

A History of the Pearl Oyster Fishery in the Archipelago de las Perlas, Panama

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Introduction

The blacklip pearl oyster (Fig. 1) ranges along the Pacific coast from Baja California, Mexico, to Peru (Keen, 1971). Gervi and Sims (1992) list its scientific name as *Pinctada margaritifera mazatlanica*. In 1948, Paul S. Galtsoff (Fig. 2), a leading U.S. shellfish expert with the Interior Department's U.S. Fish and Wildlife Service,¹ was detailed to Panama at the request of that Government to determine the cause of a rapid decline since about 1925 in the abundance of pearl oysters around the Archipelago de las Perlas in the Gulf of Panama (Fig. 3). Local citizens in the small Pearl Islands communities gained part of their livelihood from pearl oyster fishing, selling the pearls, shells, and meats. By the time Galtsoff arrived in the islands, the oysters were so scarce that the fishery barely existed. He made an ecological study of the oyster grounds

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ABSTRACT—The pearl oyster, *Pinctada margaritifera mazatlanica*, was once found around the Archipelago de las Perlas in Panama in abundance and it supported a substantial fishery by hard hat divers. The products were pearls, shells used for making buttons, and meats used locally for food. After the mid 1920's, the fishery declined due to overfishing, and by the 1940's it was nearly gone. The oysters began to repopulate the grounds during the 1970's, but the oysters remain relatively scarce. Fishing has since resumed on a small scale by skin divers using face masks.

and waters, examined the biology of the oysters, and reviewed the history of the pearl oyster fishery. He reported his findings in a U.S. Fish and Wildlife Service Report (Galtsoff, 1950).

Nothing has been written about the oyster fishery in the Archipelago de las Perlas since Galtsoff's 1948 survey. This paper summarizes pearl oyster biology and ecology, the history of the pearl oyster fishery and culture around the world, Galtsoff's (1950) paper, and describes the findings of a survey I made during 11–13 November 1998 to determine the current status of this fishery in Panama. My survey consisted of interviewing fishermen (Fig. 4) and

other local residents, observing oyster-
ing areas and equipment, and photographing related subjects on Isla del Rey, Casaya, Bolano, and Pedro Gonzalez islands in the archipelago.

The Pearl Oyster in Panama

Galtsoff (1950) stated that around the Archipelago de las Perlas the pearl oysters were found from wading zones to depths of about 22 m, but not exceeding 36 m. The oysters grew on rocks and were attached by a byssus. They could be found in large quantities growing near each other, but not in clusters, for they do not attach to one another. They grew in a vertical position, or slightly inclined

