

## Rajidae — Skates

*You can swim with them, walk with them, and, with sufficient modifications, smother with them. Capturing prey with bulk and size isn't the newest idea either. It has worked for 400 million years. How is it possible to "modify" something so ancient? Could it be the other way around?*

*One thing is certain. Pectoral fins, located on the sides of a fish near the gills, are multi-functional appendages. Not only can they propel their owner forwards and upwards, but they can enhance "walking" along the substrate, or, in the case of the flying fish, lift the animal in a long gliding motion above the surface of the sea. By contrast, the skate's pectorals have undergone alterations for the deep waters, modified to a broad surface that constitutes most of the body. Without them, a skate would look much like a gunnel, or perhaps a skinny eel. With them, its flattened form resembles the halibut, except that the skate is not so one-sided. The eyes, although small, are symmetrically arranged, and the mouth is beneath, positioned in the best place for capturing prey enveloped by the wide pectoral fins.*

Members of the Rajiformes order and the Rajidae family, an ancient group of fish related to sharks and rays, there are two common skate species in the Strait. One of them, the Big Skate (*Beringia binocularata*), is the largest of its kind in North America. This appropriately named fish can reach a maximum length of 8 feet (2.4 meters), although the average is closer to four. Like other skates, the Big Skate is most easily recognized by its broad pectoral fins and whiplike tail.

A maximum weight of 200 pounds and an average of 100 would seem more than adequate to ensure safety for the Big Skate. Yet the scientific species' name — *binocularata* — hints at a darker reality. Referring to the symmetric round eyelike spots on the top of the fish, these "eyes" may be an adaptation to confuse potential predators, such as sharks. The seeing eyes of the Big Skate are inconspicuous, positioned near small spiracles that are openings to the gills below.

The skate's broad, triangular pectoral fins consist of strips of flesh separated by cartilage. Other fins are reduced or absent altogether: missing are the anal fins, while the caudal fin consists of a small fold, making the tail elongated and narrow, punctuated by two small dorsal fins on top and roughened with small spines. At the other end an elongated snout protrudes from a rounded "head." The wide mouth, hidden below, is lined with small cusp-like teeth, arranged in rows, perfect for crunching down on invertebrates. Small scales cover the body. The skin is roughened with small prickles, and additional spines form a small row along the back; juveniles are smooth. Mottled above, and whitish below, with its spines, and fake eyes, the Big Skate is in many ways a most unusual fish.

Although fertilized internally, the female Big Skate does not

bear live young but rather deposits as many as eight embryos in egg cases, also known as "mermaid



**Big Skate (*Beringia binocularata*)**

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purses.” These unusual structures are laid year-round. Producing as many as 48,000 tiny skates in her lifetime, she is the most fecund of any modern elasmobranch fish: this ancient group dates back over 400 million years, and includes many cartilaginous fish, such as sharks and rays. The Rajidae family is by far the largest of this old group, with over 200 members and discovery of “new” skates an ongoing occurrence, although such identifications are sometimes controversial, as skate species can be notoriously difficult to distinguish from one another.

Known to live to the ripe old age of 30 years, although often much less, Big Skate females are slow to mature, reaching maximum size at 12 or 13 years of age. Males are smaller and can breed at 7-8 years. Eggs are laid year-round, sometimes in “beds.” The young hatch at approximately 9 months after the eggs are laid and are 7 to 9 inches in length.

The Longnose Skate (*Beringraja rhina*) is the second skate reportedly abundant in the Strait. Closely related to the Big Skate and slightly smaller, males and females alike can reach a maximum length of approximately 4.25 feet (1.3 meters), although the female is typically larger. Both sexes grow little after maturity, which occurs at about 3.4 feet in length and at an age between 9 and 12 years. This number can be widely varying, with some observed to mature as young as 5 years and others as old as 20.

As the common name implies, this is a skate with a long, pointed snout, composed of thick cartilage. And similar to the closely related Big Skate, this stout skate can live 30 years. Colored brown above, there is a dark ring at the base of each pectoral fin, sometimes with a light spot behind. The underside of the Longnose Skate is a muddy blue color. Up to 20 sharp spines line the tail from its base to the space between the dorsal spines. There are also spines behind the eyes and a sparse row near the orbit, the part of the skull that contains the eye. Female Longnose Skate deposit a single egg in each case, and spawning may be seasonal, although much remains to be determined about the breeding behavior. It has been observed that juveniles follow large objects, including the mother. However, neither the female nor male Longnose Skate guards the eggs.

