BIRDS DEPREDATING STINGRAYS AND SKATES (CHONDRICHTHYES: BATOIDEA): NEW OBSERVATIONS AND A REVIEW OF RECORDS

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ABSTRACT

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Gulls (*Larus* spp.) have a diet that includes fish, but they are also often dietary generalists. A limited number of dietary studies have been undertaken on the Pacific Gull *Larus pacificus*, which are endemic to Australia. Here, an observation of depredation by a Pacific Gull on a Southern Fiddler Ray *Trygonorrhina dumerilii* is described. Prior to this observation, rays and skates had not been recorded in the diet of Pacific Gulls, and there are few records in the literature of depredation by gulls (Laridae) or other bird families on species of cartilaginous fishes from the superorder Batoidea. However, there is substantial documentary evidence, available online, of gulls and other bird species preying on rays and skates, which is described herein.

Key words: diet, Laridae, *Larus pacificus*, Pacific Gull, Southern Fiddler Ray, *Trygonorrhina dumerilii*

INTRODUCTION

Gulls (*Larus* spp.), like most seabirds, have a diet that includes fish, but they are also often generalists, feeding on invertebrates such as crustaceans, echinoderms, molluscs, and terrestrial prey. Comprehensive dietary studies have been undertaken for a number of gull species (e.g., Cramp & Simmons 1983, Burger & Gochfeld 1996) using various techniques, but they are typically limited to analyses of pellets or stomachs (e.g., Götmark 1984, Garthe *et al*. 1999).

Australia, compared with other parts of the world, is depauperate in gull species, with only three breeding residents (Silver Gull *Chroicocephalus novaehollandiae*, Pacific Gull *Larus pacificus*, and Kelp Gull *L. dominicanus*). The Pacific Gull is Australia's largest and only endemic gull and occurs on its southern coasts, from the state of Western Australia to Victoria and Tasmania. Relatively little ornithological work has been undertaken on Pacific Gulls (Higgins & Davies 1996, Widdup 2013), and only a few systematic diet studies have been undertaken (i.e., Coulson & Coulson 1993, Lindsay & Meathrel 2008, Leitch *et al*. 2014). These studies used regurgitates (and, in some cases, prey remains) to determine diet, biasing their assessment of diet towards harder, less digestible prey items (Kubetzki & Garthe 2003). Thus, documenting softer-bodied prey that may not be evident in such studies is useful for better understanding this and other gull species' diets. Here, I present observations of depredation on a Southern Fiddler Ray *Trygonorrhina dumerilii*, a first record of depredation on rays and skates (superorder Batoidea) for the Pacific Gull, and I also review other instances of gulls and other bird species depredating and consuming rays and skates in the literature and in online resources.

OBSERVATIONS

On 09 June 2019, at approximately 07h30, a Pacific Gull was observed with a small live Southern Fiddler Ray on sand at the edge of shallow water at Sealers Cove, Wilsons Promontory National Park, Victoria, Australia (30°01′15″S, 146°26′35″E). Over a period of ~5 mins, the gull tried to position the ray to expose its ventral side, whereupon the gull pecked below the ray's mouth, creating a visible wound in one of the ray's gill slits (Fig. 1). The ray consistently flipped itself back so that its dorsal side faced up. The gull lifted the moving ray in its bill multiple times to reposition it before the ray was eventually killed (Fig. 1). The size, shape, mass, and active movement of the ray meant that the gull, at times, struggled to manoeuvre the ray. Upon closer approach, the gull flew off with the ray to another part of the beach, presumably to consume it.

The ray was approximately 30 cm from nose to tail tip, and based on this size was recently born (Southern Fiddler Rays are born at 21–25 cm during April–May; Last & Stevens 2009). Southern Fiddler Rays are endemic to Australia's southern coast from eastern Bass Strait and northern Tasmania across South Australia to Lancelin in Western Australia. They can be found at depths ranging from coastal shallow waters up to 205 m (Last & Stevens 2009).

