

## 2 Kellet's Whelk, *Kelletia kelletii*



Kellet's whelk, *Kelletia kelletii*. Photo credit: Gerald and Buff Corsi © California Academy of Sciences.

### History of the Fishery

The Kellet's whelk, *Kelletia kelletii*, is a large subtidal gastropod that is subject to a steadily increasing commercial fishery. Historically, Kellet's whelks have been found in archeological and paleontological sites in southern California. The earliest recorded commercial landing data specific to Kellet's whelk dates back to 1979, but prior to this it may have been recorded as miscellaneous mollusks or sea snails. Landings data indicate an increase in take starting in 1993 at 4590 pounds (2 metric tons), with highest landings in 2006 of 191,177 pounds (87 metric tons), over a forty-fold increase in thirteen years (Figure 2-1). An 81 percent increase in landings occurred between 2005 and 2006.

Kellet's whelk landings have been reported at 24 ports from 1979 to 2008, with 80 percent of landings occurring at four ports. The majority of landings (439,828 pounds, 200 metric tons) occurred at Santa Barbara, with approximately 40 percent of the total landings reported. The other three top ports were Terminal Island, San Diego, and San Pedro, with cumulative landings of 178,264 pounds (81 metric tons), 152,647 pounds (69 metric tons) and 136,971 pounds (62 metric tons), respectively.

Ex-vessel value from the 2008 commercial harvest of Kellet's whelks was approximately \$132,700, with price per pound averaging \$0.82 (\$1.81 per kilogram). Since 1979, the fishery's ex-vessel value has ranged from \$94 (1988) to approximately \$136,000 (2007) and the ex-vessel price has ranged from \$0.24 per pound (\$0.53 per kilogram) in 1981 to \$0.88 per pound (\$1.94 per kilogram) in 1992.

Since 1979, 89 percent of all harvested Kellet's whelks have been taken incidentally in lobster and crab traps when they enter to prey on bait and injured crustaceans. The other method of take is diving. Ninety-nine percent of Kellet's whelks are used for human consumption and are mainly sold in live fish markets.

The Kellet's whelk is usually taken incidentally in the lobster or rock crab fisheries. Both of these fisheries have restricted permits specific to their fishery. Rock crab fishers must also have a general trap permit, while the spiny lobster permittee is exempt from the general trap permit requirement. Commercial divers are required to have a commercial fishing license, and may only take whelks further than 1000 feet (305 meters) beyond the low tide mark, as the take of any snails is prohibited in the tidal invertebrate zone (Title 14, CCR, §123).

Recreational take of Kellet's whelk by hand is allowed (Title 14, CCR, §29.05) outside of the 1000 foot (305 meter) tidal invertebrate zone. Except where prohibited in state marine reserves, state marine parks and state marine conservation areas the bag limit is 35 animals with no closed season.

Research demands dictate the number of Kellet's whelks that are collected each year under Scientific Collecting Permits (SCP). This number varies widely depending on current research trends and SCP reporting.

