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ROCK CRAB: A POTENTIAL NEW RESOURCE

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Rock crabs *(Cancer irroratus)*, which historically have been culled and discarded from catches of blue crabs in the winter dredge fishery in Virginia, represent a potentially important resource in the Chesapeake Bay.

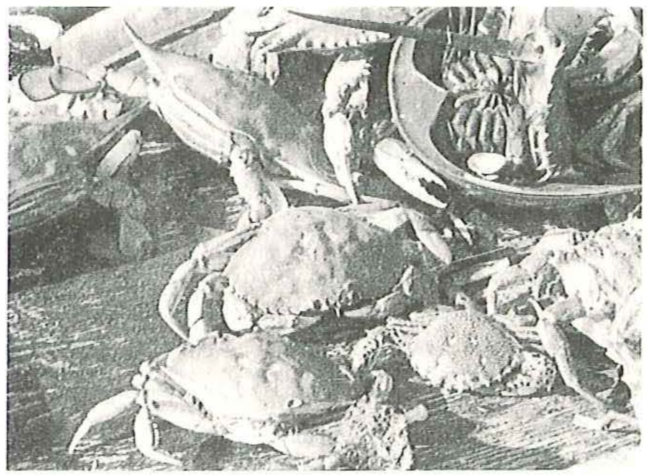
A small rock crab fishery began in Massachusetts before 1890 and later expanded to other New England states, New Jersey and Canada. This crustacean is most abundant along the New England coast where it is the main source of edible crab meat. However, because of competition from the lobster industry, there is no large commercial fishery for this food source.

Chesapeake Bay is within the southern limit of the rock crab's range and scientists at the Virginia Institute of Marine Science believe the opportunities are promising for use of this resource in Virginia.

With a flavor that equals that of the blue crab, rock crabs contain a large quantity of meat. They can be used as picked crab meat; as whole, fresh or steamed hard crabs; as peeler crabs for fishing bait; and as peeler crabs to shed into soft crabs during the winter. The sale value of soft rock crabs should be equal to or perhaps higher than that of soft blue crabs.

Rock crabs are found in the southern waters of Chesapeake Bay and in the seaside bays of the Eastern Shore from November through April. They first appear in seaside bays in late October or early November, when the water temperature drops to nearly 60°F (15.5°C), and they are often caught along with blue crabs in wire-mesh pots.

The pot catch is good until the water temperature drops below 40°F (4.4°C). Dredgers catch many rock crabs in the Chesapeake Bay, particularly on the sandy ledges along Thimble Shoal, Chesapeake and York River entrance channels—a 150 square mile area—from December through March, the legal limit of the Virginia crab dredging season. In other months, rock crabs are scarce within the bay but are commonly caught offshore in seabass and lobster pots. Egg-bearing female rock crabs are seldom seen in Chesapeake Bay or in adjacent waters, but larvae can be found near the mouth of the bay from May through October.



The rock crab (center foreground) is available in abundance to dredgers during the winter months. Historically they have been culled and discarded from catches of blue crabs.

In December and early January, peelers make up about three-fourths of the Chesapeake rock crab dredge catch. On "rank" peelers (those ready to molt), the body shell just above the leg bases is easily cracked with light finger pressure. This is the easiest and least damaging way to identify a rank peeler. Generally, all hard crabs 3½ inches or smaller in width will shed. If selection is made for these sizes, the crabber is assured of a good supply of peelers.

Crabs grow by shedding their hard, outer shells. When completely free from the old shell they are soft and wrinkled. They expand to full size within two hours, increasing in width approximately 20% before the new shell begins to harden. Soft crabs should be removed from shedding tanks or floats at least twice a day, preferably morning and night.

The rock crab shell hardens slowly—much slower than the blue crab; the change from early paper-shell to hard crab takes one month or more at winter water temperatures.

SHEDDING PLANT OPERATION

Buying or catching rock crabs. Since shedding does not naturally occur until late December or early January, and does not occur earlier under artificial holding conditions, it is not economical to hold crabs before mid-December. Rank peelers and hard crabs ranging from 2½ to 3½ inches wide should be held for shedding until the end of January. Whether it would be profitable to stop holding crabs before the end of January or to continue operating in early February would be determined by the rate of shedding and the availability of peelers.

Holding and transporting. Crabs should be selected from the dredge boat or pot catch, placed carefully in containers, covered with damp burlap to prevent drying, and placed where they are protected against freezing. Containers should not be filled with water unless a continuous supply of seawater is provided.

Nicking and feeding crabs. Crab claws may be nicked, that is, the moveable finger of each claw may be dislocated, to prevent crabs from injuring each other. Dislocating the fingers of rock crabs is more difficult than nicking blue crabs and extra care should be given to the job. Rank peelers will not eat before shedding; therefore, food should not be provided.

