

Coastlines

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Launching a Seaweed Farm

by Bruce M. Kantrowitz, Albany

Four railroad wheels donated by the Long Island Railroad became anchors for a pilot seaweed farm off Long Island's north shore near Crane Neck. The crew of the Research Vessel *Onrust* had already hoisted the 600-pound wheels over the transom and as divers prepared to attach and assemble a gridlike raft to the mooring cables, onlookers described the event as "a milestone."

They could already envision this grid as the floating seaweed farm they had long been planning. Deploying this raft in 60 feet of Long Island Sound's water marks the fruition of several years of lab work for biologists and engineers from Marine Sciences Research Center, State University of New York at Stony Brook. Theirs had been an investigation into growing seaweed for conversion to energy—a collaboration of the New York Sea Grant Institute, the Gas Research Institute, New York State Energy Research Development Authority, and the New York State Gas Group, including all seven investor-owned state gas utilities.

The farm offers scientists a long-awaited opportunity to watch their ideas grow—literally—and to answer many of their biological concerns. If successful, the next step will be a larger prototype structure to answer questions of design, energy efficiency, and economics. Scientists and planners hope the farm holds answers for future low-cost energy alternatives.

The plans used for the experimental farm at Crane Neck draw upon old and new, east and west. After developing a series of alternative plans, the team decided to base their farm design on Chinese and Japanese-style seaweed farms. This farm is a steel

cable grid six feet below the surface from which polypropylene ropes are suspended. Plants are attached to these ropes.

Boudewijn Brinkhuis, head of the project's biological team from SUNY at Stony Brook, built upon one Chinese seaweed culture method and applied it to the more controlled, highly-monitored Western laboratory setting. By controlling light, temperature, and nutrients, he and his colleagues actually improved upon the natural reproduction cycle.

In late May, on special polyvinyl alcohol string—also imported from China—Dr. Brinkhuis cultured about 2,000 *Laminaria saccharina* sporophytes. These and 4,000 other specially selected and cultivated plants will become the actual seaweed crop for the pilot farm. This compact garden bloomed on about 2 meters of string wound around a 3" x 6" frame in an ordinary plastic sweater box.

"In August when the plants reach a length of about 3 centimeters," says Brinkhuis, "we will transfer them to the culture ropes; then after they have had about a month to attach firmly and grow, we will secure these plant-bearing ropes to the floating grid off Crane Neck."

According to estimates, the 6,000 plants placed out on the farm sometime in September will yield between 1.5 to 2 metric tons of wet seaweed—about 4,400 pounds—by late next June. At 68% conversion efficiency, this pilot farm alone can produce about 23.9 million BTUs of energy—enough to run an air conditioner for a whole summer.

This project was no hasty decision. The New York Sea Grant Institute and General Electric first collaborated several years ago on a study plan that



Bud Brinkhuis, scientist at SUNY at Stony Brook, displays the seaweed Laminaria or common kelp—which can grow about an inch each day. This is the only northeast species that grows well throughout the cold months.

included setting up criteria to choose a seaweed, calculating gas yields, studying chemical compositions, and comparing growth rates.

If we can cultivate seaweed successfully, the ocean offers low-cost space near most major cities and low cost transportation. According to projections, Long Island Lighting Company could get methane equivalent to half the natural gas it needs from a seaweed farm 10 miles wide and 38 miles long, even with conservative production estimates.

While biology, chemistry, and engineering are major considerations, social and political issues also must be addressed—questions of allocation of resources, underwater land ownership, and surface rights. (to page 6.)



Coastal Tourism

Every Little Bit . . .

An impressive aspect of coastal tourism development is the importance — and impact — of modest changes made by individuals, community groups or local governments. The gas station attendant exercising her "New York Loves You" hospitality skills and the community painting bee to dress up downtown can be as important for "keeping them coming" as promotional activities are in attracting tourists in the first place. Two examples of individual or otherwise modest efforts that foster tourism growth follow.

In many coastal areas, tourism demand is not sufficient to justify major investment in new lodging facilities. In others, there is sufficient demand but only for brief periods. Individual action to the rescue!

To meet this lodging vacuum, semi-formal Bed and Breakfast businesses are sprouting up along the coasts and in many other areas as well. Such businesses typically involve the host opening unused bedrooms to guests and providing modest breakfast service — plus a good dose of hospitality.