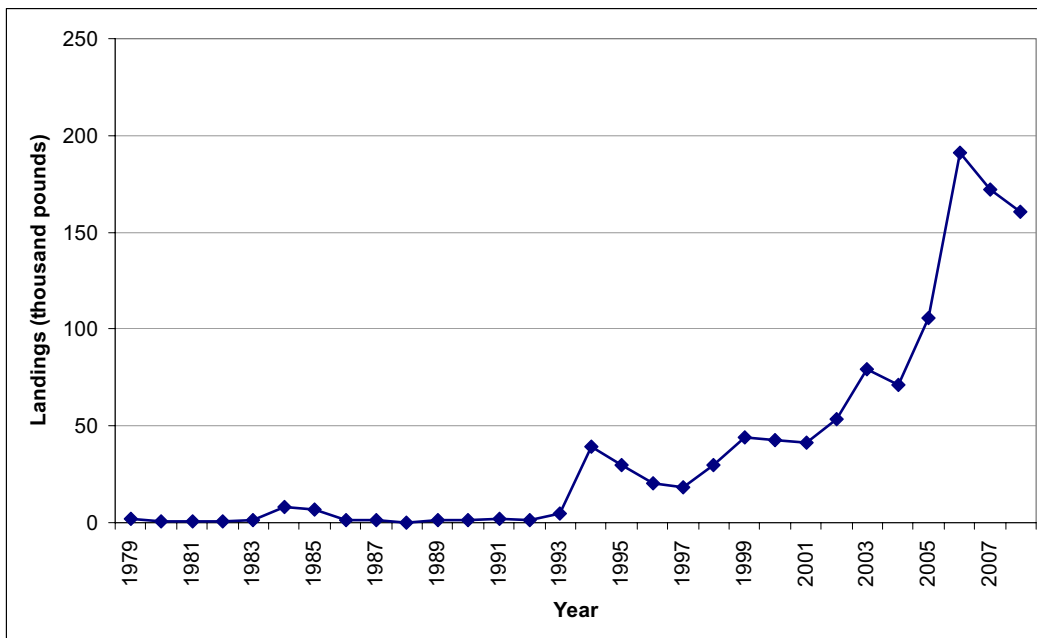


Figure 2-1. Kellet's whelk commercial landings, 1979-2008. Data source: CFIS data, all gear types combined. Data not available prior to 1979.

### Status of the Biological Knowledge

Kellet's whelks are the largest buccinid gastropods found in southern California. The robust, spindle shaped, spiraled shell can reach 6.9 inches (17.5 centimeters) in length. Shells are white to tan and are often covered with encrusting organisms such as bryozoans, sponges and algae.

The Kellet's whelk is commonly found in kelp forests and on rocky reef habitat from central Baja California to Point Conception, California. It has also been found in sandy habitat adjacent to reef structure and buried under sand or shell debris. Rarely

found in the intertidal, the Kellet's whelk depth ranges from low intertidal to 230 feet (70 meters). In 1981, observations of adult Kellet's whelks were reported in Monterey County, 250 miles (400 kilometers) north of its previously known northern boundary range.

Kellet's whelks display sexual dimorphism with females being the larger individual in a mating pair. Females are generally sexually mature between 2.6 and 2.8 inches (6.5 and 7.0 centimeters), with males maturing at slightly smaller sizes. Fertilization is internal, and spawning occurs annually in March, April and May, with aggregations of 15 to 20 mating pairs commonly seen during spawning. Reports exist of 200 to 300 individuals observed within one 215 square foot (20 square meter) area.

Oval shaped egg capsules are deposited in clusters on hard substrate, including reef, discarded mollusk shells or other Kellet's whelks, with egg laying speculated to be favored on substrate already containing Kellet's whelk egg capsules. Egg deposition may occur over several days at several locations, or all within one day. Egg capsules generally contain between 400 and 1200 eggs with the height of the capsule, and number of eggs directly correlated to the size of the spawning female. Egg capsule height generally ranges between 0.2 and 0.4 inches (6 and 9 millimeters) and may occasionally contain up to 2200 eggs. Embryos begin development within the capsule and emerge into the water column as free swimming veliger larvae. Veliger size is inversely related to egg capsule size, with smaller capsules containing larger veligers. The length of time in the planktonic larval stage is unknown.

Kellet's whelks are slow growing, and growth rates are uncertain. Studies have suggested growth of 0.3 to 0.4 inches (7 to 10 millimeters) per year until sexual maturity. Once reaching sexual maturity, growth slows considerably and it has been suggested that it takes at least 20 years to reach 3.5 inches (9.0 centimeters). In a year-long tagging study in southern California the majority of the 188 animals recaptured showed no growth.

Kellet's whelks are opportunistic carnivores that feed on dead or dying organisms, often forming feeding aggregations. However, they will also actively pursue prey including several species of turban snails. Ingestion occurs through the scraping of the radula, a tonguelike structure bearing rows of teeth, and the muscular suction action of the prehensile proboscis, a tubular extension used for feeding which can be extended up to three times the length of the shell. They are voracious eaters and often feed on bait and injured crustaceans in commercial crab and lobster traps.

Predators include the moon snail, sea stars, octopus and also sea otters in central California. Juvenile Kellet's whelks are also eaten by a variety of fish. Kellet's whelks are often found feeding alongside its predator, the giant seastar.

