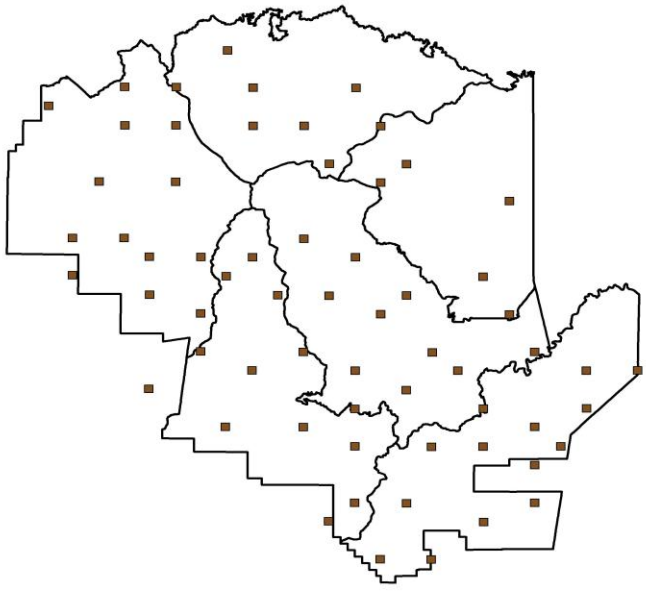


Figure HOOR-2: Block locations where breeding hooded oriole were found- based on Arizona Breeding Bird Atlas.

Breeding

Main breeding activity for this species, throughout its range, lasts from mid-April to mid-August (Pleasants and Albano 2001). One of the earliest dates for nest-building was 6 May in Maricopa County (Cornell Nest Records [CNRP] and Western Foundation for Vertebrate Zoology [WFVZ] in Pleasants and Albano 2001). The nests are often located in residential areas, and parks, especially in areas with palms. The Cornell Nest Records and Western Foundation of Vertebrate Zoology reported that of 297 nests, 54 percent were in palms, 9 percent were in sycamores, 7 percent were in eucalyptus, and the remainder were in other trees and shrubs, such as cottonwoods and oaks (*Quercus* spp.; ibid.). The average nest height above ground was 22 feet (CNRP) and 12.5 feet (WFVZ; ibid.).

Nests are cup-shaped and suspended from twigs or woven into the underside of palm leaves, being attached at the top or the top and sides with a small opening at the side or top (Harrison 1979). Nests are constructed of woven grass, palm, or other plant fibers (ibid.). Parasitism by bronzed or brown-headed cowbirds is significant and may be one of the reasons for the steep decline of hooded orioles in the lower Rio Grande Valley, where hooded orioles were abundant in the late 1800's and early 1900's, but are very rare now, and still parasitized (T. Bush pers. comm.. with Pleasants and Albano 2001). Mean clutch size is 3 to 4 eggs Pleasants and Albano 2001), incubation lasts 12 to 14 days, and the young fledge in12 to 14 days (Ehrlich et al. 1988).

Food Habits

Eats a variety of insects, along with flower nectar, fruit, and other plant materials (DeGraff et al. 1991).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP (USDA Forest Service 1985), the hooded oriole was selected as a Management Indicator Species for medium-sized trees in low elevation riparian vegetation, ranging from 1,500 to 3,500 feet elevation (Appendix G, Tonto FLMP).

In the Environmental Impact Statement (EIS) for the Tonto FLMP, Page 108 Table 20, the riparian vegetation type was determined to cover approximately 35,022 acres on the Forest. The final report on Proposed Desired Future Conditions and Candidate Management Indicator Species to monitor Desired Future Conditions (TNF 1982) summarizes the "present status" of the riparian vegetation type as follows.

A 1980 contract survey of the riparian habitat on the Tonto established that riparian communities represent only 0.6 of 1 percent of the total land area on the Forest. Fifty percent of the 18,600 acres is in poor condition, 28% is fair, 15 percent moderate, 4% good, and only 3% excellent. Eighty percent of the lower Sonoran riparian is in poor condition, 40% of the upper Sonoran riparian is poor and only 5% of the transition zone

riparian at higher elevations is in poor condition. This may reflect that the higher elevation areas are more productive and more "forgiving".

The reasons for the discrepancy in the above acreage figures is unknown, but the larger figure is taken from FLMP range capacity mapping, which may have been less precise than the riparian habitat survey.

Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that 35,022 is also the desired vegetation condition at the end of the fifth period. The policy and Management Direction (from the desired future condition report, TNF 1982) is to rehabilitate all riparian areas to fair or better condition by 2000.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No.22 06/05/96. Direction that specifically affects low elevation riparian habitat for the hooded oriole includes:

1. Rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage.
2. Coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030. Type 1 characteristically contains tall trees>20 feet high with the highest layer forming somewhat of a closed canopy. Substantial vegetation is also present in the two lower layers (shrub and grass layer).
3. Coordinate with range to achieve utilization in the riparian areas that will not exceed 20% of the current annual growth by volume of woody species.
4. Re-establish riparian vegetation in severely degraded but potentially productive riparian areas.
5. Riparian Areas: Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.

Additionally, in 1997, the Forest Supervisor provided direction which clarified the above standards. Standards for riparian vegetation utilization, bank alteration and other grazing related practices were established (Johnson and Ross 1997). These standards require (as a minimum):

1. less than 50% utilization on current year's growth on woody vegetation less than five feet in height.
2. less than 50% utilization on herbaceous vegetation.
3. less than 20% bank alteration.
4. Monitor utilization standards under the key area concept.

5. Not salting within ¼ mile; winter grazing is preferred.

Refinements to these standards, including use of height/weight curves for deergrass and a finalized Forest monitoring protocol (Johnson and McBride 2002) provide further direction in riparian streamside management. As grazing allotments go through the environmental analysis process, utilization standards in riparian areas are further reduced below maximum acceptable levels to meet MIS, ESA, watershed, riparian or other objectives.

Other forest-wide Riparian Management Practices:

1. Forest-wide Riparian Monitoring Team – this team usually conducts midseason and end of season monitoring on key riparian areas on most grazing allotments on the Forest.
2. Forest Drought Policy development and implementation – establishes trigger for evaluating range conditions on the forest based on long-term rainfall. Most livestock were removed from the forest in 2002 due to drought conditions.

Population Trends

According to the NatureServe Explorer website (2001), which can be found at: http://www.natureserve.org/explorer, the Global Heritage Status for the hooded oriole is G5, being common, widespread, and abundant. National Heritage Status is ranked as N5B, NZN, being common and widespread in its breeding range and status unknown in the non-breeding range. In Arizona, this species is ranked as S5, being common, secure, widespread, and abundant. "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

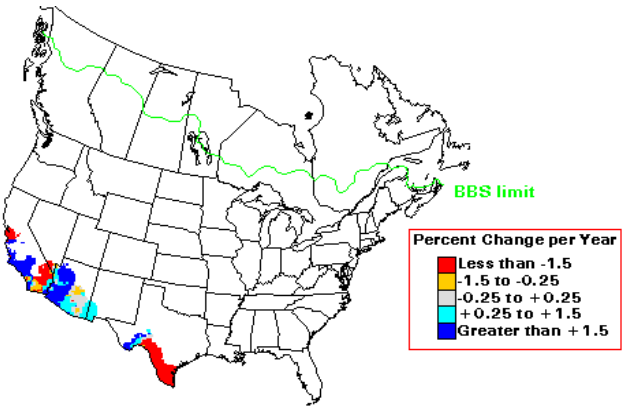


Figure HOOR – 3: Hooded oriole trends for the years 1968 to 1999 in Arizona. USGS Patuxtent Wildlife Research Center website (Sauer et al. 2001)

The hooded oriole's range seems to be expanding in several areas, possibly due to ornamental plantings of palms and other vegetation used as nest trees by orioles Pleasants and Albano 2001), while other locations have seen marked declines in numbers, as in the lower Rio Grande Valley (refer to the discussion above in the Breeding section); and in northeastern Mexico due to the expansion of croplands which has decreased available habitat (ibid.).

Breeding Bird Survey trend data for the years 1996 to 2000 show a non-significant increase of 1.3 percent over 24 survey routes (Sauer et al. 2001). Refer to figure HOOR - 4 for a graph provided by the USGS Patuxtent Wildlife Research Center website for hooded orioles for the years 1968 to 1998 in Arizona. Refer to Figure HOOR - 3 for a map of the percent change per year in BBS counts in central Arizona, which appears to be moderate.

On the Tonto National Forest the Breeding Bird Atlas has records of 60 sightings well distributed across the Forest (HOOR-2). Hooded orioles appear to be well distributed and quite abundant.

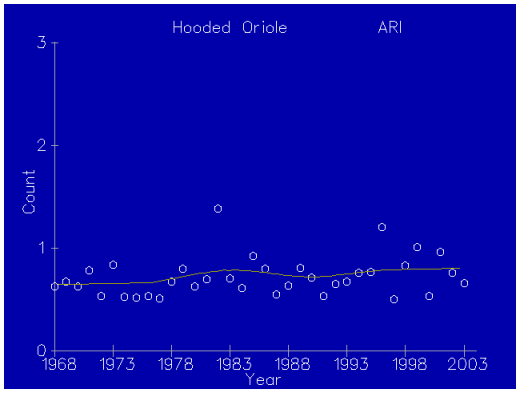


Figure HOOR - 4: Percent change per year for Hooded Oriole counts during breeding bird surveys1969-2003 (Sauer et al., 2004).

Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 269) predicted a substantial increase (800%) of populations by 2030.

Available population trend data indicate that hooded oriole populations fluctuate moderately over time (HOOR – 4), but are stable overall on the Tonto N.F. Future trends remain a concern because heavy cattle grazing, water diversions, and ORV-road use.

Tonto National Forest Population Trend

The Bartlett Reservoir BBS route is the only current route where this species is documented (Figure 7). Statewide the species is documented in low densities during CBC surveys (Figure 5). On the Tonto Basin District in 2003, this species was detected twice on one transect (Plank 2005). Low elevation riparian habitat since 1985 has remained relatively stable and has increased in some areas while decreasing in others. Based on this information the population for this species is considered to be **stable**.

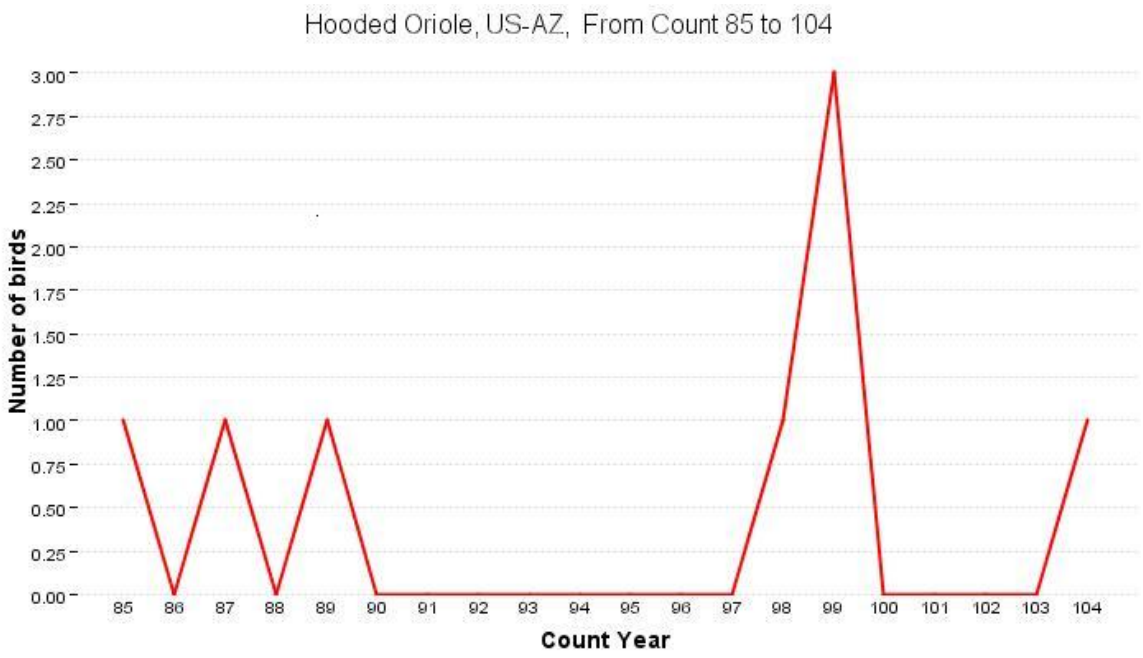


Figure 5. Hooded oriole population trend for the Arizona region 1985-2004 (National Audubon Society 2004).

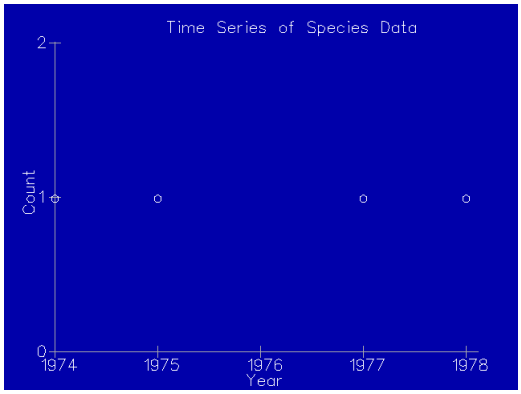


Figure 6. Hooded oriole population trend for the Aztec Peak 1974-1978.

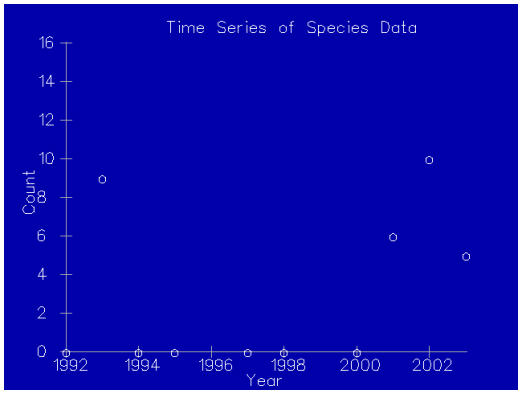


Figure 7. Hooded oriole population trend for the Bartlett Reservoir BBS Route 1992-2003.

Recommended Survey Methods

Information on the life histories of hooded orioles is limited due to the placement of their nests (Pleasants and Albano 2001). Baseline data specific to the Tonto National forest could be collected using standard point count methodology. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol. The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only

a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most efficient and data-rich method of counting birds. This is the preferred method in forested habitats or difficult terrain."

Line transects are another method used to determine an estimate of population trends, if done over a series of years. General information on line transect survey protocol can be found in *Field Guidelines for Using Transects to Sample Nongame Bird Populations* (Mikol 1980). In either survey method, survey points or transects are randomly distributed, stratified by habitat types.

The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda, every five years… Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (USDA Forest Service 1985). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

Behle, W. H., E. D. Sorensen, and C. M. White 1985. Utah birds: a revised checklist, Utah Mus. Nat. Hist. Occas. Publ. No. 4. *In* B. Y. Pleasants, and D. J. Albano. 2001. Hooded Oriole (*Icterus cucullatus*). The Birds of North America, No. 568 (A. Poole and F. Gill, eds.) The Birds of North America, Inc., Philadelphia, PA.

Binford, L. C. 1989. A distributional survey of the birds of the Mexican State of Oaxaca. Ornithol Monogr. 43. *In* B. Y. Pleasants, and D. J. Albano. 2001. Hooded Oriole (*Icterus cucullatus*). The Birds of North America, No. 568 (A. Poole and F. Gill, eds.) The Birds of North America, Inc., Philadelphia, PA.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc., New York.

Garrett, K, and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Soc., Los Angeles, CA.

Harrison, H. H. 1979. A field guide to western birds' nests. Houghton Mifflin, Boston, MA.

Hubbard, J. P. 1978. Revised checklist of the birds of New Mexico. NM Ornithol. Soc. Publ. No. 6.

Jamarillo, A., and P. Burke. 1999. New World blackbirds: the icterids. Princeton Univ. Press, Princeton, NJ.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

Monson, G., and A. R. Phillips. 1981. Annotated checklist of the birds of Arizona. 2nd ed. Univ. of Arizona Press, Tucson, AZ.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Pleasants, B. Y., and D. J. Albano. 2001. Hooded Oriole (*Icterus cucullatus*). *In* The Birds of North America, No. 568 (A. Poole and F. Gill, eds.) The Birds of North America, Inc., Philadelphia, PA.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Rappole, J. H., and G. W. Blacklock. 1994. Birds of Texas: A field guide. Texas A & M Univ. Press, College Station.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson. 1991. Birds of the lower Colorado River Valley. Univ. of Arizona Press, Tucson, AZ.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Small, A. 1994. California birds: their status and distribution. Ibis Publ. Co., Vista, CA.

Stokes, D., and L. Stokes. 1996. Field guide to the birds: Western region. Little, Brown, and Co., New York.

Udvardy, M. D. F. 1977. Audubon Society field guide to North American birds: Western region. Knopf, New York.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Wilbur, S. R. 1987. Birds of Baja California. Univ. of California Press, Berkeley and Los Angeles, CA.

19. SAVANNAH SPARROW: *Passerculus sandwichensis*

MIS Role: Grass species diversity in desert grassland

SUMMARY OF KEY HABITAT COMPONENTS

- Prefers open habitats of >20-40 acres on the Tonto such as agriculture fields, meadows, marshes, weed patches with dense ground cover
- Avoids extensive tree cover
- Highly sensitive to fragmentation
- Winter resident on Tonto
- May be indicator of grassland diversity

Species Description

Savannah sparrows are brown to gray streaked on their upper-parts and upper breast. They have a whitish breast and belly, with a faint dark central spot on their breast. Their short tail is brown and notched. A yellowish eyebrow stripe varies in pronouncement; they have a white stripe along the cheek; and a thin white stripe on the center of their pale brown crown. The beak is short and conical. Males and females are similar in plumage, although the males are usually larger than the females. Juvenal plumage is similar to that of adults, but the crown stripe is more diffuse or indistinct, the breast is more heavily streaked, wings and tail are more rufous, and the eyebrow stripe is less yellow (Wheelright and Rising 1993). This species ranges in length from 5.25 to 6.25 inches, and has a wingspan or 8.0 to 9.5 inches (Alsop III 2001). There is much variation between the different races that make up this species (ibid.).

Distribution

This species is widespread in open habitats throughout North America. Savannah sparrows breed in the northern two thirds of the continent, from northern Alaska and Canada south of the arctic islands, east to northern Labrador and Newfoundland, south through the western U.S. and locally in Mexico, to southwestern Guatemala, and south to southern Iowa and New Jersey in the east (AOU 1983). In Arizona, Savannah sparrows are known only to breed in a few high elevation sub-alpine grasslands in the White Mountains and on the Kaibab Plateau. The Savannah sparrow is only a migrant and possibly a wintering species in the arid grasslands of the Tonto National Forest (Troy Corman, AZ Game & Fish Dept., pers. comm.). Their winter range is east of the Appalachian Mountains from Massachusetts south, and southern Kentucky, Tennessee, Missouri, Kansas, central New Mexico, northern Arizona, and southern British Colombia south to the Bahamas, Cuba, most of Mexico, Guatemala, and northern Honduras (ibid.).

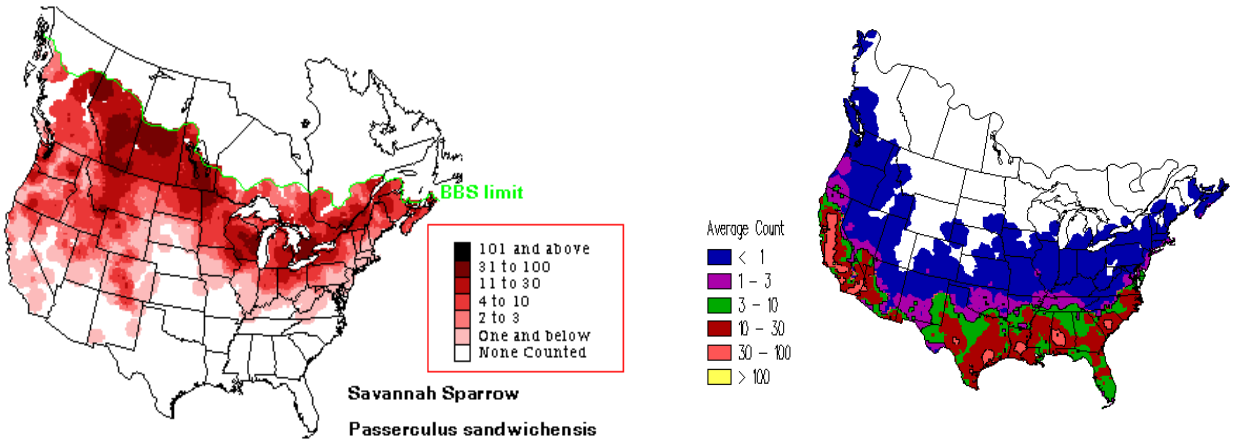


Figure 1 – Savannah Sparrow: Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts.(Sauer et.al. 2001)

Habitat

Savannah sparrows are found in a variety of open habitats across their range during breeding season, including agricultural fields, especially alfalfa (*Medigo sativa*), meadows, roadsides, marshes, coastal grasslands, and tundra (Wheelright and Rising 1993). They avoid areas with extensive tree cover, usually being found in areas with herbaceous plants or weeds. In the more arid parts of their range they are restricted to irrigated areas or to the grassy margins of ponds or river edges (ibid.), although they are more often found breeding in idle native grasslands or retired croplands than in active agricultural or grazed fields (The NatureServe Explorer website (2001). They prefer dense ground vegetation, especially grasses, and moist microhabitats (Wiens 1969). Short to intermediate grass heights with a well developed litter layer are preferred (Wheelright and Rising 1993).

Savannah sparrows may occupy small areas (< 12.4 acres) of suitable habitat but a minimum grassland size of 20 to 40 acres was suggested by (Jones and Vickery 1997); and Herkert et al. (1993) categorized the species as highly sensitive to habitat fragmentation, based on data collected in Illinois. Population density is not limited by nest sites or materials (Wheelright and Rising 1993). Breeding territories within habitat are small, ranging from 0.1 to 3.1 acres (Wheelright and Rising 1993). Management should promote grassland restoration with an emphasis on limiting fragmentation of habitat. "Restoration projects should be over 123 acres and preferably over 247 acres in size (Herkert 1991). Avoid disturbance by mowing, burning, or moderate-to-heavy grazing during breeding season, approximately 1 May to 1 August (Swanson 1996). During the migration and in the winter, which is the period when most savannah sparrows would be present in Arizona, they occupy varied habitats, including cultivated fields, pastures, golf courses, and roadsides (ibid.).

Breeding

The birds arrive on their breeding grounds between late March and early May (NatureServe Explorer 2001). Main breeding activity begins approximately the second week of June and continues into mid-to-late August (Wheelright and Rising 1993). Cup nests are built by the female, usually in a shallow depression on the ground, which occurs naturally among the goldenrods (*Solidago* spp.) or is created by the birds. Nests are well concealed by overhanging vegetation or tucked under a tussock with a tunnel averaging 13.5 inches in length (Dixon 1972). The nest is made of course grass and lined with closely woven finer materials (ibid.). Nests are usually located in open areas, but can be as close as 10.0 feet from coniferous forest edge (ibid.). Females often lay more than one clutch per season, and their later nests may be close to their first nest, but they seldom reuse nests or nest materials (ibid.). Polygyny is routine in many populations (ibid.). Parasitism of Savannah sparrow nests by brown-headed cowbirds (*Molothrus ater*) is low, but does occur in areas where the two species overlap (Friedmann et al. 1977). Incubation lasts 12 to 13 days on average, and the young fledge in 7 to 10 or more days after hatching (Ehrlich et al. 1988). Block locations where breeding savannah sparrow are likely to occur are not available at this time but are generally located in open, low stubble, herbaceous habitats.

Food Habits

During breeding season, savannah sparrows eat mainly adult insects, larval insects, insect eggs, small spiders, millipedes, isopods, amphipods, decapods, mites, small mollusks, seeds, and fruits (Wheelright and Rising 1993). In migration and during the winter they mainly eat small seeds, fruits, and insects, when available (Judd 1901, Martine et al. 1951, Baird 1968). This species uses a variety of foraging techniques, including hunting for prey or fallen seeds while walking or scratching on the ground, or sometimes leaping from the ground in short sallies to capture butterflies or flies in flight (ibid.). They feed on caterpillars in great enough numbers to sometimes reduce caterpillar populations, "altering interactions between plant-feeding insects and patterns of herbivory on host plants" (Karban 1989).

Tonto MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP (USDA Forest Service 1985), the Savannah sparrow was selected as a Management Indicator Species for grass species diversity in the Desert-Grassland Vegetative Type (Appendix G, Tonto FLMP). Troy Corman, AZ Game & Fish Department Biologist suggested that "depending on the amount of grass, slope, and other topographical features, the lark sparrow or rufous-crowned sparrow could be a better choice as a breeding indicator species (pers. comm. July 17, 2002)."

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the desert vegetation type was determined to cover approximately 605,363 acres on the

Tonto. Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that this is also the desired vegetative condition at the end of the fifth period.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to 52, which also incorporates Amendment No. 22, 06/05/96. Direction that specifically affects habitat for savannah sparrow include:

1. Manage suitable rangelands at Level A, B, C or D depending management emphasis. Rangeland in less than satisfactory condition will be treated with improved grazing management
2. Integrate habitat needs through prescribed fire with fire suppression objectives
3. Improve range condition in management areas that are unsatisfactory
4. Achieve a savannah condition in the pinyon-juniper type by leaving a minimum of 40 mature trees per 40 acre cut block

In addition to Forest Plan standards and guidelines, desired future conditions for the Desert Grassland Vegetative type include:

1. Maintain a minimum of 30% ground cover regardless of plant species composition.

2. Strive for a 60:40 ratio of cool and warm season grasses

3. Have all allotments under proper stocking with approved Allotment Management Plans that defines improved management and proper grazing systems

Population Trends

Global Heritage Status for the Savannah sparrows is ranked as G5, being common and widespread throughout its range on the NatureServe Explorer website (2001) which can be found at: http://www.natureserve.org/explorer/ranking.htm. National Heritage Status in the U.S. for this species is N5B, N5N, being considered widespread, common and abundant in breeding and non-breeding areas. "Termination of the USDA Conservation Reserve Program and a return of enrolled land to cultivation are expected to cause a population decline of 19 percent in North Dakota (Johnson and Igl 1995).

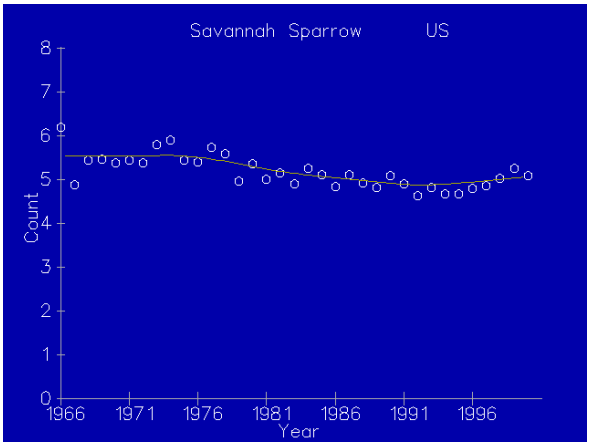


Figure 2: Savannah sparrow trends for the years 1966 to 1996 in the United States (no data available for Arizona due to extremely local breeding populations within the state). (Sauer et al. 2001)

In Arizona, this species is listed as S5, secure, common, widespread, and abundant (ibid). "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

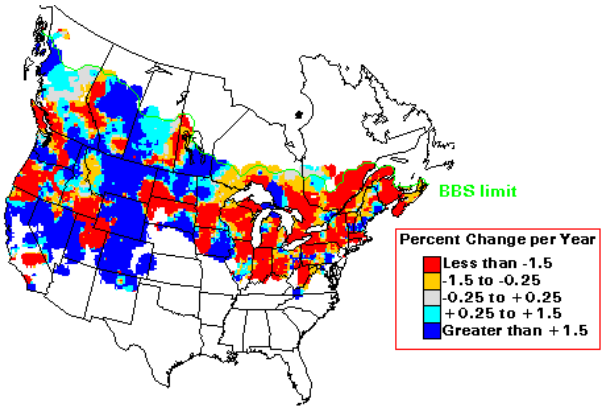


Figure 4 – Savannah sparrow: Percent change per year for Savannah sparrow counts during breeding bird surveys (Sauer et al., 2001)

Breeding Bird Survey (BBS) trend estimates are not available at the USGS Patuxtent Wildlife Research Center website for the state of Arizona, since this species is more common as a migrant and is extremely local as a breeding bird in this state. The Savannah sparrow has only been found breeding in a few high elevation sub-alpine grasslands in the White Mountains and on the Kaibab Plateau. (Troy Corman, AZ Game & Fish Dept. pers. comm). Survey-wide, for the states they commonly breed in, the BBS trend data indicates a non-significant decline of –5 percent for the years 1996 to 2000, over 1,111 routes surveyed, as reported on the USGS Patuxtent Wildlife Research Center website Sauer et al. 2001). Refer to Figure 3 for a graph provided by the USGS Patuxtent Wildlife Research Center, for the survey-wide population trends in the U.S.