To help persons exploring opening a bed and breakfast operation, a brief fact sheet entitled "Considerations in Starting a Bed and Breakfast Business" now is available. Typical business patterns, regulatory and financial management questions are outlined. See "I WANT MORE" for ordering information.

Community beautification projects were rampant in the 1960's and early 1970's. Now interest in community enhancement is reemerging as the importance of community appearance and special features in attracting and keeping tourists — as well as enhancing quality of life for residents — increasingly is recognized.

Creative opportunities for commu-

nity enhancement projects abound. Ranging from simple litter cleanups to formal, intercommunity enhancement competitions, every community group and individual can initiate real improvements. To help identify enhancement needs and mechanisms, a simple checklist has been prepared entitled "Take a Good Look". It might be just the ticket to get your service organization or local government to take action. See "I WANT MORE" to order.

— Contact M. Duttweiler, Ithaca

Shore Vegetation Bibliography

Use of vegetation to slow erosion is a long-standing practice. Unfortunately, misinformation, overly high expectations, selection of the wrong plants and improper site preparation often doom vegetative shoreline stabilization efforts.

A variety of helpful publications exist but often fall short of answering all key questions resulting in need to check a variety of resources. To help in that process, the "Use of Shore

Vegetation for Erosion Control" bibliography is now available. This nonannotated compilation includes general vegetation references and specific sections on coastal bluffs, barrier beaches, marshes, and legal, planning and management considerations. See "I WANT MORE" to order.

—Contact S. Lopez, New City

Net Fouling

Periodic lifting of fish trap netting to reduce fouling is costly to commercial fishermen in terms of time, labor and lost fishing effort. Recent interest among North Fork trap netters in water-based net antifoulant prompted Sea Grant and industry to conduct a field test demonstration of a net coating.

Test sections of a water-based preservative have been placed alongside untreated sections of conventionally tarred netting in two nets. Results to date appear promising with treated sections exhibiting considerably less fouling than untreated sections.

— Contact C. Smith, Riverhead



Research in Short



by Debra Feldman, Albany

Propeller Reduces Fuel Use

High fuel costs plague commercial fishers. The otter trawler — a fishing vessel which drags a massive net along the ocean bottom — uses more fuel than most vessels. Jacques Hadler and a team of Sea Grant-supported researchers at the Webb Institute of Naval Architecture are working to improve fuel efficiency in otter trawlers.

They have developed a computer model which incorporates hull design, engine specifications, gear reduction ratios, and propeller characteristics

to determine the effect of various equipment modifications on fuel consumption. So far, one option seems most promising — installing a special, ducted propeller known as a kort nozzle.

Depending on the specific characteristics of the vessel, kort nozzles could reduce fuel consumption by 25% while providing 25% more towing power at constant motor speed. This would allow larger gear and potentially larger catches per vessel. The economic costs and benefits of switching over to kort nozzles will also be estimated.

Too Many Sand Lance?

One plankton-eating species of fish, the sand lance, may be upsetting the ecosystem of inshore northwestern Atlantic waters. As the population of predator species which feed on sand lance has decreased, the sand lance population has increased dramatically. It now accounts for more than 90% of all larval fish in these waters.

At SUNY's Marine Sciences Research Center at Stony Brook, William Peterson is studying the impact of large sand lance populations on zooplankton — major items in the diet of popular finfish such as herring, cod and haddock. Heavy or selective predation by sand lance on zooplankton may interfere with the feeding patterns of these valuable finfish.

Dr. Peterson has discovered that through at least their second year sand lance feed selectively on adult copepods. Apparently, the sand lance does not feed on the smaller zooplankton which would be most detrimental to other species. Studies continue to develop better understanding of the sand lance population.

Growing Seawater Structures

Builders may one day "grow" seawater structures from minerals by a process called mineral accretion. With the proper electrode arrangement and current/voltage combination, it is possible to grow materials from natural seawater onto wire mesh or similar material forming a variety of sturdy shapes. In fact, the engineering properties of accreted materials approximate and in some cases exceed those of concrete.

Herbert Herman and Ray Zatorski of the Department of Materials Science, SUNY at Stony Brook, are identifying the environmental and engineering determinants of quality mineral. Among the determinants they have identified are: the amount of current used, the nature of wire used, the positioning and spacing of electrodes, and water temperature. They have discovered that it is critical to maintain a water temperature of at least 75 degrees F to ensure a reasonable rate of mineral deposition.

