Marine Resource Bulletin
A Sea Grant Advisory Service

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These modern scallop vessels berthed at Hampton, Virginia typify the larger, more powerful craft being built today to compete successfully in Virginia's expanding offshore fishery.

Cook

VIRGINIA'S CHANGING OFFSHORE FISHING INDUSTRY

by Jim Zaborski
Fisheries Advisory Specialist

COMMERCIAL FISHING IN VIRGINIA is one of the state's most rapidly growing and changing industries. New vessels are entering the fishery at an increasing rate, fishermen from other areas are moving their operations to Virginia, older processing plants are being revitalized and employment has increased both on vessels and in related shoreside occupations. The opportunity for vessel owners to realize a profit has been the driving force behind this expansion. The potential profitability of the offshore fishing industry has been influenced by factors ranging from the abundance of certain offshore species to the enactment of the Fisheries Conservation and Management Act of 1976 (FCMA), more commonly known as the 200-mile limit law.

The FCMA has eliminated some of the risk involved in an expanding fishery. The law was written to conserve the resource and, through proper management, maintain the highest pro-


Lovelace

The resources of the continental shelf off Virginia traditionally supported an offshore fishery. Flounder, croaker, sea bass, weakfish and scup were the mainstay.


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Sea scallops ready for market swing from hold to handling shed. Harvested by dredge and shucked at sea, these meats are bagged and stowed on ice to preserve freshness.

duction levels possible. The FCMA also states that only those fish in excess of U.S. harvesting capacity can be taken by foreign fishermen. This has dramatically reduced foreign fishing efforts in U.S. waters. In 1975 there were more than 2,700 foreign fishing vessels off U.S. coasts. By 1978 this number was reduced to 600. The foreign catch within the 200-mile limit has been reduced to 1.7 million metric tons from 1971's high of 3.5 million.

The FCMA however, has exhibited the characteristics of a two-edged sword in some areas. In the Gulf of Mexico, for example, the law prompted Mexico to establish its own 200-mile limit, thereby displacing that portion of the U.S. shrimp fleet which traditionally worked in Mexican waters. This, in conjunction with poor shrimp production in the Gulf over the past few years, has forced some Gulf shrimpers to look elsewhere for fishery resources. Virginia's offshore areas were attractive and some Gulf fishing vessels moved to this area, contributing significantly to the expansion of the state's offshore fleet.

The surf clam fishery has also felt the effects of the FCMA. Since November 1977, a Fishery Management plan for surf clams and Ocean Quohogs has established quotas, limited the number of fishing days and closed the fishery to new entrants until December 1980.

Under the restrictions and quotas established by the FCMA, the surf clam fishery continues to contribute significantly to Virginia's economy. Preliminary data from the National Marine Fisheries Service indicate that over 12.7 million pounds of meats valued at more than $7 million were landed in 1978. Surf clams accounted for 16% of the total value of all fisheries products landed in Virginia in 1977.

The present regulation intentionally limits the potential of the clam fishery in order to permit the stocks to rebuild to what is considered optimum yield. The regulations have limited fishing effort to as little as 24 hours of fishing time per vessel per week. Obviously, this is an inefficient use of the vessels. Unfortunately, the specialized equipment used in this fishery does not facilitate easy conversion to other offshore fisheries, with the exception of the ocean quohog.

Currently, the optimum yield for ocean quohogs is 40 million pounds. Total landings in 1977 were 8.4 million pounds and accounted for 20% by weight and 7.5% by exvessel value of all clams harvested in the U.S. This is up from the early 1970 period when ocean quohogs accounted for only about 1% of the total weight and less than 1% of the total exvessel value. Clearly, industry has made some progress toward developing this fishery, but it is still a long way from optimum yield.

The most significant changes in Virginia's

offshore fishing industry have occurred in the sea scallop fishery. In 1972 and 1973 the scallop population on the East Coast exhibited unusually high recruitment. Large numbers of scallops that were spawned during that time survived, grew to harvestable size and became available to the fishery in 1975. The availability of this resource to Virginia fishermen did not go unnoticed. Coincident with the increased production of sea scallops was an increase in demand. Prices rose and provided substantial returns on investment to members of the industry. As a result, larger, more sophisticated vessels were constructed, with more on the ways.

