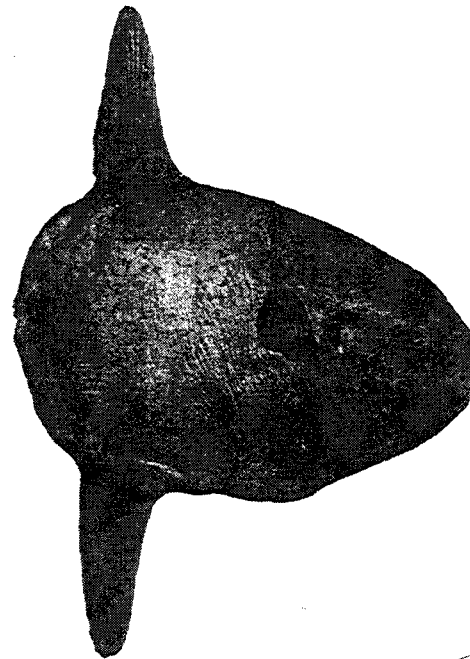


in Taiwan the intestines bring over \$11.00 per pound. The flesh of ocean sunfish has at times been reported to be toxic, but a thorough review and investigation of such reports disclose no authenticated case of poisoning from eating it. On the contrary, it is considered delectable by those that eat it. Since the flesh is somewhat watery, it is better to parboil the meat to remove some moisture. The meat then becomes firm, and the texture similar to that of shellfish. The flesh is sometimes infested with long string-like parasites, but these can be easily removed and, in any case, are not harmful when ingested. Another negative attribute is the low yield of meat found in sunfish. Because the skin and cartilaginous skeleton are so heavy, only about 20 percent of the weight of the fish is edible flesh.

Only a few ocean sunfish are brought in by fishermen for food, and very little reaches the fish market. The fish are often caught in drift gillnets which target swordfish and sharks. At times as many as 200 sunfish are caught in a mile-long net, but nearly all the fish are released alive by the fishermen. Some sunfish are also caught incidentally in roundhaul nets together with mackerel, anchovy, or sardine. Most incidental catches of ocean sunfish are made in southern California, but at times drift gillnetters also catch substantial numbers between San Francisco and Pt. Conception. Roundhaul net catches are also made primarily in southern California, but the small wetfish fleet in Monterey also captures some sunfish. A few sunfish are also caught on hook and line, as well as with harpoons. No fishing restrictions apply to ocean sunfish.



Ocean sunfish, *Mola mola*.

OCEAN SUNFISH

History of the Fishery

The ocean sunfish (*Mola mola*) is presently not sought by most commercial or sport fishermen here. However, a few fishermen who have learned from Mediterranean or Asian counterparts about its excellent eating quality consider it a delicacy. In Japan the liver is also used as a condiment for sunfish meat sashimi, and in Taiwan the intestine is the most expensive part of the fish.

Ocean sunfish is not sold here, but wholesale prices in Japan for the meat and liver are well over \$5.00 per pound, and

Status of Biological Knowledge

The ocean sunfish is a peculiar looking fish, with a truncated body and no tail. Its silvery body is oval and compressed, with tail slender fins sticking out near the posterior end. Its skin is leathery, and underlined with a thick layer of heavy cartilage. Ocean sunfish are found in most temperate and warm seas of the world. Most sightings of this fish in California are from south of Point Conception during winter and spring, and from there to San Francisco in summer and early fall. Ocean sunfish are usually observed swimming casually on the surface, with their long dorsal fin sticking high up in the air, but they are also sometimes seen lying on their side at the surface. Sunfish no doubt also occur in midwater, wherever food organisms are abundant.

Little is known about the natural history of ocean sunfish. Most sunfish caught in driftnets in southern California are under two feet long and less than 20 pounds, but larger individuals to 100 pounds or more are not uncommon. The largest individuals reported in the literature were estimated to have been over 10 feet long and nearly as wide between the tips of dorsal and anal fins, and weighing perhaps as much as 3,000 pounds.

Spawning grounds have been found in the northwestern Pacific Ocean, at around 30° N latitude and 130° E longitude. One large female of about 4.5 feet was estimated to have had 300 million eggs, although not all of those would be laid at one time. A few planktonic post-larvae of sunfish have been found on the high seas, but fertilized eggs or early larval stages are absent from plankton collections. The shape of young larvae is similar to that of other fishes, but the sunfish larva soon loses its tail and acquires a number of long spike-like projections all over the body.

The ocean sunfish has a small mouth and its teeth are fused into a sharp-edged plate in both the upper and lower jaw. It usually eats small crustaceans, fish, mollusks, jellyfish and other soft-bodied forms that are found near the ocean surface. Larger fish have also been found in their stomachs at times. The

long intestine of ocean sunfish is reminiscent of algae eaters, and indeed seaweed has also been found in their stomachs. Sharks and sea lions are the major predators of ocean sunfish.

Occasionally they are seen on the surface hovering patiently while seabirds peck on their tough hides, apparently picking off external parasites. They also have been observed by divers being "cleaned" of these parasites by small fishes which do this service for many species of fish. Ocean sunfish have frequently been seen leaping high in the air, though it's hard to imagine how they can find enough momentum without the aid of a tail fin. Mass mortalities of small ocean sunfish have occurred from August through October in Monterey Bay, where dozens of the silvery fish have been found dead on the shallow bay floor or floating on the surface. No explanations have been offered for such mass deaths.

Status of Population

Nothing is known about the population size or structure of ocean sunfish. Since they occur throughout most temperate and warm seas, it is possible that all ocean sunfish are part of a single population, at least in the Pacific Ocean. In California, those that are caught are usually returned to the ocean alive by gillnetters and, since there is no directed fishery for them, abundance of ocean sunfish here is probably rather uniform from year to year. The effect of mass mortalities is unknown, but they no doubt cause lowered population levels in localized areas.

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