I Want More!

Please check the publications which interest you and send to your nearest Sea Grant Extension office. Make checks payable to Cornell University.

- _____ **Take a Good Look: Checklist for Protecting and Enhancing Community Resources.** 1983. Pamphlet. \$0.25 for handling.
- _____ **Considerations in Starting a Bed and Breakfast Business.** 1983. J. Mulcahy. Fact Sheet. 7pp., \$0.75.
- _____ **Use of Shore Vegetation for Erosion Control: A Bibliography.** 1983. S. Lopez et al. Mimeogr. 8 pp., \$0.25 for handling.

That Other Salmon

Anglers who frequent New York's Great Lakes waters are by now quite familiar with two species of Pacific salmon, namely coho and chinook. In the future, salmonid enthusiasts may stumble across a third member of the genus *Oncorhynchus*, the pink salmon.

Pink salmon were introduced into the Great Lakes in 1956 when the Province of Ontario released a few thousand fingerlings into a tributary of Lake Superior. Mature pink salmon from this stocking first turned up in 1959. By 1975 these "humpback" salmon were spawning in a host of Lake Superior tributaries.

These small salmon were reported in Lakes Huron and Michigan in 1969 and 1973 but were either absent or unnoticed in Lakes Erie and Ontario until the fall of 1979, when documented spawning runs occurred in eight Lake Erie tributaries in Ohio, Pennsylvania and the Province of Ontario. That same year saw spawning runs in four Lake Ontario tributaries including South Sandy Creek in Jefferson County, New York.

Pink salmon normally live only two years. This, combined with the fact that much of their diet is made up of small, free swimming animals called zooplankton, means that pink salmon growth rates and maximum size are modest when compared to coho and chinook. In fact, typical mature pink salmon in the Great Lakes are only 14-19 inches in length.

Apparently pink salmon do prey on small fish in the Great Lakes on occasion. A specimen caught recently near Dunkirk, New York in the open waters of Lake Erie had two readily identifiable smelt in its stomach.

Also worth noting is the fact that these fish (in their Great Lakes form) seem to continue feeding during their spawning run, unlike coho and chinook salmon. Stomach analysis studies from spawning fish revealed a diet of terrestrial insects (especially moths and flies), fish and zooplankton.

How are these fish able to successfully reproduce in Great Lakes tributaries when other Pacific salmon are, for the most part, unable to do so? Apparently, pink salmon are circumventing the typical requirement of year-round cold water streams usually needed by salmon for successful spawning. Unlike cohos and chinooks,

baby pink salmon spend very little time in the nursery stream. Eggs are deposited near stream mouths and fry move quickly downstream into the lake thereby avoiding the lethal summer temperatures which inhibits survival of wild coho and chinook fry.

This ability to successfully reproduce in the Great Lakes, combined with the "catchability" of spawning adults may eventually allow the pink salmon to move from the curiosity stage to the legitimate, but minor fishery stage in the eyes of New York Great Lakes anglers.

— Contact: M. Malchoff, Fredonia

Salmonid Food

The continued success of New York's blossoming Lake Ontario sportfishery and its associated economic boom to coastal areas is critically dependent on the ability of the Lake to provide enough food for stocked salmon and trout populations. Therefore, New York Sea Grant recently has joined in a regional effort to assess salmonid food habits in the Great Lakes.

About 6 million individual lake trout, brown trout, rainbow trout/steelhead, coho salmon and chinook salmon were slated to be stocked in the Lake in 1983. These salmonids must place a tremendous biological demand on their food sources which are believed to be principally the alewife, smelt and slimy sculpin.

One cost-effective method for sampling these large fishes for feeding studies is to let anglers do it! The project has been concentrating its efforts at the various state and county fishing derbies held throughout the Lake Ontario region from spring through fall. Stands were set up at registration sites at which anglers register their fish for prizes. Stomach samples were taken from most fish and in return fish were cleaned. Derby officials and anglers enthusiastically supported the project and 80-90% of fish registered typically were sampled.

In addition to finding out what the salmonids are eating, the project also aims to test this simple method for monitoring seasonal changes in feeding habits and changes which may occur as stocking rates are altered and as prey species populations adapt. Hopefully, the information generated



Anglers in all Great Lakes states are assisting Sea Grant researchers by allowing the taking of stomach samples from their prized catches.

will be helpful to management agencies in their efforts to improve and maintain Great Lakes fisheries.

