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Predation on seabirds by large teleost fishes in northern New Zealand

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Abstract

Predation by yellowtail kingfish (*Seriola lalandi*) on a variety of seabirds is reported for the first time. These observations and a review of the available information indicate that at least eight species of seabird are taken by hapuku (*Polyprion oxygeneios*), snapper (*Pagrus auratus*) and yellowtail kingfish in New Zealand waters. Although predation of seabirds by large marine teleosts appears to be a rare phenomenon the evidence from northern New Zealand suggests that this may be an artifact of fishing and the collapse of seabird populations due to anthropogenic disturbance.

Keywords

Kermadec Islands; seabird predation

Sharks are well known predators and scavengers of seabirds, as well as terrestrial birds that are blown offshore or die on migration (Compagno 1984; Randall 1992; Bowman *et al.* 2000; Meyer *et al.* 2010). In contrast, predation on birds by marine teleosts appears to be rare or at least rarely reported (e.g. Bowman *et al.* 2000; Young *et al.* 2010; Farmer & Wilson 2011). Records of teleosts feeding on seabirds in New Zealand waters appear to be limited to Graham's (1956, p. 230) observation of a pied shag (*Phalacrocorax v. varius*) in the stomach of a hapuku (*Polyprion oxygeneios*) caught off Otago Peninsula, and Thoresen's (1969, p. 254) report that "numbers" of common diving petrel (*Pelecanoides u. urinatrix*) were found in the stomachs of snapper (*Pagrus auratus*) caught around the Mercury Islands during the fledging period.

The yellowtail kingfish (*Seriola lalandi* Valenciennes, 1833) is widely distributed in subtropical and warm temperate waters of the Southern Hemisphere and North Pacific Ocean. It is a large (maximum length 160 cm), opportunistic pelagic predator that primarily feeds on small pelagic fishes and cephalopods, as well as pelagic crustaceans and demersal fishes (Baxter 1960; Illingworth 1961; Doogue & Moreland 1966; Doak 1972; Russell 1983; Thompson 1981; Coleman & Mobley 1984; Smale 1986; Francis 2001). Yellowtail kingfish are common around northern New Zealand, including the Kermadec Islands and adjacent seamounts. They occur in a wide range of habitats from shallow harbours to the open ocean, and from the surface to at least 260 m depth (Francis 2001; Beaumont *et al.* 2009). At the Kermadec Islands they are one of the most abundant large inshore predators (Schiel *et al.* 1986; Francis *et al.* 1987; Beaumont *et al.* 2009; CD pers. obs.).

On 15 May 2011 a 1130 mm fork length (FL) yellowtail kingfish (AIM MA655238) was collected by spear in Boat Cove, Raoul Island (Station K2011-2, 29° 16.779' S, 177° 53.841' W). The stomach of this specimen was found to contain three Kermadec little shearwaters (*Puffinus assimilis kermadecensis*). Each of the birds was at a different stage of digestion. One was largely intact and exhibited natural colour on the legs, feet and bill (Fig. 1), whereas the skin of the second had begun to break down exposing the underlying musculature and skeleton. The head, neck and left foot (tarsometatarsus and digits) of the third had detached, and all flesh was missing from the left femur, tibiotarsus and fibula. It is not known if the birds were alive or dead when consumed.

The previous night several sea birds were observed struggling on the water's surface near the expedition vessel while it was anchored off the Meyer Islets, Raoul Island (29° 14.551' S, 177° 52.888' W). Two of these birds were recovered and identified as fledgling Kermadec petrels (*Pterodroma neglecta*). While it seems likely that kingfish would take dead or dying fledglings, Kermadec little shearwaters nest from May to November, so the birds found in the kingfish's gut were probably adults returning to the colony to prospect for nest sites (Taylor 2000). They may have died at sea, fallen into the sea from the colony, or they have been taken while resting on the surface or foraging underwater. As the birds were at different stages of digestion it seems likely that they were ingested at different times.

On 27 July 2014 three intact sea birds and the bill and three claws of a fourth were found in the stomach of a large yellowtail kingfish (c. 1100 mm FL, 27.2 kg) caught near the Mokohinau Islands, Hauraki Gulf, North



Figure 1. Kermadec little shearwater (*Puffinus assimilis kermadecensis*) from the stomach of a 1130 mm FL *Seriola lalandi* (AIM MA655238) collected in Boat Cove, Raoul Island, Kermadec Islands, 15 May 2011.