Tonto National Forest Population Trend

There are three breeding bird survey routes on the Tonto National Forest (ARI-065, ARI-071, ARI-122), but due to the migratory nature of this species and absence of breeding habitat, breeding bird surveys are not a reliable indicator of status on the Tonto. Statewide CBC data indicates that this species is wide spread and within the normal range of variability (Figure 5). Based on regional data and relatively static desert grassland trends on TNF, this species is considered **stable**.

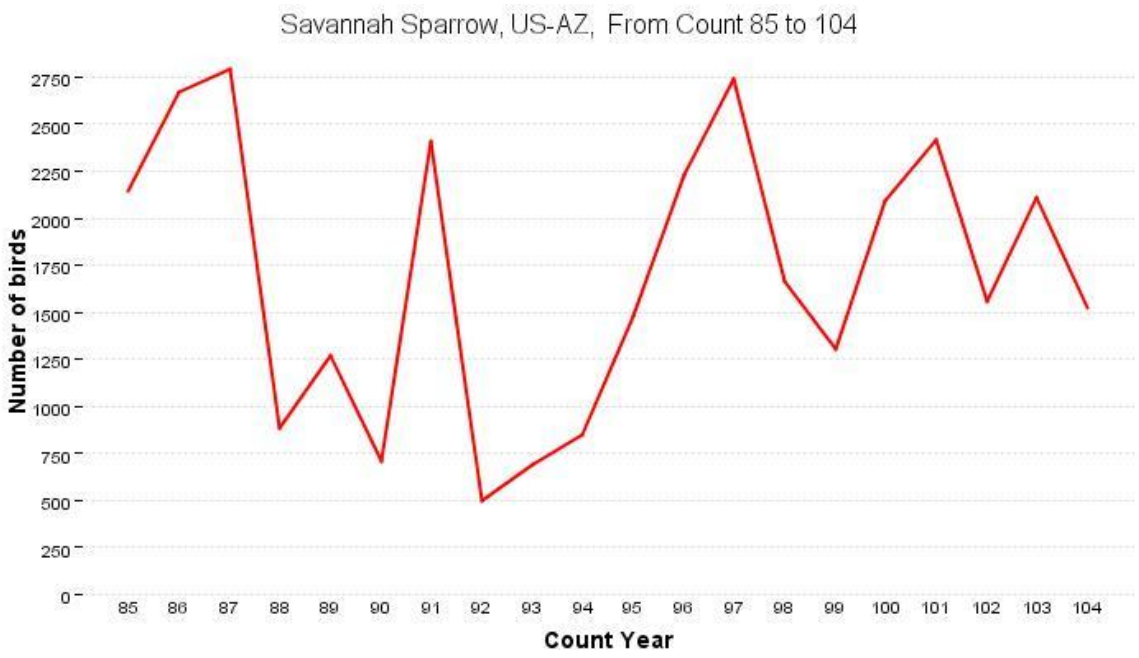


Figure 5. Savannah sparrow population trend for the Arizona region 1985-2004 (National Audubon Society 2005)

Recommended Survey Methods

Since Savannah sparrows are not known to breed on the Tonto National Forest, and are present only as migrants or possibly winter visitors; lark sparrows or rufous-crowned sparrows could be substituted as a breeding bird indicator of grass species diversity in the Desert-Grassland Vegetative Type (Troy Corman, AZ Game & Fish Dept. pers. comm.). Surveys of typical Savannah sparrow habitat (i.e. open grasslands near water) could be conducted during the non-breeding season; according to Ralph, et al. (1993), "the value of winter studies is quite high, although this species is only reported as being a winter resident in northern Arizona by Wheelright and Rising (1993) in *The Birds of North America* species account.

Baseline data specific to the Tonto National forest could be collected using standard point count methodology for the grassland species chosen to indicate grass species diversity. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol. The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most efficient

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The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda, every five years… Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (USDA Forest Service 1985). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

American Ornithologists' Union (AOU), committee on Classification and Nomenclature. 1983. Check-list of North American Birds. American Ornithologists' Union, Allen Press, Inc., Lawrence, KS.

Baird, J. 1968. *Passerculus sandwichensis savanna*. Eastern Savannah sparrow, pp. 678-698 *In* Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies (O. L. Ausing, Jr., ed.). Bull. U.S. Natl. Mus. No. 237 Pt. 2.

Dixon, C. L.. 1972. A population study of Savannah sparrows on Kent Island in the Bay of Fundy. PhD. Diss. Univ. of Michigan, Ann Arbor, MI. *In* N. T. Wheelwright and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*). The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc, New York.

Friedmann, H., L. F. Kiff, and S. J. Rothstein. 1977. A further contribution to knowledge of the host relations of parasitic cowbirds. Smithson. Contrib. Zool. 235:45. *In* N. T. Wheelwright and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*). The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union.

Herkert, J. R. 1991. An ecological study of the breeding birds of grassland habitats within Illinois. PhD. Dissertation. Univ. of Illinois, Urbana, IL. *In* N. T. Wheelwright and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*). The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union.

Herkert, J. R., R. E. Szafoni, V. M. Kleen, and J. E. Schwegman. 1993. Habitat establishment, enhancement, and management for forest and grassland birds in Illinois. Illinois Dept. of Conservation, Div. of Natural Heritage, Natural Heritage Tech. Publ. 1, Springfield, IL. *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA.

Johnson, D. H. and L. D. Igl. 1995. Contributions of the Conservation Reserve Program to populations of breeding birds in North Dakota. Wilson Bull. 107:709-718. *In* N. T. Wheelwright and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*). The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union.

Jones, A. L., and P. D. Vickery. 1997. Conserving grassland birds: managing agricultural lands including hayfields, crop fields, and pastures for grassland birds. Massachusetts Audubon Society. Lincoln, MA. *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA.

Judd, S. D. 1901. The relation of sparrows to agriculture. USDA Biol. Surv. Bull. 15:1-98. *In* N. T. Wheelwright and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*). The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union

Karban, R. 1989. Community organization of *Erigeron glaucus* folivores: effects of competition, predation, and host plant. Ecology 70:1028-1039. *In* N. T. Wheelwright and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*). The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union

Martin, A. C., H. S. Zim, and A. L. Nelson. 1951. American wildlife and plants. USDI Washington, D.C. *In* N. T. Wheelwright and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*). The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Swanson, D. A. 1996. Nesting ecology and nesting habitat requirements of Ohio's grassland-nesting birds: A literature review. Ohio Fish and Wildlife Report 13. Div. of Wildlife, Ohio Dept. Of Natural Resources. *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Wheelwright, N.T. and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*) *In* The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union.

Wiens, J. A. 1969. An approach to the study of ecological relationships among grassland birds. Ornithological Monogr. No. 8:1-93 *In* N. T. Wheelwright and J. D. Rising. 1993. Savannah sparrow (*Passerculus sandwichensis*). The Birds of North America, No. 45 (A. Poole and F. Gills, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union.

20. SPOTTED TOWHEE: *Pipilo maculates*

MIS Role: Successional stages of pinyon/juniper.

SUMMARY OF KEY HABITAT COMPONENTS

- Maintain adequate large, dense stands of chaparral.
- In PJ woodland, manage adequate stands to maintain or create midsuccessional stages with dense mid-story shrub components.
- Avoid fragmenting large shrub stands with trails, livestock water developments, or other facilities that would attract cowbirds.

Species Description (Peterson 1990)

A slender, Robin sized passerine that can be readily recognized by its robin-red (rufous) sides, heavy white spotting on back, and fiery red eyes. Sexes are mildly dimorphic with the female appearing dusky brown where the male is black. It displays a unique behavior of flashing large white patches in the tail corners, and it has distinctive song and call notes described as chup zeeeee, and cheeee respectively. Juveniles appear streaked below like an oversized sparrow, but can be distinguished by the flashing tail pattern.

Distribution

The spotted towhee, formerly the western race of the rufous-sided towhee, is distributed from the Great Plains west, from southern Canada south to Guatemala. Information on the distribution of this species on the Forest is limited. Arizona began a breeding bird atlas in the early 90's. Figure SPTO-2

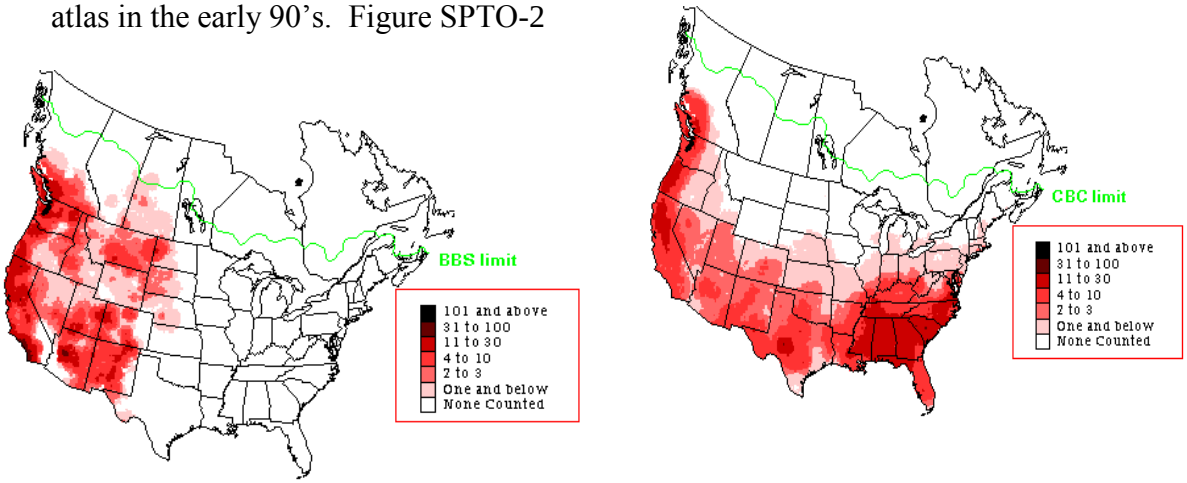

Figure SPTO-1: Summer bird distribution (left) in North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts.

below shows the results of this effort to date on the Forest. The data is depicted as points, which in reality represents "atlas blocks" established at the beginning of the atlas survey work, to obtain adequate sampling of the various habitat biomes within the State.

The spotted towhee appears to be well distributed across 4 Districts of the Tonto, and poorly distributed on the two Districts with large amounts of Sonoran desert, and grassland vegetation.

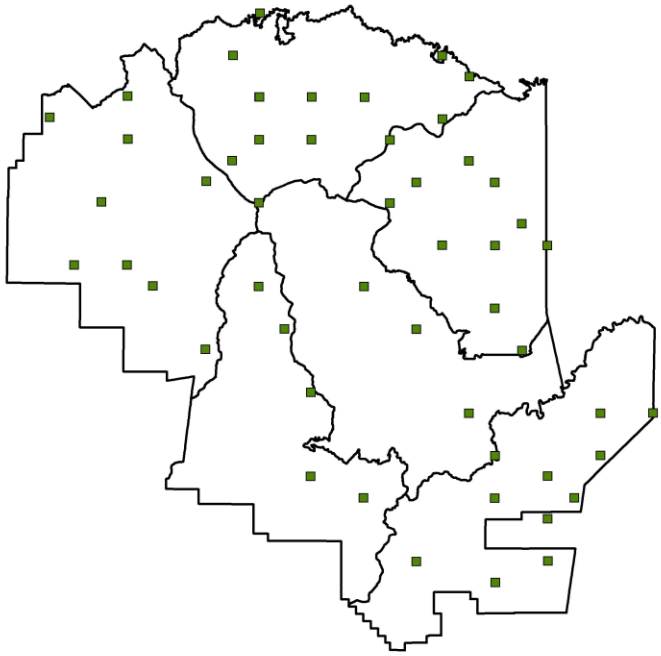

Figure SPTO-2: Block locations where breeding spotted towhee were found- based on Arizona Breeding Bird Atlas.

Habitat

Spotted towhees are year around residents of brush vegetation types found in Arizona. They are known to inhabit interior chaparral, Gambel's oak, riparian shrubs, sagebrush and a variety of other brush vegetation types. It uses dense shrubs for nesting and foraging. Spotted towhees also inhabit PJ woodland where there is a mid-successional stage of dense shrubs.

This species is commonly observed on the Forest in areas with dense shrubs. Observations are common in the Pinal Mountains where a dense chaparral mid-story occurs beneath a pine overstory. They are also observed adjacent to streamside areas where there are dense shrub habitats. Shrub vegetation types on the Forest are thought to be increasing due to heavy grazing, fire suppression, timber harvest, and perhaps climatic factors.

Management activities that could reduce the quality of SPTO habitats would include: fragmenting large dense stands by constructing trails or other developments. Type converting shrub or woodland vegetation types into grasslands for grazing forage would also reduce habitat. Spotted towhees are common cowbird hosts, and apparently do not have effective responses for ejecting cowbird eggs or young.

Breeding

Nests are usually built in a depression on the ground, in litter, or less often in low shrubs up to 3 feet above the ground. According to Bent (1968) nesting territories are established in early April, usually before leaves have appeared on oak brush or other deciduous shrubs. During this time, males are conspicuous as they sing from the tops of shrubs. By the first of May when most of the nesting activity is under way, leaves have usually appeared on the shrubs and the birds have ample protective cover.

Food Habits

The spotted towhee feeds primarily on plant materials and lesser quantities of insects (Ehrlich, et.al, 1988).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP, Appendix G, the spotted towhee was selected as an MIS for successional stage in the PJ woodland vegetation type, and shrub density in the chaparral type (USDA Forest Service 1985).

In the environmental impact Statement (EIS) for the Tonto FLMP, Page 108, Table 20, the chaparral vegetation type was determined to cover approximately 1,150,107 acres and the Pinion/Juniper type 265,485 acres.

Table 10 in Appendix K of the FLMP (Amendment no. 22 06/05/96 page 268) indicates that the desired vegetation condition at the end of the fifth period (2235) for these two vegetation types is also approximately 1,115,722 and 265,480 acres respectively. A recent analysis by local biologists (Appendix A) suggests that shrub type habitats may be increasing on the Tonto due to grazing, lack of fires, timber harvest, etc.

Chaparral

Management direction of the chaparral vegetative type can be found in individual management units of the FLMP as follows.

1. Manage the chaparral type to emphasize the production of whitetail deer (Amendment 2, page 68-1, Amendment 20 replacement page 87, pg 114, Amendment 20 pg 140, pg 166).

2. Manage the chaparral type on a 30 year prescribed fire rotation on those sites managed intensively for forage production and water yield (Amendment 22 replacement pg 69 and 88, pg 114, pg 166).

3. Use of approved herbicides on a selective basis where brush encroachment is clearly inhibiting forage production for wildlife and domestic livestock (Amendment 22, replacement pg 88, pg 114).

4. Seeding and prescribed burning in chaparral at the rate of 1/30 of vegetative type each year on those sites managed for forage production and increased water yield (pg 141).

Juniper

Management direction of the pinyon-juniper vegetation type can be found in individual management units of the FLMP as follows.

1. Landscapes outside of Goshawk PFA's Woodlands: Manage for even age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape. Provide for reserve trees, snags, and down woody debris (Amendment 22 pg 40-11).
2. Within PFA's and nesting areas: Maintain existing canopy cover levels of woodland (Amendment 22 pg 40-12).
3. Manage the pinyon-juniper type to emphasize the production of mule deer (Amendment 2 page 68-1).
4. Integrate habitat needs through prescribed fires within fire suppression objectives (Amendment 2 page 68-1).
5. Manage the pinyon-juniper type in a sustained yield evenflow basis. A mix of successional stages within 5000-acre management units will provide horizontal diversity. Ten percent of the type will be maintained as permanent openings with suitable ground cover for specific site conditions. Power lines, natural openings, or meadows count toward the standard. Where natural openings or power lines do not meet this standard openings will be created. The scheduling of fuel wood harvest will produce a distribution of successional stages as follows (Amendment 22 replacement pg 69):

    - Permanent Openings (2-40 acres) 10%
    - Fresh cut areas (0-20 years) 10%
    - Immature (20-100 years and 3-6" dbh) 40%
    - Mature (100-175+years and 6-11"dbh) 40%

6. Provide a ration of 60%: 40% forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas (Amendment 22 replacement pg 69)
7. Design the fuelwood harvest blocks in the woodland type in irregular shapes less than 40 acres and less than 600 feet across (Amendment 11 Pg 70).
8. In the pinyon-juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore seed source (Amendment 11 Pg 70).
9. Achieve a savannah condition in the pinyon-juniper type by leaving a minimum of 40 large juniper trees per 40 acre cut block (Amendment 11 Pg 70).
10. Maintain a minimum of 100 snags per 100 acres. A preferred 12" dbh and 20 feet tall over at least 50% of the pinyon-juniper type (Amendment 11 Pg 70).
11. The silvicultural prescription is even-aged management under the shelterwood method with pinyon uncut and 40 large juniper trees left per 40 acre cut block (Amendment 11 Pg 70).
12. Brush disposal will be consistent with wildlife objectives (Amendment 11 Pg 70).
13. Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement (Pg 71).

14. In the pinyon juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer wintering areas (Amendment 20 replacement page 87).
15. Planting may be necessary in some areas to restore a seed source (Amendment 20 replacement page 87).
16. Manage the pinyon-juniper type to emphasize the production of mule deer (Amendment 20 replacement page 87).
17. Integrate habitat needs through prescribed fire within fire suppression objectives (Pg 87-1).
18. Maintenance performed on revegetation acres as determined in Allotment Management Plans to retain optimum forage production (Pg141).

Population Trends

According to the NatureServe Explorer website (2001), which can be found at: http://www.natureserve.org/explorer, the Global Heritage Status for spotted towhees is G5, being common, widespread, and abundant. National Heritage Status is ranked as N5B, N5N, being common and widespread in breeding and non-breeding areas. In Arizona, this species is ranked as S5, being common, secure, widespread, and abundant. With a secure global, national, and state ranking, long-term population trends are stable. "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

Breeding Bird Survey trend data for the years 1996 to 2000 show a non-significant increase of 0.7 percent over 29 survey routes (Sauer et al. 2001). Refer to figure SPTO-3 for a graph provided by the USGS Patuxtent Wildlife Research Center website for spotted towhees for the years 1968 to 2003 in Arizona. Refer to Figure SPTO - 4 for a map of the percent change per year in BBS counts in central Arizona, which appears to be relatively high.

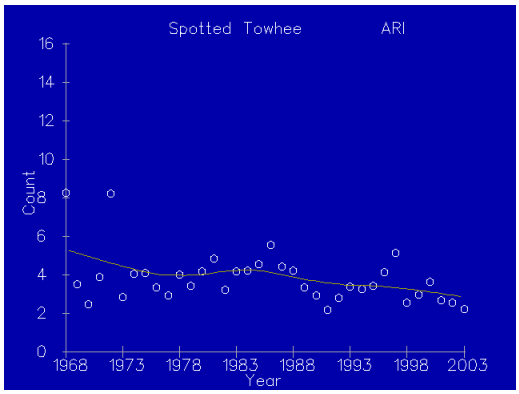

Figure SPTO-3. Spotted towhee trends in Arizona based on BBS 1968-2003. (Sauer et.al. 2004)

On the Tonto National Forest the breeding Bird Atlas has records of approximately 52 sightings well distributed across the Forest except in Sonoran desert and grassland vegetation (SPTO - 2). Spotted towhees appear to be well distributed and moderately abundant.

In 1999, local biologists knowledgeable of Forest conditions used the foregoing available literature and local experience to conclude that the population trend for the SPTO on the Forest appears to be stable or increasing. The estimated increase is assumed to be a result of increasing shrub densities throughout portions of several vegetation types.

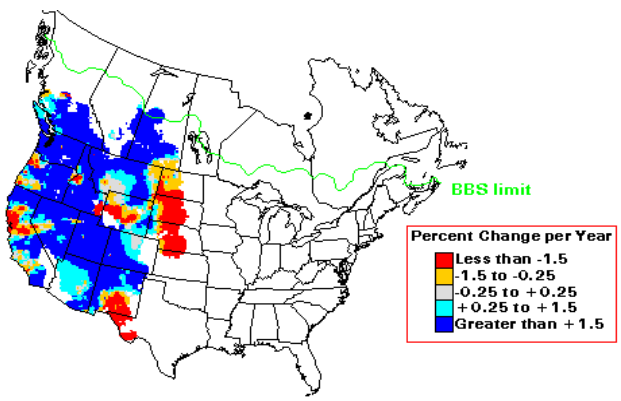

Figure SPTO – 4: Percent change per year for Spotted Towhee counts during breeding bird surveys (Sauer et al., 2001).

Appendix K of the FLMP (Amendment no. 22, 06/05/96, page 269) also predicted a small increase (15%) in population trend by 2030.

Tonto National Forest Population Trend

Figure 7 displays survey results for the Bartlett Reservoir BBS transect, and Figure 5 displays statewide CBC survey results for this species. On the Tonto Basin Ranger District in 2003 this species was documented 239 times on 18 different dates on 6 transects (Plank 2005). Based on Forest and Regional data this species is considered **stable** on TNF.

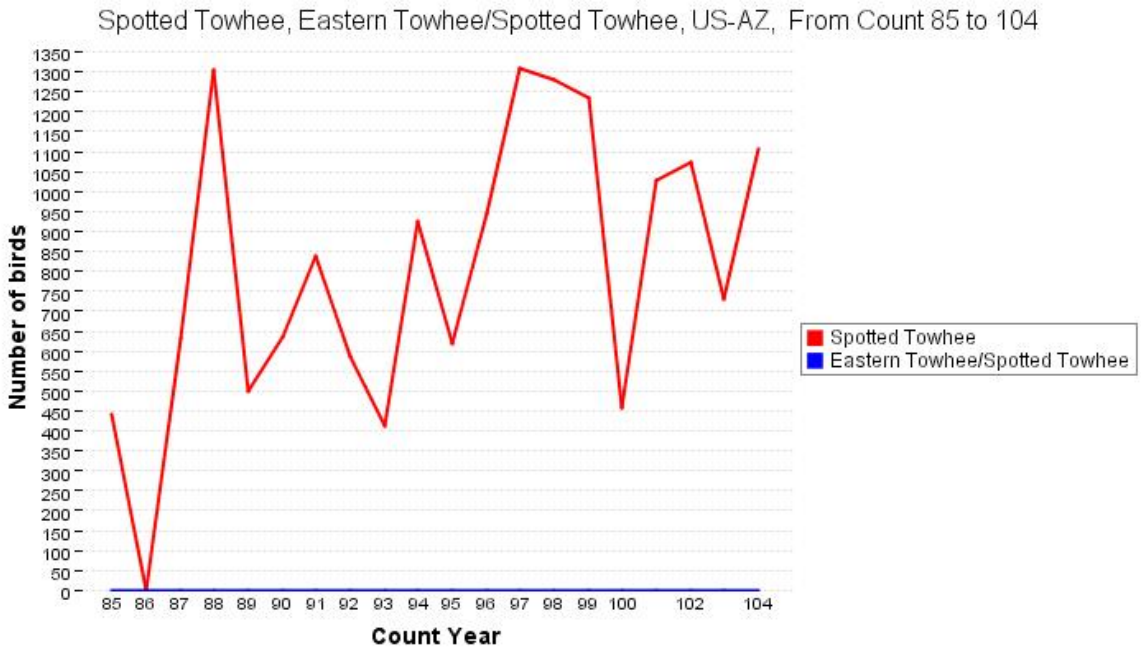

Figure 5. Spotted towhee population trend for the Arizona region 1985-2004 (National Audubon Society 2005)

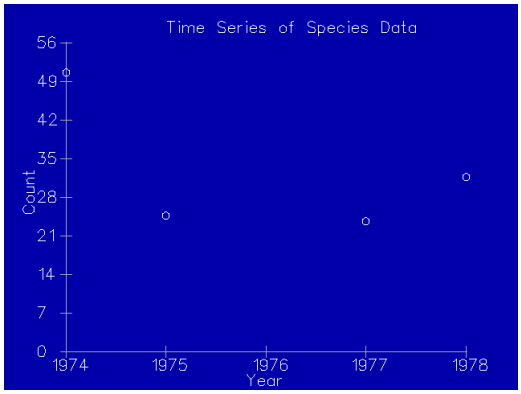

Figure 6. Spotted towhee population trend for the Aztec Peak BBS Route 1974-1978.

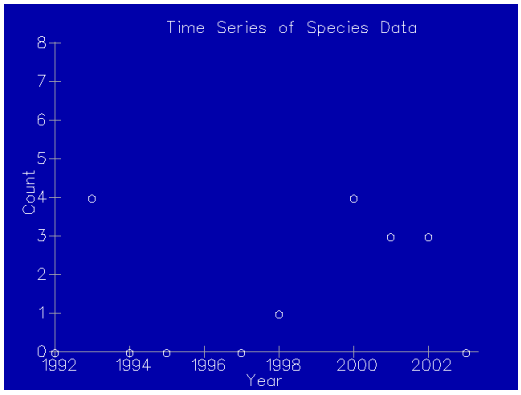

Figure 7. Spotted towhee population trend for the Bartlett Reservoir BBS Route 1992-2002.

Recommended Survey Methods

Baseline data specific to the Tonto National forest could be collected using standard point count methodology. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol. The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most efficient and data-rich method of counting birds. This is the preferred method in forested habitats or difficult terrain."

Line transects are another method used to determine an estimate of population trends, if done over a series of years. General information on line transect survey protocol can be

found in *Field Guidelines for Using Transects to Sample Nongame Bird Populations* (Mikol 1980). In either survey method, survey points or transects are randomly distributed, stratified by habitat types.

The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda" every five years." "Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (USDA Forest Service 1985). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

Balda, R. P. 1970. Effects of spring leaf-fall on composition and density of breeding birds in two southern Arizona woodlands. Condor 72:325-331.

Bent, A.C. 1968. Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies. Dover Publications, Inc. New York.

DeGraff, R.M., V.E. Scott, R.H. Hamre, L. Ernst, and S.H. Anderson. 1991. Forest and Rangeland Birds of the United States. USDA Forest Service Agriculture Handbook 688. 625 pp.

Ehrlich, Paul R., David S. Dobkin, and Darryl Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon & Schuster Inc. New York, New York.

ENature.com: Bringing Nature to life. http:/www.enature.com

Harrison, H.H. 1979. A Field Guide to Western Birds' Nests. Peterson Field Guide Series. Houghton Mifflin Company. New York, NY. 279 pp.

Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona Partners in Flight Bird Conservation Plan. Version 1.0. Nongame and Endangered Wildlife Program Technical Report 142. Arizona Game and Fish Department, Phoenix, Arizona.

