FOODS OF THE HARRIER

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SUMMARY

A study of the stomach contents of 124 Harriers showed their food to be predominantly birds, mammals and insects, occasionally frogs and fish.

Birds taken were mainly House Sparrows, Blackbirds, Song Thrushes and Skylarks. Mammals, often eaten as carrion, were rabbits, hares, Australian opossums, and hedgehogs. Insects frequently present were crickets, grasshoppers and locusts (*Orthoptera*) and cicadas (*Hemiptera*).

Macerated plant material, found in many specimens, came from the gut of prey. Fresh plant fragments appeared to have been taken accidentally.

The proportions of each kind of food varied seasonally but all the main categories were represented in stomachs throughout the year. More than half the specimens contained only one food, the rest a mixture of two or more.

INTRODUCTION

Harriers (*Circus approximans*), common throughout New Zealand except in heavily forested areas, have flourished as a result of European settlement. Clearing of forest and scrubland for farming and the introduction of exotic animals have extended their hunting range and provided them with a more abundant diet. The growing number of animals killed by motor vehicles has also augmented the amount of easily-accessible food. Under such favourable conditions Harriers have become increasingly numerous and obvious.

Many farmers and sportsmen have sought the destruction of these birds because of alleged damage to stock and game. A continuing controversy between those who would conserve and those who would destroy resulted in a decision by the Department of Internal Affairs to undertake a study of their food habits in an attempt to settle the question.

MATERIAL

Over a period of three years 134 harriers were sent to the laboratory. North Island birds were from: Taupo 49, Rotorua 13, Wairoa 11, Gisborne 10, Opoutama 6, Mangere Airport 5, Whakatane-Bay of Plenty 4, miscellaneous 9. South Island birds were from: West Coast 16, Southern Lakes 7, Otago Peninsula 4.

They were collected by officers of the Wildlife Service. Sixty-five birds were shot, 54 trapped, 8 killed on the roads, two found dead, one poisoned and one killed accidentally in an opossum trap. The causes of the three remaining deaths were not known.

Of these 134 specimens, 71 were adult and 63 juvenile, i.e., first-year birds but fully-grown. Excluding three in which determination of sex was impossible because of damage, there were 61 males (40 adults, 21 juveniles) and 70 females (30 adults, 40 juveniles). Most were in good condition and many were fat; some juveniles excessively so.

An appreciable amount of food was found in 124 stomachs, the remainder being empty or nearly so. Food was analysed qualitatively only, this being considered adequate for the present study.

Identification of material was based on a comparison of diagnostic fragments (e.g., bone, beaks, feet, teeth, hairs, etc.) with specimens in the laboratory reference collection and on information given by Mr. F. Kinsky of the Dominion Museum. Authorities frequently consulted were Howard (1929), Imms (1951), Oliver (1955), Marshall (1960), Falla, Sibson and Turbott (1966).

STOMACH CONTENTS

As Harriers depend on chemical rather than mechanical processes for the breaking down of their food, presumably the stones of varying sizes found in some specimens were from gizzards of digested prey or picked up with insects or other food. Table 1 shows the occurrence of foods for each season.

Plant. Forty-two per cent of specimens contained plant material, usually in small amounts. This was nearly always macerated and appeared to be predominantly from the gut of prey. Occasionally it appeared to have been eaten as such by the Harrier, probably accidentally. Fresh plant material most commonly occurring was clover, grass leaves and moss.

Animal. Forty-six per cent of specimens contained bird remains. These included eggs and fledglings, taken from October to January. Of identifiable species, Sparrows were the most numerous, occurring in 16 (13 per cent) of the stomachs. Other species eaten included Blackbird, Thrush, Skylark, Starling, Chaffinch and duck (Table 2). "Miscellaneous" included one each of the following: Tomtit, Yellowhammer, Goldfinch. The rest could be identified only as bird tissue, diagnostic fragments being absent.

Mammalian tissue occurred in 89 stomachs. This incidence is misleading because 50 specimens were trapped. Thirty-two of these contained rabbit, commonly used as bait, and one contained Australian opossum, this being caught in the only recorded opossum-baited trap.

One-fifth of untrapped birds contained rabbit. On this basis the permissible number of rabbit occurrences in trapped birds was 10, not 32 as found, giving an estimated total of 25 rabbit occurrences.

