

The Great Lakes: Mixed Reviews

by Michael W. Duttweiler, Assistant Program Leader

Great Lakes water quality is a good barometer of our ability to deal with environmental problems. Three points are apparent: we do well when we make a strong commitment; we fail when a firm commitment is not made; and many questions remain to be answered.

Significant progress has been made in identifying and eliminating major pollutant discharges to the Great Lakes. The **Great Lakes Water Quality Board**, a subgroup of the International Joint Commission, documents pollution abatement successes in the steel, pulp and paper and petroleum industries. Similarly, substantial decreases in domestic sewage inputs are seen throughout the Great Lakes Basin with demonstrated improvement in phosphorous concentrations in Lake Michigan, Erie and Ontario.

Our most obvious failure is in anticipating toxic substances problems.

The sequential discoveries of DDT, PCB, Mirex and additional substances in the waters and aquatic life of the Great Lakes have come as "surprises" to resource managers. Until passage of the **Toxic Substances Control Act in 1976**, there was no comprehensive mechanism for identifying potential toxic effects of chemicals produced. As a result, discovery of chemicals and their effects has been the responsibility of water quality "detectives."

The fact that over 40 chemicals now are identified in Lake Ontario fish demonstrates the lack of knowledge we have about the paths of chemicals in the environment. All these chemicals do not necessarily represent public health problems, but reflect our incomplete understanding of contaminants.

There are success stories involving chemical contaminants. Directed efforts toward reducing mercury levels

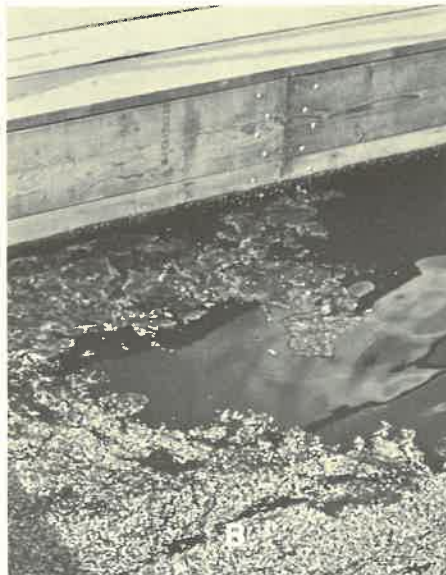
in western Lake Erie and Lake St. Clair and DDT levels in Lake Michigan have begun to take effect.

On the other hand, discovery of inadequate chemical dumps in the "Love Canal" area of Niagara Falls demonstrates that we have not fully identified even the most significant direct discharges of contaminants. In addition, our poor understanding of the role of atmospheric transport, mechanisms by which animals accumulate chemicals, interactions between chemicals, and the medical significance of toxics yields a skimpy basis for an aggressive attack on water quality problems. Yet, we must move on.

The lesson of the Lakes is that we can succeed in correcting our past blunders. We have seen success requires a firm commitment by both the U.S. and Canada, their governmental subunits, and the support of all residents in the Great Lakes Basin.



(A) Oil spills such as this one on the St. Lawrence River in 1976 are among the more obvious water quality problems of the Great Lakes. (B) Excessive aquatic plant growth often results from nutrient pollution.



(C) Shoreline erosion poses a clear threat to these houses. More insidious are the increased nutrient pollution and sediment deposits resulting from the same process.

Troubled Waters: The New York Bight—Part III

by Donna Edgar, Specialist, Stony Brook

Editor's Note - This article, the third and final in a series of three, focuses on pollution disposal alternatives in the New York Bight.

Since 1972, there have been a number of laws passed by Congress regarding water pollution control. The **Federal Water Pollution Control Act** and subsequent **Clean Water Act** amendments, the **Marine Protection, Research, and Sanctuaries Act**, the **Toxic Substance Control Act**, provide the legal foundation for our waters to become "more swimmable, fishable, and drinkable by 1983." These laws, the mechanism by which this goal is to be met, define direct agency responsibilities, identify major pollutants and their sources, and develop management strategies.

Legal enforcement

In general, the **Environmental Protection Agency** has been charged with the setting and enforcing of environmental standards; the **U.S. Coast Guard** with surveillance and enforcement; the **National Oceanic and Atmospheric Administration's Marine Ecosystem Analysis Program (MESA)** with researching human impact on the marine environment, and the **Army Corps of Engineers** with the disposal of dredged materials.