NatureServe. 2001. NatureServe Explorer. Version 1.6. Association for Biodiversity Information. www.natureserveexplorer.org

National Audubon Society. 2001. Christmas Bird Count. http://209.177.45.29/birds/cbc/hr/graph.html

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

Howell, S. N. G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford Univ. Press, New York.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

Monson, G., and A. R. Phillips. 1981. Annotated checklist of the birds of Arizona. 2nd ed. Univ. Of Arizona Press, Tucson, AZ.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Phillips, A. R., J. T. Marshall, Jr., and G. Monson. 1964. The birds of Arizona. Univ. of Arizona Press, Tucson, AZ.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Sauer, J. R., S. Schwartz, and B. Hoover. 1996. The Christmas Bird Count Home Page. Version 95.1 USGS Biological Resource Division, Patuxtent Wildlife Research Center, Laurel, MD. Online available: http://www.mbr.nbs.gov/bbs/cbc/html.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Sibley, D.A. 2000. The Sibley Guide to Birds. National Audubon Society. New York.

21. SUMMER TANAGER: *Piranga rubra*

MIS Role: Tall, mature trees in low elevation riparian

SUMMARY OF KEY HABITAT COMPONENTS

- Provide a multi-tiered, mid-upperstory lowland riparian habitat consisting mainly of high canopy closure (>90%) cottonwood-willow gallery forests.
- Provide habitat patches of 0.5 miles long x 110 yards wide, > 60 acres.
- Provide habitat patches throughout the Forest on large, low gradient, river systems and their major tributaries.

Species Description

Adult males have bright red plumage, with darker red wings and tail. Beaks are large and yellowish in color. Adult females usually have olive-yellow upper parts, and a yellow-orange breast and belly, with yellowish edges on their wing coverts. They are 7.0 inches long, and have a wingspan of 11 to 12 inches (Alsop III 2001). Immature males have blotches of green and red over their bodies, while immature females look similar to their adult counterparts (Robinson 1996, Alsop III 2001).

Distribution

Summer tanagers breed throughout most of the eastern and southern U.S. The western subspecies (*P. r. cooperi*), breeds from western Texas to southwestern California, including south and central New Mexico, south-central and northwestern Arizona, southwestern Utah, southern Nevada, and southern California south to northeastern Baja (Robinson 1996). These tanagers are winter migrants, moving to central Mexico south through Central American to northern South America as far as Bolivia and Brazil, and including the southern tip of Baja, Mexico (Fig. SUTA – 1). "Northward migration probably begins by mid- or late-February, with migration well underway by mid-March to early April. Southward migration in the fall begins during August and begin arriving at wintering grounds in late September" (ibid.).

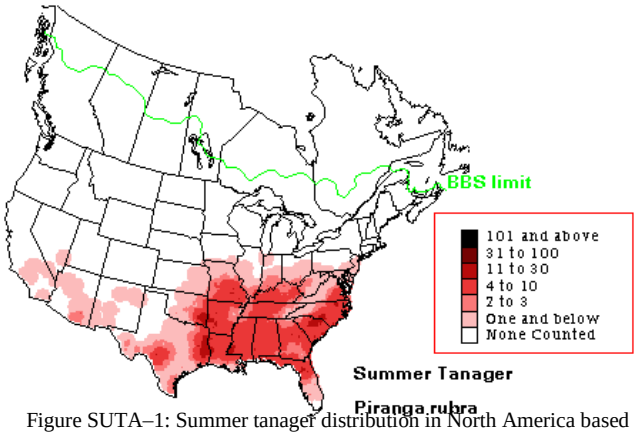

Figure SUTA–1: Summer tanager distribution in North America based on breeding bird surveys

This species appears to be well distributed on the Tonto N. F. Arizona began a breeding bird atlas in the early 90's. Figure SUTA-2 below shows the results of this effort to date on the Forest. The points on map represent "atlas blocks" (areas) within which, an SUTA was sighted. Atlas blocks are relatively large survey areas that were established at the beginning of the atlas survey work to insure adequate sampling of the various biomes within the state.

Figure SUTA–1: Summer bird distribution (left) and North America based on breeding bird surveys and winter distribution (right) based on Christmas bird counts.

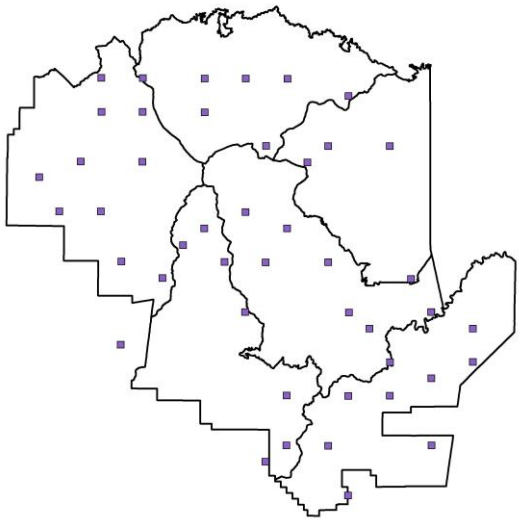

Figure SUTA-2: Block locations where breeding summer tanager were found- based on Arizona Breeding Bird Atlas.

Habitat

In the western states, summer tanagers are found in cottonwood-willow (*Populus-Salix* spp.) riparian forest along streams and in canyons at lower elevation (Grinnell 1914, Bent 1958, Rosenberg et al. 1982, 1991). Mesquite (*Prosopis* spp.) and salt cedar (*Tamarix* spp.) are used as breeding habitat at higher elevations (Robinson 1996). Mid- and higher levels in the canopy are used for foraging and nesting by summer tanagers (ibid.). In ten 64-foot radius point counts in an Illinois forest (1991 S. Robinson and W. Robinson *in* Robinson 1996), summer tanager densities varied with forest treatment types and topography: 1.5 individuals were located on ridges and 1.8 individuals in ravines in recently cut forest (i.e. cut 2 to 4 years before surveys). In older forests that were selectively harvested 11-13 years prior to surveys, 1.2 individuals were located on ridges and 0.7 individuals were found in ravines. In uncut forests, 1.7 individuals were located on ridges, and 0.4 individuals in ravines (ibid.). Therefore, during 1991, uncut ridges or cut ravines offered the highest summer tanager densities. Summer tanager densities at the Bill Williams Delta on the lower Colorado River in cottonwood-willow habitat from 1980 to 1983 were reported as 16 to 24 birds per 99 acres (Hunter 1984, Rosenberg et al. 1991), which was down from the numbers reported in 1976 to 1978 (refer to section on Population Trends in this report).

Breeding

The greatest breeding activity begins in mid-March throughout the summer tanager's range, and lasts until early April (Robinson 1996). In a study at the South Fork of Kern River Valley, California, nests were found in high canopy closure averaging 93 percent (T. Gallion pers. comm. to W. Robinson 1996). Average nest height above ground at the South Fork Kern River Valley, California, was 37 feet and they were placed an average of 13.5 feet from the main trunk (ibid.). Nests are well-constructed open cups, made of dried vegetation, lined with soft grass in the western portion of the breeding range (ibid.).

Clutches average 3 to 4 eggs. Incubation lasts 11 to 12 days (Fitch and Fitch 1945, Bent 1958, Potter 1973). The young leave the nest 9 to 10 days after hatching, but are barely able to fly, and their parents continue to feed them for at least 3 weeks or more (Robinson 1996). This species is parasitized by cowbirds (*Molothrus ater*), although the rate varies by region. At the South Fork Kern River Valley, California, only 0.06 percent of nests were parasitized (1 of 16 nests; T. Gallion pers. comm. To W. Robinson 1996). Adult summer tanagers are very aggressive towards cowbirds, especially females, and will dive and chase them (ibid.).

Feeding Habits

Summer tanagers are renowned for eating bees and wasps (Hamaher 1936a, Rau 1941, Bent 1958). They catch bees and wasps in flight, carry them back to a perch, beat the prey against the perch to kill it, and then swipe the prey against the branch to remove the stinger (Bent 1958). They will also harass adult bees or wasps until they leave their hive, and then tear off pieces of the hive to eat the larvae (Hamaher 1936a and b, Rau 1941, Alvarez del Toro 1950).

These tanagers will also hawk or hover-glean a wide variety of insects such as "cicadas, hymenopterans, spiders, coleopterans, ants or termites, grasshoppers, dipterans, and hemipterans" from foliage (Rosenberg et al. 1982). Fruits are also eaten occasionally (Stiles and Skutch 1989, Rappole and Warner 1980). They forage in cottonwood-willow gallery forests in Arizona. Average foraging height at 40 nests in a mature, tall deciduous forest in southern Illinois was nearly 38 feet (Rosenberg et al. 1982).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP (USDA Forest Service 1985), the summer tanager was selected as a Management Indicator Species for tall, mature trees in low elevation riparian vegetation, ranging from 1,500 to 3,500 feet elevation (Appendix G, Tonto FLMP).

In the Environmental Impact Statement (EIS) for the Tonto FLMP, Page 108 Table 20, the riparian vegetation type was determined to cover approximately 35,022 acres on the Forest. The final report on Proposed Desired Future Conditions and Candidate Management Indicator Species to monitor Desired Future Conditions (TNF 1982) summarizes the "present status" of the riparian vegetation type as follows.

A 1980 contract survey of the riparian habitat on the Tonto established that riparian communities represent only 0.6 of 1 percent of the total land area on the Forest. Fifty percent of the 18,600 acres is in poor condition, 28% is fair, 15 percent moderate, 4% good, and only 3% excellent. Eighty percent of the lower Sonoran riparian is in poor condition, 40% of the upper Sonoran riparian is poor and only 5% of the transition zone riparian at higher elevations is in poor condition. This may reflect that the higher elevation areas are more productive and more "forgiving".

The reasons for the discrepancy in the two acreage figures is unknown, but the larger figure is taken from FLMP range capacity mapping which may have been less precise than the riparian habitat survey.

Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that 35,022 are also the desired vegetation condition at the end of the fifth period. The policy and Management Direction {from the desired future condition report, TNF 1982} is to rehabilitate all riparian areas to fair or better condition by 2000.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No.22 06/05/96. Direction that specifically affects low elevation riparian habitat for the summer tanager include:

1. Rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage.
2. Coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030. Type 1 characteristically contains tall trees>20 feet high with the highest layer forming somewhat of a closed canopy. Substantial vegetation is also present in the two lower layers (shrub and grass layer).
3. Coordinate with range to achieve utilization in the riparian areas that will not exceed 20% of the current annual growth by volume of woody species.
4. Re-establish riparian vegetation in severely degraded but potentially productive riparian areas.
5. Riparian Areas: Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.

Additionally, in 1997, the Forest Supervisor provided direction which clarified the above standards. Standards for riparian vegetation utilization, bank alteration and other grazing related practices were established (Johnson and Ross 1997). These standards require (as a minimum):

1. less than 50% utilization on current years growth on woody vegetation less than five feet in height.
2. less than 50% utilization on herbaceous vegetation.
3. less than 20% bank alteration.
4. Monitor utilization standards under the key area concept.
5. Not salting within ¼ mile; winter grazing is preferred.

Refinements to these standards, including use of height/weight curves for deergrass and a finalized Forest monitoring protocol (Johnson and McBride 2002) provide further direction in riparian streamside management. As grazing allotments go through the environmental analysis process, utilization standards in riparian areas are further reduced below maximum acceptable levels to meet MIS, ESA, watershed, riparian or other objectives.

Other Forest-wide Riparian Management Practices:

1. Forest-wide Riparian Monitoring Team – this team usually conducts midseason and end of season monitoring on key riparian areas on most grazing allotments on the Forest.
2. Forest Drought Policy development and implementation – establishes trigger for evaluating range conditions on the forest based on long-term rainfall. Most livestock were removed from the forest in 2002 due to drought conditions.

Population Status

According to the NatureServe Explorer website (2001), which can be found at: http://www.natureserve.org/explorer, the Global Heritage Status for the summer tanager is G5, being common, widespread, and abundant. National Heritage Status is ranked as NZB, which refers to long-distance migrants who have not been detected breeding in the U.S.; however, *The Birds of North American* (Robinson 1996) does refer to their breeding in the U.S., as does the NatureServe website (2001) on other pages of their report.

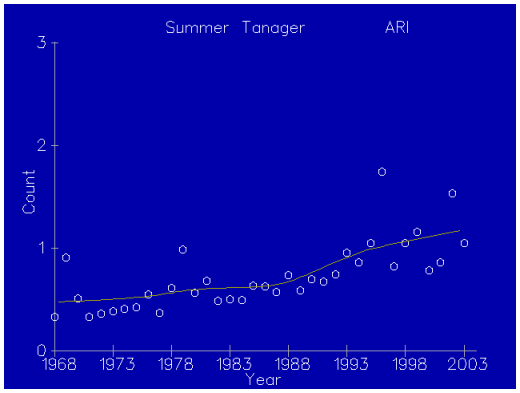

Figure SUTA-3: Summer tanager trends for the years 1968 to 2003 in Arizona. (Sauer et al. 2004)

In Arizona, this species is ranked as S4, being apparently secure, although it has declined along lower Colorado River with loss of native habitat (Hunter et al. 1988). In the lower Colorado River Valley in 1914, Grinnell reported summer tanagers as being a common inhabitant of cottonwood-willow habitat. Surveys in 1976 showed that the population had declined to 216 individuals (Rosenberg et al. 1991), and by 1983, just 138 individuals were estimated to be present (Hunter 1984). "Recent surveys show continued decline, indicating the summer tanager is on the brink of disappearing from the lower Colorado River Valley (Rosenberg et al. 1991). Destruction

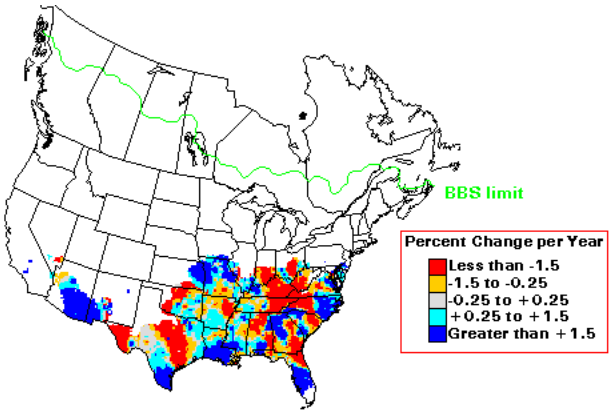

Figure SUTA-4: Percent change per year for Summer Tanager counts during breeding bird surveys (Saur et al., 2001)

of riparian forest for agricultural or urban development is the biggest threat to this species (Robinson 1996). It is unknown whether loss of wintering habitat is also a concern (ibid.).

Breeding Bird Survey (BBS) data show long-term trends that vary among geographic regions (Sauer and Droege 1992). Continent-wide trends for the years 1966 to 1991 were stable, but short-term trends from 1982 to 1991 showed a significant decrease of -1.7 percent per year over 620 routes (Sauer and Droege 1992, Robinson et al. 1996).Breeding Bird Survey trend data for the years 1996 to 2000 show a non-significant increase of 4.02 percent over 12 survey routes (Sauer et al. 2001). Refer to figure SUTA – 3 for a graph provided by the USGS Patuxtent Wildlife Research Center website for summer tanagers for the years 1968 to 1998 in Arizona. Refer to Figure SUTA – 4 for a map of the percent change per year in BBS counts in central Arizona, which appear to be relatively high.

On the Tonto National Forest the Breeding Bird Atlas has records of 47 sightings well distributed across four Districts on the Forest (SUTA-2).

Tonto National Forest Population Trend

A loss of mature cottonwoods without replacement is believed to be responsible for a declining trend. Future trends continue to be of concern because heavy cattle grazing, roads, water diversions, and roads-ORV use remain substantial problems in low elevation riparian habitats. Only one BBS route (Figure 6) has recorded this species on the Forest. Arizona CBC results also indicate that this species is a rare occurrence and sometimes not documented at all during survey results (Figure 5). In 2003 on the Tonto Basin Ranger District, this species was documented 4 times on 2 different dates. Based on Forest and regional data this species is considered **declining** on TNF.

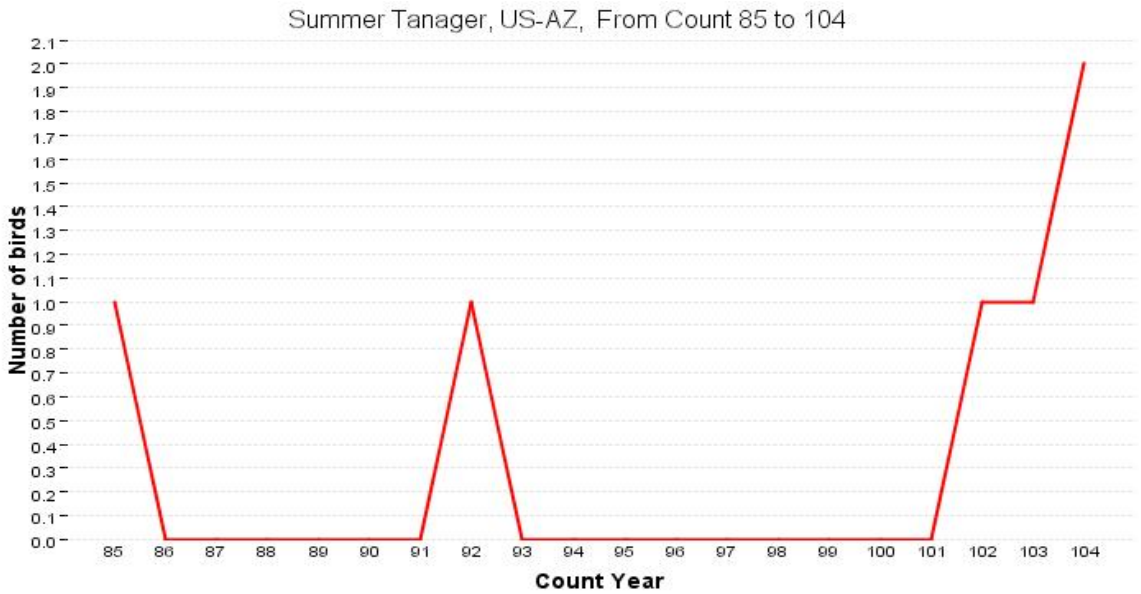

Figure 5. Summer tanager population trend for the Arizona region 1985-2004 (National Audubon Society 2005)

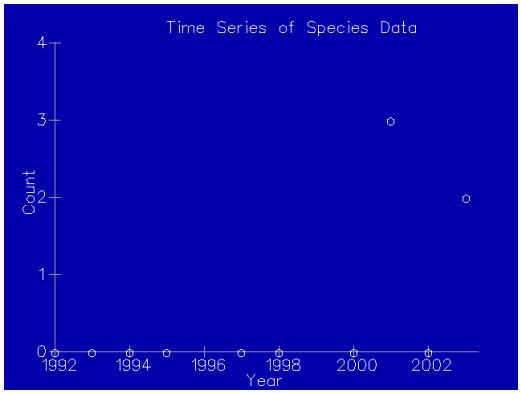

Figure 6. Summer tanager population trend for the Bartlett Reservoir BBS Route 1992-2002.

Recommended Survey Methods

Baseline data specific to the Tonto National forest could be collected using standard point count methodology. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol. The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along roadsides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most efficient and data-rich method of counting birds. This is the preferred method in forested habitats or difficult terrain."

Line transects are another method used to determine an estimate of population trends, if done over a series of years. General information on line transect survey protocol can be found in *Field Guidelines for Using Transects to Sample Nongame Bird Populations* (Mikol 1980). In either survey method, survey points or transects are randomly distributed, stratified by habitat types.

The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda, every five years… Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (USDA Forest Service 1985). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

Alvarez del Toro, M 1950. A summer tanager, *Piranga rubra*, annihilates a wasp nest. Auk 67:397.

Bent, A. C. 1958. Life histories of North American blackbirds, orioles, tanagers, and their allies U.S. Natl. Mus. Bull. 211. *In* W.D. Robinson. 1996. Summer tanager (*Piranga rubra*). The Birds of North America, No. 248 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

Fitch, H. S., and V. R. Fitch. 1955. Observations on the summer tanager in northeastern Kansas. Wilson Bull. 67:45-54.

Grinnell, J. 1914. An account of the mammals and birds of the lower Colorado Valley, with especial reference to the distributional problems presented. Univ. Calif. Publ. Zool. 12:226-304. *In* W.D. Robinson. 1996. Summer tanager (*Piranga rubra*). The Birds of North America, No. 248 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

Hamaher, J. I. 1936a. Summer tanager (*Piranga rubra*) eating wasps. Auk 53:220-221.

Hunter, W. C. 1984. Status of nine bird species of special concern along the Colorado River. Nongame Wildlife Investigations, Wildlife Management Branch, Admin. Rep. 84-2, California Fish and Game Dept., Sacramento, CA.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Potter, E. F. 1973. Breeding behavior of the summer tanager. Chat 37:35-39. *In* W.D. Robinson. 1996. Summer tanager (*Piranga rubra*). The Birds of North America, No. 248 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Rappole, J. H., and D. W. Warner. 1980. Ecological aspects of migrant bird behavior in Veracruz, Mexico. Pp.353-393 *In* A. Keast and E. S. Morton, eds. Migrant birds in the neotropics: ecology, distribution, and conservation. Smithsonian Institution Press, Washington, D.C.

Rau, P 1941. Birds as enemies of *Polistes* wasps. Can. Entomol. 73:196. *In* W.D. Robinson. 1996. Summer tanager (*Piranga rubra*). The Birds of North America, No. 248 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

Robinson, S., and W. D. Robinson. 1991. Untitled. *In* W.D. Robinson. 1996. Summer tanager (*Piranga rubra*). The Birds of North America, No. 248 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

Robinson, W. D. 1996. Summer tanager (*Piranga rubra*). *In* The Birds of North America, No. 248 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

Rosenberg, K. V., R. D. Ohmart, and B. W. Andersen. 1982. Community organization of riparian breeding birds: response to an annual resource peak. Auk 99:260-274.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson. 1991. Birds of the lower Colorado River Valley. Univ. of Arizona Press, Tucson, AZ.

Sauer, J. R., S. Schwartz, and B. Hoover. 1996. The Christmas Bird Count Home Page. Version 95.1 USGS Biological Resource Division, Patuxtent Wildlife Research Center, Laurel, MD. Online available: http://www.mbr.nbs.gov/bbs/cbc/html.

Sauer, J.R., J.E. Hines, and J. Fallon. 2001. The North American Breeding Bird Survey Results and Analysis 1966-2000. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Stiles, F. G., and A. F. Skutch. 1989. A guide to the birds of Costa Rica. Comstock Publ. Assoc., Cornell Univ. Press, Ithaca, NY.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

22. TOWNSEND'S SOLITAIRE: *Myadestes townsendi*

MIS role: Juniper berry production (winter) in piñon-juniper woodlands.

SUMMARY OF KEY HABITAT COMPONENTS

- Wintering: Old growth piñon-juniper or juniper woodlands with 3 or 4 sympatric juniper species (for dependable berry production).
- Possibly transitional areas with scattered tall pines that provide prominent perches for singing and guarding territories.
- Breeding: Conifer forests with relatively open stands, including areas thinned by light burns or selective logging, usually with little shrub layer or ground cover.

Species Description

Townsend's solitaires are noted for their beautiful flute-like songs, in contrast to their relatively drab plumage. They appear slender, with a small bill and a long tail. They are darker gray above, and lighter gray below, with a narrow white eye ring (Bowen 1997). They have a small, buffy wing patch near the base of their blackish wing feathers. Their tails are black, with white outer tail feathers that show in flight (Alsop III 2001). The sexes are similar in coloration. They range from 8.5 to 9 inches in length, with a wingspan of 13 to 14.5 inches (ibid.). Juveniles appear dark, brownish-gray with buffy and white scalloping on both their upper and underparts and with wing and tail feathers similar to adults (Bowen 1997).

Distribution

This species breeding range is mountainous areas of the western third of North America, as far north as eastern and southern Alaska and Canada's Northwest Territories. There appears to be a gap in distribution, absent from northern British Columbia, and present

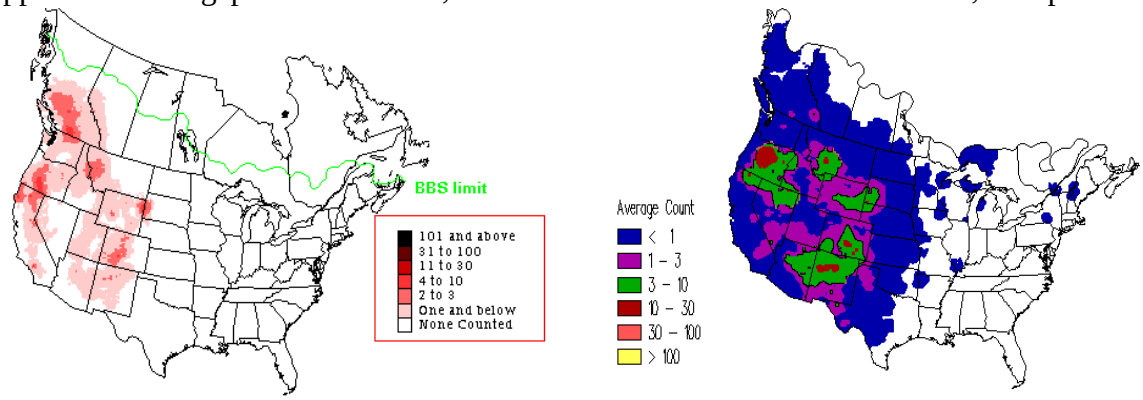

Figure TOSO 1: North American distribution of Townsend's solitaires in summer (left; from breeding bird surveys) and winter (right; from Christmas bird counts).Sauer et.al. 2001.

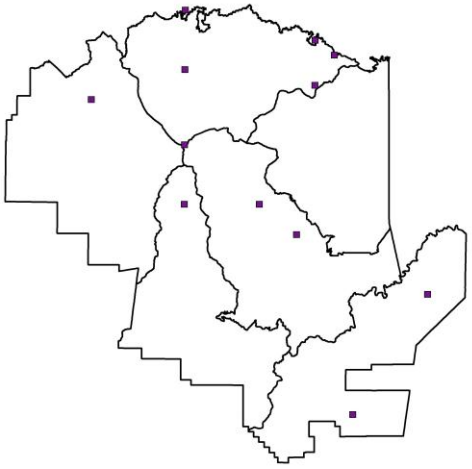

Figure TOSO-2: Block locations where breeding Townsend's solitaire were found- based on Arizona Breeding Bird Atlas.

from southeastern B.C. south to Baja, Texas, and central to eastern Mexico (Bowen 1997). There also appears to be a gap in the breeding range in Arizona; this species breeds from the northern boundary of Arizona south to the White Mountains and the Kaibab Plateau of northeastern Arizona, but excluding the southwestern corner of the state (ibid.).

Townsend's solitaires "withdraw southward from the northernmost portions of their breeding range during the winter, and from higher elevations, but otherwise are distributed through most of their breeding range, as well as the adjacent lowland areas, especially eastward onto the Great Plains…Most populations appear to make only a short altitudinal migration between summer and winter grounds, although northern breeders migrate longer distances southward for the winter…They winter in Arizona in all but the southwestern portion of the state" (ibid.).

Habitat

The Townsend's solitaire inhabits a variety of montane coniferous forest types, up to and above treeline during the summer, and moves down into adjacent lower elevation hills and valleys to winter in juniper (*Juniperus* spp.) woodlands or other areas that provide abundant fruit (Bowen 1997).

