



The buff-breasted flycatcher is an imperiled bird that inhabits forests of the southwestern U.S. Understanding birds' habitat preferences can help us design better conservation measures that may help increase population numbers. Bald eagle recovery is an example of science and successful management to aid an imperiled bird species. Credit: B. Taubert.

Keep the Home Fires Burning: Rare Birds and Better Abodes in Southeastern Arizona

Summary

The buff-breasted flycatcher is a rare bird that inhabits forests of the southwestern U.S. Long-term fire exclusion in these forests may have contributed to the buff-breasted flycatcher's historical range contraction and recent population declines. Buff-breasted flycatchers today use less than 10% of their former U.S. breeding habitat. Researchers from the University of Arizona surveyed buff-breasted flycatchers along previously surveyed and new survey routes, some of which had burned during recent wildfires, within nine mountain ranges in southeastern Arizona. Sixty-three percent of the previously surveyed routes showed negative trends, a 10.5% annual decline in buff-breasted flycatcher numbers. Buff-breasted flycatchers found at survey points were in areas that had burned, and their numbers tended to be greater in areas that had been burned by high-severity surface or crown fires. Recent high-severity forest fires in the southwestern U.S. may improve habitat quality for the buff-breasted flycatcher and facilitate re-colonization of the species into its historical breeding range. A mosaic of recently burned and unburned areas appears to be the most suitable habitat for the birds, and therefore to increasing their numbers. In addition, repeated applications of low to moderate-severity prescribed fires may help to remove understory plant clutter thought to limit foraging by buff-breasted flycatchers.

Key Findings

- Forest fire exclusion in the 20th century has been at least partly responsible for reducing the buff-breasted flycatcher's breeding range and population size in the southwestern U.S.
- Bird survey data and fire scar evidence indicate that buff-breasted flycatchers prefer forests that have burned more frequently compared to forests that burned less frequently within the last thirty years. In addition, buff-breasted flycatchers prefer forests that have experienced high-severity surface and crown fires.
- Buff-breasted flycatchers have increased from 2 to 5 birds in the Rincon Mountains since 2000, the first records of the bird in these mountains since 1911, suggesting that the birds have recolonized a portion of their historical breeding range (this may be due, in part, to the recent increase in fire frequency in these mountains).
- Buff-breasted flycatchers may benefit from the ecological succession following wildfire that transforms dense forests into their preferred habitat (i.e., more open forests).
- Recent fire affected most other forest bird species negatively in the short term (2–3 years post fire), with the response of different species dependent on the severity of the recent fires.

Introduction

Like any creature, we have our habitat preferences, and according to data from the Census Bureau, that data appear to indicate that we prefer to spread out rather than grow upward. Habitat preferences are not for humans alone. Several bird species in forests of the American Southwest have experienced a reduction in their habitat and declines in their populations. For example, the buff-breasted flycatchers once ranged over 61,000 square miles in the southwestern United States, a breeding distribution that stretched from the Mexican border northward to Prescott and Whiteriver, Arizona, and eastward to the Zuni Mountains of west-central New Mexico. But buff-breasted flycatcher numbers have declined over the last century and the species' U.S. breeding range is currently restricted to only 4 mountain ranges in extreme southeastern Arizona. Their numbers in neighboring Mexico are not known.

What has caused the range contraction and population declines of buff-breasted flycatchers in the U.S.? What does the future hold for the species? How do we conserve buff-breasted flycatchers when we aren't certain what caused the birds' decline in the first place? Chris Kirkpatrick, Courtney J. Conway, and Dominic LaRoche (all researchers from the University of Arizona) delved into these questions by examining how recent wildfires in the southwestern U.S. have affected remaining populations of buff-breasted flycatchers in the region.



An early 20th century ornithologist, Frank C. Willard, dangles from a rope to examine a buff-breasted flycatcher nest located in the Huachuca Mountains of southeastern Arizona. Credit: F. Willard; Condor 1923, Vol. 25, p. 119.



A 21st century researcher uses a tape player to broadcast buff-breasted flycatcher songs and calls to elicit responses from buff-breasted flycatchers in the Chiricahua Mountains of southeastern Arizona. Credit: M. Schroff.