### **Status of the Population**

There is a paucity of knowledge on the overall status of the Kellet's whelk population. In 1980, the first live Kellet's whelks were observed at the Hopkins Marine Life Refuge in Monterey, California, expanding its previously known range by over 250

miles (400 kilometers) from Point Conception, California. Biogeographical research indicates that a population had existed there for several years before individuals were detected as adults. No paleontological records exist for this population in central California. Studies suggest that the Kellet's whelk range expanded to Monterey Bay in the 1970s or early 1980s, possibly due to an El Niño event, and is dependent on recruits from southern California. Lack of reproductive success in this newly established population is evidenced by the lack of recruits, few juveniles and many large adults.

During a four year study (1997 to 2000) of Kellet's whelks at eleven sites throughout their range, the newer northern populations had significantly lower densities than those of historic southern populations in 1997 [ $0.65 \pm 0.22$  per square foot versus  $8.39 \pm 0.97$  per square foot ( $0.06 \pm 0.02$  per square meter historically versus  $0.78 \pm 0.09$  per square meter)]. Size frequency distributions also differed significantly, with newly inhabited regions dominated by older, larger individuals and historically inhabited regions characterized by normal size distributions and higher frequencies of juveniles (less than 1 percent in the north versus 39 percent in the south).

Other southern California studies have been completed on a localized scale. One study near Little Cojo Bay, Santa Barbara County (1980-1981), concluded that the population was stable and could potentially support a small commercial fishery. A 1995 population study at a subtidal reef off La Jolla, California, suggested the population was stable and dominated by sexually mature adults, showing low mortality, with low, but steady recruitment.

Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) coastal biodiversity survey data collected between 1999 and 2007 indicate that Kellet's whelk densities in historically inhabited regions average 0.43 whelks per square foot (0.04 whelks per square meter) and densities from the newly inhabited regions average 0.11 whelks per square foot (0.01 whelks per square meter). The site with the highest average density in the northern region is at Jalama (Santa Barbara County) with 0.64 whelks per square foot (0.06 whelks per square meter), just north of the historic range. The southern site with the highest density is at Naples (Los Angeles County) with 3.22 whelks per square foot (0.30 whelks per square meter), followed by Coho (Santa Barbara County) with 2.58 whelks per square foot (0.24 whelks per square meter). Coho is just south of Point Conception and the distance separating Coho and Jalama is less than 10 miles (16 kilometers).

## **Management Considerations**

Subject to a rapidly expanding fishery, the harvest of Kellet's whelks is not regulated by a minimum size limit, season, or any type of harvest quotas. Due to life history characteristics such as slow growth rates and aggregate feeding behavior, and the lack of knowledge on the impact of increased fishing rates, interim regulations should be implemented under a precautionary principle until a stock assessment can be completed.

Establishing a minimum size limit of 3.0 inches (7.6 centimeters) in shell length to allow for successful reproduction prior to harvest, and a closed season from March through May to protect spawning aggregations would be beneficial to the fishery.

Future considerations may include the southern range expansion of the sea otter, as foraging otters have impacted Kellet's whelk populations occurring within their current range. There are commercial fishers interested in targeting Kellet's whelk with specially designed traps. To fish such traps an experimental gear permit would be required. The issuance of an experimental gear permit requires a logbook for all fishing activities, and an evaluation by the California Department of Fish and Game and the California Fish and Game Commission of the sustainability of such a fishery based on the data generated.

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### **Further Reading**

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<b>Kellet's whelk commercial landings, 1979-2008.</b>			
<b>Year</b>	<b>Pounds</b>	<b>Year</b>	<b>Pounds</b>
<b>1979</b>	1,958	<b>1994</b>	39,513
<b>1980</b>	645	<b>1995</b>	29,959
<b>1981</b>	860	<b>1996</b>	20,391
<b>1982</b>	550	<b>1997</b>	18,453
<b>1983</b>	1,265	<b>1998</b>	29,698
<b>1984</b>	8,032	<b>1999</b>	43,779
<b>1985</b>	7,098	<b>2000</b>	42,716
<b>1986</b>	1,680	<b>2001</b>	41,039
<b>1987</b>	1,216	<b>2002</b>	53,563
<b>1988</b>	142	<b>2003</b>	79,248
<b>1989</b>	1,033	<b>2004</b>	71,304
<b>1990</b>	1,621	<b>2005</b>	105,764
<b>1991</b>	1,983	<b>2006</b>	191,177
<b>1992</b>	1,584	<b>2007</b>	172,201
<b>1993</b>	4,590	<b>2008</b>	160,696

Data Source: CFIS data, all gear types combined. Data not available prior to 1979.