According to *The Birds of North America* (Bowen 1997), breeding habitat includes a wide range of elevations, from approximately 1,150 to 11,500 feet (depending on latitude) in the Transition, Canadian, and Hudsonian life zones. Coniferous forest, with canopies dominated by pine (*Pinus* spp.), hemlock, (*Tsuga*), fir (*Abies*), and spruce (*Picea*), rocky cliffs, and adjacent brushy areas and thickets are considered typical habitat. Townsend's solitaires prefer relatively open stands, including areas thinned by light burns or selective logging, usually with little shrub layer or ground cover (ibid.). Winter habitat includes piñon (*Pinus edulis*) – juniper woodland, which provides their main winter food, juniper berries. "Large-scale geographic analysis suggests that areas with 3 or 4 sympatric juniper species are preferred over habitats with only 1 or 2 junipers, presumably because higher juniper diversity reduces annual variation in berry availability. It is possible that transitional areas with scattered tall pines are preferred over pure juniper woodlands, to provide prominent perches to sing and guard their territories, since both sexes are territorial on wintering grounds (Sullivan 1976, Salomonson and Balda 1977), although "more data is needed" (Bowen 1997). Other areas with abundant fruit that are less frequently used as wintering grounds include desert washes, open hillsides, and shrublands ((Alcorn 1988; Rosenberg et al. 1991; R.W. Campbell, pers. comm. with Bowen (1997)).

Breeding

The main breeding season activity begins in mid-May and lasts until mid-August. In general terms, this species nests in open montane coniferous forest on steep, rocky slopes in approximately a 3,000 ft band below the timberline (Ehrlich et al. 1987). Nests are placed on old grass, twigs, trash with a neat cup shape lined with fine, dry grasses (ibid.). They are usually built on the ground beneath rocks, logs, or other objects that provide a sheltering overhang, including cut banks along new road cuts. They are rarely parasitized by cowbirds (*Molothrus ater*); however, frequent nest predation is the main determinant in variation in reproductive success (Bowen 1997). They have a long nesting season, and are able to renest several times per season, which is a successful adaptation to predation (ibid.). Mean clutch size is 4 young. Incubation lasts 12 days (ranging from 11 to 13 days), and the young fledge 10 to 12 days after hatching (ibid.).

Food Habits

Townsend's solitaires sally to take insects from the air, pounce on invertebrate prey on tree trunks; and glean, reach, and sally-hover when foraging for juniper berries (Bowen 1997). Their diet consists mainly of insects and spiders during the breeding season, and berries and small fruits, especially juniper berries, during the winter. Both males and females will guard their winter territories to protect their juniper berries (Salomonson and Balda 1977; Bowen 1997). Elphick et al. (2001) describe this bird as being one of the most important of western avian seed dispersers, concentrating on several species of junipers, and also consuming fruits of mountain-ashes, serviceberries, Texas madrone and numerous other plants.

Tonto National Forest MIS Status

Management Indicator Species were selected to adequately monitor the effects of implementation of the Proposed Action in the FLMP, on wildlife habitat and species diversity. Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP (USDA Forest Service 1985), the Townsend's solitaire was selected as a Management Indicator Species for the piñon – juniper woodland vegetation type, as an indicator of juniper berry production (see Appendix G, Tonto FLMP).

<u>Piñon-juniper vegetative type</u>:

Forest-wide management direction can be found in Amendment 21, pages 38-52, 5/3/95 (which incorporates Amendment 22 as well). Direction that specifically affects habitat for the Townsend's solitaire includes:

1. In all applicable management areas, until the FLMP is revised, allocate no less than 20 percent of each forested ecosystem management area to old growth as

depicted in table 15 "The Minimum Criteria for Structural Attributes Used to Determine Old-Growth".

2. In all applicable management areas, maintain a minimum of 30% effective ground cover for watershed and forage production, especially in primary wildlife foraging areas. Where less than 30% exists, the management goal is to obtain a minimum of 30% effective ground cover.
3. Landscapes outside of Goshawk PFA's Woodlands: Manage for even age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape. Provide for reserve trees, snags, and down woody debris (Amendment 22 pg 40-11).
4. Within PFA's and nesting areas: Maintain existing canopy cover levels of woodland (Amendment 22 pg 40-12).
5. Manage the pinyon-juniper type to emphasize the production of mule deer (Amendment 2 page 68-1).
6. Integrate habitat needs through prescribed fires within fire suppression objectives (Amendment 2 page 68-1).
7. Manage the pinyon-juniper type in a sustained yield evenflow basis. A mix of successional stages within 5000-acre management units will provide horizontal diversity. Ten percent of the type will be maintained as permanent openings with suitable ground cover for specific site conditions. Power lines, natural openings, or meadows count toward the standard. Where natural openings or power lines do not meet this standard openings will be created. The scheduling of fuel wood harvest will produce a distribution of successional stages as follows (Amendment 22 replacement pg 69):

    - Permanent Openings (2-40 acres) 10%
    - Fresh cut areas (0-20 years) 10%
    - Immature (20-100 years and 3-6" dbh) 40%
    - Mature (100-175+years and 6-11"dbh) 40%

8. Provide a ration of 60%: 40% forage to cover in pinyon-juniper for mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas (Amendment 22 replacement pg 69)
9. Design the fuelwood harvest blocks in the woodland type in irregular shapes less than 40 acres and less than 600 feet across (Amendment 11 Pg 70).
10. In the pinyon-juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer areas. Planting may be necessary in some areas to restore seed source (Amendment 11 Pg 70).
11. Achieve a savannah condition in the pinyon-juniper type by leaving a minimum of 40 large juniper trees per 40 acre cut block (Amendment 11 Pg 70).
12. Maintain a minimum of 100 snags per 100 acres. A preferred 12" dbh and 20 feet tall over at least 50% of the pinyon-juniper type (Amendment 11 Pg 70).

13. The silvicultural prescription is even-aged management under the shelterwood method with pinyon uncut and 40 large juniper trees left per 40 acre cut block (Amendment 11 Pg 70).
14. Brush disposal will be consistent with wildlife objectives (Amendment 11 Pg 70).
15. Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement (Pg 71).
16. In the pinyon juniper type manage toward a goal of 25-50% cover of browse shrubs in key deer wintering areas (Amendment 20 replacement page 87).
17. Planting may be necessary in some areas to restore a seed source (Amendment 20 replacement page 87).
18. Manage the pinyon-juniper type to emphasize the production of mule deer (Amendment 20 replacement page 87).
19. Integrate habitat needs through prescribed fire within fire suppression objectives (Pg 87-1).
20. Maintenance performed on revegetation acres as determined in Allotment Management Plans to retain optimum forage production (Pg141).

As a result of these actions, the FLMP predicted a decrease in Townsend's solitaire populations of 50% by the year 2030 (Amendment 22, App. K, Table 11, page 269, 06/05/96).

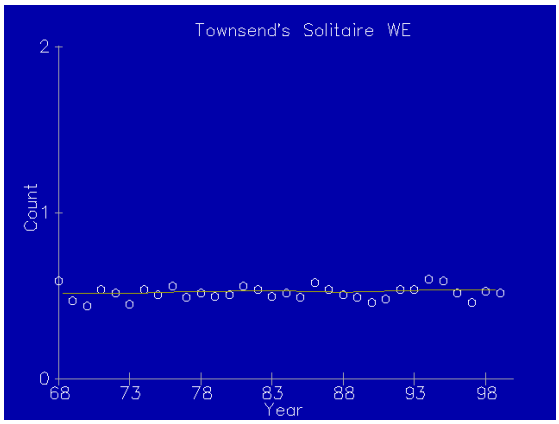

Figure TOSO-3: Townsend's solitaire trends in the Western BBS Region from BBS data (Sauer et al. 2001).

Population

"Deforestation in the breeding range and elimination of juniper woodlands in their winter range (e.g. by chaining or controlled burning) destroy habitat used by Townsend's solitaires, but no long-term effects on their populations have been documented…[This species] is widespread and shows no obvious population declines, so special management attention is probably unnecessary" (Bowen 1997). As listed on the NatureServe Explorer website (2001), population status is as follows:

- **Global status**: G-5. Common, demonstrably widespread, abundant, and secure throughout their range.
- **U.S. status**: N5. Secure. (Common, with no Federal listing status.)
- **Arizona status**: S5. Secure. (Common, widespread, and abundant.)

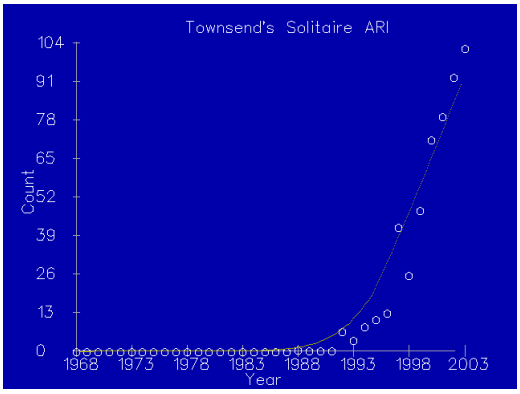

Figure TOSO-4: Townsend's solitaire trends for the years 1968 to 2003 in Arizona (Sauer et al. 2004).

Breeding Bird Survey (BBS) trend data indicate a non-significant increase of 18.4 percent for the years 1966 to 2000 (only 5 routes surveyed). Refer to Figure 6.0 for a graph provided by the

USGS Patuxent Wildlife Research Center website (Sauer et al. 2004) for Townsend's solitaire trends for the years 1968 to 2003 in Arizona.

Tonto National Forest Population Trend

No BBS routes detected this species during survey efforts on TNF. Statewide CBC indicates that his species is abundant throughout the state from 1985-present (Figure 5). In addition statewide BBS results that exclude routes on the TNF, suggest that populations are increasing over the last ten year period. Because fire suppression has allowed the pinyon-juniper vegetation type to expand, it would be plausible that this species is **stable** on TNF.

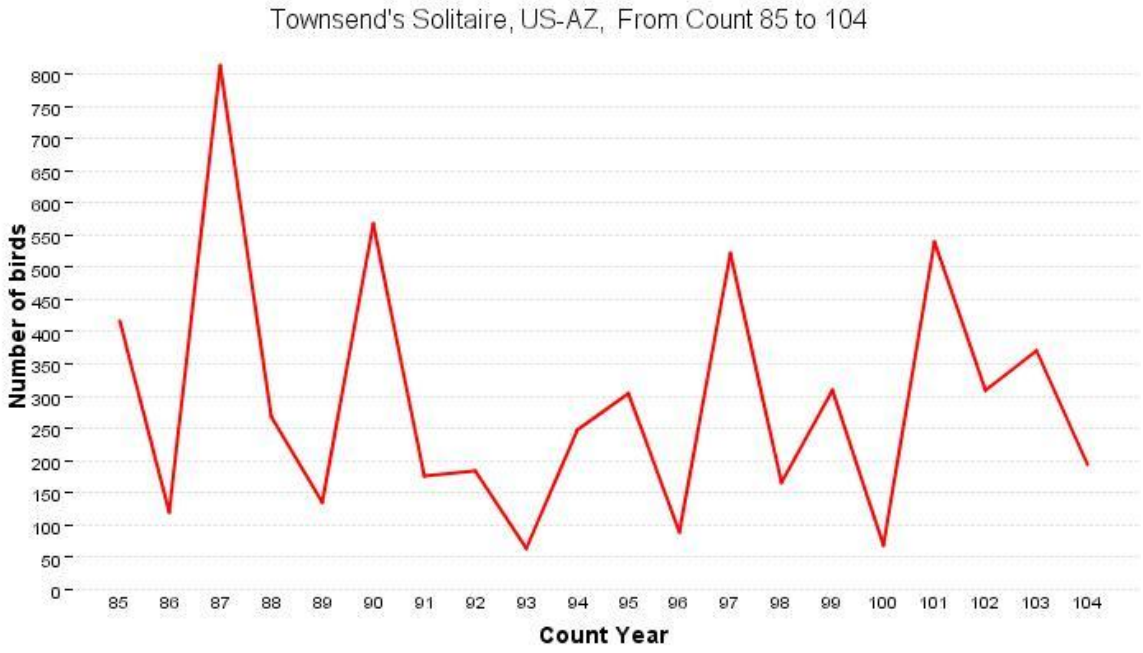

Figure 5. Townsend's solitaire population trend for the Arizona region 1985-2004 (National Audubon Society 2005).

Literature Cited

Alcorn, J. R. 1988. The birds of Nevada. Fairview West Publ., Fallon, NV. *In* R. V. Bowen. 1997. Townsend's solitaire (*Myadestes townsendi*). The Birds of North America. No. 269 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Bowen, R. V. 1997. Townsend's solitaire (*Myadestes townsendi*). *In* The Birds of North America. No. 269 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Ehrlich, P.R., D. S. Dobkin, and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon & Schuster, Inc, New York.

Elphick, C., J. B. Dunning, Jr., and D.A. Sibley, eds. 2001. National Audubon Society - The Sibley Guide to Bird Life and Behavior. Alfred A. Knopf, New York. 588 p.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington DC.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer (Accessed: September 6, 2002).

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Gen. Tech. Rep. PSW-GTR-144. Pacific Southwest Research Station, Albany, CA.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson. 1991. Birds of the lower Colorado River valley. Univ. of Arizona Press, Tucson, AZ

Salomonson, M. G., and R. P. Balda. 1977. Winter territoriality on Townsend's solitaires (*Myadestes townsendi*) in a piñon–juniper–ponderosa pine ecotone. Condor 79:148-161.

Sauer, J. R., J. E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966 - 2004. Version 2001.2, USGS Patuxent Wildlife Research Center, Laurel, MD

Sullivan, D. D. 1976. Life History of the Townsend's solitaire (*Myadestes townsendi*) in western Montana. M.A. thesis, Univ. of Montana, Missoula, MT. *In* R. V. Bowen. 1997. Townsend's solitaire (*Myadestes townsendi*). The Birds of North America. No. 269 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

23. VIOLET-GREEN SWALLOW: *Tachycineta thalassina*

MIS role: Cavity nesting habitat in ponderosa pine/mixed conifer type.

SUMMARY OF KEY HABITAT COMPONENTS

- Open habitat
- Ponderosa pine, oak and aspen snags; rock crevices, holes in dirt banks
- Dependable insect production

Species Description

As described in *The Birds of North America* (Brown et al. 1992), the violet green swallow is a glossy green to greenish-bronze above and white below. White cheek marks extend above the eye. The nape of the neck and upper tail coverts show a purplish-violet sheen. There is a white patch on each side of the rump. The tail is notched. The beak appears to be tiny. Juveniles show varying amounts of white on the flanks and have gray-brown upperparts without the greenish-purple gloss and gray-brown underparts (Alsop III 2001). These swallows range from 4.75 – 5.25 inches in length and have a wingspan of 11-12 inches (ibid.).

Distribution

Violet-green swallows are widely distributed, ranging in western North America from central Alaska and western Canada and south to the Mexican highlands. The winter range of these neotropical migrants includes the Imperial Valley and lower Colorado Valley

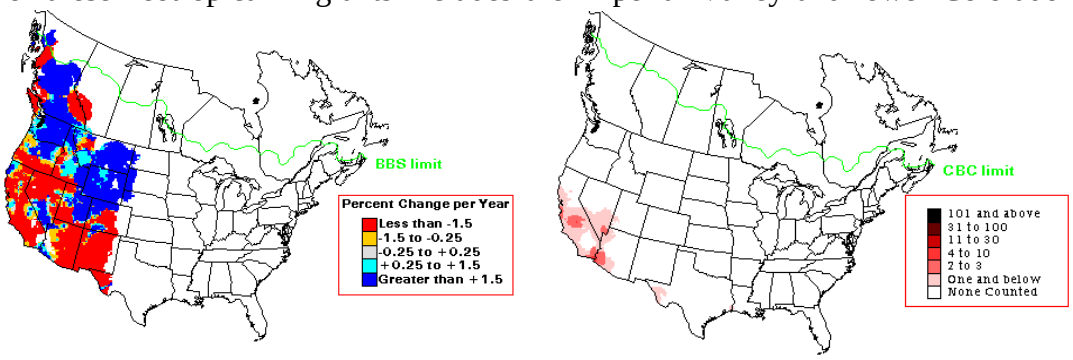

Figure VGSW-1: North American distribution of Violet-green swallows in summer (left; from Breeding Bird Surveys) and winter (right; from Christmas bird counts).Sauer et.al. 2001

and coast in California, and occasionally southern Arizona, south to Guatemala, El Salvador, and Honduras (AOU 1983).

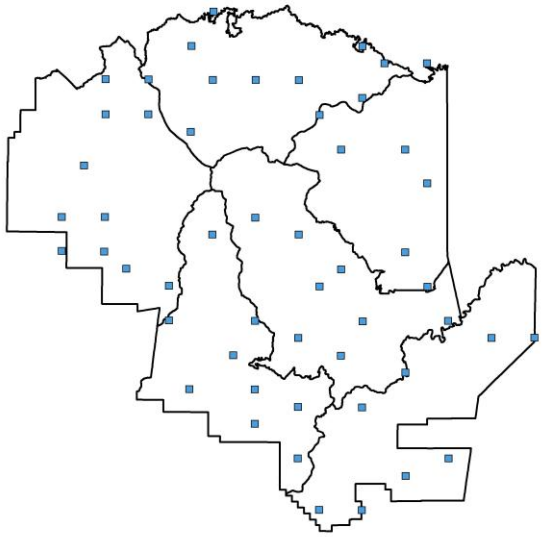

Figure VGSW-2: Block locations where breeding violet-green swallow were found- based on Arizona Breeding Bird Atlas.

Habitat

Habitat consists of open deciduous, coniferous, and mixed woodlands, including ponderosa pine (*Pinus ponderosa*) and quaking aspen *(Populus tremuloides*). They share breeding habitat with tree swallows (*Tachycineta bicolor*) but are usually in more open habitat, including rock crevices, holes in dirt banks, or in columnar cacti (Brown et al. 1992). The *lepida* race of the violet-green swallow most commonly breeds at elevations from approximately 6,500 to 11,500 feet in elevation, but has also been found in the Upper Sonoran and in one place, Lower Sonoran Life Zones (Grinnell 1928). The *brachyptera* race "apparently breeds in all life zones" (Grinnell 1928); in Arizona, they breed mainly in the Transition; lower mountain subzone of Arizona pines (Brandt 1951). Brawn and Balda (1988) found the territory size to be 2.5 to 15 breeding pairs per 90 acres in northern Arizona, and up to 50 pairs in thinned forest with added nest boxes. The USDA Forest Service General Tech. Report RM-10, *Cavity-Nesting Birds of Arizona and New Mexico Forests* (Scott and Patton 1989) reports that violet green swallows may be found in spruce (*Picea*)-fir (*Abies*), mixed conifer, ponderosa pine, and piñon-juniper (*Pinus edulis--Juniperus*) forest types.

Breeding

Violet-green swallows breed mainly from May through August (Brown et al. 1992). They nest in natural cavities, abandoned woodpecker holes, in crevices in dead trees, or in niches on rock ridges at mid-story or canopy level, usually near water. In Arizona, they mainly nest in abandoned woodpecker holes high in the mountains in the pine belt (Scott and Patton 1989). Scott and Patton (1989) found 32 nests in the White Mountains, Arizona; "5 were in the dead tops of ponderosa pines, 26 were in dead ponderosa pines, and 1 was in the dead top of an aspen tree, located 30 to 70 feet above ground." They prefer trees in open areas, such as open groves or the woodland edge. Tree species used for nesting include ponderosa pine, oak (*Quercus* spp.) and quaking aspen. Limestone cliffs have also been used in Arizona (Brown et al. 1992). The old forestry practice of removing standing dead trees has greatly reduced the availability of natural nesting sites; however, they will accept bird boxes placed at a height of 8.5 to 14 feet (Ehrlich et al. 1988).

House sparrows compete with violet-green swallows for nest sites. The swallows are gregarious and may be found nesting in colonies of up to 20 pairs, but individual pairs have also been observed nesting in dead trees, often near streams or lakes (Brown et al.

1992). Clutches consist of 4 to 6 eggs. Incubation lasts 13-14 days and the young fledge in 16-24 days. They produce just one brood per year.

Food Habits

These swallows usually feed in flocks and catch insects, their principal diet, in flight (Alsop III 2001). They may feed by skimming low above the ground or water, or by circling high above land. Their major prey is Hemiptera (mostly leafhoppers or leaf bugs), Diptera, Hymenoptera (mostly ants, with some wasps and bees), and some Coleoptera (Beal in Bent 1942).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Forest Land Management Plan (FLMP) on wildlife habitat and species diversity. In the Tonto National Forest Land Management Plan Appendix G (USDA Forest Service 1985), the violet-green swallow was selected as an MIS species for cavity-nesting habitat in the ponderosa pine/mixed conifer vegetation types.

Ponderosa pine/mixed conifer

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the conifer vegetation type was determined to cover approximately 283,200 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment 22, page 268, 6/5/96) indicates that this is also the desired management condition at the end of the fifth period.

Forest-wide management direction can be found in Amendment 21, 5/3/95, replacement pages 38 to 52, which also incorporates Amendment 22, 6/5/96. Direction that specifically affects habitat for violet-green swallows includes:

1. Spruce-fir: Leave at least 3 snags, 5 downed logs and 10-15 tons of woody debris per acre.

2. Mixed conifer: Leave at least 3 snags, 5 downed logs and 10-15 tons of woody debris per acre.

3. Ponderosa Pine: Leave at least 2 snags, 3 downed logs and 5-7 tons of woody debris per acre.

4. A preferred snag is 18 inches in diameter and 30 feet tall.

5. Retain key forest components such as oak.

6. Maintain or obtain a minimum of 30% effective ground cover.

Specific direction is also given for individual management units in the FLMP. Below are some additional guidelines that are important to the management of the violet-green swallow:

1. On those acres suitable for timber harvest, strive to achieve a structural diversity similar to what is described in the table below (Amendment 22, replacement pages 156-210, 6/5/96):

% of Acres	Age Class	Size Class	Management Indicator Species	Cover Class
8[1/]	0	Permanent Openings	Elk, turkey, western bluebird, violet-green swallow	Forage
13.3	0-20	Regenerated Seedlings	Elk, turkey	Forage
13.3	21-40	Saplings/Poles	Elk, turkey	Forage - Hiding
13.3	41-60[2/]	Poles	Elk	Forage - Hiding
13.3	61-80[2/]	Poles/Sawtimber	Elk, Abert's squirrel	Hiding/Thermal – Forage
13.3	81-100	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird	Thermal
13.3	101-120	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow	Thermal
10.0	121-180[3/]	Sawtimber/Vertical Diversity	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch	Thermal/Forage
10.0	181-240[3/]	Sawtimber/Vertical Diversity	Elk, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch, goshawk, turkey	Thermal/Forage

2. The oak component of the conifer type and the encinal oak type will be maintained.

3. Manage the oak component to maximize an optimum mix of mast and browse to accomplish wildlife objectives.

4. Where snags are not present, they will be created by leaving 2-3 trees from regeneration cuts as potential snags.

Population

Violet-green swallows are common summer residents in most of the Transition and Canadian Zones. Data from Nature Serve Explorer website (2001) at http://www.natureserve.org/ shows their Heritage Status as of March, 1997 as follows:

- **Global status**: G-5. Common, demonstrably widespread, abundant, and secure throughout their range.
- **U.S. status**: N5B and NZN. Common, with no Federal listing status;
- **Arizona status**: S5. Secure, common, widespread, and abundant.

With secure global, national, and state rankings, long-term population trends are stable.

Appendix K of the FLMP (Amendment 22, page 269, 6/5/96) predicted a slight increase in population (20%) by the year 2030 (Table 11) for the violet-green swallow.

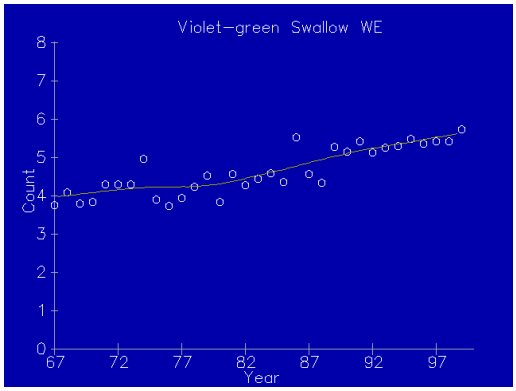

Figure VGSW-3: Violet-green swallow trends in the Western BBS Region from BBS data (Sauer et al. 2001).

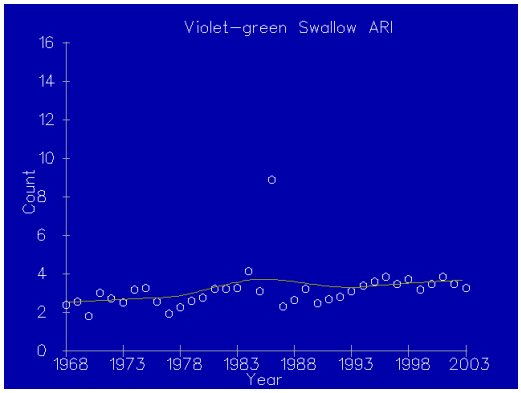

Figure VGSW-4: Violet-green swallow trends in Arizona from BBS data 1968-2003 (Sauer et al. 2004).

Breeding Bird Survey trend data for Arizona (from 28 survey routes) between 1971-2003 indicates -0.41 percent; the statistical significance was not sufficient to reject the null hypothesis that there is no change in the trend (Sauer et al. 2004). Refer to Figures VGSW-3 and 4 for violet-green swallow population trends from 1968 to 2003 in Arizona (from the USGS Patuxent Wildlife Research Center website).

Tonto National Forest Population Trend

Only the Tonto Village BBS route has documented this species on the Forest (Figure 7). Statewide CBC surveys suggest that his species is well represented throughout the state and may have benefited from drought and increases in snags used for nest sites. On the Tonto Basin Ranger District in 2003, this species was documented on four occasions on one transect. Drought conditions and wildfire have led to increases in snag densities in the ponderosa pine/mixed conifer habitat type and have likely improved nesting habitat parameters. Based primarily on regional data, this species appears to be **stable** on TNF.

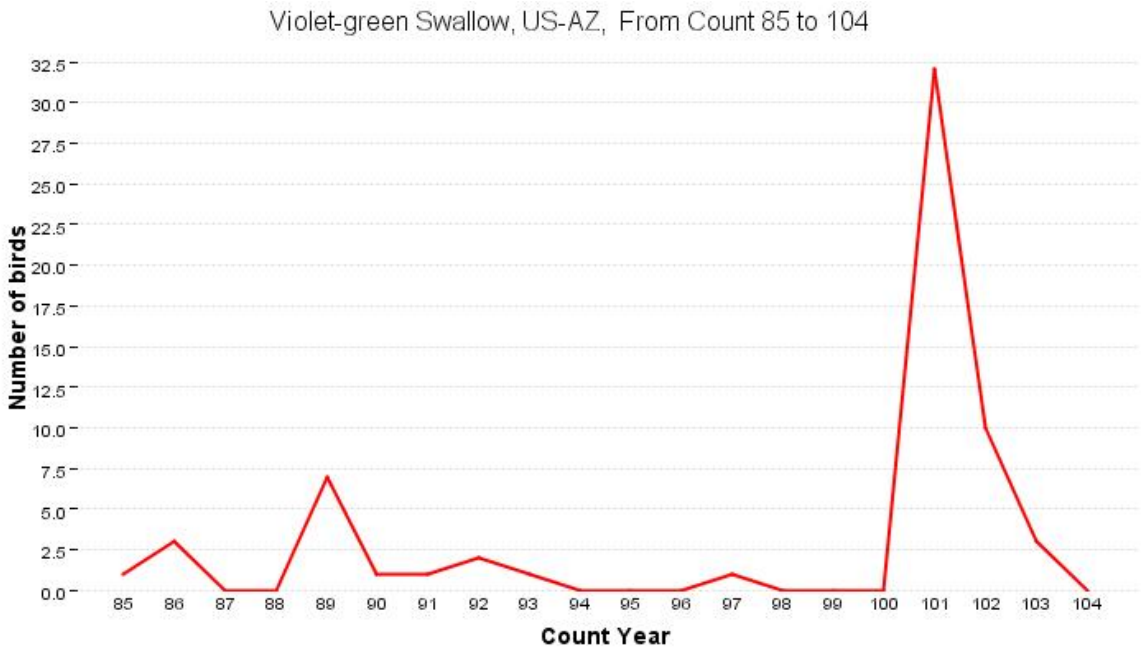

Figure 5. Violet green swallow population trend for the Arizona region 1985-2004 (National Audubon Society 2005).