DISCUSSION

In a comprehensive review of the diet of Pacific Gulls, Higgins & Davies (1996, pp. 476) described the species as a predator and scavenger, consuming "Molluscs, echinoids, fish, birds and other marine animals; carrion and tide-line wrack." At that time, the only major study on the diet of the Pacific Gull was by Coulsen & Coulsen (1993), who used freshly regurgitated pellets from southern Tasmania and found crabs in 56% of pellets, followed by fish (47%, the majority of which was Sand Flathead *Platycephalus bassensis*) and chitons (28%). Subsequently, Lindsay & Meathrel (2008) analysed 8 611 large non-consumed parts of prey and 2 478 pellets from feeding platforms of Pacific Gulls on breeding islands in the Furneaux Group, Bass Strait. Diet in that study comprised 128 different species taken from 'natural' sources and included

Fig. 1. A Pacific Gull *Larus pacificus* preying on a Southern Fiddler Ray *Trygonorrhina dumerilii*, Wilsons Promontory, Australia (in chronological sequence from left to right, top to bottom).

Annelida, Uniramia, Malacostraca, Polyplacophora, Gastropoda, Bivalvia, Cephalopoda, Echinoidea, Reptilia, Aves and Mammalia, with an additional seven items presumably obtained from human-derived sources. They found that results were biased toward hard-bodied prey and suggested that research failed to identify 90% of the food consumed by the Pacific Gull population.

Leitch *et al*. (2014) analysed 515 pellets from Seal Island, ~15 km east of Wilsons Promontory in Victoria, and found more than 50 prey taxa, with the most frequently recorded being the Common Diving Petrel *Pelecanoides urinatrix* (61%), leatherjacket spp. (Monacanthidae) (12%), Short-tailed Shearwater *Puffinus tenuirostris* (9%), unidentified fish spp. (8% collectively), Mirror Bush *Coprosma repens* (7%), Giant Cuttlefish *Sepia apama* (6%), and Semaphore Crab *Heloecius cordiformis* (6%).

Leitch *et al*. (2014) suggested that Giant Cuttlefish and all fish species recorded in the Pacific Gull diet at Seal Island (except for toadfish, whiting, and flathead) occur at depths inaccessible to gulls and, therefore, may have been consumed as regurgitate of fur seals (*Arctocephalus* spp.) or Black-faced Cormorants *Phalacrocorax fuscescens* on nearby islands, or as bycatch discarded from local fishing vessels. Cooper (1975, pp. 24) observed "large numbers" of Pacific Gulls "feeding on small fish that had been left on the beach at low tide" at Sealers Cover (the same location as my observations) in 1967.

Ray species have not previously been recorded in any studies of the diet of the Pacific Gull. However, given that the aforementioned studies used pellets (and large particles) to assess diet, soft-bodied prey such as cartilaginous fishes (including rays) may not have been evident (Lindsay & Meathrel 2008).

There are few records in the literature of rays or other elasmobranchs being consumed by other gull species. Berón *et al*. (2013) found that Olrog's Gull *L. atlanticus* in southeastern Buenos Aires Province, Argentina was taking advantage of fishery discards, such as those caught from trawlers. These included "benthic–demersal fish (Southern Eagle Ray *Myliobatis goodei*; Rio Skate *Rioraja agazzizi*; Smallnose Fanskate *Squatina bonapartii*; Spotback Skate *Atlantoraja castelnaui*)," but "pelagic and benthic–demersal fish were the prey types least consumed by all ages of Olrog's Gull" (pp. 71–72). The authors did not state whether these discards were alive upon capture. Elsewhere, Rudloe (1988; cited in Carlson *et al*. 2016) observed gulls feeding on fish in shrimp bycatch; the gulls appeared to avoid Lesser Electric Rays *Narcine bancroftii* that were released alive and only preyed upon dead individuals.

Despite the paucity of documented cases of rays in the diet of gulls in the scientific literature, there are multiple photographs and videos online showing the depredation of live rays and skates, or the scavenging of dead individuals. Pleva (2009) recorded a Great Black-backed Gull *L. marinus* consuming "a Stingray (or Skate)" in the United States, the image showing the ray on its back and the stomach cavity opened. Iles (2018) photographed a "Gull eating ray" at Rye Harbour Nature Reserve, UK, noting that the gull (a juvenile European Herring Gull *L. argentatus*) "tried to roll up the flat fish to swallow it and eventually did so." The ray appeared to be alive upon capture. Stacey (2011) photographed a Haller's Round Ray *Urobatis halleri* being eaten by a Western Gull *L. occidentalis* at San Diego County, California, USA. Kiertz (2019) recorded a likely Great Black-backed Gull consuming a dead Clearnose Skate *Raja eglanteria* in an unspecified location in North America. The gull repositioned the skate multiple times before swallowing it head-first and whole. Bishop (2009) filmed a likely Great Black-backed Gull consistently but warily pecking at the base of the raised tail of a live stingray at Martha's Vineyard, USA. The fate of the ray was not filmed. JFE4LIFE (2011) filmed a likely subadult Great Black-backed Gull briefly pecking at the 'lower ventral' area of a dead ray (location unknown).

