Experimental Clam Dredge Progress Report

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An experimental gear permit was issued to the FV Lady Rosemary to use dredge gear to harvest clams off the Oregon coast. The main species of interest was razor clams, but other clams such as cockles and gapers were also explored.

Primary objectives of the work were to (1) survey the nearshore Oregon coast for commercial quantities of clams and (2) determine effectiveness of a modified hydraulic dredge to harvest razor, gaper, and cockle clams.

Gear

The gear used was a modified east coast-type hydraulic clam dredge (Figure 1). It weighed 4,000 pounds, had a 5 ft wide variable-depth cutting edge, and an 8 inch manifold. The manifold was initially operated with 21, $^3/_4$ inch nipples, which were later changed to $^1/_2$ inch nipples. The bottom and sides of the dredge were covered with $^1/_2$ inch diameter rods, spaced 2 inches apart. The codend bag was 7 ft long, constructed of 3 $^1/_2$ inch nylon web netting. The dredge was towed with at a 2:1 scope, with a 2 inch diameter polypropylene rope. The dredge was set and retrieved with a $^5/_8$ inch wire cable by the vessel's hydraulic system.

A diesel engine supplied a 400 hp centrifugal pump capable of supplying 4,000 gallons per minute at 90 psi. A 10 inch diameter, 25 ft overboard suction line was connected to a foot valve. Up to 600 feet of 8 inch inside diameter hose connected the pump and dredge.

The first two trips were observed by ODFW staff. During one trip, an underwater video camera was installed on the forward part of the dredge to observe the habitat and the operation of the dredge.

Results

During June and July, 1998, 265 tows were made between the Columbia River and below Cape Blanco (Figure 2). Depths of tows ranged from 1 to 57 fm with and average of 15 fm. Speed, time, and psi varied considerably since operators were trying to find the best combination for efficient operation of the gear. Tows ranged in time from 3 to 154 minutes in length with an average of 20.7 minutes. Initially, tows were done at 2-3 knots. However, after the tow speed was dropped to 1 knot, operators noticed the by-catch of crab dropped to nearly zero. Thereafter, all subsequent tows were made at 1 knot. The dredge was operated between 70 - 160 psi, with the higher pressure being used with the smaller, $^1/_2$ inch nipples.

Video tapes of the habitat were made from two different areas; one just north of Tillamook Bay in 15-18 fm and another just north of Nehalem Bay in 12-16 fm. The operation of the dredge stirred up enough material where the vision of the camera was obstructed much of the time. However, the tape was clear enough of the time to see that both areas consisted of flat sandy bottom. In the area north of Tillamook, nothing could be seen on the surface of the sand. In the area north of Nehalem Bay, sand dollars covered the sand (Figure 3).

On July 2, clam harvesting for human consumption from the ocean was suspended by the Oregon Department of Agriculture due to high levels of Paralytic Shellfish Poisoning. The vessel continued to search for clam beds, but any clams harvested were dyed and sold as bait.

Two species of razor clams were found. The Pacific razor clam (*Siliqua patula*) is the species commonly found along Oregon's beaches and was found in greatest numbers between 3 and 10 fm. Harvestable sized bed were located north of Winchester Bay and north of the Coquille River. The highest densities of Pacific razors were found in areas where an offshore "berm" had developed which created a shallow area with deeper areas on both sides (Figure). Clams were not found in the deep areas on either side of the "berm". Sampled Pacific razor clams ranged in size from 77 - 146 mm, with an average of 126 mm (3 - $5^{3}/_{4}$ inches, 5 inch average). Many of the razors (sometimes up to 70-80%) would not come through the dredge whole and unbroken. Further gear development needs to be done to find a way to reduce the breakage of the razor clams.

The Sloat razor (*Siliqua sloati*) was an unexpected find in deeper areas; up to 28 fm. They were of a smaller size (approximately 104 mm / 4 inches maximum) and not found in concentrations that would be commercially harvestable.

We have long assumed, all subtidal razors were Pacific razors, and therefore felt there were significant subtidal reserves which would re-populate the heavily dug intertidal areas. The presence of the Sloat razor in deeper waters raises some questions as to the extent of the subtidal stocks of the Pacific razor. Additional surveys would be needed to assess the actual extent of subtidal Pacific razor clam populations.

Cockle clams (*Clinocardium nuttalli*) were found in depths between 2-27 fm. The highest densities of cockles were between 10 - 14 fm, but no commercial concentrations were located.

The few gaper clams (*Tresus capax*) that were found (a total of 18) were located in 11 - 22 fm. A species of macoma clam (probably the sleek macoma, *Macoma lipara*) was located in an area north of Coos Bay in about 40 (fm). No commercial concentrations of gaper or the Macoma clams were located. Most gaper and cockle clam came through the dredge unbroken; their heavier shell appeared to prevent the breakage that occurred with the razor clams.