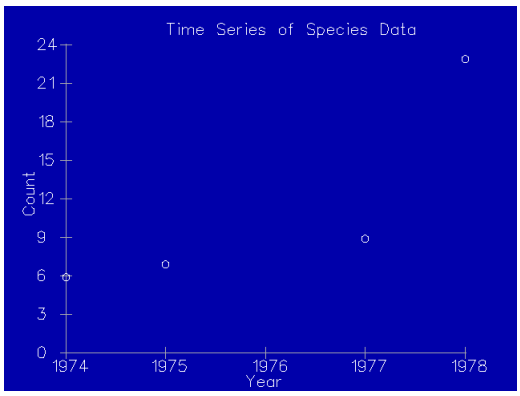

Figure 6. Violet green swallow population trend for the Aztec Peak BBS route 1974-78.

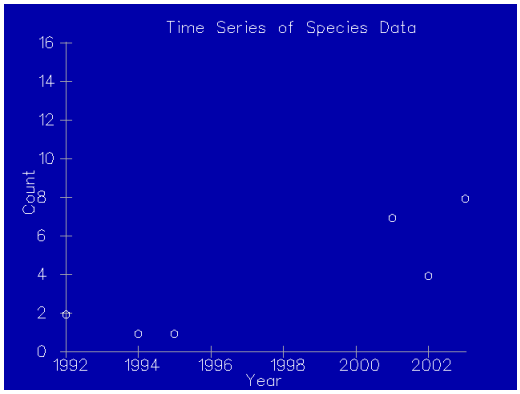

Figure 7. Violet green swallow population trend for the Tonto Village BBS route 1992-2003.

Literature Cited:

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

American Ornithologist's Union. 1983. Check-list of North American birds. 6th Ed. Am. Ornithol. Union, Washington, DC.

Bent, A.C. 1942. Life Histories of North American flycatchers, larks, swallows, and their allies. U.S. Natl. Mus. Bull. 179.

Brandt, H. 1951. Arizona and its bird life. The Bird Research Federation, Cleveland, OH.

Brawn, J. D., and R. P. Balda. 1988. Population biology of cavity nesters in northern Arizona: do nest sites depend on densities? Condor 90:61-17.

Brown, C.R., A.M. Knott, and E.J. Damrose. 1992. Violet-green swallow. *In* The Birds of North America, No. 14 (A. Poole, P. Stettenheim, and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington DC: The Amer. Ornithol. Union.

Ehrlich, P.R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc, New York.

Grinnell, J. 1928. A distributional summation of the ornithology of lower California *In*

C. R. Brown, A.M. Knott, and E. J. Damrose. 1992. Violet-green swallow. The Birds of North America, No. 14 (A. Poole, P. Stettenheim, and F. Gill, eds.) Philadelphia: The Academy of Natural Sciences, Washington DC: The Amer. Ornithol. Union.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Gen. Tech. Rep. PSW-GTR-144. Pacific Southwest Research Station, Albany, CA.

Sauer, J. R., J. E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966 - 2004. Version 2001.2, USGS Patuxent Wildlife Research Center, Laurel, MD

Scott, V. E. and D. R. Patton. 1989. Cavity-nesting birds of Arizona and New Mexico Forests. USDA Forest Service Gen Tech. Rep. RM-10. Reprinted by the Arizona Wildlife Foundation, AZ.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest Land Management Plan. Denver, CO.

24. BELL'S VIREO: *Vireo belii*

MIS Role: Well-developed understory in low elevation riparian.

SUMMARY OF KEY HABITAT COMPONENTS

- Provide dense stands of understory (shrubs, small trees) vegetation for nesting, underneath a tree canopy (shade) for optimum microclimate (cool).
- Manage for large, contiguous blocks (70 acres, >100yds. wide) of riparian habitat rather than for small fragmented areas. Large, continuous blocks of habitat reduce cowbird parasitism.

Species Description

Bells' vireos are small insectivorous neotropical migrants. They are approximately 4.75 inches long, with a wingspan of 7-8 inches (Alsop III 2001). They have grayish-greenish upperparts with white or yellowish underparts that are unstreaked. They have two faint wingbars, with the lower wingbar usually more prominent and a faint white eye ring Juvenal plumage is similar to that of adults, but duller, being mostly white and gray (Brown 1993).

Distribution

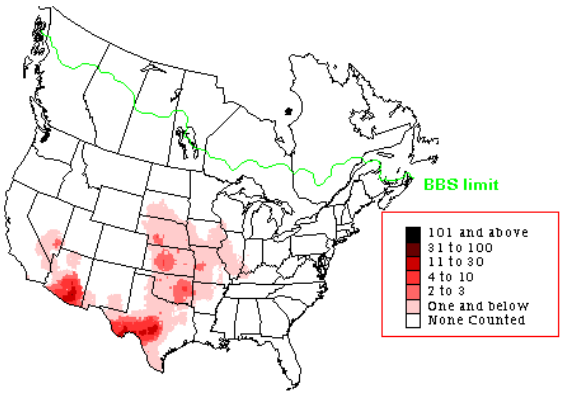

Figure BEVE-1: Summer bird distribution in North America based on breeding bird surveys.

Bell's vireos breed in the central and southwestern U.S. They are widespread in the central and southwestern U.S. and in northern Mexico; although habitat loss, cowbird parasitism, and other changes have negatively affected nesting vireos in the southwestern U.S. (Brown 1993). The least Bell's vireo subspecies has been designated an Endangered Species and the State of California (ibid.). Their winter range extends "from southern Baja California and southern Sonora south along the west coast of Mexico and Central America to the Honduras and casually to northern Nicaragua. There are also scattered winter records from southern California, southern Arizona, southern Texas, Louisiana, and southern Florida (Barlow 1980).

On the Tonto National Forest, this species appears to be well distributed. Arizona began a breeding bird atlas in the early 1990's. Figure BEVI-2 below shows the results of this effort to date on the Forest. There are 50 blocks with BEVI sightings distributed across the Forest. The points displayed in the figure represent "atlas blocks" (survey areas)

within which, one or more BEVI's was sighted. Atlas blocks are relatively large survey areas that were established at the beginning of the atlas survey work to insure adequate sampling of the various biomes within the state.

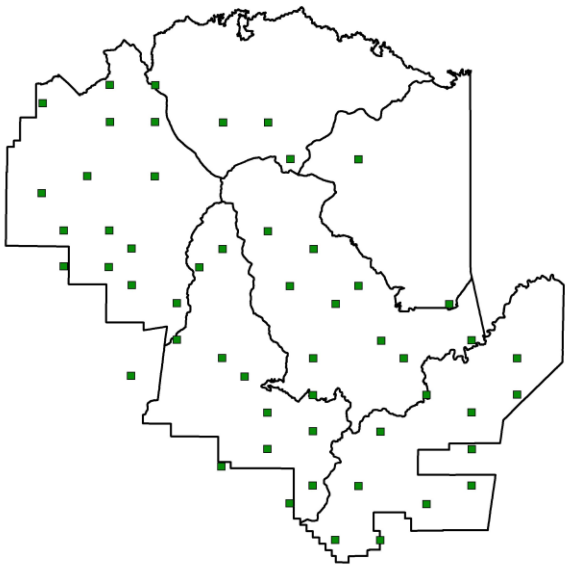

Figure BEVI-2: Block locations where breeding Bell's vireo were found- based on Arizona Breeding Bird Atlas.

Habitat

Habitat is dense, low, shrubby vegetation, generally in the early successional stages in riparian areas, brushy fields, young second-growth forest, scrub oak (Quercus turbinella), coastal chaparral, or mesquite (Prosopis spp.) brushlands usually near water (Brown 1993). They are also found in dense stream-side willow (Salix spp.) thickets. In Arizona, territory size was 26 pairs per 98.8 acres in willow-tamarisk habitat in a study by Meents et al. 1984, Szaro and Jackle 1985). During the migration and non-breeding season they are mainly found in dense scrub adjacent to watercourses, riparian gallery forests, tropical deciduous forest, and arid tropical scrub on the west coast of Mexico and in Honduras (AOU 1988, Hutto 1989). Bell's vireo nesting habitat is dependent on an optimum microclimate, with adequate shade possibly being critical for nesting success at low elevations. Tree canopies provide a cooler microclimate for bird eggs while the adults are off the nest (Thelander and Crabtree 1994). Bell's vireos also nest in tamarisk (Tamarisk ramirosa) along the Colorado River in the Grand Canyon (Brown and Trosset 1989). They are reported to use seep willow (Baccharis spp.) and mesquite instead of the available tamarisk along the Lower Colorado River Valley (Rosenberg et al. 1991).

Breeding

Most breeding activity occurs from mid-April to early July (Brown 1993). Cup nests are usually suspended from 1.5 to 5 feet above ground; on small, lateral or terminal forks of low hanging branches, in dense shrubs, small trees, or occasionally in herbaceous vegetation (Nolan 1960). Nests are usually built on the outer parts of trees or shrubs, and often near small canopied openings at the structural edge of vegetation patches (Brown 1993). Incubation lasts 14 to 15 days, and the young fledge in 11 to 12 days (Ehrlich et al. 1988). Brian Brown (1993) reported cowbird (Molothrus ater) parasitism rates of 6 percent (3 of 47 nests) along the Colorado River in the Grand Canyon in Arizona from 1982 to 1985. "The percentage of cowbird eggs hatched relative to those laid in vireo nests is low (Barlow 1962) and parasitized nests rarely fledge either cowbird or vireo young" (Wiens 1963). Bell's vireos return to the same nesting territory in consecutive years (Franzreb 1989). "Nesting success depends on an optimum microclimate, and

adequate shade may be critical for successful nesting at low elevations. Tree canopies provide cooler environments for eggs and young" (Thelander and Crabtree 1994).

Food Habits

Bell's vireos eat mainly insects (Chapin 1925) and small spiders (J. Barlow 1962). They forage from ground level up to up to 65 feet or more (Barlow 1962), most often by gleaning or while hovering (Salata 1983).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto National Forest Land Management Plan Appendix G, the Bell's vireo was selected as an MIS species for the low elevation (1,500 to 3,500 ft) riparian vegetation type with a well-developed understory (USDA Forest Service 1985).

In the Environmental Impact Statement (EIS) for the Tonto FLMP, Page 108 Table 20, the riparian vegetation type was determined to cover approximately 35,022 acres on the Forest. The final report on desired future conditions, candidate management indicator species and monitoring (TNF 1982) summarizes the "present status" of the riparian vegetation type as follows.

A 1980 contract survey of the riparian habitat on the Tonto established that riparian communities represent only 0.6 of 1 percent of the total land area on the Forest. Fifty percent of the 18,600 acres is in poor condition, 28% is fair, 15 percent moderate, 4% good, and only 3% excellent. Eighty percent of the lower Sonoran riparian is in poor condition, 40% of the upper Sonoran riparian is poor and only 5% of the transition zone riparian at higher elevations is in poor condition. This may reflect that the higher elevation areas are more productive and more "forgiving".

The reasons for the discrepancy in the two acreage figures is unknown, but the larger figure is taken from FLMP range capacity mapping which may have been less precise than the riparian habitat survey.

Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that 35,022 is also the desired vegetation condition at the end of the fifth period. The policy and Management Direction {from the desired future condition report (TNF 1982)} is to rehabilitate all riparian areas to fair or better condition by 2000.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No.22 06/05/96. Direction that specifically affects low elevation riparian habitat for the Bell's Vireo include:

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2. Coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030. Type 1 characteristically contains tall trees>20 feet high with the highest layer forming somewhat of a closed canopy. Substantial vegetation is also present in the two lower layers (shrub and grass layer).
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4. Re-establish riparian vegetation in severely degraded but potentially productive riparian areas.
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4. Monitor utilization standards under the key area concept.

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Refinements to these standards, including use of height/weight curves for deergrass and a finalized Forest monitoring protocol (Johnson and McBride 2002) provide further direction in riparian streamside management. As grazing allotments go through the environmental analysis process, utilization standards in riparian areas are further reduced below maximum acceptable levels to meet MIS, ESA, watershed, riparian or other objectives.

Other Forest-wide Riparian Management Practices:

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2. Forest Drought Policy development and implementation – establishes trigger for evaluating range conditions on the forest based on long-term rainfall. Most livestock were removed from the forest in 2002 due to drought conditions.

Population Trends

Bell's vireos have been affected by land use patterns, especially along streams and rivers. In the southwestern U.S., riparian habitat has been modified through agriculture, urbanization, firewood cutting, grazing, flood control projects, and reservoir construction and management (Brown 1993). "Modifications that promote habitat patchiness increase rates of cowbird parasitism and act to segregate remaining breeding vireos in disjunct subpopulations that are more susceptible to local extinction" (Franzeb 1989).

Bell's vireo is ranked as a G-5 Global Heritage Status, being common, demonstrably widespread, abundant, and secure throughout their range on the NatureServe Explorer website (2001): (http://www.natureserve.org/explorer/ranking.htm). In the U.S., the Bell's vireo is listed as N4B, being apparently secure within its breeding range. In Arizona, this species is listed as S4, apparently secure (ibid.). "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

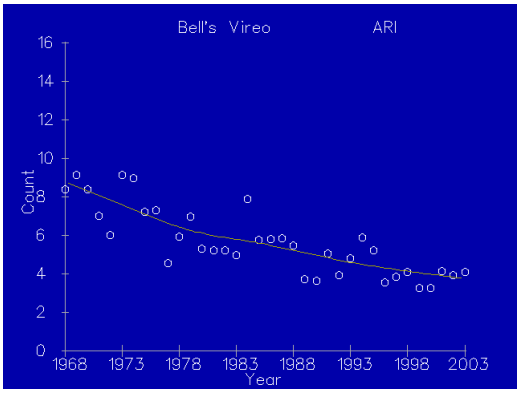

Figure 3.0. Bell's vireo trends for the years 1968 to 2003 in Arizona. (Sauer et al. 2004)

Although the population of Bell's vireo as a whole is apparently stable, population numbers of Bell's vireos have exhibited sharp declines in some localities, as in the central U.S., as indicated by the Breeding Bird Survey (BBS) data. In Arizona for the years 1966 to 2000, the BBS trend showed a non-significant decline of –1.7 percent over 22 survey routes. Refer to Figure 3.0 for a graph provided by the USGS Patuxtent Wildlife Research Center website (Sauer et al. 2004) of Bell's vireo trends for the years 1968 to 2003 in Arizona. Refer to Figure BEVI-4 for a map of the percent change per year in BBS counts in central Arizona, which appears to be low.

On the Tonto National Forest the Breeding Bird Atlas has records of 50 sightings well distributed across the Forest (BEVI-2). Bell's vireos appear to be well distributed and quite abundant. Local Tonto NF biologists commonly report anecdotal sightings throughout most of the forest.

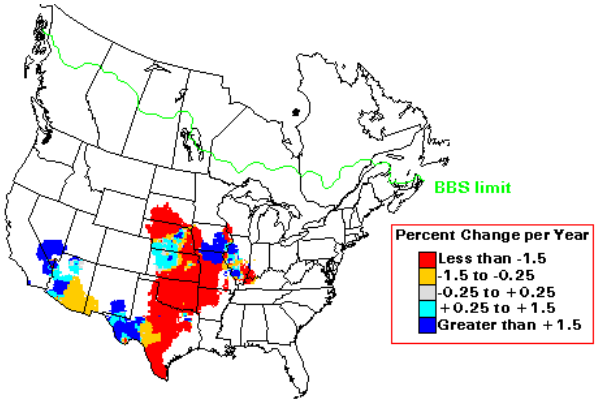

Figure HOOR - 4: Percent change per year for Bell's vireo counts during breeding bird surveys (Sauer et al., 2001)

In 1999, local biologists knowledgeable of forest conditions used the available literature to estimate that the population trend for BEVI on the Forest appeared to be stable.

BBS data in the national summaries indicate that the species is abundant and secure, while the Arizona data shows a slight decrease, and Forest information indicates good distribution (Fig. BEVI – 4) and suggests continued stability of trend. Therefore, based on the best available information, it is felt that the overall populations of Bell's vireos on the Forest continue to show a stable trend.

Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 269) predicted a substantial increase (800%) of Bell's vireo population trend by 2030. It is not apparent that such large increases have occurred, and a high percentage of lowland riparian areas remain in poor condition.

Tonto National Forest Population Trend

Statewide CBC suggests low detection of this species with peaks in the late 1990's. During the breeding season this species has been documented on the Bartlett reservoir BBS route on a regular basis. On the Tonto Basin Ranger District in 2003, this species was detected 23 times on 11 different dates on 10 different transect points (Plank 2005). Low elevation riparian habitat has improved in some areas but has declined in others due to grazing, drought and wildfire. Based on this data the population on TNF appears to be **declining**.

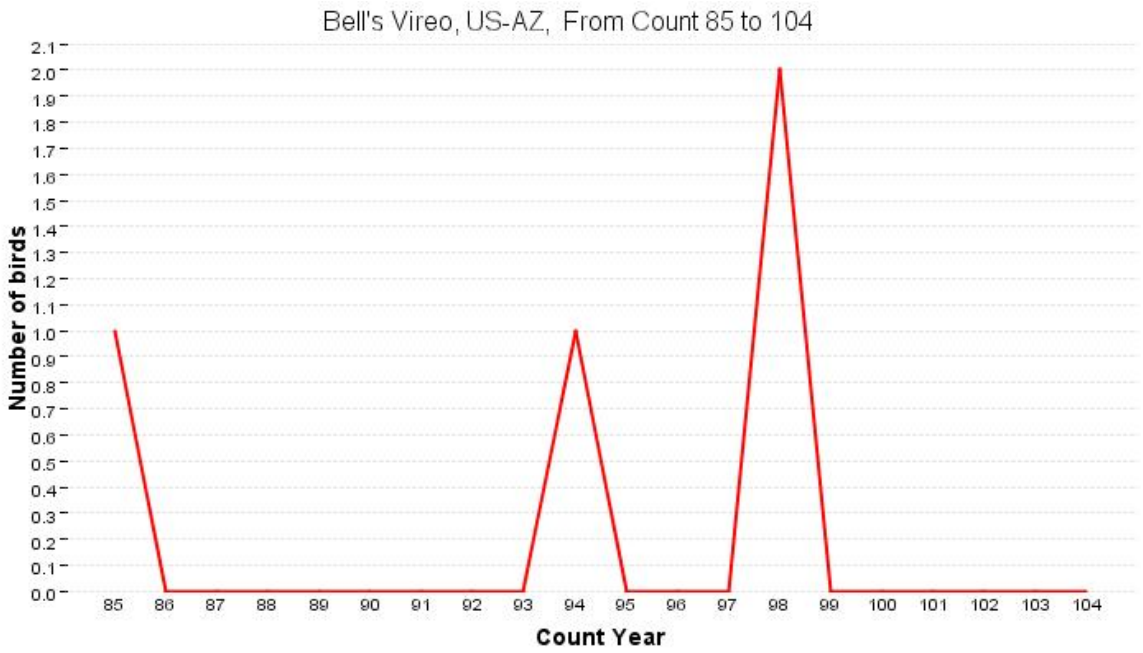

Figure 5. Bell's vireo population trend for the Arizona region 1985-2004 (National Audubon Society 2005).

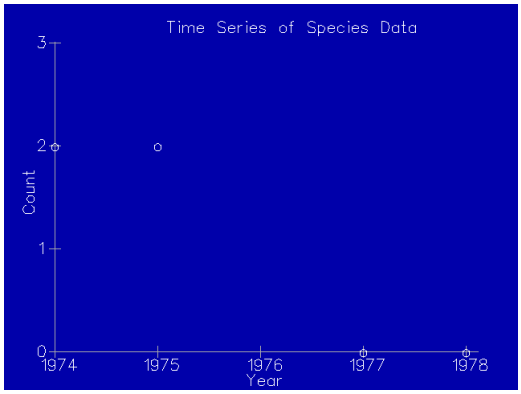

Figure 6. Bell's vireo population trend for the Aztec Peak BBS Route 1974-1978.

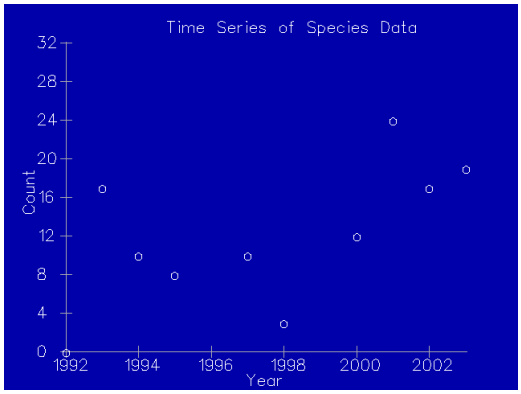

Figure 7. Bell's vireo population trend for the Bartlett Reservoir BBS Route 1992-2003.

Recommended Survey Methods

Bell's vireos are often located by song. Adult's males sing year round (except for fall migration) and sing most before 10:00 am. They rarely sing in the afternoons if temperatures are over approximately 85 degrees Fahrenheit (Brown 1993).

Baseline data specific to the Tonto National forest could be collected using standard point count methodology. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol.

The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only a measure of population abundance. Point counts will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook*

of Field Methods for Monitoring Landbirds (Ralph et al. 1993), "The point count method is probably the most efficient and data-rich method of counting birds. This is the preferred method in forested habitats or difficult terrain."

Line transects are another method used to determine an estimate of population trends, if done over a series of years. General information on line transect survey protocol can be found in *Field Guidelines for Using Transects to Sample Nongame Bird Populations* (Mikol 1980). In either survey method, survey points or transects are randomly distributed, stratified by habitat types.

The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda, every five years… Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (USDA Forest Service 1985). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

American Ornithologists' Union (AOU), Committee on Classification and Nomenclature. 1983. Check-list of North American Birds. 6th Edition. American Ornithologists' Union, Allen Press, Inc. Lawrence, KS.

Barlow, J. C. 1962. Natural history of the Bell's vireo, *Vireo bellii* Audubon. Univ. of Kansas Publ. 12:241-296. *In* B. T. Brown. 1993. Bell's vireo. The Birds of North America, No. 35 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington DC: The Amer. Ornithol. Union.

Barlow, J. C. 1964. Patterns of ecological interactions among migrant and resident vireos on the wintering grounds, pp. 79-107 *In* Migrant birds in the neotropics: ecology, behavior, distribution, and conservation (A. Keast and E. S. Morton, Eds.). Smithsonian Institution Press, Washington DC.

Barlow, J. C. 1980. Patterns of ecological interactions among migrant and resident vireos on the wintering grounds. Pp. 79-107 *In* Migrant birds in the neotropics: ecology, behavior, distribution, and conservation (A. Keast and E. S. Morton, eds). Smithsonian Institution Press, Washington D.C.

Brown, B. T. 1993. Bell's vireo. *In* The Birds of North America, No. 35 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington DC: The Amer. Ornithol. Union.

Brown, B. T. and M. W. Trosset. 1989. Nesting-habitat relationships of riparian birds along the Colorado River in Grand Canyon, Arizona. Southwest Nat. 34:260-270.

Chapin, E. A. 1925. Food habits of the vireos. Bull. 1355, USDA, Washington, DC. I*n* B. T. Brown. 1993. Bell's vireo. The Birds of North America, No. 35 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington DC: The Amer. Ornithol. Union.

Ehrlich, P.R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc, New York.

Franzeb, K. E. 1989. Ecology and conservation of the endangered Least Bell's vireo. Biol Rep. 89, U.S. Fish & Wildlife Serv., Washington, DC.

Hutto, R. L. 1989. The effect of habitat alteration on migratory land birds in a west Mexican tropical deciduous forest: a conservation perspective. Conservation Biology 3(2):138-148.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington DC.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Nolan, V. 1960. Breeding behavior of the Bell Vireo in southern Indiana. Condor 62:225-244.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson. 1991. Birds of the Lower Colorado River Valley. Univ. of Arizona Press, Tucson, AZ.

Salata, L. R. 1983. Status of the Least Bell's vireo on Camp Pendleton, California: research done in 1983. Final Rep. U.S. Fish & Wildlife Serv., Laguna, CA.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Szaro, R. C., and M. D. Jackle. 1985. Avian use of a desert riparian island and its adjacent scrub habitat. Condor 87:511-519.

Thelander, C. G., and M. Crabtree. 1994. Life on the edge: a guide to California's endangered natural resources. Biosystems Books, Santa Cruz, CA. *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Wiens, J. A. 1963. Aspects of cowbird parasitism in southern Oklahoma. Wilson Bull. 75:130-139

25. WARBLING VIREO: *Vireo gilvus*

MIS Role: Tall overstory in high elevation riparian.

SUMMARY OF KEY HABITAT COMPONENTS

- Use a variety of habitats
- Prefer deciduous riparian habitats associated with conifer and pine-oak from sea level to 10,500 ft.
- Breed in mature, deciduous, semi-open habitats
- Insectivores

Species Description

Warbling vireos are small birds that are gray-olive colored with white underparts and sometimes a yellowish wash on their flanks and undertail coverts (Gardali and Ballard 2000, Alsop III 2001). Their legs and feet are blue-gray (Alsop III 2001). They have a pale eyebrow, a faint eyeline, and a pale lores (Gardali and Ballard 2000). The plumage of both sexes is alike. Juveniles appear duller than adults, more brownish, with "very pale cinnamon or buffy wingbars" (Terrill and Terrill 1981, Pyle 1997). Average length is 5.0 to 5.5 inches, and average wingspan is 8.75 inches (Alsop III 2001).

Distribution

This species is widely distributed through North America, from southeastern Alaska and northern British Columbia, most of Alberta, and the southern portions of the other Canadian provinces throughout most of the northern and central U.S. except in east-central Washington and north-central Oregon, and excluding most of Texas and the southeastern U.S. In California, warbling vireos are absent from the central valley. They occur in southeast and northwest Arizona and southern New Mexico. They also breed locally in Baja and in Mexico. Warbling vireos winter from northwestern Mexico to El Salvador (Ehrlich et al. 1988); rarely to Honduras, extreme northwestern Nicaragua (Howell and Webb 1995); and casually or rarely into Costa Rica (Stiles and Skutch 1989). They also winter rarely in southern California, southern Arizona, and casually in southern Louisiana (Webster 1970, Remsen et al. 1996,

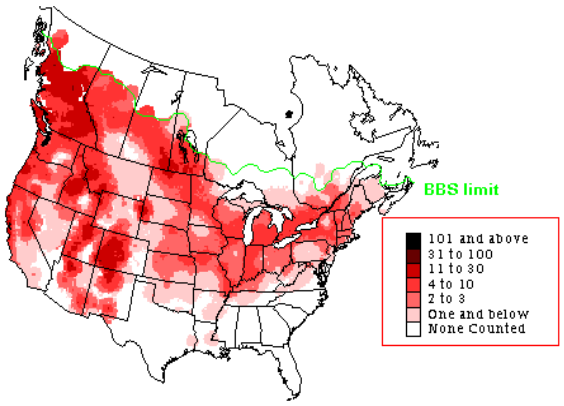

Figure 1 – Warbling Vireo: Summer distribution in North America based on breeding bird surveys.

Amer. Ornithol Union 1998). There are two main subspecies in North America, the *Vireo gilvus gilvus* in the east, and the *V. g. swainsonii* in the west (Gardali and Ballard 2000).