The resources of the continental shelf off Virginia have traditionally supported an offshore fishery. Species such as flounder, croaker, sea bass, weakfish and scup were the mainstay. Sea scallops were harvested during times of abundance or when finfish were unavailable.

Most scallops are harvested by dredge and shucked at sea, and the edible meats are returned to port for direct sale or futher processing. A few vessels still use finfish trawl nets to harvest scallops. Scallops harvested by this method are generally returned to port in their shells where they are then shucked.

The gear and techniques employed in Virginia's offshore finfish industry have changed modestly over the years. However, new developments and changes in gear design, handling techniques and methods of harvest will become obvious in Virginia's trawl fishery in the near future.

NATURE OF RECENT CHANGES

To characterize the changes in Virginia's offshore fishing industry, a comparison between the fleet of today and that of the recent past is useful. The number of vessels, their size, horsepower, type of gear and crew size are good indicators of change.

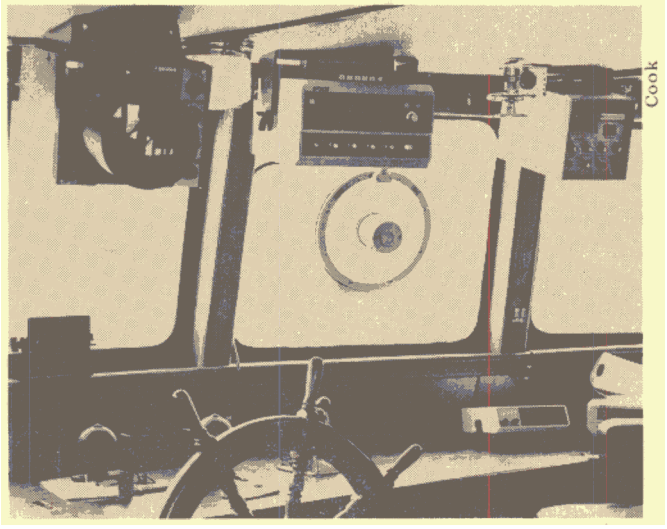
Data obtained from the National Marine Fisheries Service (NMFS) indicates that 70 vessels were active in Virginia's offshore fishery during 1970. By 1978, the fleet had almost tripled in size, with 196 vessels landing in Virginia's ports. This increase in the number of vessels has been paralleled by the increase in vessel size, gross tonnage, horsepower and crew size. A comparison of vessels constructed from 1970 to 1974 with those vessels constructed in 1979 reveal increases in average length of 6.1%, average gross tonnage of 15.7% and horsepower of 32.5%. Changes in vessel contruction and crew size can, in part, be attributed to the requirements of the sea scallop fishery, where larger, more powerful craft are needed to tow the gear. Of the 25 vessels documented during the first 7 months of 1979, 24 have entered the scallop fishery.

FISHING GEAR

Sea scallops harvested along the mid-Atlantic are generally taken in depths in excess of 30 fathoms. The gear most commonly used is the scallop dredge, a rectangular steel frame trailing a bag constructed of heavy netting material on the topside and steel rings on the bottom. The rings are generally 3" in diameter to allow small scallops and unwanted by-catch to pass through. The dimensions of these dredges varied depending upon the size and power of the vessel. Most scallop vessels commonly tow a dredge on each side, with each dredge ranging from 9 to 15 feet in width. Since a wider dredge covers a larger area of the bottom during fishing, its advantage is obvious. However, the weight and resistance of larger dredges requires considerable horsepower for towing. The use of standard-sized trawl nets does not require as much horsepower as the use of scallop dredges.

Other factors which may influence which fishery a vessel will enter and the type of gear it will employ are crew size and accommodations. Scallop vessels, for example, generally operate 24 hours a day and remain at sea for 10 days. The scallops are shucked and packed in 40-pound bags for icing, requiring a large crew to keep the operation going around the clock. These vessels require comfortable accommodations (bunk space, showers, large galley, etc.) for 9 to 13 men.

Another consideration would be age and construction of the fishing vessel. Owners of older wooden vessels might be reluctant to handle large scallop dredges because of potential damage to the hull. Still another reason for choosing one fishery over another may be a skipper's personal preference.