In Australia, Bamber (2014) photographed a Kelp Gull (misidentified as a Pacific Gull) holding what seemed to be a dead Southern Fiddler Ray by the tail but noted that it was not consumed. The ray showed similar wounds to one of its gill slits as in my observations. TheBigStevo (2014) recorded two Pacific Gulls in Victoria, Australia, pecking at what seemed to be an already-dead adult Sparsely-spotted Stingaree *Urolophus paucimaculatus*; the gulls appeared to have opened a cavity between the ray's pectoral fins and its midline to access the ray's internal organs. At least four rays/skates in these photographs and videos appeared to be alive upon capture or pursuit, or they showed signs of having been recently killed by the gull (as opposed to scavenged); moreover, rays/skates that did appear to be alive were a similar size to the Southern Fiddler Ray in my observation (or slightly smaller, i.e., 20–30 cm).

Unlike a number of other rays and skates in the online videos and photos described above, the Southern Fiddler Ray does not have a barb or spines. It is unknown whether this influenced the handling techniques of the Pacific Gull in my observations.

Published accounts of other bird species consuming elasmobranchs also appears to be rare. Ajemain *et al*. (2011) described a Great Blue Heron *Ardea herodias* capturing and consuming an Atlantic Stingray *Dasyatis sabina* off the coast of Mississippi, USA, and suggested that this observation represented the first concrete evidence of depredation on an elasmobranch by a bird. Subsequently, Fernández-Ordóñez *et al*. (2016) documented a Western Osprey *Pandion haliaetus* capturing a stingray in Venezuela. Although these accounts by Ajemain *et al*. (2011) and Fernández-Ordóñez *et al*. (2016) describe direct depredation events on rays, these authors have noted indirect evidence of depredation by birds on elasmobranches elsewhere. Specifically, both cited (1) elasmobranch remains, including placoid scales, that had been reported inside the gut of the Common Merganser *Mergus merganser* in Oklahoma, USA (Heard & Curd 1958); (2) a dead Brown Pelican *Pelecanus occidentalis* that was found with several ray species in its pouch in California, USA (Bostic & Banks 1966); (3) skate remains recovered from the nest sites of Bald Eagles *Haliaeetus leucocephalus* on Cape Breton Island, Nova Scotia, Canada (Cash *et al*. 1985); and (4) consumption of a Puffadder Shyshark *Haploblepharus edwardsii* (Scyliorhinidae) via kleptoparasitism by a Kelp Gull from a Cape Fur Seal *Arctocephalus pusillus pusillus* in South Africa (Martin 2004).

In addition to these published events, online images and videos indicate a greater variety of avian predators on elasmobranchs. Vance (2012) posted video of a Great Blue Heron trying, unsuccessfully, to consume what appeared to be an already dead stingray (likely a Smooth Butterfly Ray *Gymnura micrura*) at Anna Maria Island, Florida, USA. Cardozo (2014) published a photograph of an Australian Pelican *Pelecanus conspicillatus* about to consume a ray; River and Phoebe YT (2017) filmed an Australian Pelican unsuccessfully pursuing a ray; and Tillery (undated) photographed a Brown Pelican with a ray in its bill. Paklina (2012) photographed an

adult Sanderling *Calidris alba* with its bill penetrating what appeared to be a dead Common Stingray *Dasyatis pastinaca* (although it could have been foraging for invertebrates inside the ray).

Herein, I added multiple gull and other bird species to the small list of documented avian predators of rays and skates, many of which were clearly alive at the time of depredation. Considering the number of documented observations with photographic or video evidence that are available online, depredation and scavenging of rays and skates by gulls is likely more common than otherwise documented. This highlights the value of online photographs and video for better understanding the diet of some bird species (e.g., Naude *et al*. 2019, Berryman & Kirwan 2021).

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