— Contact S. Brandt, SUNY Oswego and SUNY-CESF Syracuse

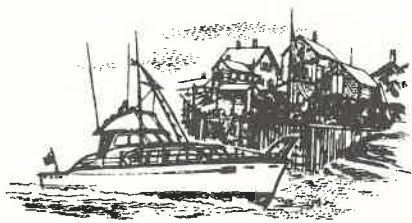
Protect Pilings

You think you have your docks and piers shipshape. Then what happens? Along comes a cold winter with thick ice, fluctuating water level and storms. The result — loosened, lifted or tilted wood pilings caused by ice jacking.

Bubbler systems, sliding sleeves and attempts to chop ice from around pilings can be effective but require on-going maintenance. Another alternative is to install piling protection jackets. These have no moving parts, are easily installed, are relatively inexpensive and are very durable.

One new product is a black, tapered polyethylene jacket designed to fit around standard pilings. It is installed during warm weather by wrapping around and nailing. Developed jointly by a commercial firm and the U.S. Army Corps of Engineers Cold Region Research and Engineering Lab, it has proven very effective under test conditions. Findings indicate up to 85% reduction in uplift forces in ice up to 20 inches thick.

— Contact: C. O'Neill, Brockport



Fires Aboard Pleasure Boats

If you're like most boaters, you probably think about your next boat trip in terms of destination, trip preparation, route selection, and recreational activities. The thought of fire on board never crosses your mind. With all that water, how can I have a fire?

But take a minute and think about what you'd do if a fire broke out. The latest Coast Guard statistics show that fire has become a significant cause of damage to pleasure boats claiming lives and costing millions of dollars.

The Coast Guard stresses the following points in safeguarding against fire:

- Locate portable extinguishers in easily accessible places and equip your vessel with more portable extinguishers than the required minimum.
- Use your sense of smell as a fume and fire detection device. Open and sniff the bilge area prior to beginning any trip.
- Keep your boat clean and free of debris.
- If you can't put the fire out, you'll have to leave your vessel. Wear a Coast Guard approved life jacket and get upwind of the boat.

It's not only foolish not to be prepared for a fire, it's also against the law. Coast Guard regulations require vessels between 16 and 26 feet to carry at least one hand held extinguisher if no fixed extinguishing system is in the engine compartment. Vessels between 26 and 40 feet must carry two such devices, and if you're fortunate to own a vessel over 40 feet, you must carry three. A smart boater might place an extinguisher in the sleeping quarters, on deck, in the bilge, and in the galley if one is present.

Three agents are rated against class B fires. These agents, which will meet the *minimum* requirement on board are BCF Halon 1211, carbon dioxide and dry chemicals. Dry chemicals, although relatively inexpensive, leave a powdery residue that penetrates everywhere fouling radar, radios, navigation gear and ship to shore phones. BCF Halon 1211 evaporates completely and leaves no residue. It also will penetrate hard to reach and crowded engine compartments to completely envelop a fire and according to Coast Guard tests is three times more effective than the CO₂ extinguisher.

Prepare for a fire before you leave the dock and you'll be better off in an emergency. If a fire should occur, you'll save your life and your boat. Perhaps extinguishers should be on your holiday gift list.

— Contact: D. Greene, E. Aurora

Purged

Some of you likely are wondering whatever happened to the short survey form included with our subscription renewal request this past spring and why address changes you indicated might not have appeared on your current mailing label. This is the last issue that will be mailed using the "old list". Starting with the Winter issue, New York residents opting to be deleted from our mailing list and most addressees not responding to the survey will no longer receive "Coastlines". The survey did NOT cover out-of-state subscribers.

If you did not renew your subscription and would like to, notify our Ithaca office.

You might be interested to know how your interests and views of "Coastlines" compared with those of our other readers. Readers have a wide range of interests. Most checked several of our primary subject areas that include general coastal issues, erosion, recreation and tourism, commercial fishing, seafood technology, seafood use and youth education.

Clearly, it is a tall order to keep all these bases covered in a quarterly newsletter.

Encouragingly, 83% of our readers indicated they find "Coastlines" to be useful or very useful while 17% find it to be only somewhat useful. Less than 1% find it not useful. Not too bad.