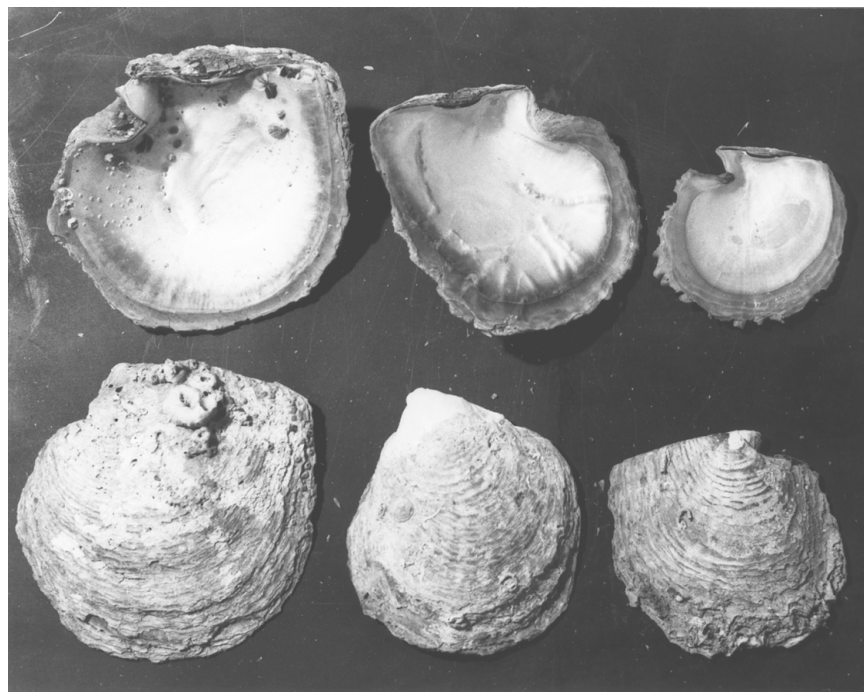


Figure 1.—Valves of blacklip pearl oysters, *Pinctada margaritifera mazatlanica*, from the Archipelago de las Perlas, Panama. Small oyster spat, species unknown, are attached to the largest shell, measuring 13.5 cm across.

at about 35° to horizontal surfaces. Pearl oysters did not occur in the tidal zone above the low water level, because they were not able to keep their valves closed when out of water. After a brief exposure to air, their muscles relax, their valves gape, and the oysters desiccate and die. They were relatively scarce along the shores of mainland Panama.

Water temperatures at the surface around the islands ranged from 21.0° to 25.7°C while salinities ranged from 32.0 to 35.9‰ during February and March. The pearl oyster grounds were inhabited by many invertebrates, including hydroids, corals, gorgoniae, starfishes, many bivalves, including edible rock oysters, *Undulostrea megodon*, gastropods, and crabs (Galtsoff, 1950).

The growth of *P. margaritifera mazatlanica* is not reported, but the growth of *P. margaritifera* in French Polynesia is rather rapid, reaching a shell diameter of 7 or 8 cm within one year, and a diameter of 11 cm by the second year (Coeroli, 1983; Coeroli et al., 1984). Maximum average shell diameters of 14–17 cm are reported (Coeroli, 1983; Coeroli et al., 1984). This species reaches full maturity in its second year (Talavera and Faustino, 1931; Crossland, 1957; Tranter, 1958; Reed, 1966).

Culturing Pearl Oysters

Most of the world's natural saltwater pearls were once found in the Persian Gulf with lesser quantities in the Indian



Figure 2.—Paul S. Galtsoff, 78 years old, at the annual meeting of the National Shellfisheries Association, Baltimore, Maryland, 1965.

