HABITAT CHANGE BY CAPE SUGARBIRDS AND ORANGEBREASTED SUNBIRDS IN AN APPARENT RESPONSE TO FIRE IN OLD MOUNTAIN FYNBOS

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The Cape Sugarbird *Promerops cafer* and Orangebreasted Sunbird *Nectarinia violacea* are two nectarivores endemic to the Fynbos Biome. Within this biome, which comprises over 20 discrete vegetation types (Moll *et al.* 1984) they are, in turn, rarely encountered outside Fynbos itself. They feed mainly from Proteaceae and *Erica* flowers and occur in high numbers at these plants when they are in bloom.

Mistnetting at a *Leonotis oxymifolia* (Wild Dagga) patch on the Cape Peninsula has demonstrated how reluctant these birds are to move even a short distance beyond their preferred habitat, despite the proximity of this rich nectar source (Fraser *et al.* 1989). The *Leonotis* occurs in small stands amounting to about 1 ha located within sparse Strandveld (evergreen coastal thicket) vegetation at Olifantsbos on the west coast of the Cape of Good Hope Nature Reserve (CoGH). The site is located on a narrow coastal plain and is bounded by the sea to the west and Strandveld scrub on a rocky slope leading up to Mountain Fynbos about 100 m to the east. One or two plants may be found in bloom at almost any time of year, but its peak flowering periods are November – December and March – April.

In a Strandveld study plot (which did not contain *Leonotis*) at Olifantsbos, Cape Sugarbirds and Orangebreasted Sunbirds occurred at very low densities, averaging 0,04 ha^{-1} and 0,10 ha^{-1}, respectively over two years. Malachite Sunbirds *N. famosa* were more numerous, occurring at a density of 0,60 ha^{-1}. Lesser Doublecollared Sunbird *N. chalybea* was the most numerous bird of all in the Strandveld plot, with an average density of 1,86 ha^{-1} (**MF**, unpubl. data). But when congregating at the nearby flowering *Leonotis* numbers of these two sunbirds greatly exceeded the local population, as our ringing and statistical projections have demonstrated (Underhill & Fraser 1990).

Despite its undoubted attraction to Malachite and Lesser Doublecollared Sunbirds, we have consistently failed to catch more than a sprinkling of Cape Sugarbirds and Orangebreasted Sunbirds at the *Leonotis*. The 929 nectarivores we ringed at Olifantsbos prior to autumn 1991 included only 3 Sugarbirds and 34 Orangebreasteds. The average contributions made by each species to the total number of nectarivores caught during the *Leonotis* flowering periods from 1984 to autumn 1991 are detailed in Table 1.

In March and December 1991, four mistnetting sessions at the *Leonotis* patch produced relatively high numbers of Orangebreasted Sunbirds. In March 1992, two days of ringing resulted in a catch of Cape Sugarbirds and Orangebreasted Sunbirds which was our highest ever there (Table 1), although still very modest by Malachite standards. Incidentally, the number of nectarivores we have ringed at

Olifantsbos from August 1984 to June 1992 (*i.e.* at all seasons, not only during the *Leonotis* flowering period) now stands at 1 501. This comprises: Cape Sugarbird 7 (0,4%); Malachite Sunbird 983 (65,5%); Orangebreasted Sunbird 76 (5,1%); Lesser Doublecollared Sunbird 435 (29,0%). Only 73 nectarivores have been caught when the *Leonotis* is not in flower.

Although nectarivores are highly itinerant and their numbers fluctuate dramatically in response to the flowering of their food plants, we suspect that in 1992 these birds were forced to switch habitat from Mountain Fynbos to the Strandveld *Leonotis* because of fire. In February 1991 a fire swept through about one third of the reserve, destroying some of the oldest Mountain Fynbos vegetation. Part of the Olifantsbos Strandveld and many of the *Leonotis* clumps were also burnt. The latter resprouted vigorously, but skipped one flowering period; hence the low catch of sunbirds in March immediately after the fire. The plants recovered completely over the winter and blossomed again the following summer, resulting in a good catch of Malachites (Table 1). Nevertheless, it was not until the next flowering period (March – April 1992) that the arrival of sugarbirds and Orangebreasteds was recorded. The absence of a more immediate reaction, by sugarbirds in particular (*i.e.* there were no relatively high numbers at the *Leonotis* in November – December), may have been the result of *Leucospermum conocarpodendron* nectar being available elsewhere in an unburnt part of the CoGH. This pincushion was flowering profusely in Mountain Fynbos near Rooikrans in the southern part of the reserve at this time and would have tided the birds over until midsummer.

In which case, the response, if such it was, to the loss of one area of Mountain Fynbos was manifested at the flowering *Leonotis* only twelve months later.