Rare birds, slip-sliding away

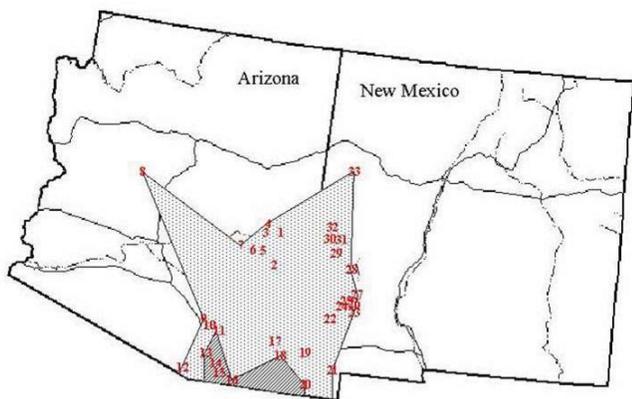
Trilling notes, rough caws, descending screeches—most often we enjoy hearing birds without ever seeing them. Many average Americans have such an emotional response to birds that often it is an imperiled bird species alone that garners public interest in, and support of avian conservation issues. When the research team began studying the U.S. population of the imperiled buff-breasted flycatcher, among the resources available to them were the records of buff-breasted flycatcher sightings, from a century to a couple of years old, by naturalists and amateur birders.



An open pine forest, free of understory plant clutter—a home design the rare buff-breasted flycatcher prefers.

The team found that historical records of buff-breasted flycatcher sightings in the U.S. were not rare—different observers repeatedly detected buff-breasted flycatchers breeding in the habitat they favored in both Arizona and New Mexico during the late 1800s and early 1900s. However, by the early 1900s and continuing through the 1970s, observers recorded a decline in the numbers of flycatchers and a contraction of the species’ breeding distribution. When the team conducted their research from 2000–2005, they estimated that only 131 buff-breasted flycatchers remained in 4 small mountain ranges located in extreme southeastern Arizona. As such, the buff-breasted flycatcher is a species that greatly concerns conservationists, but developing strategies to help buff-breasted flycatchers requires a better picture of the causes that reduced their range and population size over the last century. Fire, or the lack of it, may have something to do with this.

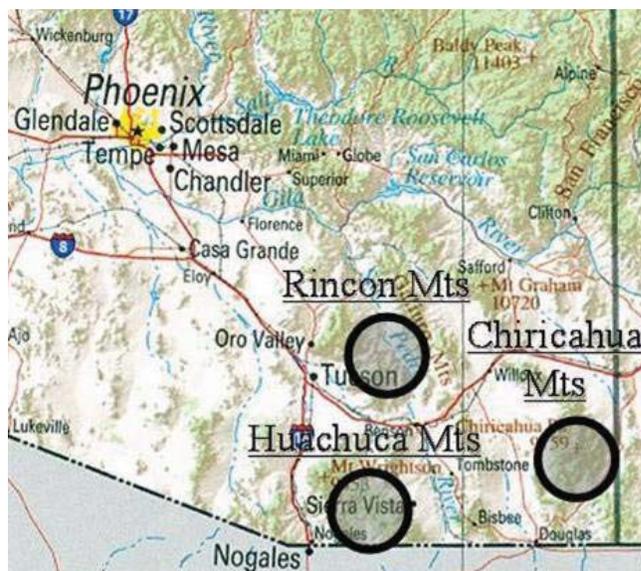
The team explains that coniferous forests in the southwestern U.S. were historically burned by low-severity surface fires every 2–12 years. For the last hundred years, this fire regime has been altered by human efforts to exclude wildfires in the region, which has created new kinds of forest structures and increased amounts of understory fuels. Thickets of pine and oak saplings now grow in the understory of these forests, and the dense understory may make it difficult for buff-breasted flycatchers to catch a meal. The increase in understory fuels has also led to a recent increase in the frequency of large, often severe, wildfires in the region. The research team set out to examine how recent wildfires (most less than 10 years old) have affected buff-breasted flycatcher abundance and distribution in nine mountain ranges in southeastern Arizona.



Buff-breasted flycatchers once inhabited an area as large as 61,276 sq. mi. in the southwestern U.S. (light stippling), but now can be found in only a small percentage (dark stippling) of their historical range. The map numbers indicate historical and contemporary locations of buff-breasted flycatchers recorded by naturalists and amateur birders from the late 1800s to the present day.