No easy answers

Through research, the major contaminants of the Bight have been identified as toxic chemicals, microbial pollutants and nitrogen compounds all of which affect water quality, bottom sediments, marine and human life. Management strategies must now be based on controlling the major sources of these contaminants.

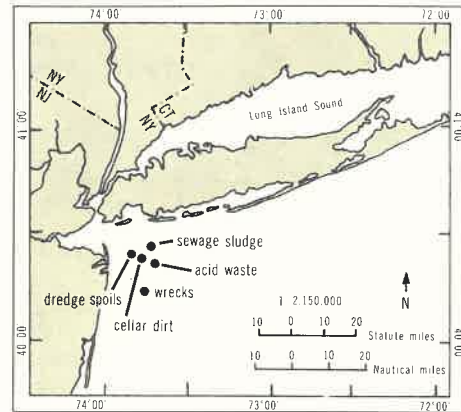
As we advance in our attempts to find "solutions" to waste disposal problems, we are discovering that there are no foolproof answers or alternatives. We find ourselves with the "solutions" creating new and even more complicated problems. For example, as the volume of raw sewage discharged into our waters decreases, the amount of sewage treated at a

sewage treatment plant increases. And even with the more advanced treatment, there is still no guarantee at this time that nitrogen and residual sewage sludge will be removed from the environment.

Since the disposal of sewage sludge into the oceans will be illegal after 1981 (violators subject to \$50,000 a day fines and up to one-year jail terms), alternative disposal methods have been sought. The major cost-effective alternatives being considered are: composting and its use as a soil conditioner or fertilizer; incineration and pyrolysis. Each of the alternatives poses unique management problems. The **composted sludges** may contain high quantities of heavy metals and toxic organics which, when used on soils, may leach out into adjacent streams and groundwaters. **Incineration** is expensive, a source of air pollution, and has an ash by-product that contains concentrated heavy metals. **Pyrolysis** or heating in the absence of oxygen, produces gases, ash, and a liquid waste containing a wide variety of organic compounds which can be used as a fuel source. Unfortunately, due to high cost and slow decision making process in large metropolitan areas, the technology for these three alternatives may not be available by 1981, thereby necessitating the continuation of ocean dumping. This means that in spite of negative effects, ocean dumping may be the most practical alternative we have.

Technology is, however, being developed to remove heavy metals and toxic chemicals before they are carried into the sewage treatment plants. This **pretreatment process** will eventually provide cleaner sludges and a mechanism to recapture and re-cycle the heavy metals into usable products rather than pollutants.

As wastewater effluent is "cleaned up," industrial and domestic polluters identified, and illegal dumping activities curtailed through stricter enforcement, bottom sediments should become less of a problem for maintenance dredging of channels and



The New York Bight is the 15,000 square miles of ocean water off the coast of New York and New Jersey.

berths. Unfortunately, contaminated spoils from past and current activities will still exist in our waters.

Need for public participation

It takes more than legislation to clean up polluted waters. Laws, enforcement, and advanced technology are only part of the pollution management strategies. A tremendous amount of effort is being made to educate and involve the public in water pollution control. In addition, the public has become more aware of pollution effects by witnessing an increasing number of closed beaches, closed shellfish areas, and fish kills such as the one in 1976 which caused an estimated \$630 million loss to the fishing, processing and marketing industries.

The time has come to stop blaming someone else and start thinking about what happens each time we flush the toilet, throw the old oil from the car into the storm drain, purchase the "use once, throw away" non-biodegradable items, or empty our boat bilge and head overboard. The time has come to start thinking about where it eventually winds up.

For more information on the New York Bight, contact Donna Edgar at the Sea Grant office in Stony Brook.

Coastal Management Hearings Planned for Spring

by Brian E. Doyle, Specialist, Brockport

Public hearings on New York's Coastal Management Plan (CMP) originally scheduled for last November will take place in March or April this year.