Locating a shedding plant. As soon as possible, crabs should be placed in seawater of nearly the same salinity as that from which the crabs were caught. Rock crabs have been found in Chesapeake Bay at salinities as low as 20 parts per thousand (ppt). In seaside bays of the Eastern Shore, crabs have been found in salinities as low as 25 ppt. Hard shell and rank peeler crabs held in seawater as low as 14 ppt at the Virginia Institute of Marine Science have shown high survival (75-95%).

Shedding plants should be located near a water source at or above 14 ppt salinities. The salinity of water from any location can be determined with an hydrometer or refractometer, by instruments recording electrical conductivity, or by chemical means. Testing equipment may be purchased from biological or chemical supply companies. Assistance in obtaining equipment and determining salinities may be obtained by contacting VIMS.

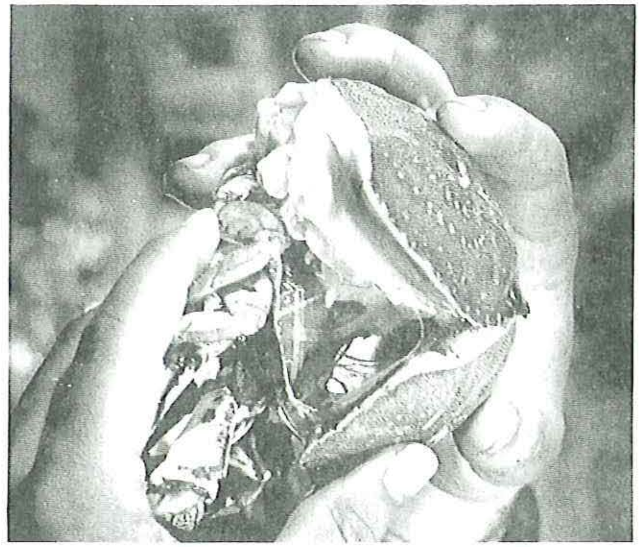
Providing suitable holding facilities. Crabs can be shed in wire pots placed in water deep enough to cover them at all stages of the tide, in crab floats, or in tanks on land and over piers. Regardless of the holding system used, water must be cool and flowing constantly. The percentage loss by death increases when water temperatures rise. When pumps are used to supply a continuous flow of water to tanks the pumps and valves must be protected against freezing, preferably by being placed in heated rooms.

Open-flow systems, in which water is pumped into tanks and is drained overboard, are highly recommended. Wood tanks are most commonly used and the easiest to construct. When soft woods are used, surfaces should be coated to prevent the leaching of toxic materials from the wood into the water and to protect the wood from marine borers, rot and surface fouling. Copper anti-fouling paints are toxic and must not be used. Epoxy resin not only waterproofs wood, but seals joints and is durable enough to be scrubbed when dirt and fouling must be removed. Fiberglas cloth and resin is an acceptable cover but difficult to apply. Alternatively, a high-density, 60/60 plywood may be used in construction. This plywood is impregnated and coated on both sides with a resin which makes it waterproof.

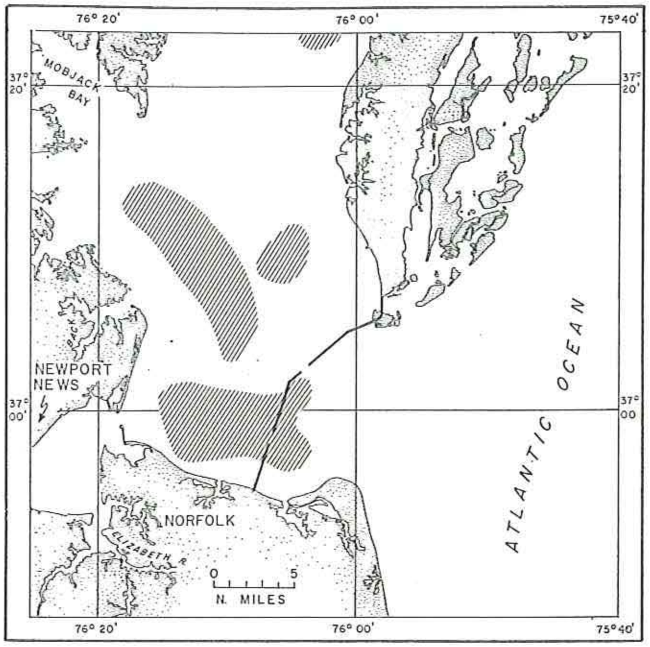
Molded Fiberglas tanks have greater strength and durability than wooden tanks. Although Fiberglas tanks are more expensive, savings in cost would accrue if standard units were ordered in large lots.

