Littleneck Clams

History of the Fishery

There are seven species commonly known as "littleneck clams" or "chiones": banded chione (*Chione californiensis*), smooth chione (*Chione fluctifraga*), wavy chione (*Chione undatella*), rough-sided littleneck (*Protothaca laciniata*), common littleneck (*Protothaca staminea*), thin-shelled littleneck (*Protothaca tenerrima*) and Manila clam or Japanese littleneck (*Tapes philippinarum*). They are grouped here because they are regulated by an aggregate bag and size limit. All are members of the family Veneridae (Venus clams) and all but the Manila clam are native to California. The Manila clam is a native of the Orient and was introduced unintentionally into California waters in the 1930s.

Although seven species have been aggregated for regulating molluscan resources, only four (smooth chione, wavy chione, common littleneck and Manila clam) are of major importance; they comprise more than 95 percent of the littleneck clam harvest in California. Since commercial clammers are restricted to the same daily bag and size limits as sport fishers (50 clams, all species combined; minimum length 1.5 inches), it is not feasible for them to make a living harvesting these bivalves. Thus, most exploitation is by sport diggers.

All digging is by hand (with rake, shovel, garden hand fork, or trowel) and is carried out in intertidal areas during daylight hours, generally at low tides of 0.0 feet or less.

Status of Biological Knowledge

The three species of chiones occur south of Point Conception on mud and sand flats of sloughs and bays, primarily in the intertidal zone. Banded and wavy chiones may, however, occur subtidally to a depth of 165 feet.

Thin-shelled and rough-sided littlenecks are both uncommon in California except in Alamitos Bay (Los Angeles County) where the latter species is abundant. Thin-shelled littlenecks occur throughout the state in firm, sandy mud of bays, in the low intertidal zone, and offshore to a depth of 165 feet. They occupy burrows up to 16 inches deep. Rough-sided littlenecks occur in California from Monterey Bay south to the Mexican border in sand or muddy sand in bays, the low intertidal zone, and in adjacent shallow subtidal areas. Larger individuals may burrow up to 12 inches below the surface. The locally abundant population in southern California is in water too deep for stand-up diggers, and the underwater visibility is too poor for skin divers to harvest them.

The common littleneck occurs throughout California in bays, coves and cobble patches along the outer coast in the middle and low intertidal zones. This species generally occurs within six inches of the surface and deep digging is not required for harvesting. Clam beds known to resident sport diggers receive relatively heavy exploitation during minus tides. Other clam beds remain underutilized due to difficulty of access or lack of public awareness. This is one of the most abundant clams on the West Coast and is highly esteemed for food.

The Manila clam continues to expand its range on the West Coast and now occurs from southern California to British Columbia. It is particularly abundant in San Francisco Bay and other estuaries to the north in the intertidal zone. It is easily dug, as it generally occurs within two inches of the surface. It prefers a substrate of coarse, sandy mud with a mixture of larger gravel and cobbles and may attach itself with byssal threads to any suitable substrate, including broken glass or ceramics. It also occurs sub-tidally in the extensive oyster shell beds of south San Francisco Bay.

Maximum length of the three species of chiones is approximately 2.5 inches. Of the four types of littlenecks, the thin-shelled is the largest, attaining a length of 4.3 inches. The other three species reach approximately three inches in length.

Of the seven species, life history information is best known for the Manila clam population in San Francisco Bay. By examining the length-frequency distribution of a strong year class over time, minimum legal size was estimated to be reached in two and a half to three years. This was verified by examining internal and external growth rings on the shells formed each year in the fall as growth slows down or ceases. Maximum age is estimated to be eight or nine years.

Manila clams have a three-week planktonic larval period. They are first recognizable in the substrate at about 0.04 inch. At 0.75 to 1.0 inch, they are capable of reproducing and are repeat spawners. The primary spawning period is late spring to early summer, and they are known as dribble spawners, releasing eggs and milt over a prolonged time period. A secondary spawning period is thought to

Common Littleneck Clam, *Protothaca staminea*
Credit: DFG

occur in the winter. Sexes are separate, as they are in all littleneck clams.

Natural mortality of sublegal Manila clams may be as high as 50 percent per year. Known predators include bat rays, mud crabs, lined shore crabs, *Cancer* crabs, channeled whelks and scoter ducks. Large clams are capable of movements of up to three feet during a single tidal cycle, although marking studies have shown virtually no net movement over a several-month period.

Common littleneck clams have a similar early life history and are capable of reproducing at about one inch in length. In southern California, they may reach the minimum legal size in one to 1.5 years. External growth checks are prominent on the shell, but these are not annual rings. The spawning season in southern California is generally from March through July.

Meat yield from harvested littleneck clams has been estimated. A limit of 50, 1.7-inch common littlenecks yields 9.5 ounces of meat, while a limit of 2.5-inch clams would provide 24.5 ounces. In contrast, a limit of 50 Manila clams from San Francisco Bay with a typical mean length of 1.6 inches would yield 6.4 ounces of meat.

In the past, littleneck clams have been cultivated and transplanted. Aquaculturists have reared the Manila clam from 0.25 inches to 1.5 inches in 10 months with 64 percent survival. Manila clams were transplanted in 1953 from San Francisco Bay to several southern California bays and sloughs. Many of the transplants survived for more than a year, but there was no natural reproduction.

Status of Population

In 1981, population estimates of Manila clams were derived for beds in San Francisco Bay. In the 10 most important beds, the peak estimate in the summer was 19.3 million clams with 3.4 million of legal size. One bed in south San Francisco Bay, covering approximately 75,000 square feet, was surveyed annually for several years in the 1980s; population estimates have ranged from 80,000 to 1,525,000. For the highest estimate, only two percent of the population was of legal size. Maximum density of legal-sized clams in this bed was 2.5 per square foot. Densities of juvenile Manila clams may exceed 100 per square foot in the most productive intertidal beds. Typically, intertidal densities in San Francisco Bay range from 20 to 40 per square foot during years of good recruitment. In the subtidal shell beds, density averages one-tenth of that in the intertidal zone.

Surveys of clammers in San Francisco Bay in 1981 resulted in an estimated annual total effort of 900 user days. However, water quality problems have limited and still limit recreational harvest opportunities.

Small beds of common littleneck clams are generally the rule in northern California. One bed in San Mateo county has sustained an annual harvest estimated to exceed 10,000 clams. San Onofre, in southern California, contains an intertidal cobble bed over one mile in length and at least 115 feet wide. A 1967 population estimate yielded 4.5 million legal-size clams; however, the bed had never been open to the public before the survey. In terms of legal limits, this bed could have furnished 90,000 user days of recreation.

The cobble beach at San Onofre probably is the most productive bed of littleneck clams in the state. However, the population is unstable and fluctuates greatly even when unexploited. Heavy runoff from a nearby creek in 1969 caused expansive sanding-in of the cobbles and destroyed much of the bed. Recovery time was estimated at five years.

Little is known about the populations of the other littleneck species. The smooth chione is in danger of extinction in areas where harbors are being developed. Habitat loss or degradation, particularly by man-induced or natural siltation, can cause permanent population reductions. Extreme variations in physical conditions, such as rainfall, can depress populations dramatically.

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