Forty-nine per cent of Harriers were thus calculated to contain mammalian tissue (Table 1). The highest incidence was in winter (June to August), when wool appeared in nine of 21 stomachs (43 per cent), probably because of deaths among lambs and ewes at that time. Total occurrences for the year were: rabbit (20 per cent), wool from sheep or lamb (13 per cent), opossum (8 per cent), hare (6 per cent), hedgehog (6 per cent), and mouse (2 per cent).

Frogs appeared in five per cent of all specimens. As with birds and mammals, they were found throughout the year.

Four small fish bones were found in a Harrier shot at Alcock's Lagoon, Arahura, in November 1966. This was the only specimen containing fish.

Invertebrates occurred in 35 per cent of specimens. Blowfly adults, larvae and eggs are excluded from the calculations, being classified as accidental inclusions with carrion. Cicadas predominated from Decem-

ber to February and members of the grasshopper family greatly outnumbered all others from March to May. Occurrences for the whole year were: field crickets (11 per cent), grasshoppers (11 per cent), locusts (6 per cent), cicadas (6 per cent), moths adult and larval (4 per cent) and beetles adult and larval (one per cent). As would be expected, winter and spring occurrences were few (9 per cent) but high numbers were recorded for summer (37 per cent) and autumn (53 per cent).

Spiders, the only other invertebrates, appeared in 2 per cent of specimens.

The percentages given do not necessarily indicate order of preference; more likely they reflect sample size and availability of food items for each season.

SELECTION OF FOOD

Harriers took their food either singly or in combination, see Table 3. Where mammalian tissue occurred in trapped birds the same adjustment as for Table 1 was considered necessary.

Sixty-three specimens had fed on one kind of food only: 28 on birds, 25 on mammals and 10 on insects. Forty contained two kinds of food and the rest three. In some instances, insect fragments may have been liberated from the digestive tracts of birds or frogs. However, usually this was clearly not so as the insects were nearly always large and entire.

Although there were expected seasonal variations in the proportions of the various items of diet, Harriers had taken throughout the year all the main kinds of food. It is unlikely that they were to any great degree selective; they appeared rather to have fed readily on whatever was available. Many were found to have gorged on one kind of food, e.g., one contained 11 locusts, 83 field crickets and 10 grasshoppers; another contained 10 frogs and a third the remains of one Blackbird, two Thrushes and two eggs.

Undoubtedly much food originated as carrion. This was confirmed by the presence of blowfly larvae or eggs, which occurred only when mammalian or bird tissue was present. Seventeen untrapped specimens contained blowfly larvae or eggs in association with the following: bird remains only (2), bird and mammal remains (5), frog and mammal remains (1) and mammal remains only (9). Mammalian tissue occurring with blowfly in untrapped Harriers was rabbit in six specimens, opossum in five, wool in three, hedgehog in three and hare in one.

Other Harriers may very well have fed on carrion but not a blown portion. All, or nearly all, adult mammalian tissue, except mouse, could confidently be classified as carrion, much of it from road kills. Harriers probably took most birds and all mice, frogs and insects alive.

DISCUSSION

Harriers are one of the few species of native birds unprotected by law. They are treated as vermin by many farmers and sportsmen; indeed, all acclimatisation societies at one time or another have offered bounties to encourage their destruction.

Undoubtedly they prey on smaller birds and mammals but there are few authenticated reports of their killing animals larger than young hares or rabbits. Stead (1932) observed three Harriers associating to attack and kill an adult hare, and on another occasion a single Harrier killing one, but he commented that usually an adult hare, when attacked, could adequately defend itself.

Harriers are often accused of maiming or killing new lambs and cast sheep. I can find no evidence of this. However, they are known to start feeding on carcases immediately after death.

They have rarely been seen successfully attacking wild game birds, although harassment is frequently recorded. It would be safe to assume that successful attacks do occur, especially when young birds are about. The only game bird remains found in this study were of ducks. These occurred once in May, once in October and once in November, the last two being ducklings. The first duck could well have been shot and not retrieved during the open season. Thus predation of game birds by the Harriers examined was light but followed the expected pattern.

