

City Under the Sea - Fishes of the Poor Knights Islands

Portrait of a community of fishes arranged in ecological groupings: hunters; plankton feeders; herbivores; bottom kissers, browsers, grazers and stalkers- this book goes beyond the I.D. function of most fish books to examine their lives and relationships in detail. Based upon years of diver observation it has value for all fish watchers.

by WADE DOAK

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Prologue

Reef Fishes World Wide

Having dived in two oceans and both hemispheres I now realise that, while species may differ, the basic pattern of reef fish communities holds true all over the world. Despite local names and variations in families there is a cosmopolitan reef fish scene. Whether in the Caribbean, California, Japan, the Mediterranean, southern Africa or Australia, I find myself descending through silvery schools of jacks and scad, bright colonies of anthias and damselfishes, all feeding on planktonic animals. Through them hurtle powerful, streamlined yellowtails on the attack. Near the reef hovers a school of sea bream awaiting the evening hours before descending to feed. Rays skim the sand like undersea birds. A john dory drifts by like a shadow, stalking its mid-water prey; from crevices and holes gape-jawed morays stare. Angelfishes thrust their pouting mouths into encrusting life as colourful as themselves. At the portals of caves and tunnels, solitary groupers and scorpion fishes rest, their jaws visible in the half-light.

Out on the white sand goatfishes dabble their barbels in search of tasty morsels, and lizard fishes lie poised, ready to engulf passing prey with their jack-in-the-box jaws. Everywhere over the reef multi-hued wrasses weave about, snipping at delicacies, while the ubiquitous triggerfishes and puffers nibble at sponges and other organisms too tough for most fishes to stomach. Over the bottom, tiny blennies jump and pause, erecting their dorsal fins as signal flags and chasing neighbours from their territories.

In 1972 my first fish book **Fishes of the New Zealand Region** was published, presenting descriptions and colour plates of some 80 different reef fishes. That book had a scientific approach and was favoured with several reprints. Since then several excellent guide books have appeared, which cover this ground exhaustively. There is another way of regarding reef fishes; a more aesthetic, entertaining and philosophical approach that does not regard them as a collection of bones, spines and scales to be preserved in alcohol, sport on a hook, or a tasty meal.

Since I began my studies, the Poor Knights Islands have become a marine reserve. In certain areas their inhabitants are protected from all molestation. Without any keepers, with no walls and no food handouts - just the stroke of a pen on paper - we have discovered how to create the most exciting of all natural zoos. In marine reserves the fishes are much more trusting and approachable than most terrestrial wild animals, and we soon learn to value each individual for the delight it can give countless visitors, rather than for its transient role as a fish dinner.

It may be that in our lifetimes reef fishes will be regarded much as birds are today. We may farm a few species or raise them in large enclosures, like salmon, but the rest we will protect, study and enjoy for their beauty of form and colour, and for their ecological value. Just as it would be unthinkable to bring home a sackful of native birds, one day we may realise that reef fishes are worth more alive than dead. Because they live in the sea and we breathe air, until now we have had a much lower regard for fishes than for birds. This is changing, and in my lifetime the edge of the sea has ceased to be a barrier to our bodies. I hope this will soon extend to our minds and our ethics, and that we will look on the reef fish communities, which are the most vulnerable and most accessible to man, as deserving of extensive protection. We have been destroying our marine libraries and art galleries.

New Zealand's first marine reserve was declared in 1975 at Goat Island near Leigh, an hour's drive from Auckland city. Since then the recovery of reef fish populations there has been dramatic. Local fishermen, once concerned at losing fishing territory, now appreciate the value of the reserve in restocking adjacent waters. The people of Auckland city flock there in such numbers over the summer months that car-parking is a major problem. At the sea's edge, snapper and blue maomao swarm to be hand-fed by unbelieving Japanese tourists. Retired people, who would normally play bowls, come there to snorkel amongst the friendly reef fishes on quiet summer evenings. Hundreds of young people have cut their teeth as divers within this reserve, which was mainly set up as an adjunct to Auckland University's Goat Island Marine Laboratory.