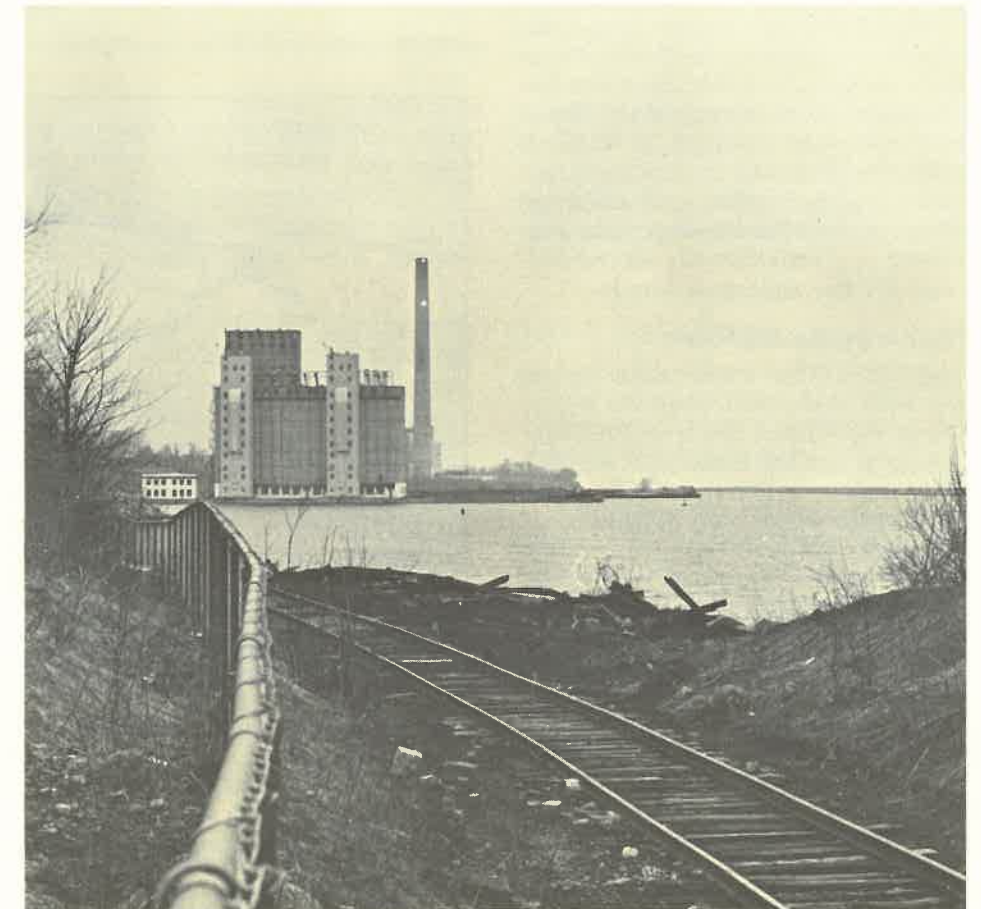
Prepared by the Coastal Management Unit of the Department of State, the plan was first presented to the public at a series of statewide meetings last summer. Due to extensive input by the public at these meetings, certain sections of the plan were revised, causing the federal Office of Coastal Zone Management to request an additional three months to review the program. Although this means a delay in the public hearings, it is anticipated that the revised plan will be submitted to the state legislature for action this session.

Public reaction to the CMP has been varied. Those in upstate New York, living along Lakes Erie and Ontario and the Niagara and St. Lawrence Rivers, feel the CMP should address the problems of shoreline erosion, flooding and lake level regulation in more detail. They are also concerned with protection of vineyards and orchards and the expansion of the tourist industry.

Along the Hudson River, power facilities siting requirements, water quality and preservation of aesthetic quality, are topics of discussion. In New York City, the major issues include rehabilitation of the waterfront, expansion of park facilities and the economic impacts of Outer Continental Shelf activities. On Long Island, comments center around the preservation of water quality for the shellfish industry, dredging and dredge spoil disposal and shoreline protection.

According to many commentators, the CMP is considered an important first step in controlling future unplanned development in the coastal zone. The public has also been credited with encouraging the state to proceed toward its implementation. Those with an interest in fishing and boating access see CMP as a valuable tool because it identifies areas where coastal access needs to be improved.

In general, local government officials have been supportive of the Coastal Management Program in spite of their concern that approval of the plan could mean a significant loss of



If approved, New York's Coastal Management Program would encourage planned coastal development.

home rule power. Since the CMP is structured primarily around existing state programs, this consequence seems unlikely. But until the final plan and its alternatives are fully explained, town, city and county officials remain apprehensive.