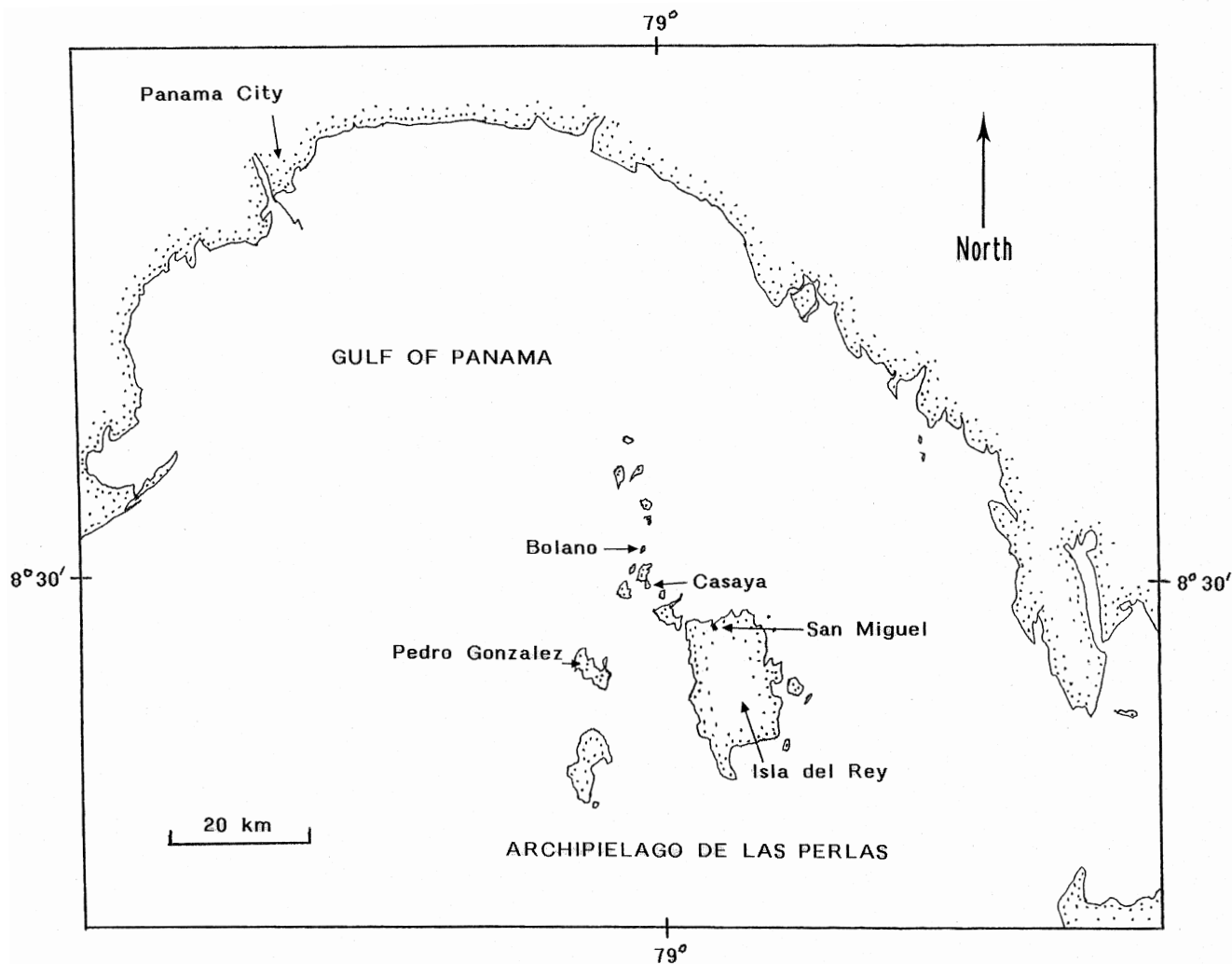


Figure 3.—The Archipelago de las Perlas in the Gulf of Panama, Panama.

Ocean, Red Sea, Pacific Ocean, and Caribbean Sea. Pearls have been collected for centuries and are described as universal symbols of beauty and value in the oldest surviving religious and secular texts. Most natural pearls are relatively small and few are round. Before the creation of cultured pearls in the early 1900's, large, spherical natural

pearls were rare and expensive. Necklaces with several pearls of similar size, shape, and color were extremely rare and costly (Ward, 1998).

In the early 1900's, Kokichi Mikimoto and other Japanese developed a system for culturing pearls (Eunson, 1963). The system involved placing a square piece of live mantle tissue from a

freshly opened pearl oyster into an incision in the flesh next to the gonad of a pearl oyster and then placing a perfectly round sphere or nucleus (from a freshwater mussel taken in the United States) against the inserted mantle tissue. The oyster then was returned to the water. The inserted mantle tissue formed a sac which produced nacre around the nucleus. The longer the oyster remained in the water, the thicker the nacre layer. After 2–4 years, its pearl was removed; some oysters have been thus implanted up to four times (Ward, 1998). Cultured pearls are heavier, prettier, and more nearly round than most natural pearls (Fig. 5) (McClintock, 1994).

Mikimoto's pearls sold at a tiny fraction of the price of natural pearls in the 1920's. By 1940, he produced about 10 million pearls annually (Foshag, 1925), or about 75% of the world's annual production (McClintock, 1994). As cultured pearls gained acceptance among buyers, the prices of natural pearls crashed. After World War II, the Japanese invested enormous resources in artificial culture. Cultured pearls became the only pearls on the market and the market for natural pearls nearly ended (Ward, 1998). The market price of pearls is determined, in this order, by size, roundness, color, and luster (Foshag, 1925). Today, pearls up to 10 mm in size are produced mainly in China followed by Japan, and those larger than 10 mm are produced in other countries around the Pacific, mainly Australia (Ward, 1998). In 1992, French Polynesia produced 600,000 highly prized black pearls (Gouletquer and Heral, 1997).