The most common by-catch was sand dollars (*Dendraster excentrucus*), both live animals and empty tests, in depths of 4 - 16 fm. It appeared, catches in individual tows were either mostly tests or mostly live animals. Perhaps empty tests get washed out into "graveyard" areas after the animals die.

Initially, some Dungeness crab were caught as by-catch; first days tows averaged 1.2 Dungeness crab/tow However, after the speed of the tows was dropped to 1 knot, the by-catch was reduced to essentially zero. Over 90% of the observed crab were whole and uninjured. Other miscellaneous by-catch consisted of peanut worms, sea stars, sculpins, and small skates.

This project generated some public concern. Several letters were written and many phone calls were answered. Most of the concerns dealt with the effects of this type of gear on the habitat and other species, especially Dungeness crab. Some people were concerned the gear will "be blasting everything out of the sandy bottom" or will "seriously jeopardize the existing Dungeness population."

Summary / Recommendations

It may be questionable as to whether this type of gear will be effective for the harvest of razor clams in the ocean for several reasons. First, densities of clams in the ocean were lower than expected. Most clams were widely scattered and few commercially viable concentrations were found. Second, because the areas of high density of Pacific razors that were found were in such shallow water, this type of gear could only be worked when the ocean is relative flat and calm. The number of days available for the right conditions is limited. And third, there was a considerable amount of breakage to the thinner shelled razor clams. Modifications to the operation of the gear or different technology need to be developed to reduce the breakage.

If commercial activity is pursued further, the effects of gear on habitat and other resources needs to be explored further to address public concerns. The area in which Pacific razor clams were found is a very high energy area with considerable turn-over of the substrate on a seasonal basis. We expect any significant lasting effects of dredge gear in this type of habitat would be minimal. The effects of the gear in deeper more stable habitats needs to be explored further.

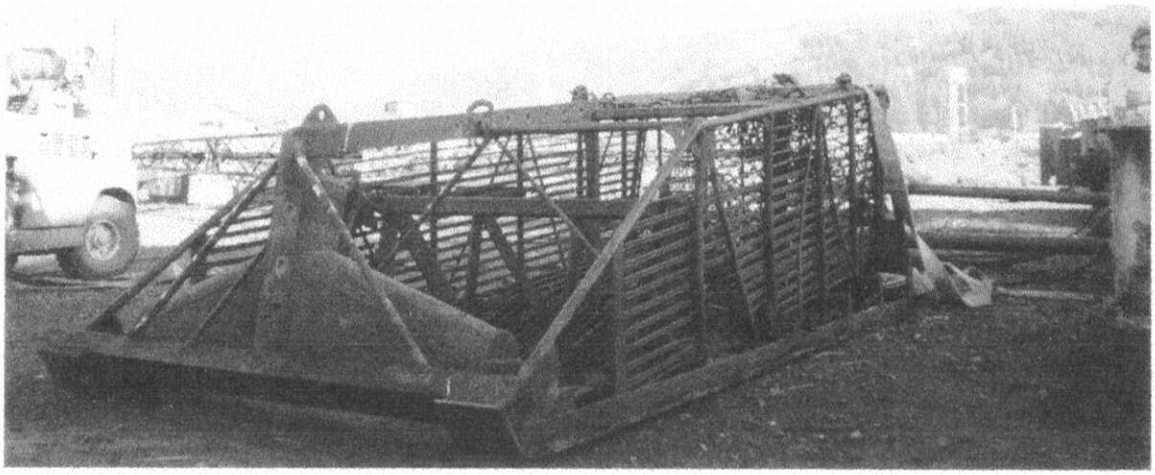

photo by P. Daniels

Figure 1. Hydraulic clam dredge.