An additional measure of the utility of "Coastlines" was gained by asking whether in-state subscribers would continue their subscriptions if it became necessary to charge a \$4.00 fee per two year subscription (the current rate for out-of-state subscribers). Results make one a bit more sceptical about the utility of the newsletter in that only two thirds of the respondents indicated they probably would continue their subscription if a fee became necessary.

Each issue of "Coastlines" is read by an average of four persons raising total readership to an estimated 14,000 or so persons per issue.

Many respondents made comments or suggestions. We thank you for them. Some highlights follow:

Make it less technical.

It's too simple — actually condescending.

More on downstate.

More on upstate.

More "how to" type articles.

More scientific articles.

More on policy/management issues.

Good newsletter.

Worthless for my particular interests in the coast.

Obviously, these examples were chosen tongue in cheek but they do illustrate the editorial problem of serving a diverse readership.

There were many suggestions for more detailed information in particular subject areas or on particular geographic areas. "Coastlines" is our umbrella newsletter and as such will continue to provide a sampler of coastal topics. Each article includes the name and location of its author with addresses listed on the back page for those requiring additional information.

Also note that persons with particular interests might find that our less formal regional newsletters and service letters better address topics of concern. These include the "Great Lakes Leader" focusing on marine education and available through Dave Greene at East Aurora, "Commercial Fisheries Update" available through Chris Smith or John Scotti at Riverhead, "Marine Facilities Notes" available through Mike Voiland at Brockport, and an aperiodic service letter on aquatic plant management entitled "Cattales" available through Mike Duttweiler at Ithaca.

Periodic surveys such as the one just completed help us to better tailor "Coastlines" to your interests. Thanks for your assistance and cooperation.

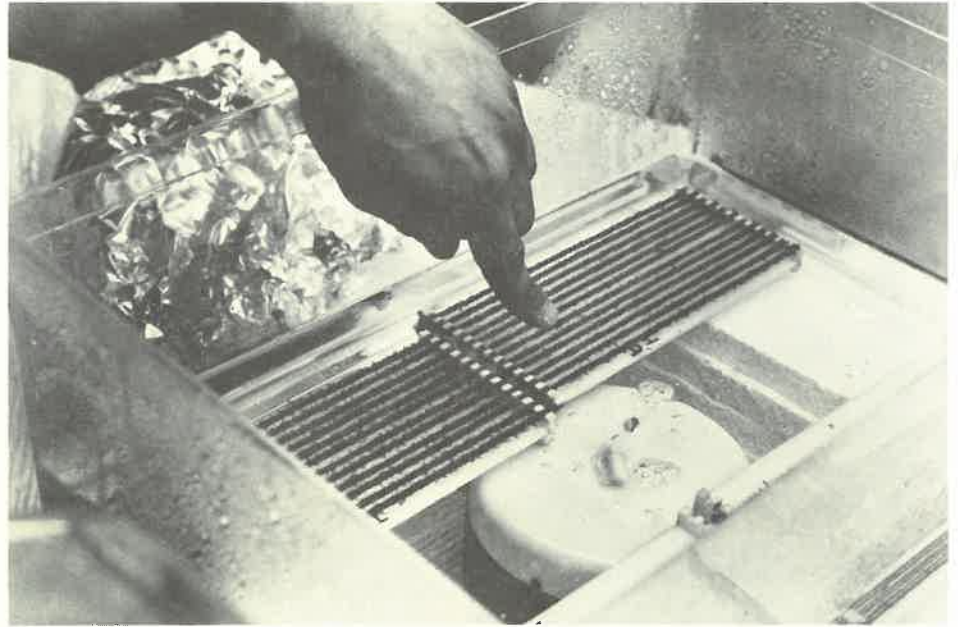
— Contact: M. Duttweiler, Ithaca

Seaweed Farm

(from page 1)

Laura McKay, assistant project manager from Sea Grant, describes the biomass project as a multidisciplinary problem in which many more questions remain — scientific questions, practical and economic questions, legal, social, and policy questions.

McKay and others involved with the Sea Grant project are heartened by the long-awaited deployment of their pilot farm — progress that suggests that heating our cities with methane from seaweed might be more than a pipedream.



The seaweed farm's future crop — about 2,000 Laminaris sporophytes raised in an ordinary plastic sweater box at the Flax Pond laboratory. When plants reach about 3 centimeters each they can be transplanted out on the farm.

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