

SEABIRD — DOLPHIN ASSOCIATIONS. A variety of associations between cetaceans (whales and dolphins) and various species of bird have been described in the literature (e.g. Evans 1982). In general, the association appears to benefit birds by providing access to food that would not otherwise be available to them, although it is also possible that cetaceans use aerial hunting birds such as terns as a cue to the location of fish. The majority of studies of the association have been made in offshore environments. Inshore bottlenose dolphins *Tursiops truncatus* are thought to have fewer bird associations and have been little studied in this context.

The senior author has been engaged in research into the behavioural ecology of free-ranging bottlenose dolphins in the Adelaide area since late 1987. About 30 dolphins are regularly located in the research area, an estuarine/mangrove and gulf beach environment less than 20 km from central Adelaide. The proximity of the dolphins to Adelaide confers a number of advantages to the researcher, not the least being that the animals are well habituated to humans and boats.

The research mainly takes the form of observing the dolphins from a small boat as they move about the study area. Observations are supplemented with audio tape recorded descriptions, still photographs and video photography.

During field work a substantial number of incidental observations on the interactions between dolphins and seabirds have been recorded. The form of these interactions varies according to the bird species involved, the habitat the dolphins are feeding within and, presumably, the type of prey species involved.

The most abundant seabird species in the study area is the Silver Gull *Larus novaehollandiae*, an opportunistic feeder with a strong orientation toward scavenging. The gulls will often hover about 4 to 5 m above dolphins feeding in shallow water (approximately 1 m deep) close to mangroves, taking advantage of a fishing technique sometimes used by *Tursiops*: "kick fishing". This technique, first described by Shane (1988), involves a shallow swimming dolphin making a powerful upward thrust of its tail flukes as it swims through a school of fish. The upward thrust, which often produces an audible thump, sometimes catapults fish several metres through the air. The dolphin then turns and retrieves the stunned or injured fish. Flocks of Silver Gulls (up to 25 birds) have been observed hovering over kick fishing dolphins, and a number of birds have been observed to obtain a fish by flying off with it

before the dolphin has had the opportunity to retrieve it.

On occasion, gulls will also attempt to take advantage of injured fish which result from coordinated group fishing activities the dolphins sometimes use on schooling fish. The gulls' behaviour follows dolphins corralling fish with their bodies and then lunging into the circle. Evans (1987) also recorded this variant of kleptoparasitism.

Another species frequently seen flying over feeding dolphins is the Crested Tern *Sterna bergii*. These terns catch fish by diving from a height of about 5 to 8 m, but do not penetrate more than a few centimetres below the surface. Tern prey must therefore be virtually on the surface.

Terns are frequently seen following dolphins engaged in herding schools of mullet in mangrove channels. A common escape response of these fish is to leap clear of the water, a manoeuvre that makes them more accessible to the terns. Terns have been observed to accompany feeding dolphins for up to 35 minutes. On one occasion a single tern (easily identified because one of its legs was injured and could not be tucked up in normal flying mode) followed a pair of dolphins over a distance of approximately 1.5 km, although it made no dives during this period.

The Pied Cormorant *Phalacrocorax varius* also uses dolphins as a fishing aid. These strong swimming birds dive from the surface of the water, can stay submerged for 30 seconds or more, and can easily swim 25 m under water. They are often found fishing the same channels as dolphins and clearly use the dolphins to guide them to fish. After completion of a dive, the cormorant will look around until it sees a dolphin's dorsal fin emerge and then either swim on the surface or fly across to where the dolphin was last seen and dive again. It seems plausible that the dolphins' ability to locate fish via sonar exceeds the visual capabilities of the cormorants in the turbid estuarine water.

All three species of bird are able to discriminate between different dolphin behaviours. Thus dolphins either "cruising" (moving from one location to another) or hunting bottom-dwelling fish do not attract seabirds. However, vigorous surface behaviour associated with mating does attract terns and gulls although fishing is not involved.

The terns and cormorants appear to be hunting the same prey as the dolphins and are thus direct competitors. The cormorants are easily accessible

to the dolphins but aggressive responses have not been observed. Occasionally, however, they do stray into the path of a dolphin and are forced to take evasive action. It is interesting to note in this context that Lockyer (1978) described an incident in which a Guillemot *Uria aalge* was used as a plaything by a solitary dolphin. The dolphin repeatedly chased the diving bird, caught it and tossed it in the air. It released the bird after about half an hour, seemingly unharmed. Similarly, another solitary animal is reported to have spent many hours playing with a Shag *Phalacrocorax aristotelis*:

"Being slow, low take-off birds, they found it impossible to escape his attentions as he leapt over them, flicked them skyward, spun around them quickly enough to dunk them in a vortex and even "bopped" them out of the sky as they fled for freedom. Though dilapidated and wet, no-one ever witnessed a permanently damaged victim." (Holmes 1990)

Other examples of dolphins using birds as playthings can be found in the literature on captive dolphins (Brown & Norris 1956; Tayler & Saayman 1973).

One intriguing incident observed during the present study may be an example of sophisticated play behaviour in a wild dolphin. Subadult dolphins in the study area are sometimes observed playing a kind of "cat and mouse" game with fish. The dolphin catches a small fish, then hangs vertically in the water with its beak at water level and rotates around an axis with a surface diameter of about 1 m. The fish is then released into the cone of water circumscribed by the rotating dolphin and flicked and prodded with its beak. Silver Gulls will often hover around dolphins engaged in such play behaviour and have been observed obtaining fish in this manner.

During one such interaction an extra dimension was added. On three separate occasions the dolphin clutched the struggling fish in the tip of its mouth, waited until a gull was within range, then flicked the fish a few centimetres in the air. The gull swooped at the fish and as it did so the dolphin attempted to catch the bird in its mouth. The dolphin did not succeed in catching the bird but it did come very close. This behaviour may be an extension of "bird staring" (dos Santos & Lacerda 1987) in which dolphins raise their heads out of the water for up to ten seconds to observe hovering gulls.

It is, of course, impossible to determine from these observations if the dolphins' behaviour is an example of purposive "fishing" behaviour, but that interpretation seems plausible.

Dolphins are present in the birds' life space for only a brief and presumably unpredictable period each day and therefore represent an opportunistic feeding strategy. The fact that all three species may expend considerable energy in following the dolphins suggests that there is a compensatory payoff in terms of the food obtained.

The apparent absence of interactions between dolphins and some species of bird is also interesting. In particular, the Black-faced Shag *Leucocarbo fuscescens*, which is closely related to, but somewhat smaller than *P. varius*, has not been observed following dolphins although dolphins frequently pass through their feeding grounds. Similarly, the Australian Pelican *Pelecanus conspicillatus* is frequently seen in the same general vicinity as dolphins, but no examples of interaction have been noted.

In summary, and contrary to the literature (e.g. Evans 1982), there appears to be a rich variety of association between inshore bottlenose dolphins and seabirds. The study area offers easy access to the researcher and the relative abundance of both dolphins and birds provides considerable scope for further research on this topic.

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