Occurring in depths as shallow as 30 feet (9 meters) but sometimes as deep as 3,500 feet, the Longnose Skate most often ranges between 180 and nearly 1,150 feet, typically deeper than the Big Skate. Most often encountered partially or completely buried in silty or sandy sea floor habitats where they feed on invertebrates and small fishes, as with other skates the Longnose covers potential prey with its wide fins, consuming its catch with a substantially sized mouth.

### Bycatch and Fisheries

“Bycatch” refers to those species taken by commercial fisheries, and recreational anglers as well, that were not the intended catch. Most often bycatch is discarded into the sea, typically as dead fish rather than alive and undamaged. Over the years, much effort has been made to reduce bycatch, as numbers taken can be very high. As an example, trawling, a method that consists of dragging a large net along the sea floor, is indiscriminate in its haul, often bringing up large numbers of non-targeted species.

Such is the fate with many skates, fishes that camouflage themselves in sandy and silty sea floor habitats where they both wait for prey and seek protection from predators. In 2005, the total skate bycatch weighed over 25,000 tons; these were not identified to species, but only as “skates.” A slow rate of growth and late sexual maturity add to the concern over recovery from such a large non-targeted catch. And with little knowledge or definitive data concerning which species constituted bycatch, at least until the first decade of the 21<sup>st</sup> century, it has been difficult to accurately estimate the numbers taken.

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Adding to the stress on the population, skates have become a target catch in recent years, particularly in California, but also in Alaska where commercial fishing is permitted in the Bering Sea and Aleutians. Initially a minor fishery, with the marketing of pectoral fins as “skate wings” that supposedly taste like scallops, but which in reality are not exceptionally appealing, in recent years the increase in price for these “wings” has added to fishing pressure on the bottom-dwelling skates. Sometimes offered in upscale restaurants, the skates have become a more desirable catch.

As with so many other species, the impact of increased skate fishing is difficult to quantify. Fisheries personnel deal with a variety of pressures, but in the end both managers and scientists alike are responsible for determining the fate of a species within the reality of limited knowledge. This is certainly true for skates; understanding of skate biology is very incomplete. For example, at one time skates were believed to be sedentary fish; new research has revealed that they can range widely in a season. Thus, Big Skate populations have been observed to move between the Gulf of Alaska and the Bering Sea. Such possible migrations make biomass more difficult to estimate. Adding to the concern, skates are slow to mature, and thus can be negatively impacted within a brief time, both by natural causes and overfishing.

Even with acknowledgement of limited understanding about skate biology, increased take is most likely their future reality, at least until exploitation reaches the point of near loss of a species. In 2020, NOAA increased the legal limit by 13 percent, adding about 26 million pounds to the permitted take. Meanwhile, in California, at least one species, the California Skate (*Beringraja inornata*) is considered vulnerable. The two skate species in the Strait are of less concern, although as with so many marketable fish, the “selling” of the skate as food will undoubtedly increase the pressure on the population.

While incomplete understanding complicates management while at the same time contributing to skate vulnerability, ironically as species of historically less commercial value funds for studying them have been in short supply. Observations help but tend to be in the arena of hindsight; as an example, decreased size provides another clue into the dynamics of the skates, but again the impact on reproduction and the possible change in the population is unknown.

Today skate populations in both the Atlantic and Pacific are considered sustainable, but lessons from the past should, as with so many fish species, serve as a warning. At least one Atlantic Ocean skate — the Barndoor Skate (*Raja laevis*) — may have been close to extinction. This reality was a subject of controversy, as with so many other species little was known, but the lack of any catch for several years was at the very least an indicator that something was amiss. Now, Barndoor Skate are considered sufficiently recovered (never given protection by the EPA, they were designated endangered by the IUCN at one time) to permit fishing once again. Overfishing was implicated in its decline. Consistency and Increased numbers remain a hopeful outcome.

Yet always the greatest concern is that lessons from the past may be easily forgotten in the reality of the present.

*Browsing the Internet for information about the marketing of “skate wings” is an interesting exercise. The most frequent subject is recipes, which, along with misinformation about the fish, goes on for pages. Investigate with a refinement of the search and you will learn that skate are used as bait for other sea species, including lobster, a questionable use for a species under increasing pressure.*

*In the Strait, the skates rest on the silty bottom, waiting for a tasty invertebrate to come their way. Wide, triangular, modified fins provide a means for capturing unsuspecting prey, while providing the “wings” to travel to another place, perhaps far distant, away from the pressures of fishing and the debates about their fate.*