Taking the “census”

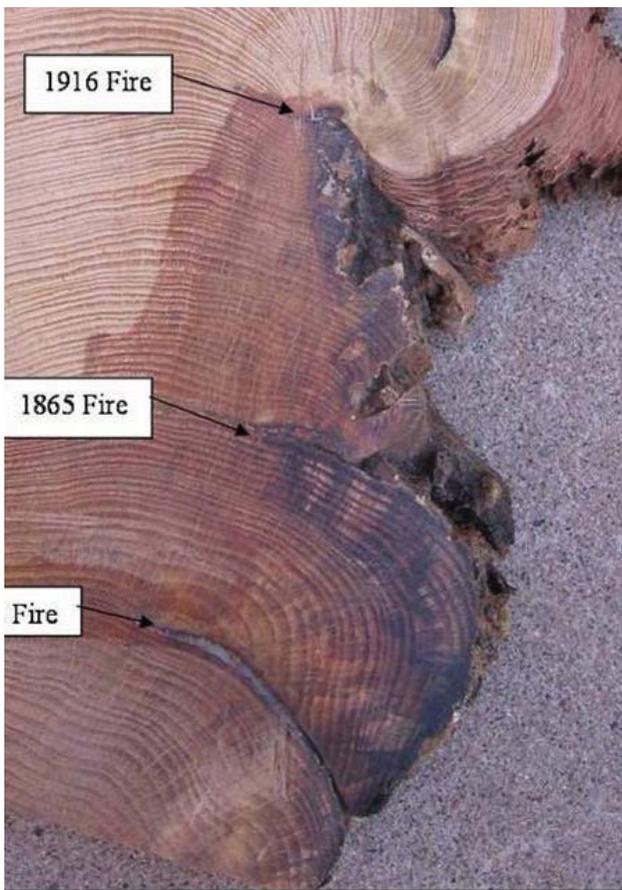
With peaks stretching 7,545–10,826 feet high into the sky, the mountain ranges in southeastern Arizona stand



apart, separated by slopes that plunge into wide, low-elevation desert basins. Known as the Sky Islands, these mountain ranges—including the Chiricahua, Galiuro, Huachuca, Pinaleno, Rincon, Santa Catalina, Santa Rita, Santa Teresa, and Whetstone mountains—are the highest in the area, and the site of the team’s field work. Within these mountains, the team surveyed buff-breasted flycatchers in pine-oak woodland, ponderosa pine and mixed-conifer forests, relatively dry places watered by brief summer thunderstorms and occasional winter snows.

Using historical and contemporary records of buff-breasted flycatcher breeding locations from ornithological reports and publications, and from museum data on skins, skeletons, nests and eggs, the scientists estimated the total land area buff-breasted flycatchers had used in their historical breeding range, and the size of their breeding range today. Taking advantage of a recent increase in wildfires in the southwestern U.S., the researchers examined how recent fires of varying severities have affected the abundance and distribution of buff-breasted flycatchers and other forest bird species. Team members counted flycatchers present along 114 survey routes, using 47 routes that had been surveyed in the mid 1990s to see whether flycatcher populations had increased, decreased, or remained the same. At bird survey points located along each route, team members recorded observations of buff-breasted flycatchers and other forest birds for three minutes. Then they broadcasted buff-breasted flycatcher songs—30 seconds of sound, 30 seconds of silence—for 3 minutes. Enticing the birds with the birds’ own greatest hits, *chee-lick-chou* and *chee-lick* song notes, and the common *pit* call note, team members recorded whether they heard or saw any flycatchers. From April through July, between sun-up and five hours following, the researcher dee-jays played the songs and took the head count.

To examine the effect of recent fires (and by extension, the effect of historical fire exclusion) on the birds, the scientists took three approaches: In the first approach, they



A fire-scar sample taken from a ponderosa pine in 2005 tells of 3 previous wildfires in Lyle Canyon in the Huachuca Mountains of southeastern Arizona.

chose paired canyons—one which had burned over the last ten years, and one which had not—so they could determine if flycatchers were colonizing burned areas following fire. In the second approach, the researchers found natural records of historical wildfires using fire-scar samples collected from trees so they could count and date the number of previous fires within forested areas that supported and did not support populations of buff-breasted flycatchers. In the third approach, they scanned the forest surrounding each bird survey point, and estimated the severity of recent fires using a burn severity index that classified visual evidence of recent fires from low-severity surface fires to high-severity crown fires. For this study’s purposes, the research team looked for height of charring on trees and major changes in forest structure following wildfires. They then examined whether the buff-breasted flycatchers detected during their bird surveys tended to be associated with forested areas that had burned and whether flycatchers in these burned forests preferred areas that were burned by low- or high-severity wildfires. With the data in hand, the scientists were ready to tell the buff-breasted flycatcher’s story.

Conclusions from the count

While the song remains the same, the flycatcher’s status in the southwestern U.S. has changed dramatically over the last century. The researchers found that the

breeding range of the buff-breasted flycatcher has been reduced by 91% since the early 1900s and flycatcher population size has declined over the last 10–20 years at an average rate of 10.5% per year. The rate of population change differed within their study area; while flycatcher numbers declined in the Chiricahua Mountains, they remained the same in the Huachuca Mountains, and slightly increased in the Rincon Mountains. Recent fire affected most other forest bird species negatively in the short-term (2–3 years post fire), with the response of different bird species dependent on the severity of the recent fires.