In the vicinity of nesting Canada Geese at Lake Forsyth, Harriers are very numerous. They have not at any time been seen to attack live birds or fresh eggs in occupied nests although they are known to eat deserted eggs containing full-term goslings (M. Imber pers. comm.). Their activities here are those of scavengers. Occupied Black-backed Gull nests in a colony under surveillance in the Napier area have been heavily attacked (T. A. Caithness pers. comm.). Here Harriers have regularly taken eggs from temporarily unsupervised nests. The presumption is that this has been done by only two of several Harriers present.

Probably because their depredations are easily observed, insufficient consideration has been given to the beneficial activities of Harriers. They are particularly useful as scavengers and they consume many plant-eating insects during the warmer months. Buddle (1951) contends that depredations of Harriers among game birds and poultry are less important than their limiting of the population of rats and other enemies of these birds. He quotes an American biologist, Herbert L. Stoddard, who examined stomachs of a large number of American Harriers and found they had eaten approximately 50 rats for each quail consumed. This supports Buller (1876) who says, "The rapacious birds have an important part to perform in the economy of nature."

CONCLUSION

These investigations support the view that the bulk of Harrier food is comprised of animal material valued by neither sportsmen nor farmers. Although most specimens were collected in areas where game birds should be abundant, they commonly contained more easily accessible food such as carrion, passerine birds, insects, and young rabbits and hares. This evidence substantiates reports that the majority of attacks attempted on wild game birds are unsuccessful. In most instances Harriers are foiled or routed by their intended prey.

Harriers play two important roles. As scavengers their value is clearly and directly seen. As predators their function in a healthy community is beneficial because a moderate degree of predation limits a population within the bounds of its own economy. However, among less vigorous species, e.g., our rarer native birds, any predation is harmful. Fortunately the habitat of most of these birds is well outside the range of Harriers.

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TABLE 1

Number of Harriers in which the main classes of foods occurred

Season	Mar. May	Jun. Aug.	Sep. Nov.	Dec. Feb.	*Number*	*Per Cent*
Sample size	34	21	11	58	124	
Food:						
Birds	10	9	7	31	57	46
Mammals	22	19	5	15	61	49
Frog/Fish	3	1	1	2	7	6
Invertebrates	18	2	1	22	43	35
Plants	11	13	–	28	52	42

TABLE 2 — Number of Harriers in which various food items occurred (total 124 Harriers)

Diet Species	*No. of occurrences*	*Diet Species*	*No. of occurrences*
Birds: Blackbird	14	Mammals: Hare	8
Chaffinch	2	Hedgehog	7
Duck	3	Mouse	2
Silvereye	3	Opossum	10
Skylark	6	Rabbit	15
Sparrow	16	Wool	16
Starling	2	Invertebrates:	
Thrush	7	Cicada	8
Misc. sp.	18	Beetle	1
Eggs	7	Cricket	14
Frogs	6	Grasshopper	13
Fish	1	Moth	5
Plant Material	52	Locust	7
		Spider	3

Notes: (a) 24 specimens contained blowfly (adult, larvae or eggs). These occurred only with carrion.

(b) An additional 32 harriers containing rabbit were excluded as these were snared with rabbit-baited traps.

TABLE 3 — Food occurrences in 110 specimens

Food Items	*No. of specimens*	
Bird only	28	
Mammal only	25	
Insect only	10	Fourteen specimens not listed
Bird and mammal	15	were trapped, containing
Bird and insect	12	mammal only.
Bird and frog	3	
Mammal and insect	8	
Mammal and frog	1	Mammalian occurrences
Insect and frog	1	include permissible
Bird, mammal, insect	5	trapped rabbit.
Bird, mammal, frog	1	
Mammal, insect, frog	1	

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WELCOME SWALLOWS IN NORTHERN HOKIANGA, 1965 - 1967

By BOB COWAN

A general survey of nest sites of the Welcome Swallow (*Hirundo neoxena*) in Northern Hokianga was made in 1965, and the results are on record (Edgar, *Notornis* 13, 53). Observations since 1965 indicate a steady increase in the swallow population of the area, and this is confirmed by my nest records for 1966 and 1967 seasons. In the following table, 1965 figures are those recorded in the 1965 survey: 1966 and 1967 figures are the result of annual checks on the same areas.

TABLE 1

Locality	*Occupied Nest Sites*		
	1965	1966	1967
Herekino to Panguru turn-off	22	26	27
Whangape harbour area	7	9	10
Runaruna area	2	5	9
Kohukohu area	4	5	8
Panguru-Mitimiti	2	4	6
Totals	37	49	60