Habitat

A variety of habitats are used by this species. Warbling vireos are mainly found during breeding season in mature mixed deciduous riparian habitats of cottonwood-willow (*Populus-Salix* spp.) along streams, ponds, marshes, and lakes (Gardali and Ballard 2000). They can also be found in aspen groves (*Populus tremuloides*; Ehrlich et al. 1988), young deciduous stands that emerge after a clear cut (Ward and Smith 2000), or urban parks, gardens, or orchards (Gardali and Ballard 2000), mixed deciduous-conifer woodland, and pine-oak (*Pinus*-Quercus) associations (AOU 1983). Deciduous patches in pine forests, mixed hardwood forests, and rarely, pure conifer forests are also inhabited by warbling vireos (ibid.). Large trees with a semi-open canopy are mainly used as breeding habitat. The amount of undergrowth can vary from dense to non-existent or grassland (James 1971, MacKenzie et al. 1982, Marzluff and Lyon 1983). This species can be found at edges or openings (both natural and human-made) as well as forest interiors. Elevations range from sea level to 10,499 feet (Gardali and Ballard 2000). Densities reported range from 13.4 birds per 99 acres in flatland aspen; 60 birds per 99 acres in scrub-meadow; and 5 pairs per 99 acres in Douglas fir (*Psuedotsuga menziesii*; BLM unpubl. in Gardali and Ballard 2000). In the winter, this species occupies light woodland and savanna groves (Stiles and Skutch 1989).

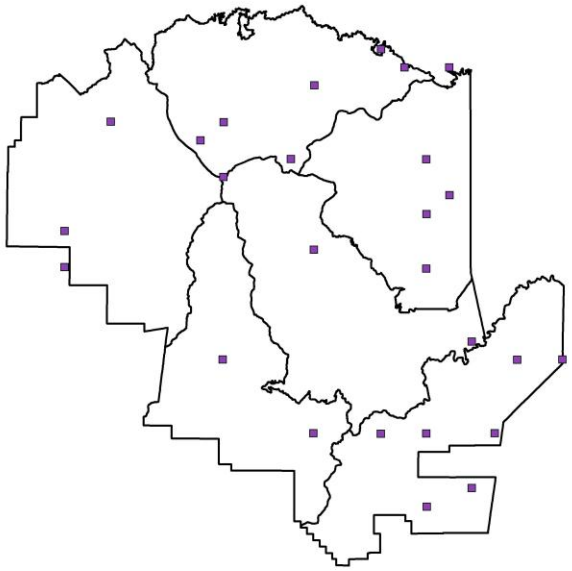

Figure WAVI-2: Block locations where breeding warbling vireo were found- based on Arizona Breeding Bird Atlas.

Breeding

Main breeding activity begins about the third week of May and lasts through the third week of July (Gardali and Ballard 2000). A requirement at breeding sites appears to be the presence of tall, mainly deciduous trees (Bent 1950, James 1971, James 1976, Walsberg 1981, Marzluff and Lyon 1983, Peck and James 1987). The structure of the lower- and mid-stories can range from groomed grass to thick shrubs (Gardali and Ballard 200). In a study Arizona by Walsberg (1981), examination of 18 nests showed that 39 percent were placed in Arizona walnut (*Juglans major*), 28 percent were in

Arizona sycamores (*Platanus wrightii*), 28 percent were in Arizona white oak (*Quercus arizonica*), and 5 percent was in ponderosa pine (*Pinus ponderosa*).

Nests are deep cups that are usually suspended by the rim from forked, horizontal twigs. The nests are made of plant materials and other matter, with an inner lining of finer materials (ibid.). Nest height in 2 studies in riparian woodland in Arizona ranged from approximately 7 feet (19 nests; Walsberg 1981) to 43 feet (115 nests; BBIRD in Gardali and Ballard 2000). Nests are usually built on the outer area of trees or shrubs (James 1976). Clutch size average 3 to 4 eggs (Gardali and Ballard 2000). Incubation lasts 12 to 14 days (Peck and James 1987) and the young fledge in 16 days, on average (Alsop III 2001). This species is a frequent victim of brown-headed cowbird (*Molothrus ater*) parasitism (Friedmann 1963, Friedmann et al. 1977, Friedmann and Kiff 1985). In the Huachuca Mountains of southeastern Arizona in 1988, a warbling vireo was observed feeding a bronzed cowbird (*Molothrus aeneus*) fledgling (J. F. Chase pers. comm. to Gardali and Ballard 2001). "Warbling vireos suffer up to 80 percent parasitism rates in some areas; this high rate, combined with the fact that parasitized nests typically produce no vireo young, can creat sink populations, even in areas where vireos are common" (Ward and Smith 2000).

Food Habits

Warbling vireos are mostly insectivorous. Main prey items include butterflies and moths (Lipidoptera), including caterpillars and moth pupae; true bugs (Hemiptera); ladybugs (Coccinellidae); other beetles (Coleoptera); spiders (Arachnida); and a small amount of vegetable matter (Beal 1907). They mainly forage near the tree tops, but have been observed foraging from just above ground level to the canopy top (Sutton 1949, Hamilton 1962), James 1976). Several foraging techniques are used. They most often glean insects from the outer foliage (Bent 1950, James 1976, Petit et al. 1990), but also frequently hover, stalk, and occasionally hawk for prey (James 1976). If their prey is large, they are known to "whack it forcefully against a perch until it is subdued (Rust 1920 Gardali and Ballard 2000).

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Tonto Forest Land Management Plan (FLMP), on wildlife habitat and species diversity. In the Tonto FLMP (USDA Forest Service 1985), the warbling vireo was selected as a Management Indicator Species for medium-sized trees in low elevation riparian vegetation, ranging from 1,500 to 3,500 feet elevation (Appendix G, Tonto FLMP).

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2. Forest Drought Policy development and implementation – establishes trigger for evaluating range conditions on the forest based on long-term rainfall. Most livestock were removed from the forest in 2002 due to drought conditions.

Population Trends

According to the NatureServe Explorer website (2001), which can be found at: http://www.natureserve.org/explorer, the Global Heritage Status for the warbling vireo is G5, being common, widespread, and abundant. National Heritage Status is ranked as N5B, being common and widespread in its breeding range. In Arizona, this species is ranked as S5, being common, secure, widespread, and abundant. *In* B. Y. Pleasants, and D. J. Albano. 2001. Hooded Oriole (*Icterus cucullatus*). The Birds of North America, No. 568 (A. Poole and F. Gill, eds.) The Birds of North America, Inc., Philadelphia, PA.

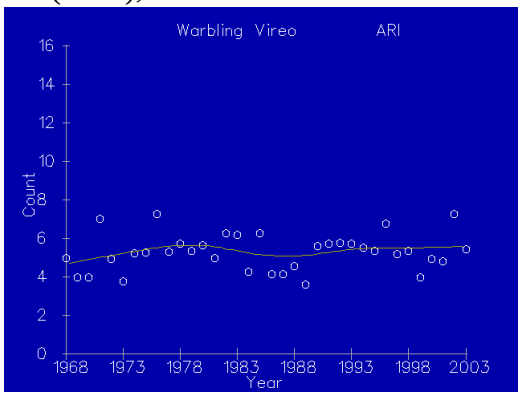

Figure 3: Warbling vireo trends for the years 1968 to 2003 in Arizona. (Sauer et al. 2004)

"NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

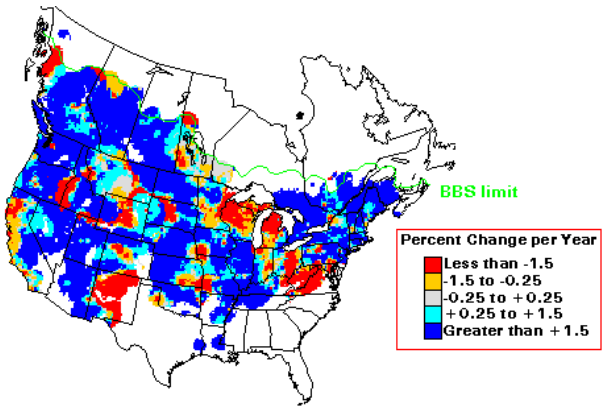

Figure 4 – Warbling Vireo: Percent change per year for warbling vireo counts during breeding bird surveys (Sauer et al., 2001).

Breeding Bird Survey trend data for the years 1996 to 2000 show a non-significant decrease of -0.4 percent over 13 survey routes (Sauer et al. 2001). Refer to figure 3 for a graph provided by the USGS Patuxtent Wildlife Research Center website for warbling vireos for the years 1968 to 2003 in Arizona.

There are three breeding bird survey routes on the Tonto National Forest (ARI-065, ARI-071, ARI-122). As represented in the map above, percent change from year to year is quite static in Arizona

Tonto National Forest Population Trend

Overall, data for Arizona, as well as range wide data, suggest that the warbling vireo's populations are relatively stable. Populations may decline on a short-term basis but recover when habitat conditions become more favorable. BBS results exist only for the Bartlett Reservoir transect and suggests that this species is uncommon at the time of year when the survey is conducted (Figure 7). Statewide CBC data is similar (Figure 5). High elevation riparian areas are considered stable and are only changed with stand replacing type wildfires. Based on this information populations on TNF are considered **stable**.

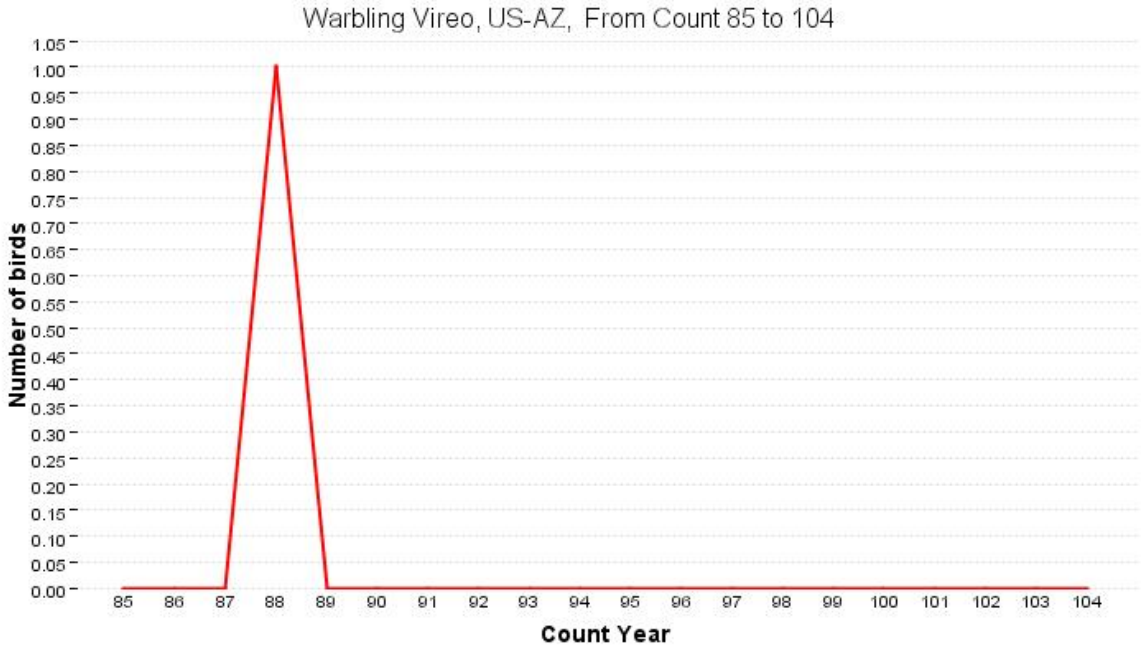

Figure 5. Warbling vireo population trend for the Arizona region 1985-2004.

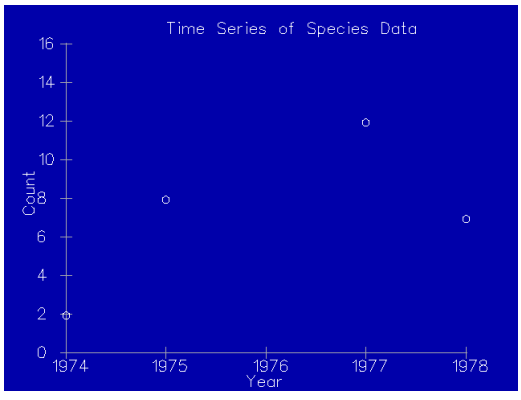

Figure 6. Warbling vireo population trend for the Aztec Peak BBS Route 1974-1978.

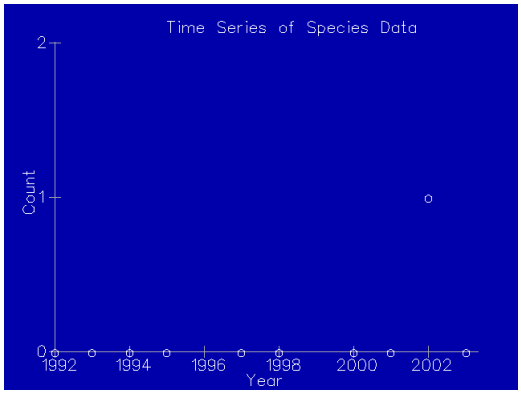

Figure 7. Warbling vireo population trend for the Bartlett Reservoir BBS Route 1982-2003.

Recommended Survey Methods

Baseline data specific to the Tonto National forest could be collected using standard point count methodology for the grassland species chosen to indicate grass species diversity. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol. The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most efficient and data-rich method of counting birds. This is the preferred method in forested habitats or difficult terrain."

Line transects are another method used to determine an estimate of population trends, if done over a series of years. General information on line transect survey protocol can be found in *Field Guidelines for Using Transects to Sample Nongame Bird Populations* (Mikol 1980). In either survey method, survey points or transects are randomly distributed, stratified by habitat types.

The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda, every five years… Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (USDA Forest Service 1985). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

American Ornithologists' Union, Committee on Classification and Nomenclature. 1983. Check-list of North American Birds. 6th ed. Amer. Ornithol. Union 1983. Allen Press, Inc., Philadelphia, PA. *In* NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA.

American Ornithologists' Union. 1998. Check-list of North American birds. 7th ed., Am. Ornithol. Union, Washington, D.C. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Beal, F. E. L. 1907. Birds of California in relation to the fruit industry. Pt. 1 USDA Bio. Surv. Bull. 30. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Bent, A. C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies US Natl. Bull. 197. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon & Schuster, Inc., New York.

Friendmann, H., and L. F. Kiff. 1985. The parasitic cowbirds and their hosts. Proc. West. Found. Vertebr. Zool. 2:225-304. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Friedmann, H., L. F. Kiff, and S. I. Rothstein. 1977. A further contribution to knowledge of the host relations of the parasitic cowbirds. Smithson. Contrib. Zool. 235:1-75. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Gardali, T. and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). *In* The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Howell, S. N. G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford Univ. Press, New York.

James, F. C. 1971. Ordinations of habitat relations among breeding birds. Wilson Bull. 83:215-236.

James, R. D. 1976. Foraging behavior and habitat selection of three species of vireos in southern Ontario. Wilson Bull. 88:62-75.

MacKenzie, D. I., S. G. Sealy, and G. D. Sutherland. 1982. Nest-site characteristics of the avian community in dune-ridge forest. Delta Marsh, Manitoba: a multivariate analysis. Can J. Zool. 60:2212-2223. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Marzluff, J. M., and L J. Lyon. 1983. Snags as indicators of habitat suitability for open nesting birds. Pp. 140-146 *In* Snag Habitat Management (J. S. Davis, G. A. Goodwin, and R. A Ockenfels, tech. cords.). USDA For. Serv. Rocky Mtn. For. And Range Exp. Stn. Gen. Tech. Rep. RM-99. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Peck, G. K., and R. D. James. 1987. Breeding birds of Ontario: nidiology and distribution. Vol 2: passerines. Life Sci. Misc. Publ., Toronto, Ontario. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Petit, D. R., K. E. Petit, and L. J. Petit. 1990. Geographic variation in foraging ecology of North American insectivorous birds. Stud. Avian Bio. 13:254-263. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Pyle, P. 1997 Identification guide to North American birds. Pt. I: Columbidae to Ploceidae. Slate Creek Press, Bolinas, CA. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Remsen, J V. Jr., S. W. Cardiff, and D. L. Dittman. 1996. Timing of migration and status of vireos (Vereonidae) in Louisiana. J. Field Ornithol. 67:119-140. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Rust, H. J. 1920. The home life of the western warbling vireo. Condor 22:85-49. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Stiles, F. G., and A. F. Skutch. 1989. A guide to the birds of Costa Rica. Cornell Univ. Press, Ithaca, NY.

Terrill, S. B., and L. S. Terrill. 1981. On the field identification of yellow-green, red-eyed, Philadelphia and warbling vireos. Continental Birdlife 2:144-149. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Walsberg, G. E. 1981. Nest-site selection and the radiative environment of the warbling vireo. Condor 83:86-88.

Ward, D., and J. N. M Smith. 2000. Brown-headed cowbird parasitism results in a sink population in warbling vireos. Auk 117:337-344.

Webster, R. 1970. Warbling vireo wintering in California. Calif Birds 1:105-106. *In* T. Gardali and G. Ballard. 2000. Warbling vireo (*Vireo gilvus*). The Birds of North America, No. 551 (A Poole and F. Gill, eds). The Birds of North America, Inc., Philadelphia, PA.

26. WESTERN BLUEBIRD: *Sialia mexicana*

MIS Role: Forest openings in ponderosa pine/mixed conifer type.

SUMMARY OF KEY HABITAT COMPONENTS

- Open woodland and edge habitat
- Oak and ponderosa pine snags
- Dependable berry and insect production

Species description

Adult male: Bright blue upperparts and throat, brownish patch on back with orange-red breast and sides; belly and undertail coverts gray.
Adult female: Blue wings and tail duller than male; crown and back gray; eye ring. Gray throat, brownish wash to breast and sides, gray belly and undertail coverts.

Distribution

The breeding range of western bluebird extends from southern British Columbia, western and south-central Montana south through the mountains to northern Baja California, Michoacan, Puebla, and central Veracruz, Mexico (AOU 1983). In the southwestern United States western bluebird flocks are nomadic in winter, traversing large areas in

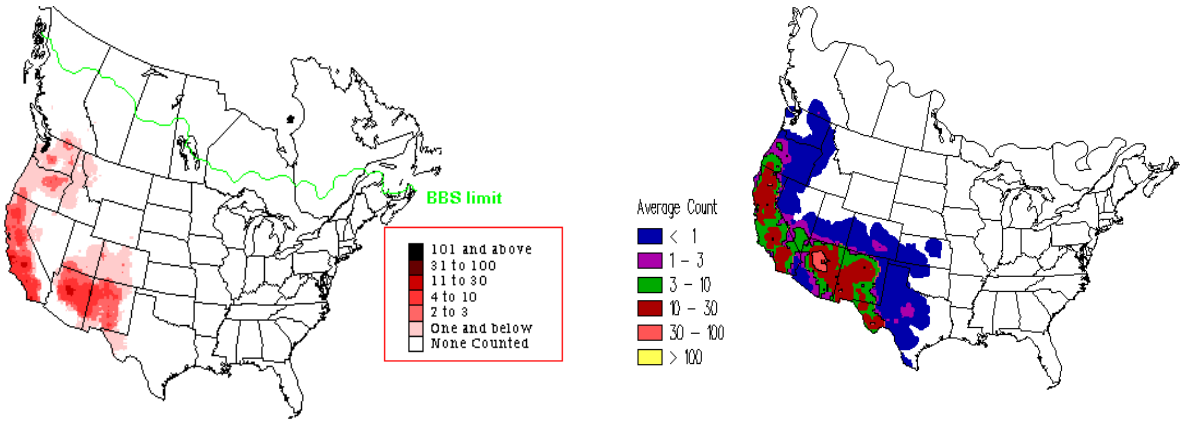

Figure WEBL-1: North American distribution of Western bluebirds in summer (left; from Breeding Bird Surveys) and winter (right; from Christmas bird counts).Sauer et.al. 2001

search of berries and water. There is some evidence that they follow regular foraging routes (Balda 1987).

Habitat

Western bluebirds normally occupy open woodland or edge habitat with exposed perches and fairly sparse ground cover (Pinkowski 1979). They are frequent drifters in pinyon-juniper woodlands in winter; density depends on availability of mistletoe (*Phoradendron*

spp.) and juniper berries). In the southwestern United States western bluebird flocks are nomadic in winter, traversing large areas in search of berries and water. There is some evidence that they follow regular foraging routes (Balda 1987).

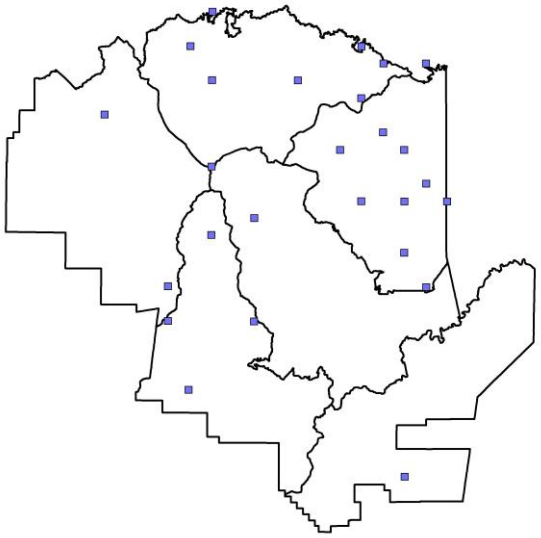

Figure WEBL-2: Block locations where breeding western bluebird were found- based on Arizona Breeding Bird Atlas.

Szaro and Balda (1982) listed western bluebirds as preferring lightly or moderately disturbed areas in northern Arizona ponderosa pine communities. Highest densities of western bluebirds were observed in plots that had been irregularly cut in strips. Severely thinned plots had lower western bluebird densities than irregular strip cut plots, but lowest western bluebird densities occurred in untreated plots. There were fewer individuals and fewer species present after wet winters (heavy snowfall) than after mild winters. The combination of lower temperatures and more precipitation during the winter and early spring is important in determining the survival of permanent residents including western bluebird.

In ponderosa pine-oak forests of Arizona, western bluebirds are less sensitive to low snag densities than other cavity nesters, using oaks more often in areas with few ponderosa pine snags (Cunningham et al 1980). In Arizona Szaro (1976) recorded the replacement of western bluebird by mountain bluebird following clearcutting in ponderosa pine forests.

Hejl (1994) hypothesized that species associated with burns and/or snags, such as western bluebirds, are less abundant in the United States than they were 100 years ago. Populations in the southwest have probably declined due to forest closure as a result of fire exclusion. Based on data from Raphael and others (1988), she also hypothesized a local population increase in northwestern Douglas-fir forests because logging has resulted in increased amounts of early successional habitats (Hejl 1994)

Breeding

Balda (1975) recommended a snag density of 2.6 per acre (6.5/ha); however, a study by Cunningham and others (1980) indicated that snag density of 2.1 per acre (5.2/ha) is sufficient. In northern Arizona, Brawn (1988) observed that nest boxes appeared to be preferred over natural cavities in ponderosa pine forests.

The average diameter of ponderosa pine snags used by western bluebirds (23 nests) was 26.5 inches (67.6 cm), ranging from 12 to 45 inches (29.5-114.6 cm). The average

diameter of oaks used by western bluebirds (9 nests) was 14 inches (35.6 cm), ranging from 10 to 26 inches (25.4-65.0 cm) (Cunningham et al 1980).

Food Habits

Mainly insectivorous; feeds on grasshoppers, caterpillars, beetles, etc. Also eats other invertebrates (spiders, earthworms, sow bugs, etc.). Feeds seasonally on berries and other fruit. Forages by flycatching and by dropping from perch to ground (Sauer et al. 2001)

Tonto National Forest MIS Status

Management Indicator Species (MIS) were selected to adequately monitor the effects of implementation of the Proposed Action in the Forest Land Management Plan (FLMP) on wildlife habitat and species diversity. In the Tonto National Forest Land Management Plan Appendix G (USDA Forest Service 1985), the western bluebird was selected as an MIS species for forest openings in the ponderosa pine/mixed conifer vegetation types.

Ponderosa pine/mixed conifer

In the Environmental Impact Statement (EIS) for the Tonto FLMP, page 108 Table 20, the conifer vegetation type was determined to cover approximately 283,200 acres on the Tonto. Table 10 in Appendix K of the FLMP (Amendment 22, page 268, 6/5/96) indicates that this is also the desired management condition at the end of the fifth period.

Forest-wide management direction can be found in Amendment 21, 5/3/95, replacement pages 38 to 52, which also incorporates Amendment 22, 6/5/96. Direction that specifically affects habitat for western bluebirds includes:

1. Spruce-fir: Leave at least 3 snags, 5 downed logs and 10-15 tons of woody debris per acre.

2. Mixed conifer: Leave at least 3 snags, 5 downed logs and 10-15 tons of woody debris per acre.

3. Ponderosa Pine: Leave at least 2 snags, 3 downed logs and 5-7 tons of woody debris per acre.

4. A preferred snag is 18 inches in diameter and 30 feet tall.

5. Retain key forest components such as oak.

6. Maintain or obtain a minimum of 30% effective ground cover.

Specific direction is also given for individual management units in the FLMP. Below are some additional guidelines that are important to the management of the western bluebird:

7. On those acres suitable for timber harvest, strive to achieve a structural diversity similar to what is described in the table below (Amendment 22, replacement pages 156-210, 6/5/96):

% of Acres	Age Class	Size Class	Management Indicator Species	Cover Class
8[1/]	0	Permanent Openings	Elk, turkey, western bluebird, violet-green swallow	Forage
13.3	0-20	Regenerated Seedlings	Elk, turkey	Forage
13.3	21-40	Saplings/Poles	Elk, turkey	Forage - Hiding
13.3	41-60[2/]	Poles	Elk	Forage - Hiding
13.3	61-80[2/]	Poles/Sawtimber	Elk, Abert's squirrel	Hiding/Thermal – Forage
13.3	81-100	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird	Thermal
13.3	101-120	Sawtimber	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow	Thermal
10.0	121-180[3/]	Sawtimber/Vertical Diversity	Elk, Abert's squirrel, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch	Thermal/Forage
10.0	181-240[3/]	Sawtimber/Vertical Diversity	Elk, Hairy woodpecker, western bluebird, Violet-green swallow, pygmy nuthatch, goshawk, turkey	Thermal/Forage

8. The oak component of the conifer type and the encinal oak type will be maintained.

9. Manage the oak component to maximize an optimum mix of mast and browse to accomplish wildlife objectives.

10. Where snags are not present, they will be created by leaving 2-3 trees from regeneration cuts as potential snags.

Population

During the breeding season western bluebird density in northern Arizona ponderosa pine forests at 6,930 to 7,590 feet (2,100-2,300 m) elevation was observed in three different habitat structures, comparing plots with nest boxes to plots with no nest boxes (control plots). The three treatment plots consisted of ponderosa pine stands that had been severely thinned (open), moderately thinned (thinned), and uncut for 60 years (dense). There were higher densities of breeding western bluebirds on open and thinned plots with nest boxes than on similar habitat with no nest boxes. The amount of increase was about the same open and thinned plots. Breeding densities were similar on dense plots with and without nest boxes. The authors concluded that nest site availability influenced breeding density in areas with limited nest sites. Brawn (1988) found no negative effects on fledging success with increased breeding population density with added nest boxes. However, other factors such as availability of foraging perches may affect breeding density when nest sites are plentiful (Brawn and Balda 1988).

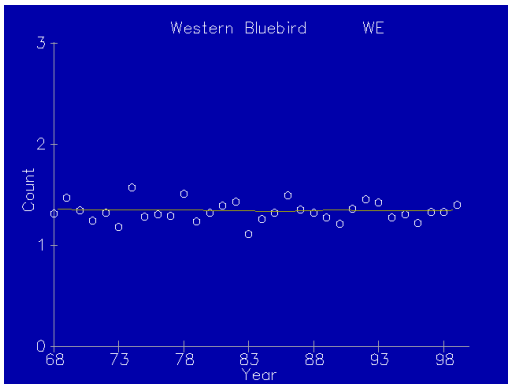

Figure WEBL-3: Western bluebird trends in the Western BBS Region from BBS data (Sauer et al. 2001).

Data from the NatureServe Explorer website (2001) at http://www.natureserve.org/ shows their Heritage Status as of March, 1997 as follows:

- **Global status**: G-5. (Common, demonstrably widespread, abundant, and secure throughout their range.)
- **U.S. status:** N5. Secure: (Common, widespread, and abundant.)
- **Arizona status:** S5. Secure. (Common, widespread, and abundant.)

