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PHOTOS BY PHIL ZEROFKI

## JUMBO SQUID (DOSIDICUS GIGAS)



**The jumbo squid is a large, abundant cephalopod (squid, octopus, nautilus, and cuttlefish) that has tremendous economic and ecological importance in the eastern Pacific. Historically, jumbo squid have occupied the subtropical coasts of North and South America from Chile to Baja**

California and the Sea of Cortez. In recent years the Southern California Bight has been home to large numbers of jumbo squid, with recreational vessels capitalizing on this pelagic resource. Because of their importance to the ecology and fisheries of the Humboldt Current system off the coast of South America, they are also commonly referred to as "Humboldt" squid.

### Biology

As the largest member of the family Ommastrephidae, the jumbo squid is capable of reaching sizes in excess of eight feet in length and over 100 pounds. The sheer magnitude of the jumbo squid biomass in the eastern Pacific makes them a very important compo-

nent of pelagic food webs, providing an important link between small deep-dwelling (mesopelagic) organisms and large pelagic predators. A variety of studies on their feeding ecology indicates that jumbo squid are opportunistic predators, able to consume a wide range of prey. Primary prey items include lantern fishes (myctophids), mackerel, sardines, anchovies, pelagic red crabs, and other squid. Larger, slower-growing fish species, such as hake and rockfish, have also shown up in their diet off California, suggesting that these abundant and fast-growing squids may also have an impact on fish stocks off the Southern California coast. Cannibalism is also common, particularly when jumbo squid are incapacitated or

struggling on a fishing line.

To pelagic predators such as tunas, marlin, swordfish, pelagic sharks, and marine mammals that will gorge on jumbo squid of all sizes, the squid provide a valuable food source. While they may appear to be an ideal food source, their ability to vertically migrate and remain within the cold, oxygen-poor waters below the thermocline provides them with an avenue to escape predation by many species. This refuge is not without predators, as swordfish, some sharks (like the big-eye thresher), and many marine mammals (e.g., elephant seals, Risso's dolphin, and sperm whales) are frequently found hunting the squid resource of the deep.

Like most other squids, jumbo squid are fast-growing and short-lived, with life spans of just one to two years, and they have the potential to mature when mantle length is as little as six inches, although the size at which reproduction occurs is highly variable

across its vast range. Reproductive strategies and locations are poorly understood, but it is thought that they grow larger and spawn later with increased distance from the equator. It has been estimated that a large individual can produce up to 30 million eggs; however, it was not until 2006 that the first jumbo squid egg mass was identified.

### Fisheries

Exploratory fishing was initiated within several regions of the eastern Pacific in the mid-1970s, with catches reaching 19,000 tons by 1980. As Chilean, Peruvian, and Mexican fisheries grew in response to market demand, annual commercial landings surpassed 200,000 tons for the first time in 2000. By 2004, global jumbo squid landings exceeded 800,000 tons per year, a quantity more than any other species of squid in the world. Over 100,000 tons is harvested annually within the Sea of Cortez alone.

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Once considered a nuisance by fisherman, the arrival of Humboldt squid often provides a welcome early-season opportunity.

**Below Opposite:** Anglers have compared pulling on jumbo squid to hauling up a five-gallon bucket of water from the depths.



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### Movements

Tagging data indicates that jumbo squid spend the majority of daylight hours at depths of 100 to 200 fathoms, where oxygen levels can be as low as one to ten percent of the O<sub>2</sub> concentrations near the surface. Vertical distribution is considerably shallower at night, when they spend most of the time between 20 and 100 fathoms. Since this species is clearly tolerant to a wide range of depths, temperatures, light, and oxygen levels, it is difficult to pinpoint the conditions that may be contributing to the apparent range expansion of the population over the past decade. In California, historical fishery records indicate that jumbo squid were abundant off the coast in the mid 1930s, during which period they were considered a nuisance to fishers targeting tuna, salmon, and rockfish. Beach strandings and intermittent catches of

jumbo squid were occasionally reported off California from the 1960s through the 1990s, but it was not until the strong El Niño condition in 1997-1998 that jumbo squid apparently took up residence off the California coast. Every year since 2002, they have been observed in Monterey Bay, with reports as far north as southeast Alaska (57° N) in recent years.

Ecological implications of this species and its wide-ranging distribution are not fully understood; however, it is certain that this resource hasn't gone unnoticed by California recreational and commercial fishers, proving to be both an intermittent diversion for anglers and an exotic pest in a variety of fisheries

For more detailed information on the jumbo squid go to: Arguelles, J., Rodhouse, P.G., Villegas, P.

and G. Castillo (2001) Age growth and population structure of the jumbo flying squid (*Dosidicus gigas*) in Peruvian waters. *Fisheries Research* 54, 51-61.

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