Pearl oysters have also been valuable for their shells, called mother-of-pearl due to the iridescence of their inner side. Mussels and abalone also produce mother-of-pearl. For centuries most mother-of-pearl was used to make buttons. From the 1890's to the 1920's, the U.S. was the principal market for shell buttons; they were made from America's freshwater mussels (Ward, 1998). Today, mother-of-pearl is used to make jewelry, and inlays and decorations of handcraft boxes, serving knives, forks, and spoons, and buttons for expensive clothes (Ward, 1998).



Figure 4.—Some pearl oyster fishermen on the island of Bolano.



Figure 5.—A small (5 mm), yet nearly spherical pearl from the Archipelago de las Perlas, Panama.

History of Pearl Oyster Harvesting in Panama

Galtsoff (1950) compiled the following history of the pearl oyster fishery in Panama mainly from the writings of Oviedo y Valdes (1535), Irving (1831), and Mosk (1934, 1938). The following is paraphrased and shortened from Galtsoff's account.

In the 1500's, extensive exploitation of the Caribbean Sea's pearl oysters began almost immediately after Europeans discovered them in the waters of present-day Columbia, Venezuela, and the Lesser Antilles. New and valuable pearl grounds soon were discovered on the Pacific side of Central America, with credit going to Vasco Nunez de Balboa concurrent with his discovery of the Pacific Ocean in 1513. Balboa then visited a group of islands in what is now the Gulf of Panama, found the waters abounding in oysters bearing pearls, and named the entire group *Islas de las Perlas* (now known as *Archipiélago de las Perlas*).

The native Indian inhabitants of the islands, who valued only the meats of the pearl oysters, could not understand the white man's joy at seeing the pearls, which they could not eat. In 4 days, Balboa's men gathered about 96 ounces of pearls. They organized pearl fishing parties, employed large numbers of Indian divers, and showed them how to open the oysters without roasting them, as was their practice, and spoiling the pearls.² Upon leaving the coast of the Gulf of Panama, Balboa received from a local chief a tribute consisting of 160 ounces of gold and 200 large pearls.

The value of the pearls shipped from the New World to Spain is not known, nor is the share contributed by the *Archipiélago de las Perlas*, but occasionally records mentioned the finding of good pearls from the islands. For example, Mosk (1938) stated that in 1543 one

Martin Alonso carried to Spain gems valued at 9,000 ducats (gold or silver coins), and that the largest pearl of the lot was from the *Archipiélago de las Perlas*.

In the latter part of the 1500's, the pearl fishery declined along the Caribbean coasts, and this led to an increase in the exploitation of the pearl grounds off Panama's Pacific coast. Of particular interest are the records of the large Cordona Company, which conducted its operations almost exclusively on the Pacific coast. It had six well-outfitted vessels which sailed from Cadiz, Spain in July 1613, and visited the Caribbean Islands apparently for the purpose of acquiring black workers, for the royal decree of 25 June 1585 had forbidden the use of Indians in pearl fishing and specified only blacks were to be employed for diving (*Recopilacion de Leyes do los regnos de las Indias*, Madrid, 1774, book, title 25, law 31, quoted from Mosk, 1934). In 1614, the expedition established its headquarters at Acapulco, Mexico, where it constructed three vessels of about 200 tons capacity. They began their explorations in 1615. They located pearl grounds by scanning beaches to locate shell mounds left after the natives ate oysters there. In the words of the Cordona's report (quoted from Mosk, 1934): "Along the sea coast, on the interior (Gulf) side, for a distance of one hundred leagues, one does not see anything but mounds of pearl shell." The description refers to the Gulf of California, but the Spanish may have used the same method to find pearl grounds elsewhere.

In the early 1900's, the pearl oyster fishery along the Pacific coast of Panama was well developed; it provided a steady livelihood to a number of communities on the *Archipiélago de las Perlas* and in the Gulf of Chiriqui, especially around Coiba and other islands. The main product of the fishery in the 50 years before 1948 was the mother-of-pearl shell, most of which was exported to Europe, presumably for use as buttons and inlays. With the number of pearl oysters on the grounds decreasing, the chances of finding a valuable pearl became so remote that pearls had lost their importance. Nevertheless, the inhabitants of

the *Archipiélago de las Perlas* still hoped in 1948 (during Galtsoff's survey) to become rich overnight by finding a large valuable pearl. Many oysters were being taken in that mostly vain hope.

