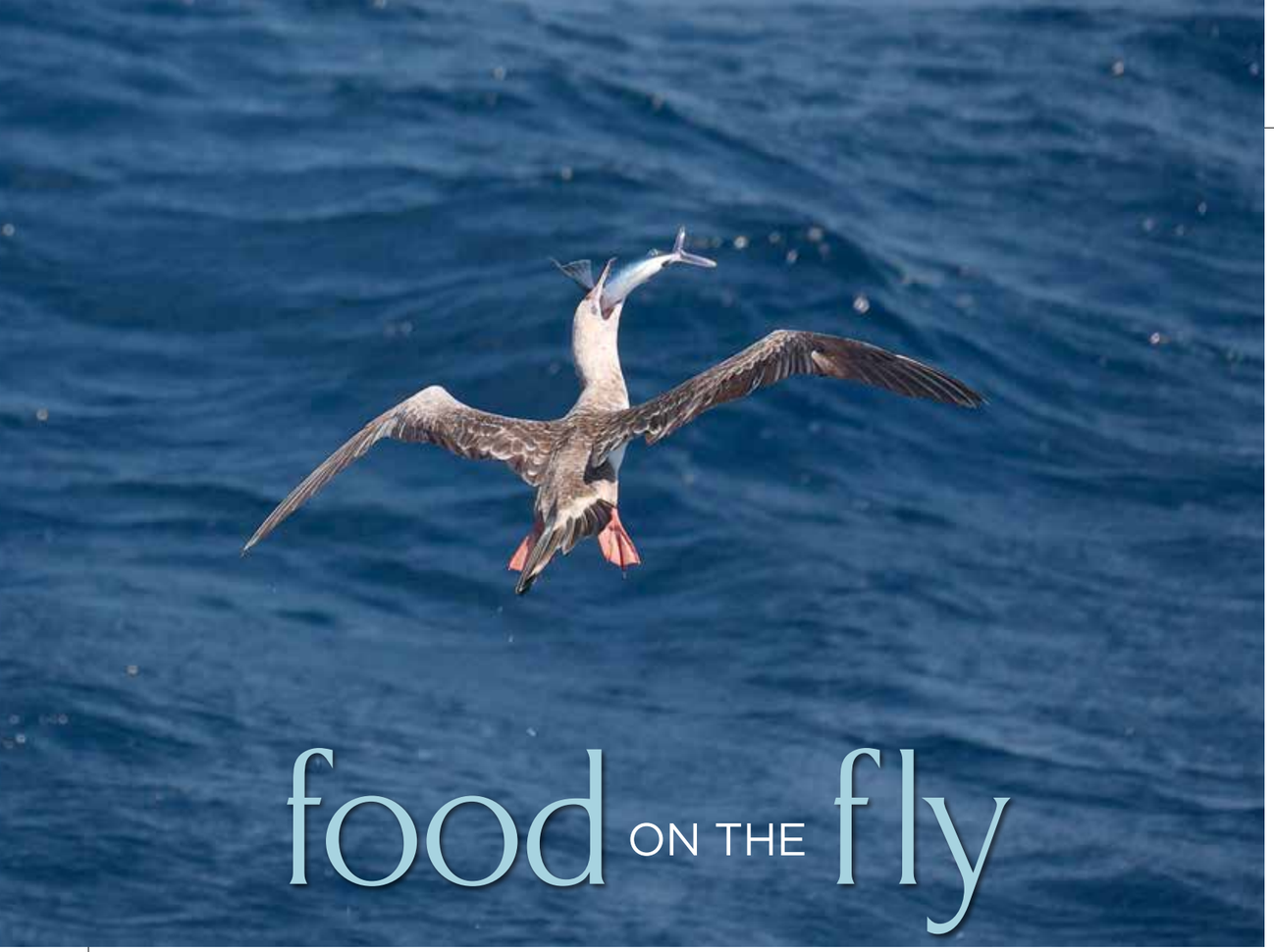

# food ON THE fly

## Red-footed Boobies in hot pursuit of flying fish

The tropical oceans are often regarded as marine deserts. The sun warms the surface waters, creating a strong barrier to vertical mixing. As a result, essential nutrients such as nitrates and phosphates, required by phytoplankton to produce food, are scarce where there is sufficient light for photosynthesis. And little photosynthesis, especially by larger-celled phytoplankton, means little food for zooplankton, fish and ultimately top predators such as seabirds.

above *An immature brown morph Red-footed Booby prepares to swallow a large flying fish caught in flight in the Mozambique Channel.*

To make matters worse, the warm water speeds up the metabolic rates of cold-blooded fish, increasing the amount of food they need to consume. Faster metabolism also means faster maximum swimming speeds, increasing competition between predatory fish and warm-blooded predators. It's no accident that the most impressive aggregations of seabirds and marine mammals occur at high latitudes, where they have a huge physiological advantage over their cold-blooded competitors and prey.

For so-called 'bait fish' – the small pelagic fish that form the main prey of many top marine predators – the tropics are a particularly challenging place to live. The crystal-clear oceanic waters offer few places to hide from fast-paced gamefish like tunas, marlins and dolphinfish. One option is to flee into the air. From below, the surface of the sea resembles a mirror and fish that launch into the air effectively 'disappear' for subsurface predators.

The more distance that bait fish can put between themselves and pursuing predators before returning to the watery realm, the greater their chances of escaping. The halfbeaks propel themselves across the surface with just the tip of their tail in the water, but the flying fish have enlarged pectoral and pelvic fins that allow them to glide hundreds of metres away from danger, often boosting their flights with a series of tail flicks. This is not a new strategy. Fossils of flying fish, unrelated to modern species, have been found from more than 200 million years ago.