This spring's public hearings are semi-legal proceedings required by federal regulations established by the Office of Coastal Zone Management. The public is to be notified of the hearings no less than 30 days in advance. At the time of notification, all materials pertinent to the hearings including documents, studies, and other data, must be available for public review in the locale where hearings are conducted. Presently, the hearings are scheduled in: New York City, Mineola, Riverhead, Fredonia, Lockport, Buffalo, Rochester, Lyons, Oswego, Watertown, Kingston, Ogdensburg, Albany, Poughkeepsie, White Plains and Mamaroneck.

Although a verbatim transcript of the hearings need not be prepared, a comprehensive summary must be available to the public within 45 days after the hearings. This means that if you are unable to attend a particular hearing, you can request a written summary from the Coastal Management Unit. It also means you can submit your comments in writing for the public record if you cannot attend the hearings.

The public hearings are your final opportunity to provide input to New York's Coastal Management Program. After four years of ups and downs, dozens of studies, and hundreds of meetings by citizens advisory committees, the final plan is now ready. If you have something to add, change or delete, you must act now. For more information on the hearings, write the Coastal Management Unit, Department of State, 162 Washington Avenue, Albany, N.Y. 12231 or call (518)474-8834.

Fish Prices Up, But Still Good Buy

by Jim Daniels, Specialist, Ithaca

Fish and seafoods are no longer the economy foods they once were. Prices have gone up steadily over the last 10 years, so a favorite fish dinner may now cost as much as steak or pork. But fish and seafoods are natural, healthy foods, and although they cost more these days, they represent a "nutritionally economic" meal for the American family.

Higher production costs

The Retail Food Price Index figures for 1977 show that over the last 10 years, the cost of foods in the "fish" category has increased 127 percent. This means a fish worth \$1.00 in 1967 would have been around \$2.27 last year. While these types of economic indicators are useful, they can also be misleading. For example, the Retail Food Price Index is an average for all fish and although the fish group increased more since 1976 than other foods, certain kinds of fish showed moderate increases while gourmet items such as lobster, shrimp, salmon experienced above average increases. But the important thing is that fish prices have risen sharply and the more popular fish now cost about the same as beef and pork.

The reason for these price increases is the rising costs of fishery products at every step of production from the actual catch of the fish to its sale in stores. Boats, equipment, labor and fuel are more, so fishermen have to charge more to make a profit. Energy, packaging and other ingredients have gone up, increasing the costs of the processor, the next in the production chain. Due to the rising expense of labor and gasoline, it costs more to transport the finished product to stores. From a business standpoint, these extra costs for raw material, production, and transportation must be passed on to the consumer in the form of higher prices.

In the face of higher prices just when the U.S. seafood industry is becoming healthy once again, there has been concern about the industry's growth. Surprisingly, American consumers are continuing to purchase and increase their consumption steadily in spite of rising prices. According to marketing research by government and the seafood indus-

try, the major reason for the continued success of fish products is their nutritional attractiveness to a growing number of Americans who are concerned about the quality of their diet.

Nutritional value of seafood

From a nutritional standpoint, seafoods are low in fat, cholesterol, and calories, and high in unsaturated and polyunsaturated fats. For those concerned about diet and heart disease, these are desirable traits since studies have shown that eating fish helps reduce the levels of triglycerides and saturated fats in the diet.

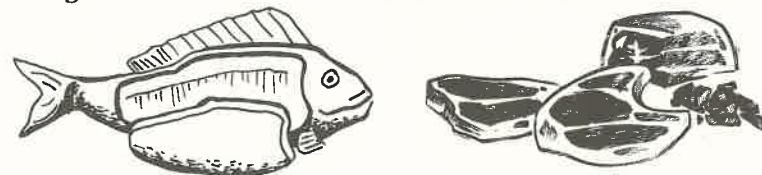
Fish are grouped into low-, medium-, and high-fat categories, but even high-fat fish rarely have half the fat found in the "red" meats we eat regularly. In addition, more of the fat in fish is the unsaturated or polyunsaturated form, which is thought to be less harmful.

Since there is less fat, there are also fewer calories. For instance, a standard size portion of a low-fat fish (containing from 1-5 percent fat) has between 80 and 100 calories. Compare this to equal sized portions of beef and pork which have about 200 and 270 calories respectively.

