Farming - Four Feet Under

It sounds like a farmer's dream — a crop that "seeds" itself, needs no fertilizer or supplemental nutrients, does not require artificial irrigation, will produce up to three sizeable harvests per year, and sells for around $500 a metric ton (dryweight).

There are, however, a few problems with the dream. The "crop", even at the lowest tide levels is under about four feet of water and needs swift currents to achieve maximum growth. And, at the current state-of-the-art, it must be harvested by hand.

The crop is seaweed, or more specifically, the species *Iridaea cordata* and *Gigartina exasperata*, which produce a commercially valuable extract called carrageenin. The extract is widely used as a suspension agent in enterprises as diverse as food processing and paint making.

And the problems associated with seaweed farming, though looming large at the moment, may be on their way to solution through research sponsored by the Washington Department of Natural Resources (DNR) and the Washington Sea Grant Program.

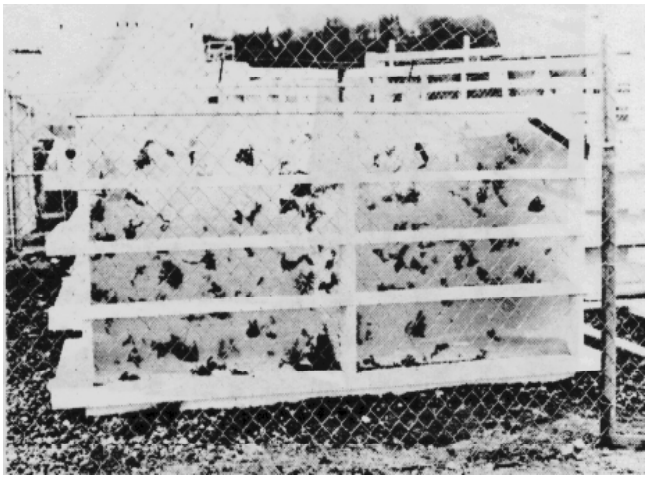
Dr. Tom Mumford, DNR marine biologist, and Dr. J. Robert Waaland of the Department of Botany at the University of Washington are two researchers who hope to provide the technical base to turn seaweed farming into a commercially viable enterprise. They're looking at all aspects of seaweed culture, from finding the hardiest, highest-yield strains to development of a mechanical harvester.

Dr. David Jamison, formerly employed by DNR and now with the State Department of Ecology, was the first to see the commercial potential of Washington's seaweed resource, Dr. Mumford said. "He worked with groups in 1970 to explore harvesting the existing wild stocks. But there were numerous problems." Among these were the dangerous locations of the wild populations—primarily areas of strong currents, accessible only by boat — and the small amounts the harvest yielded in proportion to the harvesting time expended.

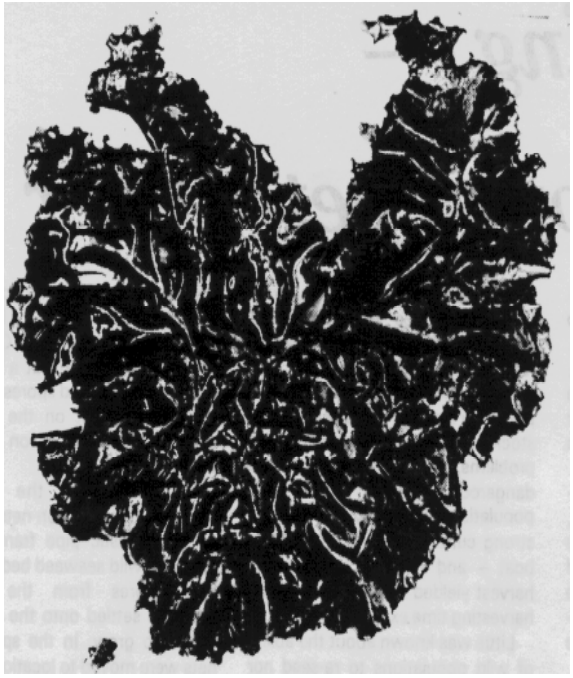
Little was known about the ability of wild populations to re-seed nor was there much knowledge about optimum growing conditions.

But the prospect of enhancing the balanced use of marine lands, one of the operating functions of DNR, and of encouraging the establishment of a new, clean marine resource industry still existed. "The basic research work was continued by my predecessor at DNR, Cliff Kemp," Dr. Mumford said. "In fact, it was Cliff who discovered you can put a net on a bed of seaweed and spores from the seaweed will set on the net and grow. Cliff did this on a small scale."

