Success Stories

The Southern Fire Exchange and JFSP bring professionals together to improve outcomes

> The JFSP-funded research on Florida bonneted bats is pivotal "to encourage our fire program and to support our management efforts, especially in the early wet season, [which is also going to benefit other species.]"
>
> *—Deborah Jansen*
> *Wildlife Biologist at the*
> *Big Cypress National Preserve*

The Southern Fire Exchange is a member of the Joint Fire Science Program funded nationwide Fire Science Exchange Network (FSEN). The goal of the FSEN is to accelerate the awareness, understanding, adoption, and implementation of readily available wildland fire science information..

JFSP-funded research informed fire management to improve habitat for the endangered Florida bonneted bat

Carolina Baruzzi and Raelene M. Crandall

School of Forest, Fisheries, and Geomatic Sciences, University of Florida, Gainesville, FL

Joint Fire Science Program Success Story

In 2015, the Joint Fire Science Program (JFSP) funded research to identify the effects of prescribed fire on Florida bonneted bat activity. Prior to this research, we knew little about managing fire for this endangered, nocturnal bat beyond their general habitat preferences. Florida bonneted bats forage for flying insects over trees or in open, burned habitats. During the day, when usually inactive, Florida bonneted bats are likely roosting in high, enclosed spaces such as tree cavities, buildings, and bat houses.

Did you know?

- The Florida bonneted bat, *Eumops floridanus*, was first recognized as its own species in 2004. It was previously included as a subspecies of *Eumops glaucinus*.
- The Florida bonneted bat is also called the Florida mastiff bat because of its size; it is the largest bat species in Florida. See Figure 1.
- Unlike other bats, they do not migrate or hibernate.
- Its entire geographic range is restricted to habitats that were historically burned frequently.
- Florida bonneted bats form harems that generally consist of one dominant male and a variable number of other bats, primarily females.

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> Without that information, it is my personal opinion as a wildlife biologist, that the timing of our prescribed burning would have been significantly more limited.
>
> *—Mark Danaher*
> *Wildlife Biologist at the Florida Panther National Wildlife Refuge*

The Florida bonneted bat has been understudied

One of the main challenges to protecting many endangered species is the lack of knowledge about the species' behavior and distribution. The Joint Fire Science Program addressed this challenge by providing funding to advance our knowledge on the distribution and behavior of the Florida bonneted bat, which was listed as endangered in October 2013. The Florida bonneted bat has quite possibly the most limited geographic range among all bat species in the U.S. It was listed as endangered due to low population numbers in the wild and the species' high vulnerability to external factors such as extreme weather events (Bailey et al. 2017). In fact, because this bat species is extremely rare, our understanding of the factors that determine bonneted bat abundance and distribution has been very limited, posing great challenges in developing habitat management plans to protect them. Protecting bonneted bat populations is particularly important because, as with many other endangered species, they are sensitive to habitat changes related to fire regimes, fragmentation, and climate change. As such, researchers at the University of Florida and land managers agreed that increasing our knowledge of its basic ecology, including roost site selection and foraging area, was necessary to guide habitat management decisions and promote conservation of the Florida bonneted bat.

Figure 1. *Florida bonneted bat from front (top) and side (bottom) views. Note the large, bonnet-like ears, which give this bat both its name and unique appearance. Photo credit: Melquisedec Gamba-Rios of Bat Conservation International.*

The Joint Fire Science Program supported research that linked frequent fire to the Florida bonneted bat

Fire is often used in the southeastern U.S. to create habitat for wildlife. Because it alters vegetation structure and plant species composition, changes to the fire regime may promote or reduce food availability and roost abundance for wildlife, including bonneted bats. Given the bonneted bat's habitat is frequently managed with fire, Drs. Holly Ober, Robert McCleery, and Elizabeth Braun de Torrez proposed to investigate its relationship with fire. According to Deborah Jansen, Wildlife Biologist at the Big Cypress National Preserve where Florida bonneted bats are known to occur, "prescribed fire is one of the key management tools for us, especially since Big Cypress is such large landscape [...] we have a strong fire program in place."

The University of Florida research team discovered that fire positively affects bonneted bats overall, and that these effects are mediated by fire season and interval. In one study published in *Fire Ecology*, they indicate that bat activity and foraging were highest in the early wet season (i.e., late May to October in Florida) at sites burned at 3- to 5-year intervals (Braun de Torrez et al. 2018a). Moreover, another study (Braun de Torrez et al. 2018b) by the research team shows that bonneted bat activity increased immediately post-burn, especially during the dry season, likely due to higher prey availability post-burn. In fact, several insect species are attracted to recently burned areas, while others are displaced into the canopy to avoid smoke and fire. According to Mark Danaher, Wildlife Biologist at the Florida Panther National Wildlife Refuge, "Research like Braun de Torrez et al. has had significant management implications, because

[...] this research shows that the species actually selected frequently burned pine flatwood communities to establish their roost. That was very informative not only for the species, but also from a management standpoint because [...] it showed that we can still maintain fire-dependent ecosystems, like our fire-dependent pine flatwoods, with fire and at the same time provide habitat for endangered species such as the bonneted bat."

The research effort led by Ober, McCleery, and Braun de Torrez also improved methodology to capture bonneted bats using mist-net by using acoustic lures (Braun De Torrez et al. 2017) and locate bonneted bat roosts by developing the combined use of acoustic sampling, cavity searches, and emergence observations (Braun de Torrez et al. 2016). Knowing where bonneted bat roosts are located is vital information for developing management plans. According to Danaher "having the information [where roosts are located] allow us to adequately plan for prescribed burnings to take the species into account; we have to take all the federally listed species into account when we do habitat management activity such as prescribed burnings. The research that Braun de Torrez and her team conducted provided us with that critical information necessary to adequately complete the environmental assessment that we have to do."

What is next for the Florida bonneted bat?

With funding from JFSP, Ober, McCleery, and Braun de Torrez made critical recommendations for the management of Florida bonneted bat. The Southern Fire Exchange is disseminating these important findings and will work to connect fire practitioners with additional research as it is published. Several programs have begun to build on the work of Ober, McCleery, and Braun de Torrez to increase our knowledge of the Florida bonneted bat's natural history. For instance, the Big Cypress National Preserve is using citizen science to monitor Florida bonneted bat roosts, which is a powerful way to promote scientific research, and engage and educate the public on endangered species and prescribed fire management. In addition, Zoo Miami and Bat Conservation International, with funding provided by Florida Power and Light, have partnered to examine the management and conservation of urban populations of the Florida bonneted bat in and around Miami, FL (see Miamibatlab.org). Every new finding brings us another step closer to saving the Florida bonneted bat from extinction. The research funded by JFSP provided fundamental understanding of bonneted bat habitat requirements and informed the management and conservation of this endangered species.

For more Southern Fire Exchange **Fire Science Success Stories**, visit **https://southernfireexchange.org/publications/fire-science-success-stories**. Our success stories series showcases collaborative projects in the Southeastern U.S. that have solved problems, advanced knowledge, saved money, and improved fire management programs.

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