Regular statistical data regarding the yield of the fishery, available only from 1906 to 1960 and listed by Galtsoff (1950) and Villalaz and Gomez (1997), were mainly of shell production and were not considered especially reliable (Fig 6). Pearl sales were often private and with no official record of the transaction. Such data are available only from 1933 to 1938. With these limitations, the statistical data are still useful in showing the declining trend of the pearl fishery between 1925 and 1938. Two factors caused wide fluctuations in the quantities of shells exported from Panama: 1) increase or decrease in the demand for Panama's shells in the world market and 2) the abundance or scarcity of pearl oysters on the grounds. The quantity of shells shown by official record of export in 1918 is so high as to be entirely out of the range of the fluctuations for the preceding and subsequent years; it cannot be explained by any special conditions which might have affected the fishery at that time. Galtsoff believed there was an error in the methods of collecting statistics owing to unsettled economic conditions in Germany, the principal country importing Panamanian mother-of-pearl shells. A steady decline in the production of shells after the peak in 1925 is due to a decline in the supply of pearl oysters. Besides Germany, other markets to which Panama's mother-of-pearl shells were exported were London, New York, Paris, Trieste, Barcelona, and Genoa.

Years of forced inactivity in the fishery during the World War II years, 1939–43, did not result in an increase in the supply of oysters. In 1944–45, when the fishery resumed, the fishermen still found the pearl oysters extremely scarce. Data from Villalaz and Gomez (1997) show no recorded pearl oyster landings in Panama between 1948 and 1960.

Galtsoff (1950) stated that the income derived from the pearl fishery had been substantial in the various small communities in the *Archipiélago de las Perlas*, where people engaged primarily in fishing. The town of San Miguel on Isla

² Camargo (1983, quoted in Villalaz and Gomez, 1997) stated the Spanish used small rowboats and sailboats to harvest the oysters. A rowboat could be built from a single tree and carry as many as eight people. The Spanish initially hired Indians to dive for the pearl oysters, but disease and poor food reduced their numbers. By the end of the 16th century, slaves from Africa had replaced the Indians.

del Rey (Fig. 7) was the principal pearl oyster center, but for several hundred local fishermen living there pearl fishing was only a part-time occupation. Galtsoff estimated that from 1920 to 1935, between 40 and 50 diving boats operated around all of Panama's Pacific islands (Fig. 8). The boats were about

7.5–8.5 m long, and were equipped with sails and oars but no engine. Each carried a crew of six men (1 diver, 1 assistant diver, and 4 deck hands), and was equipped with a hand pump for supplying air to the diver. The divers wore hard hats and gathered oysters at low tide at depths of 11–22 m, but they

could descend to 33 m. They were paid by the number of oysters they brought up, usually at the rate of \$2/100 pounds of shells. The other men worked for wages. Each diver was expected to harvest at least 200 pounds of shells/day. From the diving boat, the oysters were taken to a mother ship, where they were opened under the watchful supervision of an officer of the company. All pearls were the property of the operating company. On Sundays, the divers were permitted to fish for themselves, but they had to turn over to the company one-half of the shells and pearls gathered.

The divers without hard hats worked by themselves. They gathered oysters at depths not exceeding 11 m. Their maximum catch per day did not exceed 50 pounds of shells.³

When sufficient shells were gathered, they were taken by boat to Panama and sold to wholesale shippers. The men also caught fish and farmed small patches of land. Oyster meat provided additional food, while cash was received from the sale of shells. With the almost complete disappearance of the pearl oysters, the economic life of the communities was greatly upset.

Galtsoff's 1948 Investigation

Galtsoff's study included 1) a quantitative sampling of the pearl oysters to determine their abundance on various grounds, 2) recording the temperature, salinity, and pH of surface and bottom waters, and tests of copper, 3) vertical sampling of plankton, 4) ecological observations on the pearl oyster grounds and adjacent bottoms, 5) microscopical examination of oyster tissues to determine whether the oysters were diseased, and 6) observations on spawning of pearl oysters.