Manning the wheel of a modern offshore fishing vessel demands an increasing knowledge of electronics. Sonar, autopilots, radar, LORAN-C track plotters and fish scopes are becoming commonplace.

An important characteristics of the newer vessels entering the offshore fishery is that they are "combination boats" capable of entering into either the scallop or finfish fisheries. These vessels have the flexibility to switch from one fishery to another with a minimum of time and expense.

LANDINGS AND VALUE

The quantity and value of offshore fishery resources landed in Virginia's ports are important indicators of how the industry is growing and changing. Both the finfish and scallop landings have increased significantly over the past three to four years. Of considerable importance is the dramatic increase in the value of scallops landed (from $1.6 million in 1975 to more than $17.3 million in 1978). Financial returns from increased landings and values of finfish and scallops have provided capital for investment in new vessels, processing plants and docking facilities.

Although the recent expansion of the offshore fishing industry has been in response to the abundance of scallops, the capability of the industry is flexible. Flexibility is a key element in a business that depends upon the abundance of a wild, living resource. Fishermen are well aware of this, which is why they are building multi-purpose vessels.

Changes in the world's economy and the 200-mile fishing limit afford alternatives. Resources such as squid, butterfish, herring and mackerel are abundant off Virginia's coast. Demand for these resources is high in foreign markets and could develop in domestic markets, as well. The offshore fishing industry in Virginia should be in a good position to take advantage of the under-utilized fishery resources in the mid-Atlantic region. The offshore fishing industry will continue to contribute substantially to the economy of the Commonwealth.

ECONOMIC IMPORTANCE TO VIRGINIA

The offshore finfish and scallop fishery in Virginia generates a substantial amount of personal income for the state. In 1978, the income generated by Virginia's offshore fishing fleet was estimated at $44.4 million, with a total effective employment of more than 4,300.

In terms of income and employment, the economic benefits from commercial fisheries can be expressed in two ways. First is the direct income generated on vessels, at processing plants and in firms supplying goods and services to the industry. The second is indirect income which results from the spending of income earned on vessels, in processing plants and supply houses. From July 1977 to July 1978, Virginia-based sea scallop vessels spent more than $2.3 million on such goods and services as fuel oil, grocery supplies, ice, repairs and other marine necessities. In 1978, offshore trawlers spent $1.0 million for similar goods and services. For every dollar of finfish and scallops landed, approximately $1.35 of income is produced as crew members and vessel captains spend their earnings in the local economy. For every pound of seafood landed from offshore vessels, approximately $.83 of additional income is produced as processors, dock workers and individuals in the supporting industries spend their income.

The economic benefits of the offshore fishery are not measured by income and employment, alone. Other considerations are property tax revenues generated by vessels, individual income and sales taxes and the abundance and convenience of fresh seafood at reasonable prices. An intangible "extra" is the satisfaction Virginians may gain at having an important and thriving industry located at their doorstep.

TAX GUIDE

A "Tax Guide for Commercial Fishermen" is now available upon request from the Sea Grant Marine Advisory Services Office at the Virginia Institute of Marine Science (804/642-2111, Ext. 297). This guide is designed for the commercial fisherman who is a sole proprietor and who reports the profit or loss on Schedule C (Form 1040). It does not cover the corporate or partnership form of a business operation. The guide will help a fisherman become familiar with the federal tax laws as they apply to the fishing business so that he will pay only the correct tax.

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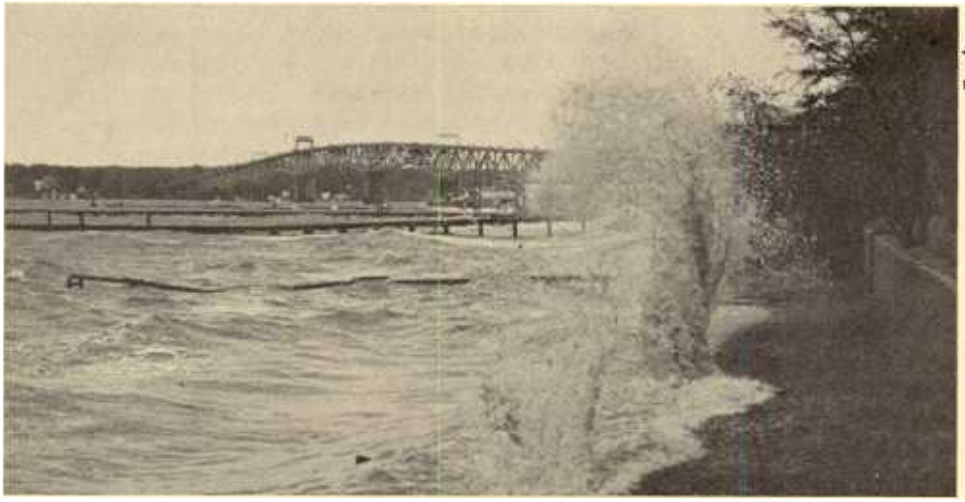
SHORELINE EROSION: A MATTER OF GROWING CONCERN

