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PACIFIC BLUEFIN TUNA (*THUNNUS THYNNUS ORIENTALIS*)

Undoubtedly, one of the largest and most sought-after tuna species, worldwide, is the bluefin tuna. The bluefin species complex is comprised of at least three sub-species, which include the Pacific bluefin tuna, the Southern bluefin tuna,

and the Northern bluefin tuna (also called the Atlantic bluefin). Although granders are very newsworthy nowadays, the Atlantic bluefin can reach sizes of up to 1,500 pounds. Pacific bluefin (*Thunnus thynnus orientalis*) is the species that we encounter seasonally (summer and fall months) off the California coast, and it can also tip the scales at over 1,000 lbs (550 kg). In recent years the catch off of California has been dominated by juveniles, with fish over 200 pounds rarely taken in the recreational fishery.

Bluefin tuna, like the other 15 tuna species, have the ability to elevate body temperature above that of the surrounding water. This trait likely contributes to their broad geographic range and capacity to inhabit a wide range of water temperatures. Thus, even when a bluefin is in frigid, 60-degree water, its internal temperatures are actually operating around 75 degrees F. In addi-

tion to expanding the thermal range of the bluefin, an elevated body temperature also provides faster digestion rates and an enhanced swimming performance when compared to most fish (increased muscle contraction rates and muscle power output).

Primary spawning grounds for the Pacific bluefin are located in the Western Pacific, both around the Sea of Japan and the Philippine Archipelago. At the early age of one to two years, some of the Western Pacific juveniles undertake a trans-Pacific migration to the rich waters of the Eastern North Pacific. In the Eastern Pacific, tagging studies have shown juveniles to exhibit a predominant north-south migration (from Southern Baja to Oregon and vice versa); however, tagging data has also demonstrated that individuals are capable of yearly trans-Pacific movements. As the bluefin grow and near sexual maturity, they are thought

to return to the Western Pacific to spawn. Because of the variation observed in the movement patterns and the lack of long-term tagging studies, it is difficult to fully understand bluefin movements in the North Pacific. However, the recent advancements made in both tagging and tracking bluefin have certainly helped us comprehend how migratory this species is and the importance of international management for this valuable resource.

Most Pacific bluefin reach sexual maturity around five years of age and approximately five feet in length (160 cm). In years past, large adult bluefin were often caught around Guadalupe Island by those dedicated anglers and spear fishermen who visited the island in the 80s and into the mid 90s. For reasons unknown, the large Guadalupe bluefin have not been encountered for the past decade, and instead Guadalupe now seasonally supports a thriving yellowfin tuna fishery. As with many large- and small-scale changes in species distribution and abundance, it is difficult to fully diagnose the factors most responsible for



A hungry school of Pacific bluefin on the prowl.

these changes. Was it fishing pressure or perhaps natural oscillations in either the forage base or possibly changes in oceanographic conditions?

Fisheries:

An extremely high market value of the bluefin, which is regarded as one of the highest sashimi-grade commodities, continues to fuel intensive fishing operations around the globe. Intense harvesting has led to suppressed population levels in both the Atlantic and Southern stocks. For the Pacific bluefin, the vast majority of the take occurs in the Western Pacific; however, growing purse-seine operations along the Baja Peninsula have flourished over the past decade. Impacts of the relatively recent tuna ranching operations are not fully understood; researchers are now investigating the effects of these operations on both the bluefin stocks as well as the prey used to feed the captive tunas. Tuna ranching involves encircling schools of bluefin with a net when they are near the surface. Schools are then transferred to tow-pens that are slowly hauled to

grow-out facilities (pens) located along the productive northern Baja coast. Captive tuna are fed daily and grown to a marketable size before they are strategically harvested when the price is optimum.

"Bluefin tuna move great distances between feeding and spawning grounds and spend a great deal of time in higher latitudes"

Conservation Concern

Unlike the tropical tunas (i.e., yellowfin and skipjack), bluefin tuna move great distances between feeding and spawning grounds and spend a great deal of time in the higher latitudes. Bluefin also reach sexual maturity later than most of the tropical tunas. Aspects of their reproductive biology, including the brevity of their spawning season and the concentration of mature spawning adults at isolated spawning locations makes the bluefin particular-

ly susceptible to over-exploitation. By far the largest threat to the world's bluefin tuna stocks stems from their tremendous value on the world market. With such a high demand from global sashimi markets, bluefin fisheries can operate at a much lower catch per unit effort than traditional tuna fisheries. This means that fishing operations have the potential to drive stocks to critically low levels before fish receive any reprieve. International management bodies are currently working collaboratively in an attempt to develop measures to ensure healthy bluefin stocks in years to come, but there are many challenges associated with the international management of a shared resource.

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