TABLE 1

Relative and Absolute Numbers (in brackets) of Nectarivores caught at Olifantsbos during Flowering Seasons of *Leonotis oxymifolia*

	PRE-FIRE	POST-FIRE		
	Mean % (actual range) 1984-Feb 91	Percentage (total) Mar-Apr 91	Nov-Dec 91	Mar-Apr 92
Cape Sugarbird	0,3% (0-2)	-	-	1,7% (4)
Malachite Sunbird	50,0% (4-202)	42,5% (17)	85,0% (187)	68,5% (157)
Orange B. Sunbird	2,7% (0-6)	20,0% (8)	3,2% (7)	17,9% (41)
L. D. C. Sunbird	47,0% (10-66)	37,5% (15)	11,8% (26)	11,8% (27)
Total	100,0% (939)	100,0% (40)	100,0% (220)	100,0% (229)

The mean annual density of these birds in CoGH study plots in Taylor's (1984) "Mixed Upland Fynbos" (that component of Mountain Fynbos in which the birds' food plants predominantly occur) is 1,2 ha^{-1} for Cape Sugarbird and 1,1 ha^{-1} for Orangebreasted Sunbird (Fraser 1990). Monthly densities fluctuate tremendously, however, and mid- to late summer is the time of year when Cape Sugarbirds and Orangebreasted Sunbirds are at their lowest. They were, in fact, often absent from study plots, presumably in response to the scarcity of flowering food plants. Perhaps only species which provide a "pivotal" food source (*sensu* Knight 1986), such as widely scattered, long-flowering *Erica gilva* and *E. cerinthoides*, represent a dependable food supply before the *Protea repens* and *P. lepidocarpodendron* (both much utilised by nectarivores) come into flower in autumn.

In which case, why do sugarbirds and Orangebreasted Sunbirds not use the *Leonotis* as a regular, if relatively short-lived, stop-gap during these lean months? Do the relatively high numbers of these birds seen at the flowering *Leucospermum conocarpodendron* and *Mimetes fimbriifolius* in spring and summer leave the area altogether? Or do many of them remain in the general vicinity and just become more thinly dispersed and less conspicuous than the chattering groups which attend flowering pincushions, for example? If the last mentioned is the case, then after fire in Mountain Fynbos the birds would be expected to concentrate at any available food source, even a less preferred one such as *Leonotis*. Suitable food plants in early post-fire Mountain Fynbos at CoGH are generally scarce and limited to a few resprouting species such as *Erica cerinthoides* and bulbs, particularly *Watsonia* spp.

In early 1992 a large part of the Silvermine Nature Reserve, which is on the Cape Peninsula 20 km north of CoGH, was burnt. This may also have contributed to the high numbers of Cape Sugarbirds and Orangebreasted Sunbirds at Olifantsbos in March of that year. Our ringing has demonstrated that sugarbirds can easily cover this sort of distance. Although we have no direct evidence, it would be reasonable to expect that Orangebreasteds can also readily travel 20 km in the course of seasonal wanderings as they track their food plants. A more local origin was suggested by only one bird, a retrap from 1 January 1990. The two fires together destroyed a large area of Mountain Fynbos and must have deprived many nectarivores of feeding habitat. The increase of sugarbirds and Orangebreasteds at the *Leonotis* may, therefore, have been part of a more wide-ranging response to displacement from their preferred into marginal feeding areas. We have no recoveries to indicate where the birds moved when the *Leonotis* finished flowering by the end of April.

As far as the other species are concerned, Malachite Sunbird was very scarce in Mountain Fynbos study plots and Lesser Doublecollared did not occur at all (although it has been recorded at flowering *Erica gilva* in Mountain Fynbos elsewhere in the reserve). The impact of the fire would inevitably be less severe or even non-existent on these species. The numbers of Malachites caught in December 1991 and March 1992 (Table 1) were impressive but not unprecedented. Such catches (including over 200 Malachites in a weekend) have also been made in years without a recent fire. The high proportions of youngsters would reflect a good

breeding season rather than a response to fire (61% and 49% in Dec and Mar, respectively). In contrast, only 29% of the Orangebreasteds were subadults.

The results emphasise (but do not explain) the sharply-defined partitioning of habitat and resources between the two pairs of nectarivorous species. This exclusivity may be disrupted by catastrophic changes to the environment, forcing the birds to congregate at food sources where previously they did not co-occur. And because temporal variation in the density of nectarivores in Mountain Fynbos is so great, fire-related responses (e.g. a reduction in the densities of birds) may be masked by normal seasonal movements. Paradoxically, therefore, it may be more practical to assess the effects of fire on nectarivores in Mountain Fynbos by counting the birds at stands of food plants (in their flowering and non-flowering seasons) in nearby unburnt or non-Fynbos vegetation (such as Strandveld or Kloof Woodland) and not the area to be burnt. This would only be possible, of course, in management burns where the areas to be retained would, theoretically at least, remain unburnt. This would allow pre- and post-fire censuses. To be at all representative, a minimum of one year's study either side of the fire would be required to cover the flowering of all food plants (Fraser 1989). Other complicating factors include the size and season of the burn, the age of the vegetation when burnt, the density of food plants before the fire and their flowering phenology, the distance from the burnt area to the nearest food plants, the interval between the fire and the flowering of the nearest food plants, and the fire-survival strategy (reseeders or resprouters – the latter will mature more quickly) of the food plants concerned.

In summary, we attribute the increase in relative and actual numbers of Cape Sugarbirds (albeit small) and Orangebreasted Sunbirds in the *Leonotis* patch at Olifantsbos to a delayed but not altogether surprising response to fire in adjacent Mountain Fynbos. We accept that this is indicative rather than definitive, and raises more questions than it answers. Fynbos is nothing if not hideously complex! Nevertheless, we hope that it will encourage ringers to try and interpret such incidental results which arise through ringing, to add to those already derived from recoveries, measurements and moult.

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