Galtsoff found the pearl oyster population had been reduced to such a low level that the fishery for them had nearly ceased to exist. On the other hand, the remaining marine life was flourishing.

³ Local residents said the independent divers had used glass-bottom boxes to take the reflection off the water surface, enabling them to see the oysters in 3–5 m of water. They then dove down to get the oysters without using face masks or flippers. Local fishermen also got some oysters in the shallows by wading for them at low tide.

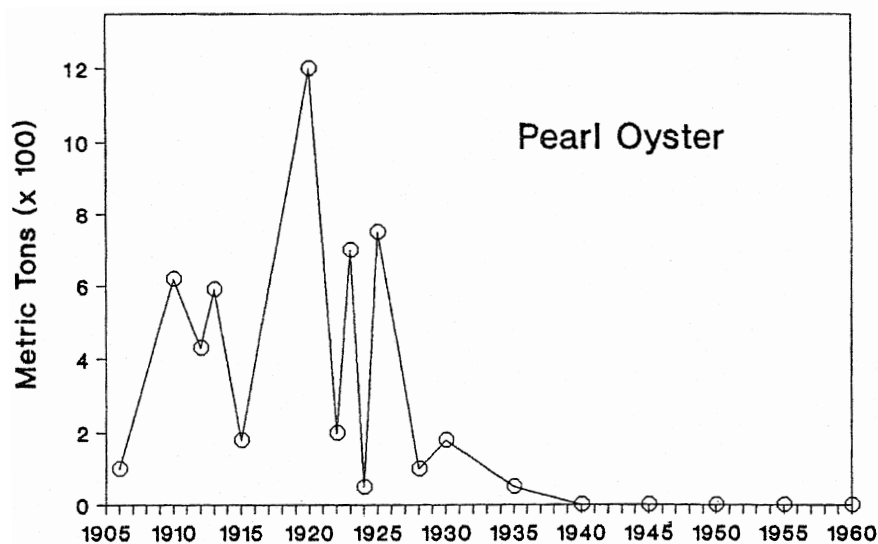


Figure 6.—Annual total landed weight of pearl oysters, *Pinctada margaritifera mazatlanica*, in Panama. Data (to 1948) from Galtsoff (1950) and annual bulletins published by the Department of Statistics of the Republic of Panama.

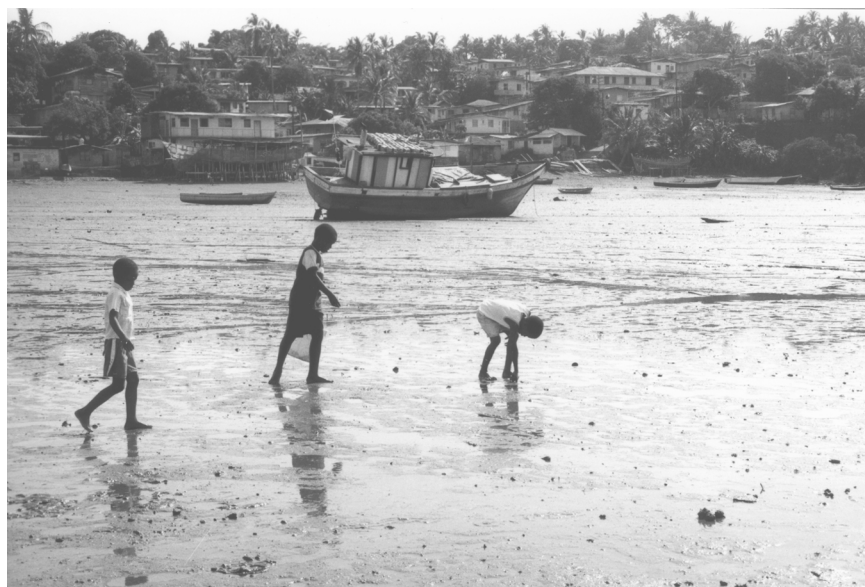


Figure 7.—Waterfront of San Miguel on Isla del Rey island. Children in foreground are harvesting the clam called concha de burro (*Anadara grandis*).