To propagate the natural seaweed stocks, nylon nets stretched over plastic pipe frames were placed in wild seaweed beds in early fall. Spores from the mature seaweed settled onto the nets and began to grow. In the spring, the nets were moved to locations where the water, even at low tide, was deep enough to afford the young seaweed blades protection from the sun, and where strong currents existed.



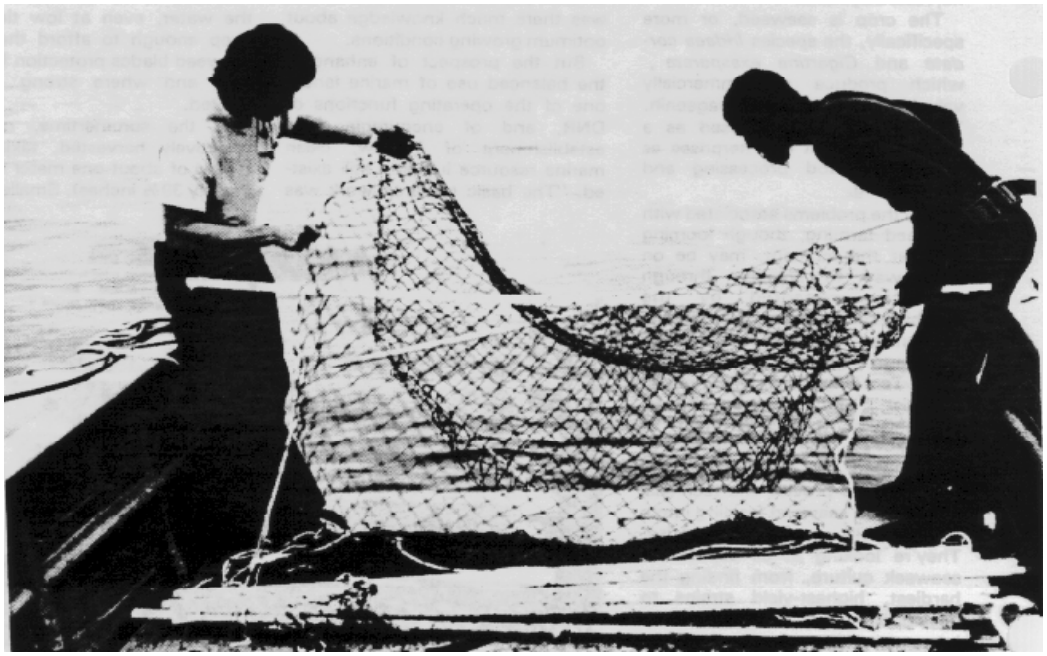
Constantly circulating water is essential to the well-being of seaweed plants grown in this experimental tank.



This *Iridaea cordata* plant, measuring about .5 meters (approximately 20 inches long was transplanted from laboratory conditions to natural waters as part of seaweed growth rate studies.

In the summertime, nets are selectively harvested, taking only blades of about one meter (approximately 391/3 inches). Smaller blades are left on the net to grow. A "hold fast" or small button at the base of the plant fixes it to the net. Generally, a dozen blades will emerge from a single hold fast. Usually only one blade grows to its full length, but smaller blades still are commercially valuable.

From a tiny beginning, the natural seeding experiments have progressed to a full scale test bed located just off Barnes Island, a bit of land north of Orcas Island in the San Juan chain. Twenty-five quarter-meter-square nets are in place, wired to cement blocks to anchor them in the currents.



Nets for natural seeding of seaweed are Inspected carefully before being lowered into the waters off Barnes Island (Photos courtesy of Dr. Tom Mumford and Dr. J . Robert Waaland.)

"The system we're dealing with at Barnes Island is fairly natural. We're dependent on Mother Nature to see to it that seaweed spores come to rest and grow on our nets. We're not manipulating the environment by adding nutrients or fertilizer to the water," Dr. Mumford said.

While the natural system hopefully flourishes, Dr. Mumford and his colleagues will be carefully measuring a number of factors. Growth rates will be checked against such variables as sunlight and water movement. Net sizes ranging from three to six-inch mesh will be monitored to determine which will hold and bring to maturity the largest number of plants. Similar