The water introduced into the tank must be aerated and supplied in sufficient volume to allow no less than 10 turnovers per hour. It is not necessary for the depth of water in the tank to exceed 4 inches.

Perhaps the most important consideration is the design of the inflow and drains so that complete



The rock crab molts in winter, usually in January. On a molting crab the hard outer shell cracks and parts. The soft crab emerges with a wrinkled shell which expands about twenty percent before it begins to harden.(Photo by W. L. Klender. Courtesy the Baltimore Sunpapers).



During the winter rock crabs are found on sand ledges along Thimble Shoal, Chesapeake and York River entrance channels—a one hundred fifty square mile area.

circulation and turnover of water occurs. Any dead spots or layering will cause stagnation which leads to low oxygen levels and production to toxic gases such as hydrogen sulfide.

Tank support. There is no specific design for tank support, but it should be ruggedly built and reinforced. Remember that a cubic foot of water (7½ gallons) weighs 62.3 pounds. The weight of a 4 ft x 8 ft x 5 inch volume of water will be nearly 1000 pounds.

Pumps and plumbing. Some pump manufacturers provide directions and formulae for selecting the correct pump for each job. Some of the facts which must be known in order to apply these formulae are (1) the vertical suction lift from water to pump, (2) the length of the suction line, (3) whether or not a strainer is employed on the suction line, (4) the vertical discharge head from the pump, (5) the length of the discharge line, (6) the number and type of fittings, (elbows, tees, etc.) and (7) the desired rate of flow.

It is critical that the pump and lines complement each other, and therefore it is advisable to consult with a company engineer in order that the most efficient combination be selected for the job.

The size of the pump will depend on the volume of the overall operation. It is necessary, however, that the turnover rate, which is the number of times per hour that the total volume of water in the tank is replaced, be sufficient to keep the water aerated and the wastes removed. Ten complete turnovers per hour is marginal. Better results can be obtained with higher rates.

Pumps with copper, monel metal, zinc or lead impellers and other internal metallic parts that come in contact with seawater should not be used, for these metals are toxic.

All piping and related fittings should be corrosion resistant. A wide variety of polyolefin and other chemically inert materials are being employed today. Plastic, polyvinyl chloride (PVC) and hard rubber are examples of non-toxic materials and they are inert in seawater.

The opening to the water intake pipe should be located as close to a channel and as far from the shedding operation as possible. A deep channel is usually more saline and therefore preferable to a shallow location. The intake should, however, be suspended a few feet above bottom so that mud, sediments and low-oxygen water are not drawn into the system. A screened intake may be necessary. The outflow (waste) should be at the surface and as far as possible from the intake. It would be detrimental to the entire system if the de-oxygenated and metabolic waste-laden outflow water were to be picked up in the intake and recycled.

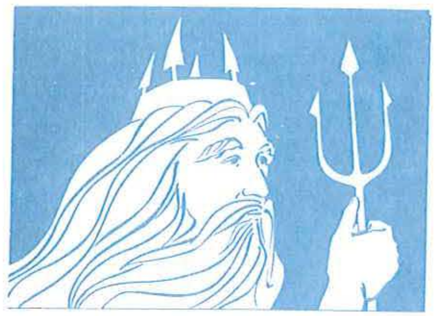
Fouling organisms such as sea squirts, barnacles and other encrusting animals can set in the pipelines and seriously impede water flow. Periodic shutdown and backflushing with fresh water will kill the organisms and free the lines. In the Chesapeake area, frequent shutdowns are necessary (biweekly in winter; weekly in spring and fall; every three to four days in summer). Since this is not practical with a single pump and line system, a double system is recommended. The dual system allows one set of pumps and lines to be placed in operation while the other set is being cleaned.

Pump seals must be kept in good condition and the plumbing must be properly installed to prevent air leakage. If air is drawn into the system and compressed, nitrogen gas reaches supersaturated levels in the seawater. When this pressure is released as the water enters the tank, the nitrogen gas comes out of solution. This may occur within the blood of the crab, in which case nitrogen bubbles form, blocking the blood vessels in the gills and obstructing the heart. Gas bubble disease ultimately leads to death of the animal.

Crab shedders may recognize gas bubble disease by the following symptoms: hard crabs become limp; soft and papershell crabs float on the surface of the water; if the shell of a diseased crab is removed, bubbles can be seen in the gills and heart.

Cost. Equipment costs will vary widely between shedding plants and will depend on the complexity of the facility and whether materials are new or used.

The opportunities for development of a new resource appear to be good. Anyone desiring additional information on shedding the rock crab or developing markets for them should contact the VIMS Department of Advisory Services.



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