by Dick Cook, Editor



Cook

Gale force winds generate a destructive storm surge that can nullify ill-conceived shore-protection structures.

VIRGINIA BOASTS A TIDAL shoreline length of more than 5,000 miles, much to the delight of millions who visit both the Chesapeake Bay and the beaches of the Atlantic each season. Ownership of this choice shoreline property is almost entirely in the hands of private citizens. The state owns 1.4 percent; the Federal government 6.7 percent and municipalities 1.1 percent. Historically, this has meant that any action to stop the loss of land to shoreline erosion has been piecemeal and, in many cases, ill-conceived.

Is shoreline erosion a problem in Virginia? Grossly averaged, the eastern and western shores of Chesapeake Bay lost approximately 12 acres per mile over the last century. On the coast, between Cape Henry and the North Carolina-Virginia border, roughly 44 square miles of land washed away during the period 1850-1950.

Although individual shoreline segments in Virginia have eroded as much as 27 feet per year, the average is approximately 1 foot per year. With waterfront property escalating in price, it's no wonder concerned property owners are now seeking professional advice in methods of coping with the erosion problem.

In Virginia, free advice on this subject is available from two sources: the Virginia Institute of Marine Science (VIMS) and the Soil Conservation Service of the federal Department of Agriculture. VIMS has been involved in a

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VIMS shoreline advisory services specialist Scott Hardaway assesses erosion damage along the lower James River. Such examples points out the need for education programs to show landowners how erosion processes work.

substantial amount of research on shoreline erosion and coastal processes work since the mid-1960's.

In 1970, the Chesapeake Research Consortium, of which VIMS is a member, embarked on a study of the problems occurring on the "fringe" of the Bay. The study, funded by the National Science Foundation under the program of Research Applied to National Needs (RANN), sought to improve our ability to manage the problems associated with man's occupation of the shoreline. One urgent problem was how to modify the shoreline to reduce erosion.

In order to estimate the magnitude of the problem of shoreline erosion within the Bay and its tidal rivers, shoreline maps of the 1850's were compared with those of the 1950's. This study provided the baseline facts which clearly indicated the degree to which erosion was occurring.

While this activity was progressing, VIMS started receiving inquiries from local property owners looking for answers to their own shoreline erosion problems. During 1972-73, scientists in the VIMS Geological Oceanography Department started responding to requests for advice on a time-available basis. It was about that same period that VIMS started looking at shoreline erosion on a county-by-county basis. VIMS main effort was directed at developing a shoreline situation report for each tidewater county and city. Such a report would help planners and managers see the shoreline in the context of the problems that existed along it.

The Federal Coastal Zone Management Act was passed in 1972, and by late 1973 Virginia was participating in the initial planning phase. One of the elements required of participating states was that they develop a planning process to cope with the impact of shoreline erosion; not stopping it, necessarily, but simply reducing the impact. Besides structural erosion controls, planners were also to consider such institutional controls as zoning and setbacks.

VIMS became involved in that work in 1975 and completed its part in March 1979 with the report "Shoreline Erosion in the Commonwealth of Virginia: Problems, Practices and Possibilities." This Special Report (No. 220) in Applied Marine Science and Ocean Engineering portrays the magnitude of the problem of shoreline erosion, the legal issues involved, presents various management strategies and can serve as an economic model in decision making.

As early as 1973, with VIMS scientists involved in the RANN program and the increased field activity demanded by the "Edges of the Bay" study, there was an increase in public awareness of VIMS' interest in shoreline erosion and a dramatic increase in calls for assistance. At this point VIMS asked for Sea Grant help in establishing an erosion advisory service, the first of its kind in the nation. The request was granted on a ¼ time basis. The second year, with an even greater public request for assistance, Sea Grant funded the effort on a ½ time basis.