Buff-breasted flycatchers favored forests that had burned recently, particularly forests that had experienced high-severity surface or crown fires. For example, the researchers detected roughly three times as many buff-breasted flycatchers at survey points with evidence of high-severity surface fires compared to survey points with evidence of less severe fires or evidence of no recent fire. However, buff-breasted flycatchers were not common, and not even always present in some recently burned areas, the scientists found.

“Coniferous forests in the southwestern United States represent the northern extent of buff-breasted flycatcher breeding distribution and areas on the periphery of any species’ range are typically thought to go through repeated periods of extirpation and recolonization,” Courtney Conway offers. “However, prior to the recent records in the Rincon Mountains, we have no evidence to suggest that buff-breasted flycatchers have recolonized any of their former breeding range in the U.S. during the past 50 years.” Buff-breasted flycatchers in the U.S. are breeding primarily in two relatively small areas within the Huachuca and Chiricahua Mountains. If the number of flycatchers breeding here continues to decline by 10.5% every year, the scientists warn, this bird will be gone from the U.S. within 45 years.

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Habitat from humanity: Restoration actions for planners and managers

Though the news sounds grim, an understanding of the causes of the birds’ decline can help shape recovery efforts. Results from the current research support the idea that buff-breasted flycatchers have declined in the U.S. due to fire exclusion. Mountain ranges in southeastern Arizona with substantial evidence of recent fire still have breeding flycatchers, the scientists explain, whereas mountain ranges with little or no evidence of recent fire have no breeding flycatchers. However, the scientists believe the lack of flycatchers in some recently burned areas they surveyed suggests other factors may be at work, for example: (1) fire exclusion may not be the cause, or the main cause of the birds’ decline; (2) flycatchers may not colonize burned areas until many years (more than 10) after fire; (3) one

incident of a low- or medium-severity surface fire may not be enough to make fire-excluded areas suitable for breeding flycatchers; or (4) local numbers of birds may be too low for them to expand into fire-restored areas.

To prevent these birds from disappearing in the American Southwest, the scientists urge that some management actions need further testing. Prescribed fires in the forest understory, they explain, may only be helpful to buff-breasted flycatchers if they are high-severity surface fires that burn away most or all of the understory vegetation. Alternatively, moderate-severity surface fires, applied to the understory repeatedly over long periods (so that few understory plants remain), can also help restore flycatcher habitat. However, there may be another story, the researchers explain. Low reproductive success could be causing the observed population declines and preventing buff-breasted flycatchers from responding to changes in habitat quality. For this reason, the team suggests managers conduct annual surveys of flycatchers, measure reproductive success of breeding flycatchers, and continue examining factors that may be limiting the ability of these birds to expand into newly restored habitat.

All is not gloom. The buff-breasted flycatchers that the team detected in the Rincon Mountains during this study represent the first records of this species in this mountain range in 89 years. Forests in the Rincon Mountains have been actively managed with repeated prescribed fire in recent years, and have experienced more high-severity wildfires than surrounding mountain ranges. This prompts the scientists to make a hopeful suggestion to managers: restoring the natural fire regime in the Sky Island Mountains, either through wildland fire use or through active prescribed fire management that includes frequent moderate-severity surface burns, appears to facilitate buff-breasted flycatcher recolonization of their former breeding range in the U.S. As architects of change, we can learn to build better avian neighborhoods.



Additional data on the effects of fire on many forest bird species, such as the band-tailed pigeon, are needed. Restoration actions depend on clearer understandings of each inhabitant's preferences. Credit: C. Kirkpatrick.

Management Implications

- Managers should monitor buff-breasted flycatcher populations on a regular basis—at least once every 3 years—by conducting surveys along established buff-breasted flycatcher survey routes in southeastern Arizona.
- Managers should also survey buff-breasted flycatchers in other recently burned mountain ranges within the next five to ten years to evaluate the effects of recent wildfires on the distribution of buff-breasted flycatchers in the region. The scientists believe these mountain ranges are particularly well suited for re-colonization by buff-breasted flycatchers because these mountains are part of the flycatchers' historical range.
- Additional data are needed on the effects of fire on many other forest bird species in southeastern Arizona.

