

SHORT COMMUNICATION

The diet of the Brown Booby *Sula leucogaster* and Masked Booby *Sula dactylatra* on Rose Atoll, SamoaCRAIG S. HARRISON¹, THOMAS S. HIDA² & MICHAEL P. SEKI²

IBIS 126: 588-590

Received 10 February 1983

The Brown Booby *Sula leucogaster* and Masked Booby *S. dactylatra*, have pantropical ranges (Nelson 1978) and their diets have been studied on several breeding islands. Brown Boobies are considered to be inshore feeders (Diamond 1978) and have a varied diet. They feed principally on flying fish and halfbeaks in the Bahamas, but supplement this diet with prawns, parrot fish and flat-fish (Murphy 1936: 859). At Ascension Island, Brown Boobies took at least 12 prey items, including a squid *Hyaloteuthis pelagicus*, a blenny *Ophioblennius webbii*, a flying fish *Exocoetus volitans* (Dorward 1962, Stonehouse 1962) and a carangid *Trachiurops* [(*Selar*)] *crumenophthalmus* (Simmons 1967). In Australia, they fed on flying fish, squid, a mackerel *Rastrelliger kanagurta* and a carangid *Chorinemus lysan* (Serventy 1952). At Christmas Island (Indian Ocean), this species fed on a flying fish *Cypselurus bahiensis* (Gibson-Hill 1947). Our own recent study of 244 samples from the Hawaiian Archipelago (Harrison *et al.* 1983) indicated that a single squid family (Ommastrephidae) and 18 fish families (especially flying fish, carangids, and halfbeaks) were the most important components of the diet. We know of no published information concerning the diet of Brown Boobies in the South Pacific.

There are numerous published reports of the diet of Masked Boobies, which are considered to be pelagic feeders (Diamond 1978). Murphy (1936: 848) reported that they fed primarily on flying fish in South America. Flying fish *E. volitans* were also important at Ascension Island, but a blenny *O. webbii*, a trichiurid *Benthodesmus simonyi*, and an anchovy *Engraulis* spp. were also commonly taken (Dorward 1962). In Australia, this bird fed on a mackerel *Rastrelliger kanagurta* (Serventy 1952) and in the Seychelles, it fed on a flying fish *Exocoetus* spp. and squid (Vesey-Fitzgerald 1941). In the Pacific, Schreiber & Hensley (1976) reported that Masked Boobies fed primarily on flying fish and squid at Christmas Island. Our own study of 305 samples from Hawaii (Harrison *et al.* 1983) indicated that one squid family (Ommastrephidae) and 15 fish families (especially carangids, flying fish and halfbeaks) were important. We have located only anecdotal references to the diet of this species in the South Pacific: Nelson (1978) reported it ate kingfish *Regificola grandis*, a mullet *Mugil* spp., a flying fish *Cypselurus* spp. and squid at Lord Howe Island.

During the course of our work on the diets of seabirds in the Hawaiian Archipelago, we had an opportunity to examine samples from nine Brown Boobies and four Masked Boobies that were collected by regurgitation at Rose Atoll (14°32'S, 168°09'W) on 11 November 1980. These were identified to the lowest taxon possible,

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counted, measured for displacement volume and, where possible, measured for length.

The samples from Brown Boobies contained a mean of 18 prey items, ranging from eight to 46. Sample volumes averaged 73.3 ml (range 25–115 ml). Prey lengths for the 35 measured items averaged 63.5 mm (range 29–103 mm). Standard length (SL) was used for all fishes. The list of prey items (Table 1) utilizes rankings of importance to family level using a system similar to that employed by Ashmole & Ashmole (1967) in which the three commonly reported measurements of prey importance (numbers of organisms, percent occurrence, average percent volume) are equally weighted. This ranking system is described further in (Harrison *et al.* 1983). The most important prey items of Brown Boobies at Rose Atoll were juvenile forms of ommastrephid squids, goat fishes (Mullidae), and a squirrel fish *Holocentrus diadema*. The lengths of important prey items include *Symplectoteuthis oualaniensis* ($\bar{X} = 77$ mm, $n = 10$), goatfishes ($\bar{X} = 61$ mm, $n = 6$), and *Acanthurus triostegus* ($\bar{X} = 37$ mm, $n = 6$).

The four samples from Masked Boobies contained primarily flying fishes (including one *Cypselurus* spp.) and ommastrephid squids (including one *S. oualaniensis*). A single skipjack tuna *Katsuwonus pelamis* was the only other prey item identified. The samples contained an average of three prey items (range 1–6), a mean volume of 93 ml (range 35–168 ml) and a mean prey length of 74 mm (56–89 mm, $n = 4$).

Our experience with the analysis of seabird food samples from Hawaii make us wary of drawing premature conclusions based on limited sample sizes. However, our results here further underscore the relative stability of the diet of the Masked Booby

TABLE 1
Prey items identified to lowest taxon from nine Brown Booby samples from
Rose Atoll, Samoa

Prey	Rank	Organisms (<i>n</i>)	%, of samples in which occurred	%, by volume
Fishes				
Acanthuridae	5 (tie)			
<i>Acanthurus triostegus</i>		18	11	4.9
Unidentified acanthurid		2	22	0.7
Carangidae	9	1	11	2.2
Coryphaenidae	8			
<i>Coryphaena equiselis</i>		2	11	0.8
Exocoetidae	5 (tie)	6	56	5.8
Holocentridae	4			
<i>Holocentrus diadema</i>		5	22	1.2
Unidentified holocentrid		5	56	1.1
Mullidae	1 (tie)	91	78	27.3
Scombridae	7			
<i>Katsuwonus pelamis</i>		4	22	4.9
<i>Thunnus alalunga</i>		1	11	1.3
Squid				
Ommastrephidae	1 (tie)			
<i>Symplectoteuthis</i> spp.		5	22	5.6
<i>S. oualaniensis</i>		7	33	18.4
Unidentified ommastrephid		16	67	18.9
Unidentified squid	10	1	11	0.2
Unidentified remains	3	6	67	6.7

throughout its range. Our results also underscore the ability of Brown Boobies to exploit apparently any prey that is available in inshore waters. Goat fishes, squirrel fishes and convict tangs *A. triostegus* are considered to be rather inshore fishes associated with the reef. In comparison with samples from Hawaii, Masked Boobies ate similar numbers of prey (3 \bar{x} . 2.5 items per sample), but Brown Boobies at Rose Atoll ate more prey items (18 \bar{x} . 12 items per sample) of smaller length (63.5 \bar{x} . 94 mm, ANOVA $P < 0.01$). The importance of goat fishes to Brown Boobies on a South Pacific island, which is paralleled in importance for many seabirds in Hawaii, indicates that future investigators of the diets of tropical seabirds should examine a reference collection to determine whether goat fishes occur in the diet. It is possible that some of the unidentified fishes from other studies (e.g., Schreiber & Hensley 1976) were goat fishes but were not recognized by laboratory personnel.

We are grateful to J. R. Shallenberger for collecting the samples and to R. S. Shomura for making this inter-agency work possible.

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