Finally, in late 1978, three erosion-oriented activities were going on at the same time which involved VIMS: completion of the shoreline situation reports; the beginning of a fulltime Sea Grant sponsored erosion advisory service; and the onset of work in low-cost erosion control techniques. This last item was a natural offspring of the shoreline situation report field work. It soon became obvious through field studies that many of the structures erected by private landowners were either inappropriate to the problem or failing entirely. This started scientists involved in the VIMS erosion advisory effort working on alternate means of protecting the shoreline, and eventually led to some early Sea Grant-supported experiments on the Eastern Shore.

In 1977, the Coastal Plains Regional Commission supplied funds to investigate additional low-cost erosion control techniques designed to trap sand against the shoreline, thereby enlarging the beach so that wave action is dissipated before hitting the bank. In some locations the beach elevation was increased by 2 or 3 feet.

During that same year, the Virginia General Assembly formed a Coastal Erosion Abatement Commission. The purpose of this joint House and Senate venture was to examine shoreline erosion problems in the Commonwealth and make recommendations to the General Assembly and the Governor.

Among the recommendations in this report, due to be delivered to the General Assembly and the governor in December, 1979, is that a state matching fund be established to help localities in their programs to protect and enhance the public beaches of the Commonwealth. Scientists at VIMS would serve as advisors.

The Commission feels the need for an expanded advisory service, and proposed it as being an arm of the State Soil and Water Conservation Commission. Through legislation in

MARINE SCHOOLHOUSE SERIES NO. 9
Sea Grant Marine Advisory Services
Virginia Institute of Marine Science

Wavelets

HOMEMADE OCEANOGRAPHIC EQUIPMENT: the beach seine

by MARY SPARROW

IN 1969, INTEREST IN OUTER SPACE reached a new high when the United States landed men on the moon. When the astronauts returned to Earth, they brought with them rocks, soil and other samples of the moon environment. Officials, realizing most people will never visit the moon, displayed some specimens for the public, while others were examined closely by scientists in laboratories.

In Wavelets No.s 1 and 2 you were introduced to "Inner Space," a water world as fascinating and amazing as the world of outer space. Directions were given for setting up a salt-water aquarium to display and observe "Inner Space" creatures. In this issue, we are going to tell you how you can explore Inner Space, and like the moon astronauts, bring back specimens from another world for display and observation.

To do this you will need some equipment. You can make a variety of oceanographic sampling equipment in your home. Probably one of the most useful pieces of collecting equipment is the beach seine, which was mentioned in Wavelets No. 3. Pulling this net through shallow water areas, you may catch small blue crabs, jellyfish, mummichogs and other killifish, silversides, grass shrimp, small croakers and spot.

HOW TO MAKE A BEACH SEINE

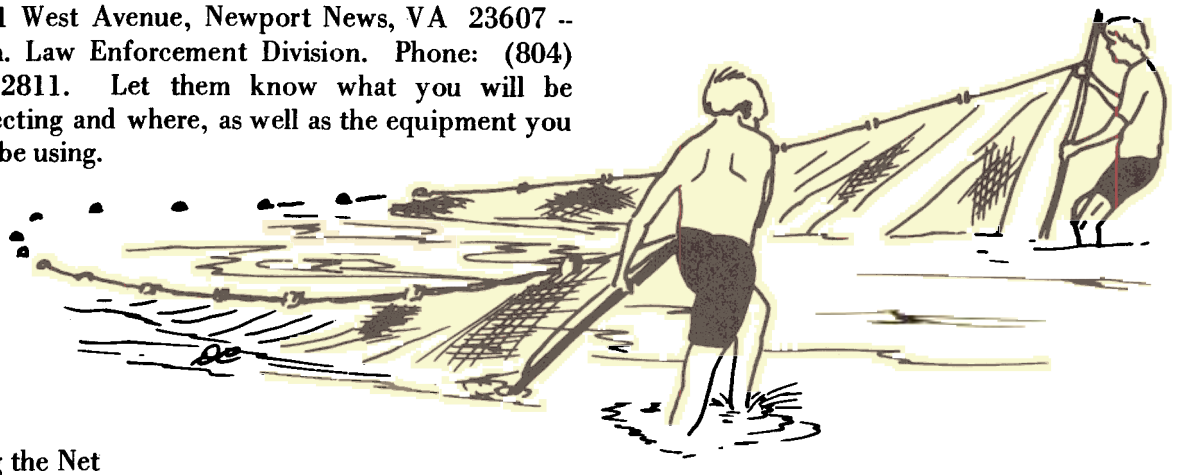
Materials:

