

EFFECTS OF FIRE ON SAVANNA BIRDS IN CENTRAL BRAZIL

Roberto B. Cavalcanti & Maria Alice S. Alves¹

Departamento de Zoologia, Universidade de Brasília, 70910-900 Brasília, DF, Brasil.

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INTRODUCTION

Fire is a widespread phenomenon in tropical savannas, to the extent that it has been suggested that these landscapes are fire-climaxes (Gillon 1983). The effects of fires on the soils and plants of savannas have been well studied (see reviews in Gillon 1983, Walker 1987). The effect of fire on the vertebrate fauna in Australia was reviewed by Catling & Newsome (1981), who make eight predictions about the qualities that a fauna might possess, if exposed to frequent fires over evolutionary time. They suggest that there should be fire specialists, that there should be a prevalence of ecological generalists, and that species diversity overall would be low.

The purpose of this paper is to describe the effects of fire on a community of birds in the cerrado savannas of Central Brazil, and to compare our results to the predictions of the characteristics of a fire-adapted avifauna.

STUDY SITE AND METHODS

The cerrado of Central Brazil occupies over 1.8 million km², and is a savanna in the broadest sense, ranging from open grassland to arboreal woodland (Eiten 1972). The most characteristic form of cerrado is a semiopen grass-scrub-tree woodland, closed ("cerrado") when seen against the horizon but not overhead (Eiten 1984). In Brasília, Brazil, most sites are burned by human-induced fires every couple of years or so.

We studied the bird community at the University of Brasília Ecological Station (47°56'W, 15°57'S), approximately 20 km SE of Brasília.

The Station is part of a 12,000 ha area of interconnected cerrado, which neighbor agricultural and suburban areas. Our study plot, in cerrado *stricto sensu* (Eiten 1984), was crossed by a dirt road 4 m wide and 2 km long. Observations and banding were conducted within 150 m on either side of the road.

Approximately half the site had burned in 1981, and the entire site burned on 20–21 June 1984.

We banded birds from March 1984 through February 1985, using 36 mm mesh mist nets and aluminum and color bands. Before the fire we sampled the site on 14 dates (nets open 107 h, 1705 net-hours). After the fire we sampled on 17 dates (nets open 128 h, 1806 net-hours).

RESULTS

Population changes. Only five species could be compared before and after the 1984 fire (Table 1). In four species all individuals banded before were still present after the fire, suggesting a fire-adapted fauna. The fifth species was only recorded after the fire, as a colonizer.

Site fidelity. The White-banded Tanager, *Neothraupis fasciata*, with 17 individuals marked, was compared with respect to site fidelity after the fire. Eleven individuals remained within 100 m of their locations before the fire, two within 200 m, and one each within 300 m, 500 m, 700 m, and 800 m. Assuming 200 m to be the average radius of their home range (Alves 1990), this produces a site fidelity rate of 76%.

The three individuals of Narrow-billed Woodcreeper, *Lepidocolaptes angustirostris*, two of Suiriri Flycatcher *Suiriri suiriri*, and two of Rufous-fronted Thornbird *Phacellodomus rufi-*

* Present address: Setor de Ecologia, DBAV, Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier, 524, Rio de Janeiro, RJ, 20550-013, Brasil.

TABLE Presence of banded birds before and after the fire.

Species	Individuals before	Individuals: after
<i>Neotbraupis fasciata</i>	17	17
<i>Suiriri suiriri</i>	3	
<i>Lepidocolaptes angustirostris</i>	3	3
<i>Phacellodomus rufifrons</i>	2	2
<i>Charitospiza eucosma</i>	0	14

frons were all resighted within 100 m of their locations before the fire.

Foraging behavior. The White-banded Tanager forages on low bushes or on the ground (Alves 1990, 1991), the Narrow-billed Woodcreeper on tree trunks and branches or leaves, and the Suiriri Flycatcher in the canopy. Following the fire, the grass layer was completely eliminated, and leaves up to about 3 m were burned or shed within 10 days. The White-banded Tanager responded by feeding almost exclusively on the ground in the weeks following the fire, before regrowth of the vegetation. Both the Narrow-billed Woodcreeper and the Suiriri Flycatcher maintained after the fire the same foraging strategies as before.

Fire specialists. The Coal-crested Finch, *Charitospiza eucosma*, had only been seen sporadically before the fire, and none banded. In the three months following the fire we banded 14 adult individuals. No new individual was captured in 1985, and all banded birds had left the area by March. The foraging and social behavior of the Coal-Crested Finch is similar to that of the White-banded Tanager, in that both forage on the ground and in low shrubs, have similar contact calls, and show sentinel behavior. The presence of this finch in recently burnt *cerrado* was also noted by Fry (1970).

DISCUSSION

Our results are consistent with the behavior of a fire-adapted community, in which species and individuals survive the passage of fire. The predictions of Catling & Newsome (1981) were borne out with respect to ecological generalists, as demonstrated by the foraging flexibility of the

White-banded Tanager. The major fire specialist in the area was the Coal-crested Finch. The absence of a larger number of fire specialists may be due to the existence of a fire-adapted resident fauna, which may resist invasion of such specialists.

The *cerrado* habitat has a low percentage of endemic taxa, about 11 %, and a comparatively low species diversity (Sick 1965). Although this is consistent with the predictions of Catling & Newsome (1981), it does raise the question of whether other phenomena than fire could lead to the same predictions. Open habitats such as *cerrado* tend to have lower species diversity than forested habitats in the same region. In addition, open habitats, with important grass layers, are also more fire-prone than denser forested areas. To separate these effects, it would be necessary to compare burned and unburned open habitats. A recent study in *campo limpo cerrado* indicates that species numbers and abundances are similar between a burned site and one unburned for five years (Figueiredo 1991).

The one fire specialist we recorded, the Coal-crested Finch, does occur naturally in sparsely wooded *campo* habitats. The effect of fire may be to temporarily create in *cerrado* a habitat open enough for it to colonize. This type of response to fire has also been noted for granivorous, omnivorous and carnivorous birds in Australia (Woinarski 1990).

Our study focused the small birds of the tree and shrub layers. Other groups also respond to fire, in particular birds of prey which are attracted to the fire front to capture insects and vertebrates in flight, or tinamous which forage in recently-burnt areas (Sick 1985). A more comprehensive test of predictions relating the effects of fire must also take into account these important taxa.

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