In writing this book I have a dream: if only the intrinsic qualities of reef fishes were widely appreciated, and along all the shores of the world, at reasonable intervals, we could establish more and more such reserves to protect reef fishes and their ecosystems. Just as every city has amenities such as libraries, parks and gardens, art galleries and zoos, an accessible undersea area should be set aside for marine recreation and education: 'wet libraries'. Functioning at the same time as conservation zones, a network of such reserves would be the best way to ensure that the sea could continue to contribute food for a crowded planet. Otherwise the negative trend is all too clear. Like canaries in a coal mine, healthy reef fish populations are a measure of the impact humanity is having on this planet's most vital organ: the ocean.

The Poor Knights Community

The reef is one of the richest zones of life on earth. Opportunities to gain a living abound in successive layers - every cubic metre is productive. The most mobile members of the reef community are the fishes. All animals find advantages in exploiting new sources of energy not available to others in a crowded community and, most flexible and adaptable, the fishes have spread into every available ecological niche - just as in a city people are always seeking new occupations and modes of employment. Each fish, whatever its speciality, needs only a few square metres of space for its support. Instead of competing with one another for a limited food resource, the reef fishes have radiated into a vast array of different species, each with its own mode of diet, its own adaptation of body form and its own habitat, so that every available energy source is exploited.

On any reef in the world the same three broad categories of habitat can be distinguished. Firstly, there are the open-water fishes, which live independent of the bottom. Secondly, there are the bottom-swimming fishes, which live close to the reef and are partly dependent on it for food and shelter. Then, within cracks and crevices, beneath seaweed fronds, in caves and under ledges are the bottom-dwellers, which are greatly dependent on the bottom for food and shelter. Ecologists studying fish habitats in any one area have found it useful to sort out the exploiters of these habitats according to their feeding patterns, grouping together all species that exploit the same resources in a similar way. As they resemble mediaeval craft unions, such groups have been called 'guilds'.

While I have dived on reefs of rock and coral in many parts of the Pacific, and in the Atlantic, I have spent four decades observing the reef fishes around the Poor Knights Islands, a group of volcanic rock piles 24 km off the northern coast of New Zealand at 35° latitude. I now plan to examine this community of fishes in detail, as it is ideal for this purpose.

The greatest diversity of life occurs in tropical seas. A coral reef may have 2000 different species - a bewildering metropolis - but the average size of fish is only 15 cm. In cooler waters, with their marked seasonal changes in temperature and food supply, there are fewer kinds of fishes, but they are usually found in greater numbers and are much larger individually. In concentrating on the fishes of the Poor Knights Islands, I can straddle both worlds. Most of the temperate-water species, found on the mainland coast, flourish here under optimal conditions, although a few appear to suffer from competition and are more abundant further south. In addition, many warm-water species from tropical and subtropical families have found the islands favourable. This is probably due to

the warm East Auckland current, which flows offshore down this coast, bringing with it larval fishes from coral reefs out in the Tasman, such as Lord Howe Island. The Poor Knights Islands, with their wide variety of deep-water habitats, caverns, archways and tunnels, offer unusual ecological niches not much used by local species. By contrast, a handful of species common on the adjacent coast are not found there at all.

Situated near the edge of the continental shelf, the Poor Knights are remnants of a string of volcanoes that once erupted along a fault line on the Pacific rim. When ice ages froze so much of the world's water that sea levels fell, the surf eroded the softer portions of the volcanic rock, creating vast sea caves and archways, tubes and tunnels, chimneys and air-bubble domes. Divers find the Poor Knights ideal. The steep cliffs plunge almost vertically to around 30 m, broken by ledges, fissures, overhangs and grottoes. At 50 m there is often a sandy plain shelving away gently, before a second slope carries on to depths beyond scuba range (depths which recently I was privileged to explore with a robotic submarine). Such undersea topography provides the diver with a wide range of depths within a short horizontal distance, encompassing the conditions of broad expanses of the continental shelf within a single dive.

The rich nutrient flow brimming past the island day and night supports a wall of mouths of stunning diversity, which I have described in **The Cliff Dwellers**. In gaps between the islands, shallow, sand-floored avenues and reef outcrops provide optimal conditions for reef fishes: a constant, gentle current; shelter from wave violence, and sunlit, seaweed jungles. In such areas, diver observation of reef fish communities has been intensive and long term.