Further Information: Publications and Web Resources

- Conway, C.J., and C. Kirkpatrick. 2007. Forest fire suppression as a cause of population decline in buff-breasted flycatchers. *Journal of Wildlife Management*. 71:445-457.
- Kirkpatrick, C., C.J. Conway, and D. LaRoche. 2006. Effects of wildland fires on buff-breasted flycatchers and other forest birds in southeastern Arizona. Wildlife Research Report #2006-05, U.S. Geological Survey, AZ Cooperative Fish and Wildlife Research Unit, Tucson, AZ. Online at <http://www.ag.arizona.edu/srnr/research/coop/azfwru/cjc/> (follow link to "Research" and "Past Project #8" or "Past Project #9"; 31 September 2007).
- Kirkpatrick, C., C.J. Conway, and P.B. Jones. 2006. Distribution and relative abundance of forest birds in relation to burn severity in southeastern Arizona. *Journal of Wildlife Management*. 70:1005-1012.
- Kirkpatrick, C., C.J. Conway, and D. LaRoche. 2007. Range expansion of the buff-breasted flycatcher (*Empidonax fulvifrons*) into the Rincon Mountains, Arizona. *Southwestern Naturalist*. 52: 149-152.

Scientist Profiles

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Effects of Wildland Fires on Buff-Breasted Flycatchers and Other Forest Birds in Southeastern Arizona: A Manager's Perspective

Written By: Leslie Smith

Purpose of this opinion piece

Manager's Viewpoint is an opinion piece written by a fire or land manager based on information in a JFSP final report and other supporting documents. This is our way of helping managers interpret science findings. If readers have differing viewpoints, we encourage further dialogue through additional opinions. Please contact Tim Swedberg to submit input (timothy_swedberg@nifc.blm.gov). Our intent is to start conversations about what works and what doesn't.

Problem

Long-term fire suppression in Southwestern forests is thought to have influenced the distribution and abundance of many bird species, including rare species such as the buff-breasted flycatcher. Despite the historical importance of wildfires in shaping these forest ecosystems and the recent increase of wild and prescribed fires in the region, few studies have examined the effect of fire on forest birds in the Southwest. The 2002–2004 wildfire seasons and subsequent prescribed burns in the region provided a unique opportunity to collect post-burn data and critically evaluate the role of fire in influencing the distribution and abundance of buff-breasted flycatchers and other forest bird species in southeastern Arizona.

Application for Land Managers: Necessary Recommendations on Habitat Management

The results of this study add to a growing body of correlative and anecdotal evidence supporting the hypothesis that fire suppression has been responsible, in part, for the range contraction and population declines of buff-breasted flycatchers in the southwestern United States during the 20th Century. Furthermore, results also indicate that buff-breasted flycatchers will ultimately benefit from recent wildfires in southeastern Arizona and elsewhere in the state as forest succession transforms recently burned areas into potential buff-breasted flycatcher habitat.

Thus, this study provides needed recommendations and justifications on habitat management for buff-breasted flycatchers and other avian species in the Southwestern montane forest. Results from this study also provide managers with information that can be used to make and test predictions about the effects of future wild and prescribed fires of varying severities.

High-severity surface and crown fires are burn severity classes shown to be positively correlated with buff-breasted flycatchers abundance (Conway and Kirkpatrick 2007) as well as burn-severity classes that could have the best potential to create habitat characteristics preferred by buff-breasted flycatchers—an open canopy of pines with an open understory of oaks. The Burn Severity Index refined during this study now provides a useful method for the rapid assessment of burn severities during future bird surveys.

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The Santa Catalina Mountains of southeastern Arizona seem especially well-suited for colonization by buff-breasted flycatchers. This mountain range is part of the species' historical range and contains several broad canyons and ridges with pine forest or pine-oak woodland burned during recent wildfires. Given the small population size and restricted geographic range of this rare species, the continued monitoring of buff-breasted flycatcher populations is certainly warranted.

References

Conway, C.J.; Kirkpatrick, C. 2007. Forest fire suppression as a cause of population decline in buff-breasted flycatcher. *Journal of Wildlife Management*. 71: 445-457.

Manager Profile



Leslie Smith was born and raised in the Appalachian Mountains of East Tennessee just outside of the Great Smoky Mountains National Park. She is currently the Natural Resource Program Manager for the Tellico Ranger District on the Cherokee National Forest in Tellico Plains, TN. She has worked as wildlife biologist, wildlife technician, fire protection officer, and law enforcement officer with the National Park Service and U.S. Forest Service.

Leslie holds a BS from Middle Tennessee State University in Agriculture and Animal Science. Her interests include prescribed fire and ecology, with a special interest in oak-grassland restoration.

The information for this Manager's Viewpoint is based on JFSP Project 03-3-3-26, Effects of Wildland Fires on Buff-Breasted Flycatchers and Other Forest Birds in Southeastern Arizona; Principal Investigator was Chris Kirkpatrick.