1 - 3' x 4' piece of ¼'' nylon (discount and fabric stores)
2 dowel sticks (1" - 2" diameter, 4' long) or two broomsticks
8 styrofoam balls (arts and crafts store)
8 - 2 oz. weights, washers or fishing sinkers
Several feet of heavy cord, preferably ¼" cm. nylon (hardware and fabric stores)

Procedure:

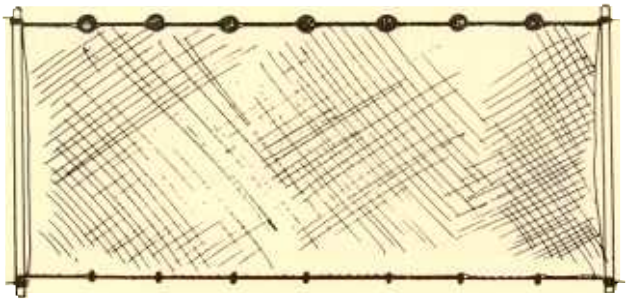
1. Put in a ½ inch hem all the way around the net. Sew a weight into the bottom hem every 6 inches.
2. Punch a hole through the middle of each styrofoam ball. String the balls on heavy cord by pushing the cord through the hole. This makes a float line.
3. Attach float line securely along the top of the net, spacing balls evenly.
4. Securely attach a piece of cord (1 foot) at each corner of the net.
5. Drill a hole or notch at the top and bottom of each dowel or broomstick.
6. Attach corner net cords securely to dowels, through the holes or around notches.

Special Note: Before collecting with the seine or any other equipment, be sure to notify the Virginia Marine Resources Commission, P. O. Box 756, 2401 West Avenue, Newport News, VA 23607 -- Attn. Law Enforcement Division. Phone: (804) 245-2811. Let them know what you will be collecting and where, as well as the equipment you will be using.



Using the Net

It takes two people to pull the seine net. Position the net between you and your friend. The floats should be at the top and the weights at the bottom. There are two methods frequently used.. The U-pull requires that both people stand parallel to the shoreline at the water's edge. You then walk straight out for some distance, make a u-turn and return to the beach. The other method positions the net perpendicular to the shoreline. One person stands close to the beach, the other stands straight across from him/her in waist deep water. Pull the net along the shoreline. When you are ready to beach the net, the person closest to shore stands still while the other person swings around and proceeds until they are once again straight across from each other. Both, then, pull the net onto the beach.



Your specimens and your aquarium

If possible, leave your specimens in the bucket (with aeration) for 24 hours. During this period, observe the animals for signs of illness. Add only the healthy and most active animals to the aquarium. Return the others to the collection site. The water in the bucket will be different from that in the aquarium. You can avoid stress to your specimens by pouring a half cup of aquarium water into the bucket every 15 minutes for an hour. Use your net to transfer the specimens from the bucket to the aquarium.

Selecting Specimens

On a collecting trip, be sure to take a bucket or other container for holding specimens. Fill it half way with water from the river or pond where you are collecting. After you have beached the net, quickly select specimens for your aquarium and place these in the container. Gently return the other animals to the water.

Some animals will die during the collecting process just from handling. If returned to the water, these will serve as food for other animals. Try to return as many animals as possible alive, however.

Before handling fish, be sure to wet your hands. This will protect the mucous covering on the fish, which shields them from infection. If possible, use a battery-operated pump to aerate the water. Remember not to overcrowd your containers.

Safety

Always go collecting with another person, and in an area you know well. Be sure currents are not too strong. Wearing a life jacket is good insurance against accidents. Let an adult know where you are going and when you plan to be home.

1973, this Commission was given the responsibility and authority to coordinate all activities of state agencies and universities on matters bearing upon shoreline erosion, and has subsequently relied heavily upon VIMS in these matters.