Protein is another important nutrient in the human diet, and fish are an excellent source of a readily di-

SEAFOOD NEWS

A comparison of the approximate nutrient levels in a 3.5 oz. serving of raw white fish fillet and beef round steak.



| | | |
|--------------|---------------|---------------|
| Energy | 80 calories | 200 calories |
| Protein | 40% of RDA* | 45% of RDA |
| Carbohydrate | 0 | 0 |
| Fat | 1.4 grams | 12 grams |
| Cholesterol | 30 milligrams | 80 milligrams |
| Sodium | 52 milligrams | 68 milligrams |
| Iron | 2% of RDA | 20% of RDA |

*Recommended Daily Allowance

gestible protein. Finfish contain about 20 grams of protein per 100 gram serving (3.5 oz.). That's over one-third of the adult daily protein requirement.

In terms of amino acids and minerals, fish provide levels similar to domestic animal meats. However, fish are higher in calcium, magnesium, chlorine, and iodine, and lower in iron and sodium. Low sodium may actually be an advantage for people restricted to a low sodium diet, and most fresh fish have low enough levels to fit special diets. Caution is advised when selecting processed fish however, because salt is sometimes added during production.

Important vitamins from the B family, namely, Vitamin B₁₂ and niacin are found in significant amounts in fresh fish. These and other vitamins are present in approximately the same amounts as in the meats we eat more often.

What this means is, seafoods contain the same nutrients as red meats, but less fat, cholesterol and calories—the things we should eat in moderation. Combine these benefits with the good taste of fish, and you have an excellent change of pace in a weekly menu that just happens to be good for you, too. Yes, fish and seafood prices have been going up, but, nutritionally, you get a lot for the money.

Dish Out the Fish

Party time! Don't let the winter blahs get you this year. If you're planning a big bash after skiing or skating, or just a relaxing evening with friends, try a fish dish.

Here are some recipes you can use with fresh or frozen fish. Most will make about six servings, but the beer batter-fried recipe will serve 25, for that real winter wing-ding.

Perch Jambalaya

1 lb. fish fillets, ½ c. chopped bacon, 1 c. chopped onion, ½ c. chopped green pepper, 1 clove garlic, finely chopped, 1 chicken bouillon cube, 1 c. boiling water, 1 can (1 lb.) tomatoes, 1 can (8 oz.) tomato sauce, 1 c. uncooked rice, ¼ c. chopped parsley, 1 t. salt, ¼ t. thyme, dash ground cloves, nutmeg, and dash cayenne pepper.

Skin fillets and cut into 1" pieces. Cook bacon until crisp. Cook onion, green pepper, and garlic, until tender. Dissolve bouillon cube in boiling water. Combine all ingredients and pour into a well-greased two-quart cas-

serole. Cover and bake in a moderate oven (350°F.) for 50 to 60 minutes or until rice is tender and fish flakes easily when tested with a fork.

Poached Fish Fillets with Cheese Sauce

1 lb. fillets, 1 c. milk, 2 T. sherry, dash of Worcestershire sauce, ¼ t. season salt, dash pepper, 1 T. flour, 3 oz. sharp cheddar cheese, grated.

Put ¾ cup of milk, sherry, Worcestershire, salt and pepper in a skillet, mix and heat to simmer. Add fish fillets, cover and poach until done. With a slotted spatula, carefully remove fish to a serving platter. Cover to keep warm. Combine ¼ cup milk and flour in jar. Add to simmering liquid in pan and stir well with wire whisk. Add grated cheese and stir until melted and thick. Pour over fillets, sprinkle with paprika and serve.

Beer Batter-Fried Fish

8 lbs. ocean perch, yellow perch, croaker, sea bass, sole, or other small fish fillets, 1½ T. lemon juice, 2 T. salt, 1 qt. all purpose flour, ¼ c. paprika, 3 cans (12 oz. each) beer, ½ c.

water, cooking oil for deep frying, tartar sauce.

Cut fish into serving size pieces. Sprinkle fish with lemon juice and 1/3 of the salt. Combine and mix remaining salt and all purpose flour. Add beer and water to dry ingredients gradually; beat until batter is thin and smooth. Dip fish in batter; drain slightly and fry in deep hot cooking oil, 350°F., 3 to 4 minutes or until fish is brown and flakes easily when tested with a fork. Drain on absorbent paper. Serve with Tartar Sauce. Serves 25.