One downside to this aerial escape is the risk of attack from above. Flying fish feature strongly in the diets of a host of tropical seabirds and many of them are caught in the air. Frigatebirds are well known for their aerial agility, but arguably the most impressive aerial predator of flying fish is the Red-footed Booby. In the past, this species, which is the smallest member of its family, relied mainly on gamefish or dolphins to chase flying fish into the air. However, they have now learnt that ships frequently flush flying fish, giving any birders aboard a front-row seat to the action.

On windy days, the boobies cruise effortlessly in the updraft created by the ship, whereas on calm days they perch on the bow. Once a fish takes to the air, the chase is on. The booby dives, flapping strongly to accelerate as quickly as possible, then levels out just above the water. Flying fish are not entirely defenceless – they can change their wing angle to dive into the water if threatened, but they seem to struggle to detect boobies approaching from directly behind.

Despite the fish gliding at about 60 kilometres per hour, they are soon hauled in by the booby. Unless they dive before the booby reaches them, the odds are against them surviving. And even fish that dive just in time may be pursued into the water. Sometimes two or three boobies chase the same fish, each noisily proclaiming to have dibs on the hapless creature. But more often than not this leads to the fish escaping, as they either detect the pursuing birds or the birds get in each other's way.

Once a fish is securely grasped in the booby's serrated bill, the bird climbs steeply while manoeuvring its prey to swallow it head first. Occasionally a fish is impaled on the bill, requiring it to first be shaken free. If a fish is dropped, the booby really shows its aerial agility, turning instantly to recapture the falling fish.

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above *The 'Mozambique Cerulean' is one of the more common flying fish targeted by Red-footed Boobies in the Mozambique Channel.*

top *White-tailed brown morphs comprise more than 98 per cent of boobies on Europa Island.*

The Red-footed Booby is the only polymorphic member of the Suliformes. Adults come in three main colour morphs: white, brown and white-tailed brown. It is tempting to speculate that this results from selection favouring the rarer morph in a given region, because their prey learn to recognise the most common morph. This argument has been used to explain the high incidence of colour polymorphism in raptors and skuas, but it fails to explain why nocturnal owls also have a high degree of polymorphism.

Currently, most plumage polymorphisms are thought to result from disruptive selection favouring the more extreme morphs. This might apply >

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*An adult white morph Red-footed Booby in the Mozambique Channel. Most white morphs in the western Indian Ocean breed at Aldabra and Cosmoledo atolls in the Seychelles.*

in the Pacific Ocean, where all three morphs tend to co-occur in similar ratios across much of the region. However, a single morph dominates four of the five surviving colonies in the western Indian Ocean. Almost all adults breeding in the three remaining colonies in the Seychelles are white morphs, whereas white-tailed brown morphs comprise more than 98 per cent of birds at Europa Island in the southern Mozambique Channel. Only the small colony on Tromelin Island, east of Madagascar, has a mix of morphs, with roughly twice as many white morph as white-tailed brown morph birds. This ratio has remained constant for more than 50 years.

Quite why the morphs differ so strongly between colonies in the Indian Ocean is not clear. World-renowned gannet and booby expert Bryan Nelson suggested that white-morph birds should be at a disadvantage at islands where there is a high risk of kleptoparasitism, because their white plumage makes them more conspicuous to potential thieves. Female Great Frigatebirds (which are larger than the males) frequently try to steal fish from boobies returning to Europa Island, as do the Brown Skuas that are non-breeding visitors to the island.

Red-footed Boobies returning to Europa take several steps to reduce the risk of having their hard-earned meals pilfered. They usually return to the island in groups, flying higher above the sea as they approach to increase their chances of evading pursuit, and most only return at dusk, when they can more easily slip through the cordon of frigatebirds and skuas. However, boobies breeding on Aldabra Atoll also experience high rates of kleptoparasitism from the large breeding populations of frigatebirds, yet the white morph makes up more than 80 per cent of birds.

Red-footed Boobies used to breed at 15 islands in the western Indian Ocean and the only other place where the white-tailed brown morph was dominant was at Glorieuses, close to the large colonies of white-morph birds on Aldabra and Cosmoledo. Sadly, we'll probably never know why this colony differed from the others in the region.

The White-tailed Tropicbirds of Europa Island also differ from those at other islands in the western Indian Ocean. Long recognised as an endemic subspecies, recent genetic studies show that the Europa birds are closer to the South Atlantic populations of White-tailed Tropicbirds than populations breeding in nearby Madagascar, Comoros, the Seychelles or the Mascarene Islands. Quite why this might be is uncertain, but there is no doubt that Europa is one of the most important seabird breeding islands in the western Indian Ocean, providing a safe breeding site for nearly 800 000 pairs of seabirds of eight species.

**PETER RYAN**

## FLOCK AT SEA 2023

Following the success of three previous Flock at Sea voyages, BirdLife South Africa will be heading to the tropical waters of the Mozambique Channel in October/November 2023.

Flock to the Mozambique Channel will provide an opportunity for birders to see tropical species such as tropicbirds, boobies and frigatebirds. The MSC *Orchestra* will depart from and return to Durban on this five-night voyage. Further announcements will be made in the coming months; bookings will probably open in September 2022.

Flock™
The BirdLife South Africa Expedition to Eastern Tropical waters
to the Mozambique Channel 2023