The growth of littoral fauna was luxuriant, did not appear to be inhibited anywhere, and there was no indication of unusual mortality of any sedentary organisms. The large number of species inhabiting the waters and the size and abundance of many gastropods and lamellibranchs was evidence of a most favorable environment for the propagation and growth of mollusks. In addition, his examination of plankton samples showed large numbers of nauplii, lamellibranch and annelid larvae, copepods, arrow worms, and other forms. The animal communities were unaffected by red tide or by any toxic material which may have been dumped into the sea. Galtsoff stated that the pearl oysters were not attacked by carnivorous snails or starfish, and all live oysters he examined were in a healthy condition with no symptoms of disease, malnutrition, poisoning, or parasitism. Galtsoff further reported that the method of gathering the pearl oysters by divers who picked them up by hand had inflicted no damage to the grounds: The physical condition of the bottom had not been altered by the intensive fishing. From the facts he amassed, Galtsoff concluded that the most probable cause of the depletion of the pearl oyster grounds was simply overfishing. (The rapid growth of this species and the delay of maturity until its second year would make it highly susceptible to overfishing.) He recommended that efforts be made to protect the remaining pearl oysters and to facilitate their propagation by the enactment of the following measures:

- 1) Complete closure of the pearl oyster fishery and prohibition of the taking of pearl oysters for any purpose except scientific research; and
- 2) organization of pearl oyster investigations to determine the rate of rehabilitation of pearl oyster grounds after closing the fishery.⁴

If, at the end of 5 years, the oysters were increasing substantially, the fish-

⁴ I did not uncover any information about the Panamanian government prohibiting the fishing for pearl oysters, and there does not appear to be any publications relating to investigations regarding the rate of rehabilitation of the oyster stocks. Apparently, no such investigations were made.

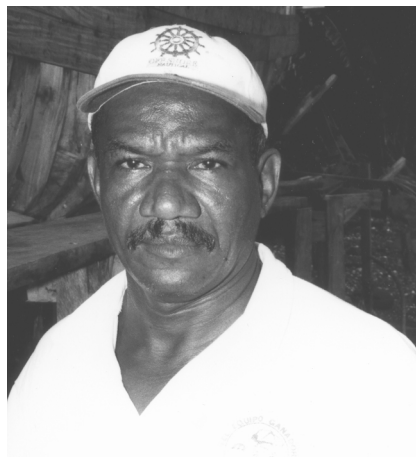


Figure 8.—Men in San Miguel, Isla del Rey, whose grandfathers harvested pearl oysters during the 1930s.



Figure 9.—Settlement on Pedro Gonzalez Island, whose fishermen harvest pearl oysters.

ery could be reopened partially under strict government supervision, allowing harvests to take place only as the oysters increased in abundance.

(Author's comment: As noted, the prices of natural pearls had fallen sharply by 1948. With few large spherical pearls to be found even if the oysters became abundant, the resource would have value only in the sales of shells.)

The Pearl Oyster Fishery in 1998

The pearl oyster is unique among shellfish in that the meat and shell have

value—often considerable. Finding a pearl is an added bonus for the fishermen. In 1998, some steady fishing continues for pearl oysters in the Archipelago de las Perlas. The oysters are most abundant around Casaya, Bolano, Pedro Gonzalez (Fig. 9), and Esmeralda islands, always growing on rocky bottoms. The pearl oysters apparently occur around nearly all the other islands in the group.

About 75 fishermen harvest oysters on Isla del Rey, 50 on Pedro Gonzalez, and 20 on Casaya. They seek finfish,

shrimp, and oysters, sometimes fishing for more than one species in any day. The fishermen usually harvest oysters



Figure 10.—Face mask and snorkel fishermen use to find pearl oysters.