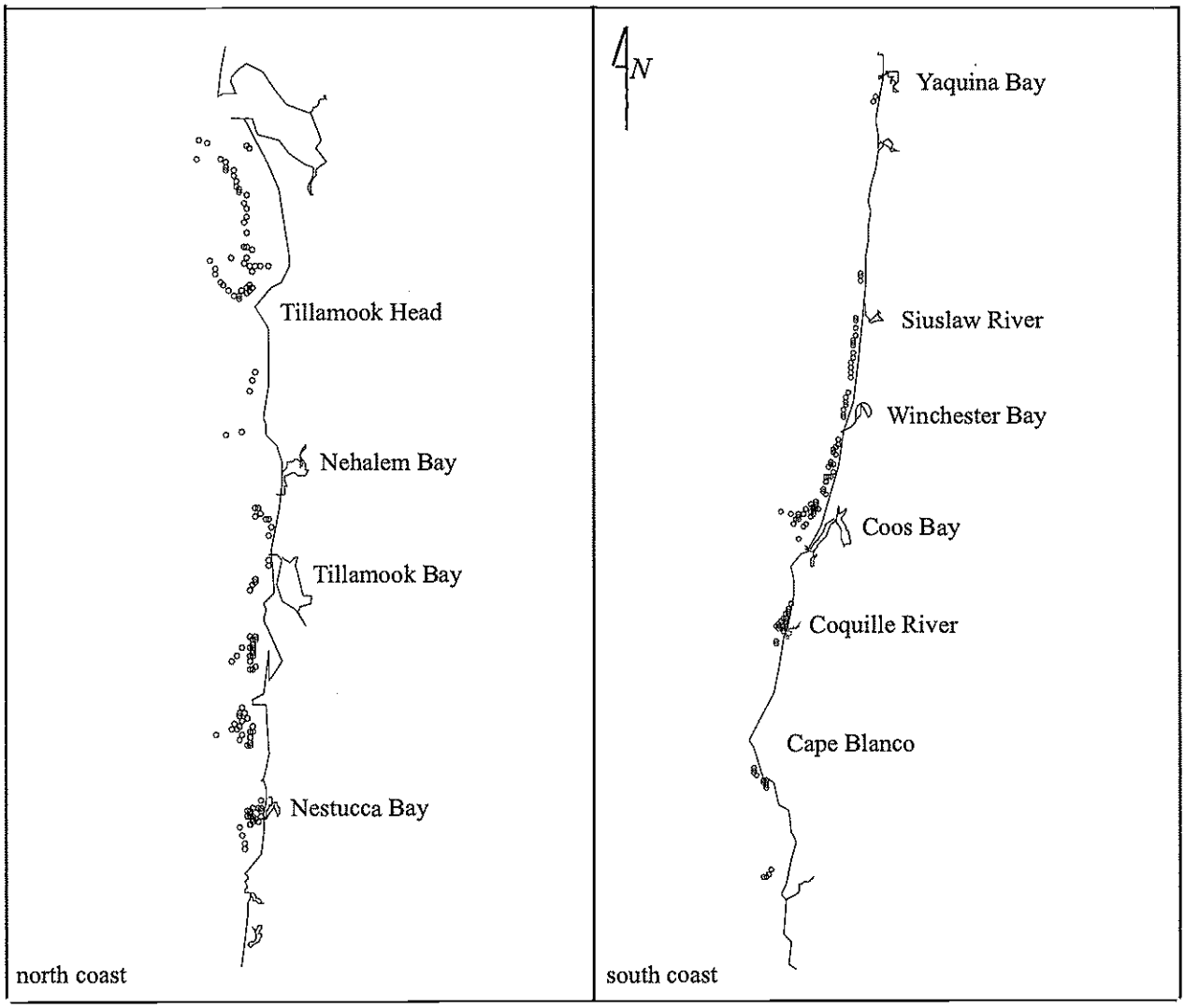

Figure 2. Location of clam dredge tows, June through July, 1998.

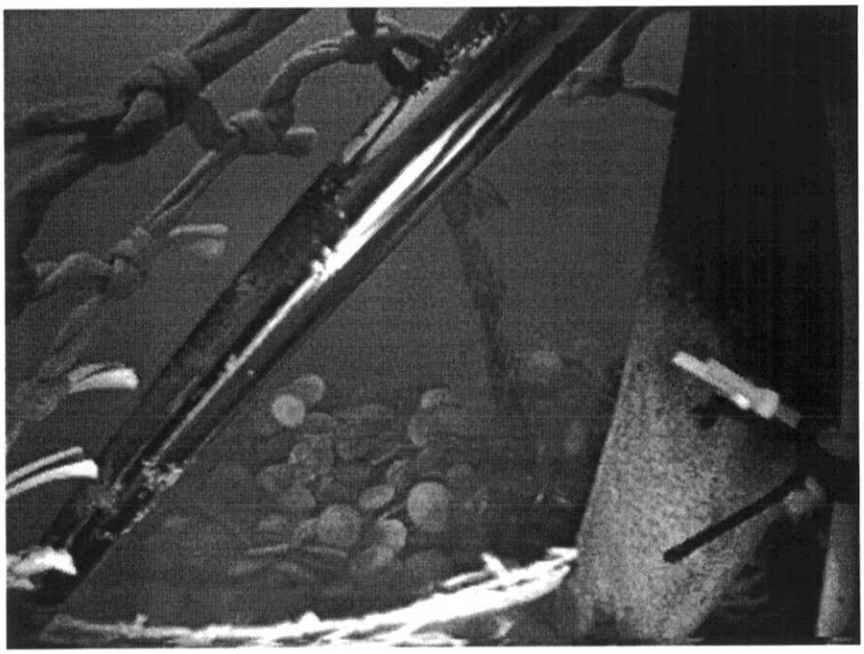

Figure 3. Sand dollars in front of clam dredge.