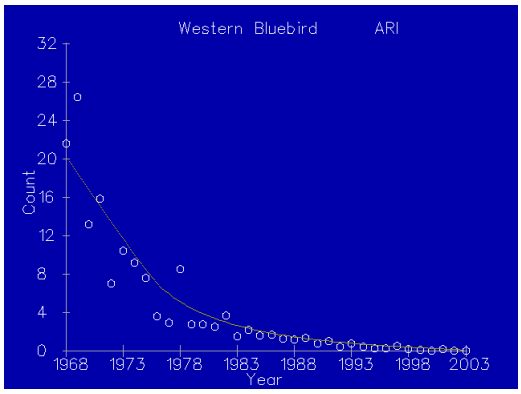

Figure WEBL-4: Western bluebird trends in Arizona from BBS data 1968-2003 (Sauer et al. 2004).

Appendix K of the FLMP (Amendment 22, page 269, 6/5/96) predicted a slight increase in population (10%) by the year 2030 (Table 11) for the western bluebird.

Refer to Figures WEBL-3 and 4 for western bluebird population trends from 1968 to 2003 in Arizona (from the USGS Patuxent Wildlife Research Center website).

Tonto National Forest Population Trend

The Tonto Village BBS transect is the only location where this species is detected during survey efforts. Data suggests this species is encountered at low densities (Figure 6). Statewide CBC suggests that this species is commonly documented during winter months (Figure 5). Based on this information, this species is considered **stable** on TNF.

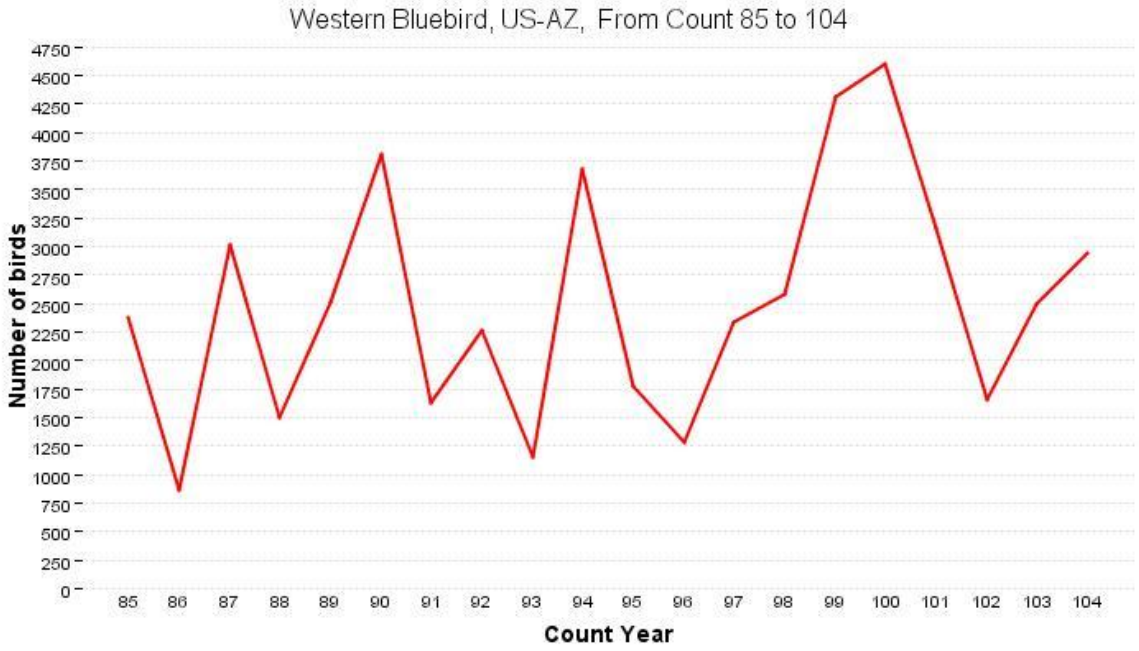

Figure 5. Western bluebird population trend for the Arizona region 1985-2004 (National Audubon Society 2005)

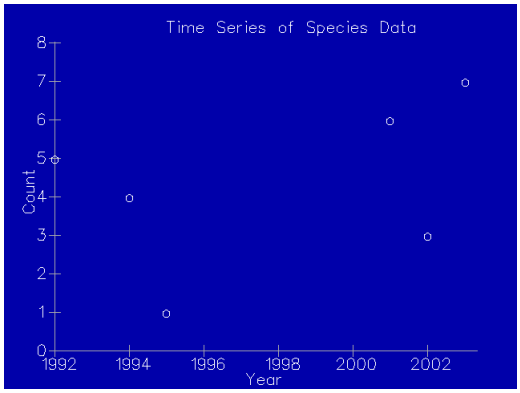

Figure 6. Western bluebird population trend for the Tonto Village BBS route 1992-2003

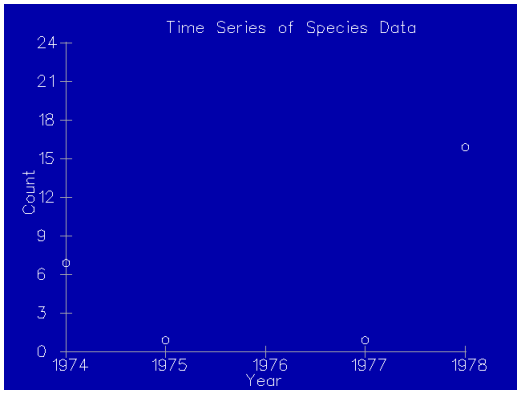

Figure 7. Western bluebird population trend for the Aztec Peak BBS route 1974-1978.

Literature Cited

American Ornithologists' Union. 1983. Checklist of North American birds. 6th ed. Lawrence, KS: Allen Press, Inc. 877 p.

Balda, R. P. 1975. The relationship of secondary cavity nesters to snag densities in western coniferous forests. Wildlife Habitat Technical Bulletin No. 1. Albuquerque, NM: U.S. Department of Agriculture, Forest Service, Southwestern Region. 37 p.

Balda, R. P. 1987. Avian impacts on piñon-juniper woodlands. In: Everett, Richard L., compiler. Proceedings--piñon-juniper conference; 1986 January 13-16; Reno, NV. Gen. Tech. Rep. INT-215. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 525-533.

Brawn, J. D. 1988. Selectivity and ecological consequences of cavity nesters using natural vs. artificial nest sites. Auk. 105(4): 789-791.

Brawn, J. D. and R. P. Balda. 1988. Population biology of cavity nesters in northern Arizona: do nest sites limit breeding densities? Condor. 90: 61-71.

Cunningham, J. B.; R.P. Balda and W.S. Gaud. 1980. Selection and use of snags by secondary cavity-nesting birds of the ponderosa pine forest. Res. Pap. RM-222. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 15 p.

Hejl, S. J. 1994. Human-induced changes in bird populations in coniferous forests in western North America during the past 100 years. Studies in Avian Biology. 15: 232-246.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, Virginia, USA: NatureServe. Available: http://www.natureserve.org/explorer (Accessed: September 6, 2002).

Pinkowski, B. C. 1979. Foraging ecology and habitat utilization in the genus Sialia. In: Dickson, James G.; Conner, Richard N.; Fleet, Robert R.; [and others], editors. The role of insectivorous birds in forest ecosystems: Proceedings of a symposium; 1978 July 13-14; Nacogdoches, TX. New York: Academic Press, Inc.: 165-190.

Raphael, M.; K.V. Rosenberg and B.G. Marcot. 1988. Large-scale changes in bird populations of Douglas-fir forest, northwestern California. Bird Conservation. 3: 63-83.

Sauer, J. R., J. E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966 - 2004. Version 2001.2, USGS Patuxent Wildlife Research Center, Laurel, MD

Szaro, R. C. 1976. Population densities, habitat selection, & foliage use by the birds of selected ponderosa pine areas in the Beaver Creek Watershed, Arizona. Flagstaff, AZ: Northern Arizona University. 264 p. Ph.D. Dissertation.

Sauer, J.R., G.A. Gough, and M. Iliff. Patuxent Bird Identification Infocenter. 1998. Version 97.1. Patuxent Wildlife Research Center, Laurel, MD.
http://www.mbr-pwrc.usgs.gov/Infocenter/infocenter.html

Szaro, R. C. and R.P. Balda. 1982. Selection and monitoring of avian indicator species: an example from a ponderosa pine forest in the Southwest. Gen. Tech. Rep. RM-89. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 8 p.

Szaro, R. C. and R.P. Balda. 1986. Relationships among weather, habitat structure, and ponderosa pine forest birds. Journal of Wildlife Management 50(2): 253-260.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest Land Management Plan. Denver, CO.

27. WESTERN WOOD PEEWEE: *Contopus sordidulus*

MIS Role: Medium overstory in high elevation riparian.

SUMMARY OF KEY HABITAT COMPONENTS

- Mature high elevation riparian broadleaf communities (tall riparian trees with large dbh)
- Low to medium canopy cover and basal area, either within or adjacent to a riparian corridor
- Open under-story with openings, either within or adjacent to riparian corridor
- Snag density = 2/acre in ponderosa pine and 3/acre in mixed conifer – distributed throughout the landscape including adjacent to and within the riparian corridor

Species Description

This is a small flycatcher, being just 5.5 to 6.3 inches in length (Bemis and Rising 1999), with a wingspan of 10.5 inches (Alsop III 2001). Adults have dark, grayish brown upperparts, wings with indistinct, pale wingbars, and dull whitish underparts, becoming dusky on the breast and flanks. The bill is dark. Its feet are grayish-black. Both sexes are similar in appearance. Juvenal plumage (observed June – Nov.) is similar to that of the adults, but the upperparts have a brownish-cinnamon wash. the wing bars are distinctly buff or cinnamon (Pyle 1997), and the upperparts and breast appear darker than that of adults (Kaufman 1990).

Distribution

The Birds of North America (Bemis and Rising 1999) lists this species as being widely distributed, from Alaska and western Canada south into the western US, the mountains of Mexico, the Honduras, and possibly into north-central Nicaragua and Costa Rica (Stiles and Skutch 1989). This neotropical migrant winters from Colombia and Venezuela south to Peru and Bolivia and return to its U.S. nesting range in April to May (Terres 1980).

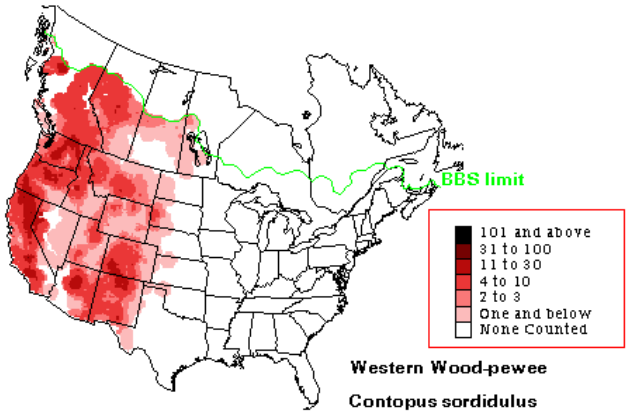

Figure 2 – Western wood-peewee: Breeding distribution in North America based on breeding bird surveys. Sauer et.al. 2001

Habitat

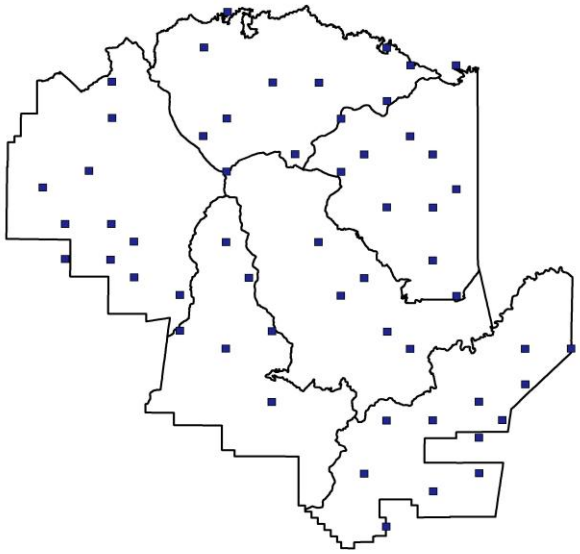

Figure WEWP-2: Block locations where breeding western wood-pewee were found- based on Arizona Breeding Bird Atlas.

Western wood pewees are habitat generalists, breeding in relatively open coniferous and coniferous-deciduous forests, forest edges, and poplar or riparian woodlands at elevations ranging from sea level to over 9,000 feet. They are not found in dense forests (Bemis and Rising 1999). They use aspen (*Populus tremuloides*) , conifer, willow (*Salix* spp.) associations, and to a limited extent, open pine (*Pinus* spp.) stands (Morrison et al. 1977). "Important habitat components may include large tree diameters, open understory, edge characteristics, and dead trees or trees with dead limbs" (Kilgore 1971, Flack 1976, Ryser 1985). "Preferred habitats support low to intermediate percent canopy cover, forest edge, and wooded habitat with clear areas " (USFS 1982). More open stands appear to support their foraging behavior (Pollock, Tonto National Forest unpubl.).

In Arizona, nesting areas are provided by sycamores (*Platanus* spp.), cottonwoods (*populus* spp.), and other trees along mountain streams at approximately 4,900 to 5,900 feet elevation (Terres 1980), riparian woodland, approximately 2,950 to 3,280 feet (Carothers et al. 1974), ponderosa pine (*Pinus ponderosa*) forest (Szaro and Balda 1979), and pine-oak-juniper (*Pinus-Quercus-Juniperus* spp.) habitat (Cody 1981).

Breeding

In a study in mixed riparian forest in northern California, western wood pewee nest trees were most commonly located in cottonwoods, black walnuts (*Juglans nigra*), and sycamores (Bemis 1996). In a study in New Mexico by D. Curson and Goguen (*in* Bemis and Rising 1999), nests were found exclusively in pinyon pine (*Pinus edulis).* They usually nest on a horizontal limb far from the trunk, ranging anywhere from near ground level to over 80 feet in height. Their neat, compact cup nests are well-camouflaged by their construction with plant fibers, spider webs, and other plant materials. Nest building begins in early May through August (ibid.). From 2 to 4 eggs are laid on average. Incubation lasts 14 to 15 days on average and the young fledge in approximately 15 days. Their nests are infrequent hosts to brown-headed cowbird (*Molothrus ater*) (Friedman and Kiff 1985).

Food Habits

The main foods taken are flying insects, especially flies, ants, bees, wasps, beetles, and bugs (Bemis and Rising 1999). Western wood pewees forage from high, exposed perches on the tops and outer canopy of trees, as well as telephone wires, (Verbeek 1975) by sitting and waiting and then flying out to catch prey.

Tonto National Forest MIS Status

Management Indicator Species were selected to adequately monitor the effects of implementation of the Proposed Action in the FLMP, on wildlife habitat and species diversity. In the Tonto Forest Land Management Plan (USDA Forest Service 1985), the western wood pewee was selected as a Management Indicator Species for the High Elevation (>3,000 ft) Riparian Vegetation Type (Appendix G, Tonto FLMP) and was considered to be an indicator for medium riparian overstory. In 2000, the Tonto National Forest and the Arizona Game and Fish Department cooperatively conducted a review of the Forest's MIS species. In that process, it was noted that this species is also common in pine stands adjacent to riparian corridors (Pollock, Tonto National Forest unpubl.).

Table 10 in Appendix K of the FLMP (Amendment no. 22, 06/05/96 page 268) indicates that 35,022 are also the desired vegetation condition at the end of the fifth period. The policy and Management Direction {from the desired future condition report (TNF 1982)} is to rehabilitate all riparian areas to fair or better condition by 2000.

Forest wide management direction can be found in Amendment No. 21, 5/3/95 replacement page 38 to page 52, which also incorporates Amendment No.22 06/05/96. Direction that specifically affects riparian habitat and other necessary habitat for the western wood-peewee include:

1. Rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80% of the potential overstory crown coverage.
2. Coordinate with range to achieve at least 50% of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030. Type 1 characteristically contains tall trees>20 feet high with the highest layer forming somewhat of a closed canopy. Substantial vegetation is also present in the two lower layers (shrub and grass layer).
3. Coordinate with range to achieve utilization in the riparian areas that will not exceed 20% of the current annual growth by volume of woody species.
4. Re-establish riparian vegetation in severely degraded but potentially productive riparian areas.

In addition to Forest Plan standards and guidelines, desired future conditions for the riparian and other necessary habitat types include:

1. Achieve a mix of stand age classes to provide horizontal diversity and increased edge in the conifer type.

2. In the pinyon-juniper vegetation type, manage for a savannah aspect by leaving a minimum of four mature trees per acre.

3. Have rest rotation grazing system and proper stocking rates implemented by 1995.

In 1997, the Forest Supervisor provided direction which clarified the above standards. Standards for riparian vegetation utilization, bank alteration and other grazing related practices were established (Johnson and Ross 1997). These standards require (as a minimum):

1. less than 50% utilization on current years growth on woody vegetation less than five feet in height.

2. less than 50% utilization on herbaceous vegetation.

3. less than 20% bank alteration.

4. Monitor utilization standards under the key area concept.

5. Not salting within ¼ mile; winter grazing is preferred.

Refinements to these standards, including use of height/weight curves for deergrass and a finalized Forest monitoring protocol (Johnson and McBride 2002) provide further direction in riparian streamside management. As grazing allotments go through the environmental analysis process, utilization standards in riparian areas are further reduced below maximum acceptable levels to meet MIS, ESA, watershed, riparian or other objectives.

Other Forest-wide Riparian Management Practices:

1. Forest-wide Riparian Monitoring Team – this team usually conducts midseason and end of season monitoring on key riparian areas on most grazing allotments on the Forest.
2. Forest Drought Policy development and implementation – establishes trigger for evaluating range conditions on the forest based on long-term rainfall. Most livestock were removed from the forest in 2002 due to drought conditions.

Population Trends

Western wood pewees are listed as having a Global Heritage Status Rank of G5, which indicates the species is considered globally secure and common, widespread, and abundant; although it may be rare in portions of its range; on data provided on the NatureServe Explorer website (2001, http://www.natureserve.org/explorer/ranking.htm), In the U.S., they are listed as N5B, i.e. secure, common, widespread, and abundant. In Arizona, they are listed as S5, secure, common, widespread, and abundant within their breeding range (ibid.). "NatureServe and the Heritage Natural Network was formed in 1999 as the Association for Biodiversity Information when The Nature Conservancy and

the Natural Heritage Network jointly established an independent organization to advance the application of biodiversity information to conservation" (NatureServe Explorer website 2001).

Breeding Bird Survey (BBS) trend estimates from 1966 to 1994 for both the US states and Canadian provinces over 591 survey routes show a significant decline of 1.5 percent. British Colombia, California, Oregon, Arizona, and New Mexico show significant declines, with only Montana showing a significant increase. In south-central Alaska, this species has increased in places where spruce bark beetle has killed large numbers of mature white spruce (*Picea engelmannii*) (Bemis and Rising 1999). Western wood pewees also increased in the San Benito Mountains, California from 1983-1984, possibly due to increased rainfall during the preceding 50 years combined with past fires and logging (Johnson and Cicero 1985).

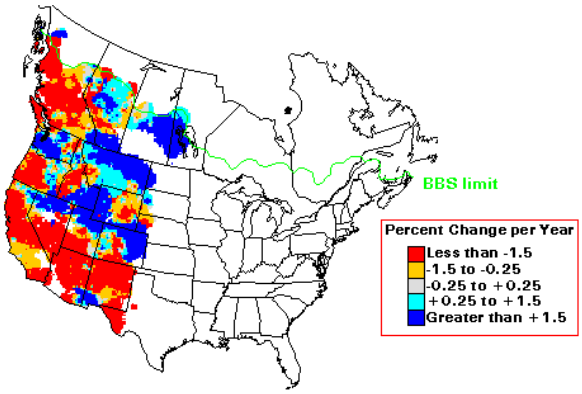

Figure 3. Western wood pewee trends for the years 1968 to 1998 in Arizona. (Sauer et al. 2001)

Data for Arizona (Figure 4) and the Tonto National Forest appear suggest declines in western wood-peewee populations also. Much of this is likely due to alterations of key habitat components, especially riparian area structure. Emphasis on restoration and improved management should benefit this species.

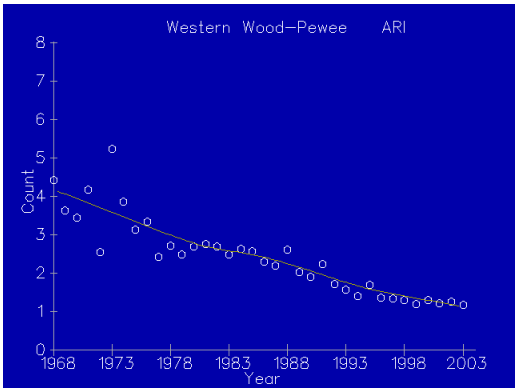

Figure 4 – Western wood-peewee: Trend analysis for 1968-2003 indicates a decrease in Arizona according to breeding bird surveys **(**Sauer et.al. 2004).

Tonto National Forest Population Trend

BBS data for the Tonto Village route suggests that his species occurs at low densities (Figure 7). Other routes do not exhibit the necessary habitat parameters to support this species. Statewide CBC suggests that this species occurs at low densities throughout the state (Figure 5). On the Tonto Basin Ranger District in 2003, this species was documented 55 times on seven different dates on 4 survey routes (Plank 2005). Precipitous declines in this species may be related to declines in high elevation riparian habitat that are used for breeding habitat. Based on this information, populations for this species appear to be **declining** on TNF.

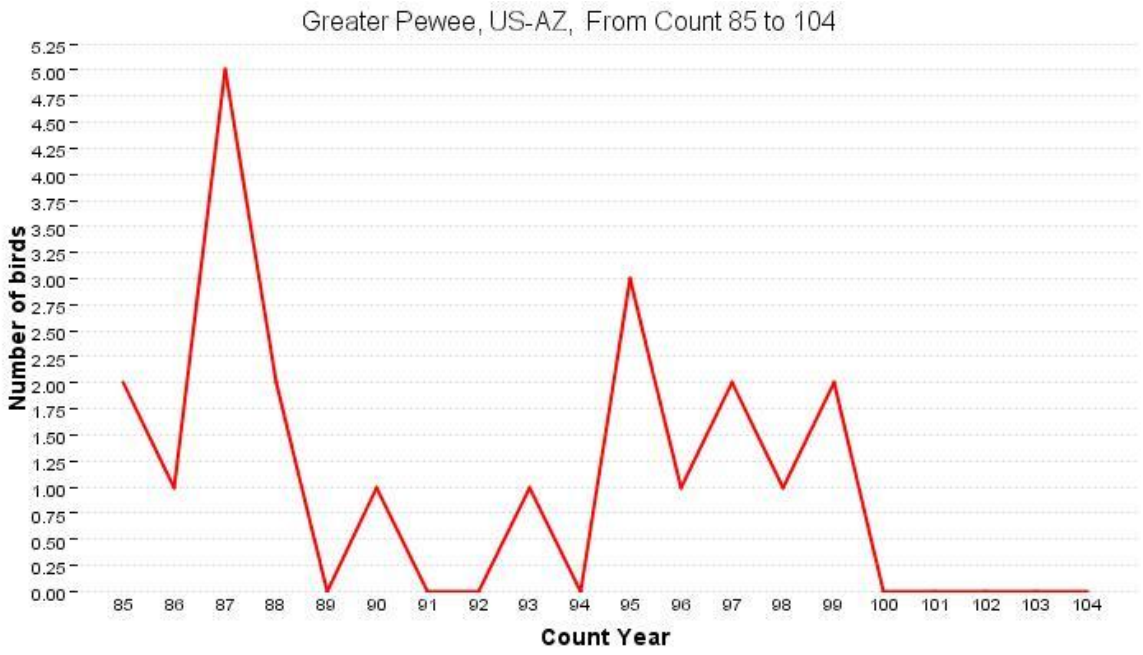

Figure 5. Pewee population trend for the Arizona region 1985-2004 (National Audubon Society 2005).

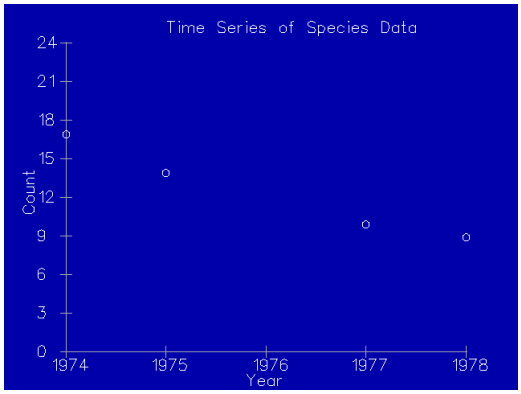

Figure 6. Pewee population trend for the Aztec Peak BBS Route 1974-1978.

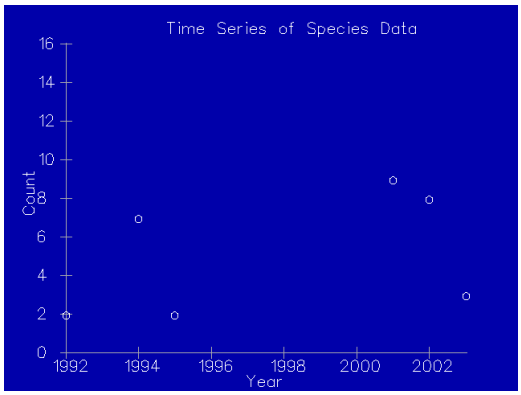

Figure 7. Pewee population trend for the Tonto Village BBS Route 1992-2003.

Recommended Survey Methods

Baseline data specific to the Tonto National forest could be collected using standard point count methodology. Refer to the Patuxtent Wildlife Research Center website listed above or Ralph et al. (1993) for a detailed description of the survey protocol.

The point count methodology provides a systematic, standardized collection of information on songbird population trends, on a large geographic scale, if completed over a series of several years. This method provides only a measure of population abundance. It will not provide information as to the cause of population declines, once they are noted. The point counts should be located within the habitat being studied, and not just along road sides to gain a more accurate count. This will also allow the surveyor to record characteristics of vegetation and habitat and match them with the information gathered on bird abundance (Point Reyes Bird Observatory 1993). Additional information, such as differences in species composition between habitat types and abundance patterns can be also detected using point counts. According to *The Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993), "The point count method is probably the most efficient and data-rich method of counting birds. This is the preferred method in forested habitats or difficult terrain."

Line transects are another method used to determine an estimate of population trends, if done over a series of years. General information on line transect survey protocol can be found in *Field Guidelines for Using Transects to Sample Nongame Bird Populations* (Mikol 1980). In either survey method, survey points or transects are randomly distributed, stratified by habitat types.

The *Tonto National Forest Land Management Plan* (USDA Forest Service 1985) describes a method of monitoring population trends using variable plot sampling and point sampling (60 points) located randomly or along 350 foot transect lines, three times per breeding season, "as described in GT-RM-89 by Szaro and Balda, every five years.. Relative species frequencies, species composition, and relative densities will be used to infer or indicate desired condition or trend of habitat within the ponderosa-mixed conifer vegetation type" (ibid.). Surveys completed every year or on alternate years would provide much better trend information and would allow the Forest Service to react more quickly to any perceived downtrends in population trends.

Literature Cited

Alsop, F. J. III. 2001. Birds of North America: western region. DK Publishing, Inc. New York.