Quick Tartar Sauce

½ c. mayonnaise or salad dressing, ¼ c. undrained sweet pickle relish.

Combine and mix ingredients; chill. Makes ¾ cup of sauce.

For more information on how to catch and clean fish, how to buy and prepare quality seafood, the New England Marine Advisory Service has published a **Seafood Sourcebook** bibliography.

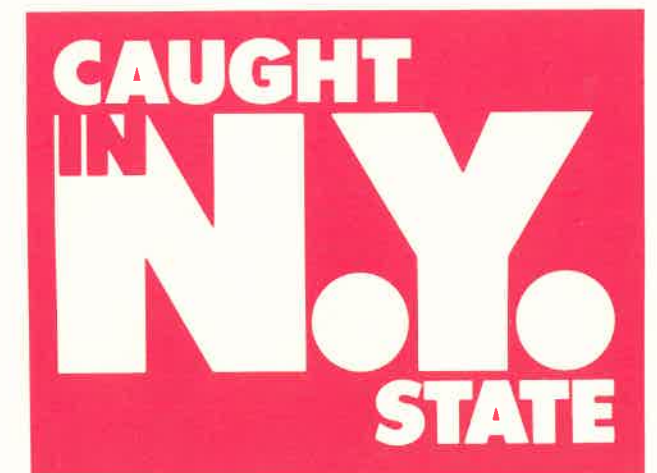
With over 150 entries, the sourcebook describes all aspects of seafood including harvesting and purchasing, preparing, storing and preserving, cooking and nutrition (recipes), contaminants, identifying species, and technical information. Each entry gives the author, title, publisher, publication number, pages and cost—many are free—plus a brief abstract, subject index, and ordering information. See **I WANT MORE.**

Unless you caught that fish, it's difficult to tell where it came from. After all, who can tell the difference between Boston or New York whiting? That's where the "Caught in New York" idea comes in. The New York State Department of Agriculture and Markets recently developed a slogan to create an awareness of New York-produced seafoods.

Retail establishments may find this logo especially helpful, but packers and resellers may also find it useful when sending seafood to market. Wholesalers, too, should benefit as they seek out the freshest supplies at the market. And so it goes, from vessel to dinner plate.

This distribution process, or the "ride that seafood takes from fisherman's net to display case" is really an uneventful one. But with something to show that these fish are really "fathoms fresher", local seafood can indeed make the hit it should. Be on the lookout for this logo, and don't be "caught" without New York seafood.

For information on how to get **Caught in New York State** posters and stickers write: New York State Dept. of Agriculture and Markets, Building 8, State Campus, Albany, New York 12235 or call (518) 457-5982.



RESEARCH

Reclaiming Nutrients from Clam Wastes

by Theodore Kubaska, Rensselaer Polytechnic Institute, Troy

Wash water and meat left-over from discarded clam shells—once considered useless waste products of the clam processing industry—can now be converted into beneficial food products.

This is the conclusion of a Sea Grant research report entitled, "Reclamation of Protein and Flavor Materials from Clam Wash Water" by Robert R. Zall and Lamartine F. Hood of the Department of Food Science at Cornell University.

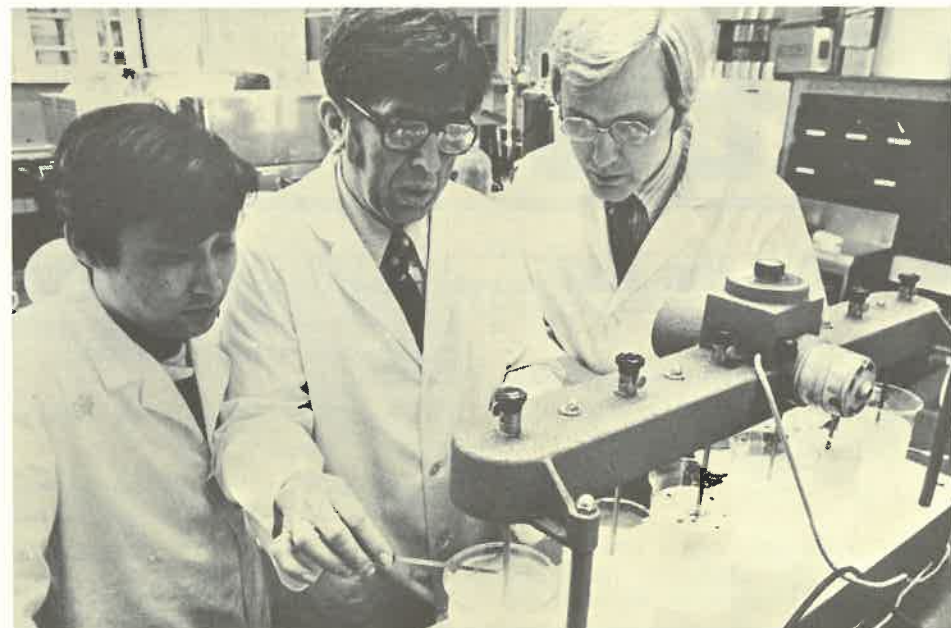
In the course of their research, Hood, Zall and associates have:

- developed a process that converts clam wash water into a marketable clam juice;
- demonstrated ways to recover meat from discarded clam shells;
- converted reclaimed clam juice into a freeze dried clam flavor that can be used in soups, snacks and entrees;
- studied the treatment and disposal of wastes discharged by clam processing.

A marketable clam juice.

Ordinarily, surf clams are washed three times during the processing. According to Hood and Zall, the water from the third wash has a distinctive "sweet" clam flavor and contains more solids and proteins than either of the first two washes. In cooperation with the Sea Grant researchers, the Shelter Island Oyster Company of Long Island—which normally discarded the third wash water, a discharge that amounted to 5 gallons a minute—collected and processed wash water, thereby increasing its capacity for manufacturing clam juice and reducing the amount of troublesome organic wastes discharged into the municipal sewage system.

Converting wash water into clam juice, however, was more difficult than just collecting it. If the water was not processed immediately, it developed an undesirable fishy flavor. Because the percentages of protein and total solids in the third wash water was somewhat lower than those of the company's commercial clam juice, the wash water had to be con-



Graduate student I. J. Cho and Sea Grant researchers Robert R. Zall and Lamartine F. Hood of the Department of Food Science at Cornell University experiment with methods of treating clam processing wastes.

centrated by either boiling, vacuum evaporation, or ultrafiltration. After extensive testing, Hood and Zall found that boiling, along with the addition of about 2 percent salt produced the best flavor. If canned and stored at room temperature, the concentrated wash water maintained its sweet clam flavor for at least six months.

Salvaged clam meat.

Another major clam waste is the loss of meat adhering to discarded clam shells. Zall and Hood found that if a shellfish processing plant reclaims those shells containing large amounts of meat adhered to them, almost 77 percent of the meat previously discarded can be salvaged. This represents approximately 5 percent of the total mass of salable meat being processed by the plant. To a processor such as the Shelter Island Oyster Company which operates 200 days a year, this could mean significant additional profit.

The method of salvaging discarded meat consists of a water wash followed by pressure heating and juice separation, another wash followed by brine, meat, and shell separation, and a final wash before meat collection. Spray washing in a rotating cylinder, similar to the type now used in industry, was the preferred wash method. The yield from this procedure was equally divided between cooked meat—anterior and posterior adductor—and juice. And, although this meat is less desirable than the foot or neck, it is edible especially when mixed

and packaged with other shellfish parts.

A freeze-dried clam product.

When the concentrated wash water was blended with 5 percent dextrin—to improve color, body and moisture retention—and freeze dried, a high quality clam flavored powder was produced.

Tested by a 10-member trained "taste" panel, the product was rated highly as a clam flavored ingredient in New England seafood chowder. A meatless chowder with the clam powder added, for example, scored as well as chowder made with meat. This type of product has excellent potential for expanding the markets of seafood processors.

Waste treatability study.

According to Zall and Hood, clam processing wastes are readily amenable to an aerobic biological treatment. This treatment uses bacteria to remove colloidal and dissolved organic compounds from clam wastes, resulting in a less troublesome discharge from clam processing plants.

While researchers Hood and Zall with the help of the Shelter Island Oyster Company can develop beneficial food products from clam and other seafood processing wastes, the American consumer will determine their usefulness. If consumer acceptance comes about, converted clam products will undoubtedly be common in the future. See **I WANT MORE.**

UPDATE



A September review of New York's Sea Grant Program included field trips along the Great Lakes and Ma-

rine coast. Joseph Birk (extreme right) of the Long Island Duck Cooperative explains the fish deboner at the Eastport plant, to Robert Shephard of the National Sea Grant Office, and Dr. Lloyd Ferguson (far left) of the University of California.