Image by Ged Wiren, Auckland Museum

Island (35° 54.344' S, 175° 6.839' E) (T. Wong-Kam pers. comm.). These were identified as adult fairy prions (*Pachyptila turtur*) from digital photographs and video (Fig. 2). This species breeds on the nearby Poor Knights Islands and large foraging flocks are regularly seen off the Mokohinau Islands in winter and spring (authors' pers. obs.). As fairy prions feed mainly by making shallow dives or surface-seizing small prey while hydroplaning these birds were probably taken at or close to the surface. Three recently ingested seabirds were also found in the stomach of a large yellowtail kingfish (> 1000 mm FL) caught at Volkner Rocks, White Island (37° 28.741' S, 177° 7.860' E) on 1 November 2014 (Tim Blomfield pers. comm.). These were identified from a digital photograph as two adult red-billed gulls (*Larus novaehollandiae scopulinus*) and a common diving petrel (<https://www.facebook.com/PursuitFishingCharters>, downloaded on 10 November 2014). As red-billed gulls do not dive to capture prey these birds must have been taken at the surface, probably while feeding above schools of pelagic fishes such as trevally (*Pseudocaranx georgianus*) and kahawai (*Arripis trutta*) (Mills 1970; Mills *et al.* 2008).

To the best of our knowledge these observations are the first confirmed reports of yellowtail kingfish feeding on seabirds. We are also aware of an anecdotal report of a storm petrel (Hydrobatidae) being found in the gut of a large kingfish caught near Mokohinau Islands (S Tindale pers. comm.), and others of hapuku taking little blue penguins (*Eudyptula minor*) (CD Roberts and AR Duffy pers. comm.). One of us (CD) also observed a large snapper attempting to eat a fledgling Buller's shearwater (*Puffinus bulleri*) in Maroro Bay, Aorangi Island, Poor Knights Islands in May 2003. The shearwater was dead but may have been alive when first attacked by the snapper. On the same day a large unidentified fish was observed pursuing another fledgling Buller's shearwater, forcing it off the water. Given the large reductions in



Figure 2. Fairy prions (*Pachyptila turtur*) from the stomach of a 1100 mm FL *Seriola lalandi* caught near the Mokohinau Islands, Hauraki Gulf, North Island, New Zealand, 27 July 2014. Image courtesy of Tony Wong-Kam

size and abundance of predatory fishes, particularly snapper, kingfish and hapuku, that have occurred around mainland New Zealand, and the decimation of sea bird colonies by introduced predators, human harvesting, habitat loss and other anthropogenic impacts it seems likely that predation on seabirds by large marine teleosts was historically a common phenomenon.

Seabirds are vulnerable to predatory fishes when incapacitated, resting on the surface, or while foraging at the surface or underwater. With some notable exceptions (e.g. common diving petrels and penguins), the proportion of time seabirds spend on or underwater is negligible compared to the time spent in the air, roosting and nesting. Predatory interactions between seabirds and large predatory fishes are also likely to be constrained to areas and times of high pelagic productivity when seabirds and predatory fishes feed in close proximity to one another, and nesting and fledging. The best documented example of the latter is the seasonal aggregation of tiger sharks (*Galeocerdo cuvier*) at French Frigate Shoal, northwestern Hawaiian Islands, to feed on fledging black footed albatross (*Phoebastria nigripes*) (Meyer *et al.* 2010). While it may seem that predation by fishes could have little influence on the ecology of sea birds it has been suggested that the risk of predation by fishes, notably sharks, is the reason some tropical and subtropical seabirds generally do not rest on the water at night (Weimerskirch *et al.* 2005; Jaquemet 2010). In some cases relatively large numbers of healthy not just dead and dying fledglings may be taken (e.g. Meyer *et al.* 2010). Mills *et al.* (2008) also suggest that the risk of being bitten may force red-billed gulls to feed around the periphery of schools of pelagic fishes and increase intra-specific competition.

As niche partitioning between seabirds includes differences in nesting period large numbers of breeding and fledging seabirds may be present on some seabird islands for most of the year. For some predatory fishes inhabiting archipelagos in relatively oligotrophic regions fledging seabirds could therefore represent an important food subsidy. In this regard it is worth noting that during the Kermadec Biodiscovery Expedition large spotted black grouper (*Epinephelus daemeli*) were occasionally seen hovering just beneath the surface off the Meyer Islands and Herald Islets (CD pers. obs). As these islands support large sea bird colonies it is possible spotted black grouper also feed on sea birds. These observations demonstrate the value of complementary protection of marine and adjoining terrestrial areas for protecting and restoring natural trophic processes that would otherwise be difficult or impossible to observe elsewhere.

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