The Erosion Advisory Commission presently is focusing on public beaches and the question of expanded advisory services, and hasn't come to grips yet with the question of financial assistance to private property owners. This group would like to see some state asssistance to help defray their costs of shoreline protection.

A current problem is that individual property owners are taking action of one kind or another and, according to Dr. Robert Byrne, the action has generally been "piecemeal in time and space." Byrne is a senior marine scientist in VIMS' Physical Oceanography Department and the leader of the Institute's shoreline erosion work since 1969.

"Few property owners are aware of the consequences of building a seawall, groin or other shore-protection structure." Byrne said. "They generally spend a considerable amount of money and effort without consideration of the environment in which they're working. What is needed is a strong education program to show these people just how erosion processes work. Secondly, landowners within an area where there is a demonstrated interdependence, such as a long, straight stretch of beach, should be encouraged to act collectively." There is some thought being given to "shoreline erosion education" through community meetings.

The way the process works now, individuals contact VIMS for help, either in person or by phone. They are requested to follow their initial contact up with a letter for file purposes. A date is then set for the advisory agent and the landowner to meet at the property.

Scott Hardaway, VIMS present full-time shoreline erosion advisory specialist, feels one-on-one conversations, especially with long-time residents, are helpful in determining historic changes. During the meeting with the property owner, Hardaway tries to work in a little education, explaining the natural processes involved which created the particular problem.

Property owners range from those living on the Bay or oceanfront who are losing several feet of frontage each year, to those living on small tidal creeks whose front yards may be slumping a bit.

Hardaway carries a 35 mm camera along on his field trips. He likes to take slide photos for later study. If the erosion problem looks like it will necessitate a great deal of expense, the erosion advisory agent will set up a slide program to solicit comments from Dr. Byrne and other scientists at VIMS. In this way, all of the shoreline erosion expertise at the Institute is brought to bear on mapping out recommendations to solve the landowner's problem. These are sent to the landowner in the form of a report.

In most cases, the solution consists of devising a way to buffer shoreline wave action. Control methods take the form of natural (usually vegetative control) or structural (bulkhead, rip rap, sand bags). VIMS is not in the business of providing specific engineering design, but rather tells the landowner what engineering requirements are necessary for the different commerical methods to be effective. A bulkhead, for example, must be constructed with several things in mind: The probable height of the storm wave that will hit it and the forces that will be acting upon it from behind.

Byrne and Hardaway, when asked if there

When contacted by a shoreline property owner in need of help, Hardaway makes an on-site visit, later sends the landowner a report detailing erosion processes and corrective measures.

was a certain peak time of the year when calls for assistance came in, agreed that early spring topped the list. In explaining this phenomenon, Byrne said it was a case of the absentee landowner coming back to open the summer cottage and discovering the ravages of several winter storms.

VIMS now has, as a result of the shoreline situation report project concluded in 1978, a collection of low altitude oblique color slides of the entire tidal shoreline of the Commonwealth. Therefore, when the erosion control staff is notified of a specific problem area, they can preview the sites before ever leaving the office. This collection numbers approximately 35,000 slides that were acquired during the various studies conducted over the years.

What does the future hold? Byrne emphasizes the need for an expanded advisory service. As it stands now, Hardaway is the only VIMS field specialist, and the U.S.D.A.'s Soil Conservation Service has one agent. With the increasing number of calls for assistance that has been occurring, plus the need for "a real concentration on education," as Byrne puts it, either the state or VIMS is going to have to come up with more people to handle public requests. Also, Virginia's legislature will have to address itself to such questions as: Do we continue to manipulate the shoreline on an individual, piecemeal basis? Should there be state aid to property owners? Should there be erosion abatement districts, where property owners are assessed for taxes on a front-footage basis for the loss of structures?

Byrne, in concluding his remarks on the subject, feels strongly that more effort should go into research and development of low cost erosion control techniques, particularly, into extending the range where vegetative controls might work. This subject is one that also is of great interest to the State Erosion Abatement Commission. The VIMS scientist would also like to see continuing research in coastal processes. "We can generally tell you what will happen, given certain weather factors, but we cannot yet tell you to what extent it will occur." This last part is of particular interest to the property owner footing the bill.

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