Ed Matthews, who recently worked for Sea Grant in the Brockport and Stony Brook offices, will be the new 4-H-Sea Grant agent in Suffolk County Cooperative Extension Association. As the first joint Sea Grant/county supported agent, Matthews will work toward strengthening 4-H and Community Resource Development in this important Long Island county.

The fourth Annual Tropical and Subtropical Fisheries Conference will be held on April 22-25 at the St. Petersburg Hilton in Florida. For information, contact W. Steven Otwell, 325 Food Science Building, University of Florida, Gainesville, FL 32611 or phone (904) 392-2558.

Tom Mack, Sea Grant Intern at Brockport since June, has assumed a position with the Minnesota Sea Grant Extension Program as Area Extension Agent in Marine Recreation. Our best wishes accompany him to the shores of Lake Superior.

I WANT MORE

The following publications are available from New York Sea Grant. Please check those which interest you and send to the nearest Sea Grant Extension office.

Single copies of the following publications are free:

- _____ **Cleaning Surf Clam Meat and Recovering Edible Food from its Processing Waste**, New York Sea Grant Thesis Abstract, I. Choo, 1978, 2 pp.
- _____ **Offshore Sand and Gravel in the Greater New York Metropolitan Area: What Kind and How Much?**—Short Report, Carlisle and Wallace, 1978, 3 pp.
- _____ **Retail Market Tests of Minced Seafood Chowders**, Goodrich and Whitaker, 1978, 14 pp.
- _____ **Pollution Reduction Through Dry Clean-Up and By-Product Recovery**, Marine Extension Bulletin, Bough, Reimold, Hardisky, and Hall, 1978, 4 pp.

For the following publications, make checks payable to Cornell University:

- _____ **Seafood Sourcebook**, New England Marine Advisory Service, 1978, \$1.00
- _____ **A Comparison of the Effects of Chlordane and PCB on the Growth, Photosynthesis, and Cell Size of Estuarine Phytoplankton**, Biggs, Rowland, O'Connors, Powers and Wurster, 1978, 11 pp., \$1.00
- _____ **Enzyme Hydrolysis of Malt Glucans Using a Mollusc Carbohydrase Preparation**, Lindley and Shallenberger, 1977, 5 pp., \$1.00
- _____ **MESA New York Bight Atlas Monograph #31: Marine and Coastal Birds**, Howe, Clapp and Weske, 1978, 87 pp., \$4.00

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If you would like to be notified of additional publications by New York Sea Grant Institute, please check the appropriate category and send to the Albany Sea Grant office. Be sure to include your name and address.

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| _____ General information on Sea Grant | _____ Oceanography, Limnology, Geology |
| _____ Aquaculture, Fisheries, Seafood | _____ Using our Coastal Zone |

Grant Applications for Energy Technology Including Aquaculture Systems Being Solicited by Dept. of Energy

Requests for grant applications in energy technology including aquaculture systems are now being accepted by the New York State Energy Research and Development Authority (NYSERDA) and the U.S. Department of Energy.

Under the program, grants up to \$50,000 are authorized, and may be made to individuals, small businesses, local, non-profit institutions or organizations, state and local government, educational institutions and Indian tribes. A total of 1.2 million dollars is available for the northeastern United States and the Caribbean Territories.

According to Bruce Bishop, Executive Director of NYSERDA, grants are being made to support energy-related projects which use small-scale technologies "appropriate" to local needs, skills and available energy resources. Examples of "appropriate" technologies are solar technologies, use of wood or wood wastes, wind systems, use of geo-

thermal resources, waste heat recovery systems, methane production from organic wastes, small hydroelectric systems, aquaculture systems, solar storage systems, and energy conservation measures.

The program will support three types of energy-related projects: 1) **concept development projects** which seek to define the potential of innovative ideas; 2) **development projects** which study, investigate or test ideas which have gone beyond the concept development phase; and 3) **demonstration projects** which evaluate the feasibility of technologies through testing under actual operational use and conditions.

Completed grant applications must be received by February 23, 1979. For more information and an application form, New York State respondents may write to: Dr. Burton Krakow, AT Program Manager, NYSERDA, Rockefeller Plaza, Albany, New York 12223.

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