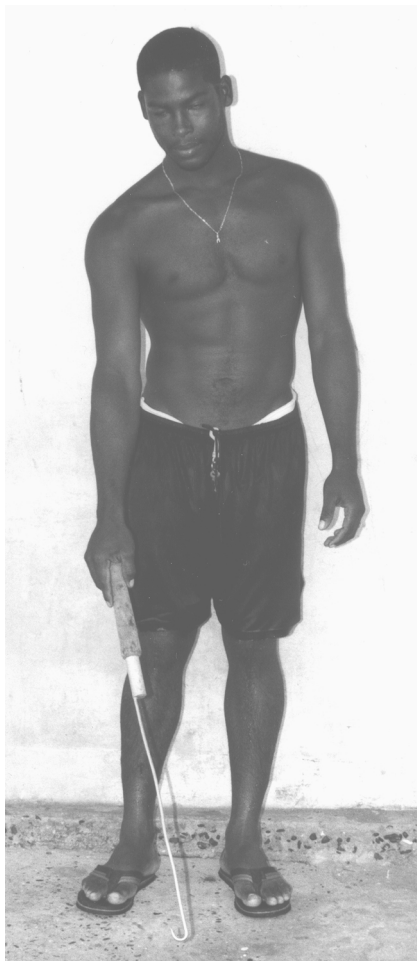


Figure 11.—Hook which fishermen use to remove pearl oysters from rocks.

from 1 to 3 days a week, and they do not always take them around the island on which they live. For instance, the fishermen of Pedro Gonzalez Island harvest oysters around Pedro Gonzalez, San Jose, and Casaya islands, while the fishermen on Casaya Island harvest them around Casaya and Bolano islands. Oyster harvesters use a face mask, snorkel, and flippers; none use hard hat diving gear, as most did during the 1940's and earlier decades, or scuba gear. Most carry a hook, while some use a machete, to remove the oysters from the rocks.

The fishermen go out in groups of about three men at low tide in boats about 7.5 m long, propelled by outboard motors, and they dive for the oysters in 3.7–5.5 m of water. After arriving at a harvesting site, the fishermen swim along the surface while looking down at the bottom for oysters through their face masks (Fig. 10). When they see one, they dive down to get it (Fig. 11) and put it in the boat. In the 2–4 hours they are oystering, each man gets about 15 oysters.

The fishermen remove the meats from their oysters in their boats, on beaches, or in their homes (Fig. 12). They eat some meats and sell the rest to neighbors and to small restaurants, such as in the town of San Miguel on Isla del Rey, for \$1/pound. They sell the shells for 10 cents a pound to a company which ships them to Italy to be used to make buttons.⁵ The local people keep some

shells to clean sores on their skin, scraping the affected area and then flooding it with lime juice. They also use some shells to make household ornaments.

The two valves of a large pearl oyster (14 cm) together weigh about 1 pound (0.45 kg), while the two valves of a half-grown oyster (10 cm) together weigh about 0.5 pound (0.23 kg). Since some half to full-grown oysters are taken, the average weight of the two valves of a typical oyster harvested might be about 0.75 pounds (0.34 kg). Fifteen oysters would then weigh about 11 pounds (5.0 kg), selling for about \$1.10. Fifteen oysters yield about 3 pounds (1.36 kg) of meat selling for about \$3.00. The local people usually cook the meats in water with tomatoes, oil, onions, and salt. Pearls are rarely found: Every 100 oysters yields at most 1–2 pearls. Nearly all pearls are small, few are spherical, and the color varies. Island people collect them in vials for sale to tourists. One person had 14 pearls of white, green, and black coloration; she asked \$80 for the collection.

The history of oystering and oyster production between 1948 and 1998 is vague, but oyster abundance probably was low. Interviewed residents claim the oysters were mostly dead by 1948, and

⁵ In button factories, workers operate machines that punch buttons from the shells, punch holes in them, and then grind them to a uniform thickness. The buttons go through several steps of polishing that involve using pumice, diamond cutting wheels, and soaking in sulfuric acid. The workers then sort them by quality (DeMasters, 1999).



Figure 12.—Knife used to remove meats from pearl oysters.

they began to repopulate the grounds in the 1970's. The 1948 date coincides with Galtsoff's visit. In the past several years, oyster harvesting has occurred, but at a much lower scale than in the 1920's and earlier. The fishermen believe the oyster stocks are not increasing or decreasing in abundance. At this time, there is no artificial pearl culturing in the islands.

Acknowledgments

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