Bemis, C. 1996. Nest site selection and nesting success of the western wood pewee (*Contopus sordidulus*) in the Sacramento Valley, California. M.S. Thesis, California State Univ., Chico *In C.* Bemis and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Bemis, C. and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). *In* The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Carothers, S. W., R. R. Johnson, and S. W. Aithchison. 1974. Population structure and social organization of southwestern riparian birds. Am. Zool. 14:97-108. *In* C. Bemis and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Cody, M. L. 1981. Habitat selection in birds: the roles of vegetation structure, competitors, and productivity. BioScience 31: 107-113. *In* C. Bemis and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Flack, J. A. D. 1976. Bird populations of aspen forests in western North America, Ornithol. Monogr. 19. *In* C. Bemis and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Freidmann, H., and L. F. Kiff. 1985. The parasitic cowbirds and their hosts. Proc. West. Found. Vertebr. Zool. 2:225-304. *In* Bemis, C. and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Johnson, N. K., and C. Cicero. 1985. The breeding avifauna of San Benito Mountain, California: evidence for change over one-half century. West. Birds 16:1-23 *In C.* Bemis and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Kaufman, K. 1990. A field guide to advanced birding. Houghton Mifflin Co., Boston, MA.

Kilgore, B. M. 1971. Response of breeding bird populations to habitat changes in a Giant Sequoia forest. *In* C. Bemis and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Mikol, S. A. 1980. Field guidelines for using transects to sample nongame bird populations. FW/OBS-80/58, for Western Energy and Land Use Team, Fish and Wildlife Services, Washington D.C.

Morrison, M. J., V. H. Reid, R. E. Pillmore, and M. C. Hammer. 1977. Birds and mammals of the Manitou Experimental Forest, Colorado. USDA Forest Service Gen. Tech. Rep. Rm-38. CO.

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc May 2005.

NatureServe Explorer. An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA. USA. NatureServe. Available: http://www.natureserve.org/explorer.

Point Reyes Bird Observatory. 1993. On behalf of songbirds: California planning and action for the Partners in Flight Initiative. Pt. Reyes Bird Observatory Publ. in cooperation with California Dept. of Fish and Game, National Audubon Society, National Park Service, and USDA Forest Service. Stinson Beach, CA.

Plank, H. 2005. unpubl. Tonto National Forest Management Indicator Species (MIS) Survey Data. USDA Forest Service, Tonto National Forest, Region 3. Tonto Basin, AZ.

Pollock, D. A. unpubl. Tonto National Forest Management Indicator Species (MIS) unpubl. USDA Forest Service, Tonto National Forest, Region 3. Payson, AZ.

Pyle, P. 1997. Identification guide to North American Birds. Part I. Columbidae to Ploceidae. Slate Creek Press, Bolinas, CA.

Ralph, J.C., G.G. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. The handbook of field methods for monitoring landbirds. USDA Forest Service Pacific Southwest Research Center Gen. Tech. Rep. PSW-GTR-144. Pacific SW Research Station, Albany, CA.

Ryser, F. A., Jr. 1985. Birds of the Great Basin: a natural history. Univ. of Nev. Press. *In* C. Bemis and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey Results and Analysis 1966-2004. Version 2001.2. USGS Patuxtent Wildlife Research Center, Laurel, MD.

Stiles, F. G., and A. F. Skutch. 1989. A guide to the birds of Costa Rica. Cornell Univ. Press, Ithaca, NY

Szaro, R. C., J. D. Brawn, and R. P. Balda. 1990. Yearly variation in resource-use behavior by ponderosa pine forest birds. Stud. Avian Biol. 13:226-236.

Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York.

USDA Forest Service, Southwestern Region. 1985. Tonto National Forest land management plan. Denver, CO.

Verbeek, N. A. M. 1975. Comparative feeding behavior of three coexisting tyrannid flycatchers. Wilson Bull. 87:231-240. *In C.* Bemis and J. D. Rising. 1999. Western wood pewee (*Contopus sordidulus*). The Birds of North America, No. 451 (A. Poole and F. Gill, eds.). Philadelphia, PA.

28. AQUATIC MACROINVERTEBRATES

Macroinvertebrates (class *Insecta*) are the most abundant and diverse group of animals found on earth. Aquatic macroinvertebrates inhabit a diverse array of aquatic environments including springs, rivers, lakes, reservoirs, ponds, and wetlands. These animals lack a backbone, are greater than 0.5 mm in body size, and require an aqueous environment to persist and reproduce.

Aquatic macroinvertebrates were selected as a management indicator (MIS) for late-seral riparian and aquatic habitats across elevational gradients for the Tonto National Forest. Macroinvertebrates can be used to monitor the effects of land use activities such as mining, timber extraction, grazing, and road building in a watershed. Developing baseline data on groups or species of aquatic macroinvertebrates enables scientists and lands managers to evaluate the ecological health and productivity of the system. Groups or species of macroinvertebrates are classified by habitat preferences and life history characteristics. A main distinction between species or groups is their tolerance to pollution. Species are classified as Pollution Intolerant taxon or a Pollution Tolerant taxon. Monitoring of macroinvertebrate populations on a regular basis can detect negative land use activities that are impacting watersheds. The Monitoring Plan for the Tonto National Forest Land Use and Monitoring Plan specifies monitoring of aquatic ecosystem health through the systematic field sampling The United States Environmental Protection Agency (EPA 1989) identifies the following advantages of using macroinvertebrates for bioassessments and indicators of aquatic ecosystem health and functioning:

1. Because aquatic macroinvertebrates have limited migration patterns they are well suited for assessing localized, site-specific impacts in aquatic habitats.
2. Macroinvertebrates complete their life cycle in 1 – 2 years. Short-term perturbations or environmental stressors in the aquatic environment can is often reflected the structure and abundance of aquatic invertebrate communities.
3. Long-term degraded environmental conditions are reflected in the species composition and abundance of aquatic macroinvertebrate communities.
4. Sampling of macroinvertebrate communities is relatively simple and cost effective.
5. Aquatic macroinvertebrates are the primary food source of many recreationally and commercially important fish. An understanding of the macroinvertebrate community lends insight into the sustainability of forest fish resources.
6. Macroinvertebrates are often present in small aquatic systems where other higher-level aquatic life forms are absent.
7. Federal, State, and local governments routinely use aquatic macroinvertebrates evaluate aquatic health. Protocols for collection and evaluation are standardized which allows for comparison by various agencies.

Monitoring Methodology

To evaluate stream ecological health and water quality trends the following guidelines and methods have been established for the Tonto National Forest:

1. Establish aquatic macroinvertebrate sampling stations in 15 streams and conduct a Biotic Condition Index Survey (BCI) at each station in each stream.
2. Each stream and each station will be sampled 2 times per year every 5 years. Three macroinvertebrate samples will be taken at each sampling location. Macroinvertebrate samples will be collected using modified Hess or Surber samplers with 280 micron mesh. Samples will be preserved for analysis using 95% ethanol.
3. Samples will be analyzed by the Bureau of Land Management Aquatic Ecosystem Laboratory - Logan, Utah or other qualified macroinvertebrate analysts.

Table 1 lists the ecosystem health criteria and Biotic Condition Indices for Macroinvertebrate analysis and watershed health determinations**.**

Table 1. Watershed health criteria and respective Biotic Condition Indices developed for the analysis of macroinvertebrate collections by the Bureau of Land Management Aquatic Ecosystem Analysis Laboratory.

Ecosystem Health Rating	Diversity Index[1] (DAT)	Standing Crop[2] Dry g/m^2	Biotic Condition[3] Index (BCI)
Excellent	18-26	4.0-12.0	Above 90
Good	11-17	1.6-4.0	80-90
Fair	6-10	0.6-1.5	72-79
Poor	0-5	0.0-0.5	Below 72

[1] **DIVERSITY INDEX** is a measure of dominance and number of taxa where dominance of one taxon indicates stress and numerous taxa indicate health in an aquatic system.

[2] **STANDING CROP** is the dry weight or biomass in grams of macroinvertebrates per square meter.

[3] **BIOTIC CONDITION INDEX (BCI)** is a value expressed as a percent of expected. A community tolerance quotient is predicted based on its potential as determined by natural physical and chemical characteristics, then divided by the community tolerance quotient estimated from samples.

Population Trend:

Macroinvertebrates have been sampled in 15 perennial streams on the Tonto National Forest from 1986 to present. Perennial streams, sampling locations and elevation where macroinvertebrates have been sampled are given in Table 1. Results from 12 streams where long-term trends were available are presented.

Table 2. Streams and macroinvertebrate sampling locations for the Tonto National Forest listed from lowest elevation to highest elevation.

Stream	Station	Location	District	Elevation (ft)
Salt River	1	Coon Bluff	Mesa	1,329
Verde River	4	Ft McDowell	Cave Creek	1,483
Verde River	2	Sheep Bridge	Cave Creek	2,043
Sycamore Creek	3	Round Valley	Mesa	2,060
Wet Bottom Creek	1	Trail 11	Cave Creek	2,211
Pinal Creek	1	Salt River	Globe	2,303
Sycamore Creek	4	Mesquite Wash	Mesa	2,345
Cave Creek	1/2	Spur Cross	Cave Creek	2,482
Tonto Creek	3	Gun Gage	Tonto Basin	2,520
Pinto Creek	8	Henderson	Tonto Basin	2,532
Verde River	1	Childs	Cave Creek	2,655
Salome Creek	1	At Corral	Tonto Basin	2,774
Pinto Creek	1	Weir	Globe	2,877
Pinto Creek	2	Iron Bridge	Globe	3,146
Cherry Creek	1	Devils Chasm	Pleasant Valley	3,287
Sycamore Creek	2	Bushnell Gage	Mesa	3,321
East Verde River	3	Above Pine, AZ	Payson	3,367
Sycamore Creek	1	Bushnell	Mesa	3,389
Spring Creek	1	At Bryant	Pleasant Valley	4,313
East Verde River	2	At Hwy 87	Payson	4,504
Tonto Creek	2	Bear Flat	Payson	4,956
Haigler Creek	1	Alderwood Campground	Pleasant Valley	5,199
East Verde River	1	Below Dude Ck	Payson	5,306
Haigler Creek	2	Upper Campground	Pleasant Valley	5,318
Tonto Creek	1	Horton	Payson	5,446

Stream	Station	Location	District	Elevation (ft)
Haigler Creek	3	Fisherman's Point	Pleasant Valley	5,598
Christopher Creek	2	Campground	Payson	5,615
Christopher Creek	1	Above Campground	Payson	5,772
Canyon Creek	1	Below Mule Creek	Payson	6,388

Aquatic Conditions

Canyon Creek – Aquatic habitat conditions is Canyon Creek appear to be good and have remained stable from 1985 to 2005. Standing crop ranged from 9.1 in 1985 to 8.7 in 1990. This indicates an excellent food base for fishes. In contrast, however, BCI are low. BCI levels ranged from 68 in 1985 to 64 in 2001. This indicates that there are opportunities to improve stream conditions.

Cave Creek - BCI values in Cave Creek have declined from 70 in 1986 to 51 in 2005. This indicates poor conditions exist at present in this drainage.

Cherry Creek – The aquatic macroinvertebrate community in Cherry Creek is dominated by sediment tolerant taxa. There is a scarcity of clearwater species. In 1986 and 1987 the DAT values for Cherry Creek were 11.1 and 10.1, respectively. These values would rate the diversity as fair. Standing Crop values were 0.9 in 1986 and 1.9 in 1987. BCI values in 1986 and 1987 were 74 and have declined to 59 in 2005. Overall conditions in Cherry Creek appear to be declining.

Christopher Creek - Aquatic conditions are improving in Christopher Creek as by BCI values. In 1986 BCI values were 65and 67 whereas in 1991 BCI values were 76 and 78. Standing crop increased from 0.5 g/m^2 in 1986 to 1.7 g/m^2 in 1991.

Haigler Creek – Habitat conditions in Haigler Creek appear to declining as per results fro macroinvertebrate analysis. BCI rating decreased from 75 in 1986 to 57 in 2005. DAT index decreased from 19.7 in 1986 to 14.0 in 2001. This indicates moderate organic enrichment and poor conditions.

Pinto Creek – Pinto Creek is dominated by sediment tolerant taxa which indicates organic enrichment. Diversity has decreased in Pinto Creek from 1986 (DAT = 15.7) to 1991 (DAT = 2.6 and 4.4). Standing crop has experienced a similar decrease. Standing crop was 3.1 g/m^2 in 1986 and only 0.6 g/m^2 and 0.7 g/m^2 in 1991. BCI has remained stable however. The BCI value was 89 in 1986 and 87 in 2005.

Salt River – Macroinvertebrate diversity appears to be declining. DAT value for the Salt River was 7.6 in 1987 and declined to 2.7 in 1991. Standing crop decease from 2.8 g/m^2 in 1986 to 0.5 g/m^2 in 1991. BCI values have improved in this stream. The BCI value in 1986 was 76 whereas in 1990 and 1991 the BCI values were 85 and 80 respectively. This indicates that this stream is in good condition, however the DAT and standing crop

values indicate that conditions could be improved through management activities. No additional data available for 2005.

Sycamore Creek - The macroinvertebrate community in this stream is currently dominated by sediment tolerant taxa. Cleanwater taxa were absent from the community. BCI values for this stream were 67 and 76 in 1986 and 1987, respectively. BCI declined to 54 and 57 by 2005 indicating declining biotic conditions in this stream.

Tonto Creek - Overall aquatic conditions in Tonto Creek appear to be poor as indicated by BCI values from 1986 to 2005. BCI values ranged from 68 in 1986 to 60 in 2005. This indicates poor aquatic conditions continue to persist in this drainage. Diversity of aquatic macroinvertebrates has declined in this drainage as indicated by DAT analyses. For example station 15 had a DAT of 14.1 in 1986 and a DAT of 2.1 in 1991.

East Verde River – Aquatic habitat conditions are trending lower in this drainage as indicate by BCI values. For example a BCI value of 75 was recorded for sample site 1 in 1986 and declined to 60 by 2005. Macroinvertebrate diversity at this station declined from 4.7 g/m2 in 1986 to 0.7 in 1991.

Verde River - In general macroinvertebrate samples in the Verde River are dominated by sediment tolerant taxa. This is an indication of organic enrichment and declining aquatic conditions. The BCI values in this stream range from 65 to 85. The highest value (85) was recorded in the Sheep bridge area. This reach has had a consistently good rating from 1986 to 2005. Values for standing crop has fluctuated but appear to be declining for the stream as a whole.

Wet Bottom Creek - Organic enrichment and sediment tolerant species of macroinvertebrates were present at sampling locations in this drainage. BCI values of 60 in 1987 and 54 in 2005 indicate aquatic habitat conditions in Wet Bottom Creek are declining and the system is extremely stressed. Standing crop has declined from 2.4 g/m2 to only 0.4 g/m^2.

Summary

Data from each of the 12 streams presented indicate all are impaired to some degree. These data indicate that opportunities exist for managers to improve conditions in these watersheds. Analysis of grazing regimes, timber harvest, recreation, and road networks needs to be conducted so that management practices contributing to impairment can be identified.

Literature Cited

Plafkin, J.L., M.T Barbour, K.D. Porter, S.K. Gross, and R.M. Hughes. 1989. Rapid Bioassessment Protocals for Use in Streams and Rivers. EPA/440/4-89/001, May, 1989

IV. Population Trend Summary

Table 1. 2005 population trend for MIS, Tonto National Forest.

MIS	1985 Predicted Population Trend	2005 Estimated Trend
Elk	Increase	Stable
Turkey	Increase	Stable
Arizona grey squirrel	Increase	Stable
Abert's squirrel	Increase	Decreasing
Pygmy nuthatch	Increase	Decreasing
Violet-green swallow	Increase	Stable
Western bluebird	Increase	Stable
Hairy woodpecker	Increase	Stable
Northern goshawk	Increase	Decreasing
Ash-throated flycathcer	Increase	Stable
Gray vireo	Decrease	Decreasing
Townsends solitare	Decrease	Stable
Juniper (Plain) titmouse	Decrease	Decreasing
Northern flicker	Increase	Stable
Spotted towhee	Increase	Stable
Black-chinned sparrow	Increase	Stable
Savannah sparrow	Increase	Stable
Horned lark	Increase	Decreasing
Black-throated sparrow	Increase	Stable
Canyon towhee	Increase	Decreasing
Bald eagle	Increase	Stable
Bell's vireo	Increase	Decreasing
Summer tanager	Increase	Decreasing
Hooded oriole	Increase	Stable
Warbling vireo	Increase	Stable
Western wood peewee	Increase	Decreasing
Common black-hawk	Increase	Decreasing
Macroinvertebrates	N/A	N/A

Table 1. Status of management indicator species populations, Tonto National Forest, July 2005

Species Name	Indicator of:	Species Status	Evidence of Status	Determined by:	Comments
elk	PP/MC - general forest conditions	S	AGFD surveys, monitoring, util. cages	Russ Richards	
turkey	PP/MC - vertical diversity; general forest mix	S	AGFD surveys	Russ Richards	
Arizona grey squirrel	High Elevation Riparian (>3000')	S	AGFD surveys	Russ Richards	
Abert's squirrel	PP/MC - successional stages PP	D	AGFD surveys	Russ Richards	
pygmy nuthatch	PP - old growth	D	BBA, BBS, Monitoring	Troy Corman,	Loss of preferred habitat due to drought, wildfires, and drought induced bark beetle infestations
violet-green swallow	PP/MC - cavity nesting	S	BBA, BBS, Monitoring	Troy Corman	Could be slightly increasing due to recent death of large trees to drought, bark beetle, and wildfires
western bluebird	PP/MC - forest openings	S	BBA, BBS, Monitoring	Russ Richards	
hairy woodpecker	PP/MC - snags	S	BBA, BBS, Monitoring	Troy Corman	Could be slightly increasing due to recent death of large trees to drought, bark beetle, and wildfires
northern goshawk	PP/MC - vertical diversity	D	BBA, Monitoring	Troy Corman	Loss of preferred habitat due to drought, wildfires, and drought induced bark beetle infestations
ash-throated flycathcer	PJ Woodland - ground cover	S	BBA, BBS, Monitoring	Troy Corman	Loss of preferred habitat due to drought, wildfires, and drought induced bark beetle infestations
gray vireo	PJ Woodland - tree density	D	BBA, BBS, Monitoring	Troy Corman	Loss of preferred habitat due to drought, wildfires, and drought induced bark beetle infestations
Townsend's solitare	PJ Woodland - berry production (winter)	S		Russ Richards	
juniper titmouse	PJ Woodland - general conditions	D	BBA, BBS, Monitoring	Troy Corman	Loss of preferred habitat due to drought, wildfires, and drought induced bark beetle infestations
northern flicker	PJ Woodland - snags	S	BBA, BBS, Monitoring	Russ Richards	

Species Name	Indicator of:	Species Status	Evidence of Status	Determined by:	Comments
spotted towhee	PJ Woodland - successional stage Chaparral - shrub density	S	BBA, BBS, Monitoring	Troy Corman	Local loss of habitat to fire, should be quickly followed with an increase as chaparral and other low vegetation quickly grows back
black-chinned sparrow	Chaparral - shrub density	S	BBA, BBS, Monitoring	Troy Corman	Local loss of habitat to fire, should be quickly followed with an increase as chaparral and other low vegetation quickly grows back
savannah sparrow	Desert-Grassland - grass species diversity (winter)	S	Monitoring , range condition trends	Russ Richards	
horned lark	Desert-Grassland - vegetative aspect	D	BBA, BBS, Monitoring	Troy Corman	Overall, annually poor grass cover due to drought conditions
black-throated sparrow	Desertscrub - shrub diversity	S	BBA, BBS, Monitoring	Russ Richards	
canyon towhee	Desertscrub - ground cover	D	BBA, BBS, Monitoring	Troy Corman	Loss of preferred habitat due to extensive wildfires
bald eagle	Low Elevation Riaprian (<3000')	S	BBA, Monitoring	James Driscoll	Several new territories
Bell's vireo	Low Elevation Riaprian (<3000') well developed understory	D	BBA, BBS, Monitoring	Troy Corman	Loss of preferred dense mesquite and other shrubs along washes and drainages due to extensive wildfires
summer tanager	Low Elevation Riaprian (<3000') tall mature trees	D	BBA, BBS, Monitoring	Troy Corman	Loss of preferred riaprian gallery woodland to extensive wildfires
hooded oriole	Low Elevation Riaprian (<3000') medium sized trees	S	BBA, BBS, Monitoring	Russ Richards	
hairy woodpecker	High Elevation Riaprian (>3000') snags, cavities	S	BBA, BBS, Monitoring	Troy Corman	Could be locally increasing due to recent death of large trees to drought and wildfires
warbling vireo	High Elevation Riaprian (>3000') tall overstory	S	BBA, BBS, Monitoring	Troy Corman	Local loss of tall broadleaf trees due to extensive wildfires
western wood-peewee	High Elevation Riaprian (>3000') medium overstory	D	BBA, BBS, Monitoring	Troy Corman	Local loss of tall pines and riparian broadleaf trees due to extensive wildfires

Species Name	Indicator of:	Species Status	Evidence of Status	Determined by:	Comments
common black-hawk	High Elevation Riaprian (>3000') streamside	D	BBA, BBS, Monitoring	Troy Corman	Loss of preferred riaprian gallery woodland and silting of foraging drainages due to extensive wildfires.
macroinvertebrates	fisheries habitat water quality	S	Sampling and Analysis	Bob Calamusso	

Status

I = increasing, S = stable, D = decreasing, U = unknown

Evidence of Status

BBS = Breeding Bird Surveys, BBA = Breeding Bird Atlas Blocks, CP = Partners In Flight Conservation Plan

Reliability - sources are very reliable; best information currently available.

Table 2. 2002 macroinvertebrate values and trend, Tonto National Forest.

Stream	Diversity Index	Standing Crop	BCI	Condition	BCI Trend (1985 - X[1])
Canyon Creek		E ↓	P →	Poor	Downward
Cave Creek			P ↓	Poor	Downward
Cherry Creek	F ↓	G ↑	P ↓	Poor	Downward
Christopher Creek		G ↑	F ↑	Poor	Upward
Haigler Creek	G ↓		P ↓	Poor	Downward
Salt River	P ↓		G ↑	Good	Upward
Sycamore Creek	P ↓	P ↓	P	Poor	Downward
Pinto Creek	P ↓	P ↓	G →	Good	Stable
Tonto Creek	P ↓		P ↓	Poor	Downward
East Verde River	P ↓		P ↓	Poor	Downward
Verde River	Variable	Variable	Variable	Variable	Downward
Wet Bottom Creek		Poor ↓	Poor ↓	Poor	Downward

[1] The last year of macroinvertebrate sampling/evaluation varies by sample site. Some information is mid – 90's, other information is 2004. BCI condition may have declined at some sites, such as Pinto Creek.

Tonto National Forest Habitat Trends 1985-2005

Table 1: Ponderosa pine/Mixed conifer vegetation trends 1985-2005 by year, Tonto National Forest. Includes all management activities (prescribed fire, wildfire, timber harvest, and roads).

Size/Age Class	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Grass/Forb/Shrub	2,775	2,775	2,775	2,775	2,775	4,695	4,695	4,695	4,695	4,695
Seedling/Sapling	15,805	15,897	15,897	16,205	16,250	16,428	16,566	16,566	16,566	16,566
Poles/Sawtimber*	380,011	380,511	380,511	380,511	388,990	382,916	382,916	382,916	382,916	382,916
Immature Sawtimber	17,010	17,010	17,010	17,010	17,031	16,410	16,410	16,410	16,410	16,410
Mature Sawtimber	7,640	7,548	7,548	7,240	7,195	7,017	6,879	6,879	6,879	6,879
Total Acres	**423,241**	**423,741**	**423,741**	**423,741**	**432,241**	**427,466**	**427,466**	**427,466**	**427,466**	**427,466**

Size/Age Class	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Grass/Forb/Shrub	4,695	4,695	4,695	4,695	5,695	7,532	7,832	9,281	12,897	19,005	19,905
Seedling/Sapling	16,566	16,566	16,566	16,566	16,566	16,566	16,566	16,357	16,357	18,006	18,126
Poles/Sawtimber*	382,916	382,916	382,916	382,916	374,334	372,197	371,119	371,114	367,026	359,461	359,461
Immature Sawtimber	16,410	16,410	16,410	16,410	16,514	16,514	16,792	16,387	16,902	16,767	16,767
Mature Sawtimber	6,879	6,879	6,879	6,879	6,879	6,879	6,879	6,879	6,879	6,879	6,879
Total Acres	**427,466**	**427,466**	**427,466**	**427,466**	**419,988**	**419,688**	**419,188**	**420,018**	**420,061**	**420,118**	**421,138**

*** Only TNF Plan Management Areas 4D and 5D include timber that is inventoried for Size/Age Class and possible timber harvest. Because there are several other Management Areas on TNF that have ponderosa pine/mixed conifer but are not inventoried, it is included in the Poles/Sawtimber (61-80 year class) by default.**

Table 2: Ponderosa pine/Mixed conifer vegetation trends 1985-2005, Tonto National Forest.

*Size/Age Class	1985 Composition Acres	2005 Composition Acres	% Change 1985-2005	1985-2005 PP/MC Vegetation Trend
Grass/Forb/Shrub	2,775 (0.7%)	19,905 (4.7%)	+ 617%	Upward
Seedling/Sapling	15,805 (3.7%)	18,126 (4.3%)	+ 15%	Upward
Poles/Sawtimber (61-80)	380,011 (89.8%)	359,461 (85.4%)	- 5%	Static/Downward
Immature Sawtimber	17,010 (4%)	16,767 (4%)	- 1%	Static
Mature Sawtimber	7,640 (1.8%)	6,879 (1.6%)	-11%	Downward
Total Acres	**423,241**	****421,138**	**-0.5%**	**Static**

**** 2005 total acres are lower than 1985 acres due to type conversion by road construction and/or wildfire.**

Table 3: Range condition trend by acres and TNF Plan Management Area.

TNF Plan Management Area	Desert Grassland Trend	Desert Scrub Trend	Chaparral/PJ Trend	Water	Barren	Ground Cover Trend	2005 Acres
1A			S				5,215
1A			U				5,215
1B		U				U	9,812
1B			U				10,476
1B			S				12,835
1B		S				S	23,138
1B			D				29,615
1B		D				D	30,000
1C	D						5,044
1C	D						242
1C	S						1,261
1C				709			709
1D	S						262
1D				119			119
1D		S				S	252
1D			S				252
1E		S				S	4,445
1E		U				U	4,445
1E				5,781			5,781
1F		D				D	20,287
1F			D				48,675
1F			S				68,120
1F			U				77,852
1F		S				S	91,320
1F		U				U	91,320
1G					Dam		0
2A			S				23,535
2B			S				714
2B				1,161			1,161
2B		S				S	20,654
2C			S				347
2C		S				S	402
2C		U				U	402
2E		U				U	492
2E		S				S	627
2F					2,100		2,100
2F		S				S	41,551
2F		S				S	62,327
2F			U				264,985
3A	S						194

3A	U						171
3A			S				9,651
3B		S				S	11,834
3B			U				38,585
3C			S				5,952
3C		S				S	56,702
3D			S				10,532
3D		D				D	12,109
3D		S				S	18,163
3E		S				S	488
3F				2,046			2,046
3F		S				S	10,380
3G		S				S	1,200
3I					1,475		1,475
3I		S				S	63,725
3I			U				72,240
3I		U				U	113,289
3J					Dam		0
4A	D						2,289
4A		D					2,289
4A			S				82,501
4B	S						680
4C	S						194
4C		S					194
4C			S				274
4F			S				193,786
5A			S				13,559
5B			S				15,100
5C			S				5,233
5E			S				7,934
5F			S				1,288
5G			U				2,400
5G			S				155,324
6A			S				5,234
6B	S						7,749
6C	U						20,892
6C			S				7,811
6C			S				20,892
6D			S				2,318
6F		U					900
6F				21,925			21,925
6F		D				D	38,571
6G		S				S	1,869
6G			S				3,052
6G		D				D	4,806
6H		D				D	484
6H		S				S	616

6H			S				9,872
6I		D				D	1,476
6I			S				3,008
6J		U					500
6J			U				21,957
6J			D				23,740
6J		S				S	53,449
6J		D				D	102,253
6J			S				153,907
6K					Dam		0

U – Upward
D – Downward
S – Stable