For me, after 40 years exploring out there, the most distinctive quality of the Poor Knights, in comparison with so many coral reefs I have visited, is that I dive **in** them, not at them, and their many internal spaces give architectural dimensions to the undersea world. Sometimes it seems like a waking dream as I fly through the galleries, halls and corridors of a drowned city. The exquisite, encrusting life suggests a Louvre or a Taj Mahal, perhaps even Xanadu. For all the reef fish guilds, the diversity of habitat and food supply around the Poor Knights provides opportunities; it is a vertical city, a world tipped on edge, facing the infinity of inner space and all its drifting galaxies.

The Guilds

At the Poor Knights Islands, as on any reef, there are three guilds of open-water fishes: the **plankton pickers**, the **open-water hunters** and the **general predators and scavengers**. Adjacent to the cliff faces they range from just

beneath the surface to within a few metres of the bottom. (Predators like mako and bronze whaler sharks are rare at the Poor Knights these days). Feeding on the larger plankton animals near the surface are dense schools of trevally and blue maomao, their backs often humping out, mouth parts slurping greedily as they pursue frantic, lolly-pink krill. Just beneath them long ropes of demoiselles nip copepods and plankton creatures with deft manoeuvres. Through them all dash silvery schools of pelagic fishes, koheru and jack mackerel, in quest of similar prey. Deeper down, other kinds of plankton creatures sustain masses of perch grouper: pink maomao, butterfly perch and splendid perch. Close to the cliff hover swarms of tiny plankton-feeding triplefins. Further out, huge sunfish gulp down gelatinous forms of plankton. At dusk all these daytime plankton feeders retire and the 'night shift' members of the guild emerge: roughies or squirrel fishes, big eye and golden snapper.

Sweeping along the cliff face by day are the open-water hunters: kingfishes, barracouta and kahawai. Near the bottom, but still in mid-water, the cardboard-thin john dory stalks its prey with stealth and cunning. Close to the rock faces, weaving through thickets of seaweed or fossicking over sand plains and reef flats, are the members of seven bottom-feeding guilds.

In shallow, weedy coves, **plant grazers** with specially adapted teeth closely trim the algal turf like lawnmowers, and **plant browsers** weave among the taller sea plants, nipping off chunks of fronds and grinding them up in their pharyngeal mills. These plant eaters are black angelfishes, marblefishes, parore butterfly and silver drummer.

With their thick, rubbery lips and brush-like tooth pads the **invertebrate gleaners** rummage over rocky areas, sucking and kissing off patches of encrusting life swarming with tiny invertebrates. At first sight it seems these gleaners are weed-eating fishes as they mouth the algal turf carpeting the rocks. Members of this guild are red moki, painted moki and porae.

Invertebrate grazers scrape off encrusting organisms such as tube worms or anemones with specially adapted teeth. Some nibble like mice at tough, bristly sponges. Guild members are triggerfishes, pufferfishes, mado, blue-fish and crested blennies.

Invertebrate browsers range very widely, snipping invertebrates such as crabs and shellfish from rock, sand or mud; snapper, tarakihi, butterfly fishes, boarfishes, kelpfishes and rays belong to this guild.

The **bottom grubbers** swim over mud and sand, probing with sensitive barbels

and pectoral fins, and engulfing mouthfuls along with tube worms and other invertebrates. This guild consists of goatfishes, occasionally joined by trevally, blue moki, tarakihi and porae.

A very large guild, the **bottom fossickers**, swim over areas of broken rock, raking off encrusting life with sharp, rat-like teeth. All the wrasses belong to this guild, each with its own speciality and its own niche on the reef.

With their bold insignia the **parasite pickers** form a highly specialised guild, removing lice from the gills, fin bases and skin of other reef fishes. The crimson cleaner, the combfish and the juvenile Sandager's wrasse are the principal members of this guild, joined by young trevally, mado and triplefins. As they fossick for crustaceans on the bottom, these small fishes do not mind if a lice-infested patch of fish skin gets in the way; and the lice-carrier enjoys their grooming service.

To the guild of **bottom stalkers** belong the morays, congers, rock cod, groupers, scorpion fishes, lizardfishes, triplefins and blennies. Many are night predators. By day the scorpion fish lies motionless beneath ledges, under fronds of seaweed or perched in a large cup sponge; out of crevices stare rock cod, morays and congers; within rocky recesses groupers rest. All await nightfall before venturing out to snap up crustaceans and small fishes.

Whenever I explore the cliff face at night, my flashlight reveals a startling change in the fish guilds. The bottom stalkers are out hunting, and the day feeders are at rest.