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ABSTRACT

This publication is designed for use as part of a curriculum series developed by the Regional Marine Science Project. As an informative text for a three-week unit in marine science for grade six, it considers man's role in using coastal resources and how he affects the marine environments. An ecological approach to nature is emphasized, stressing the ties between culture, economy, and resource use. Topics are divided into three units: Food and Recreation, Transportation, and Minerals and Conservation. Each unit includes a vocabulary, fill-in questions, and disucssion topics. Numerous diagrams illustrate topics discussed. This work was prepared under an ESEA Title III contract. (BL)

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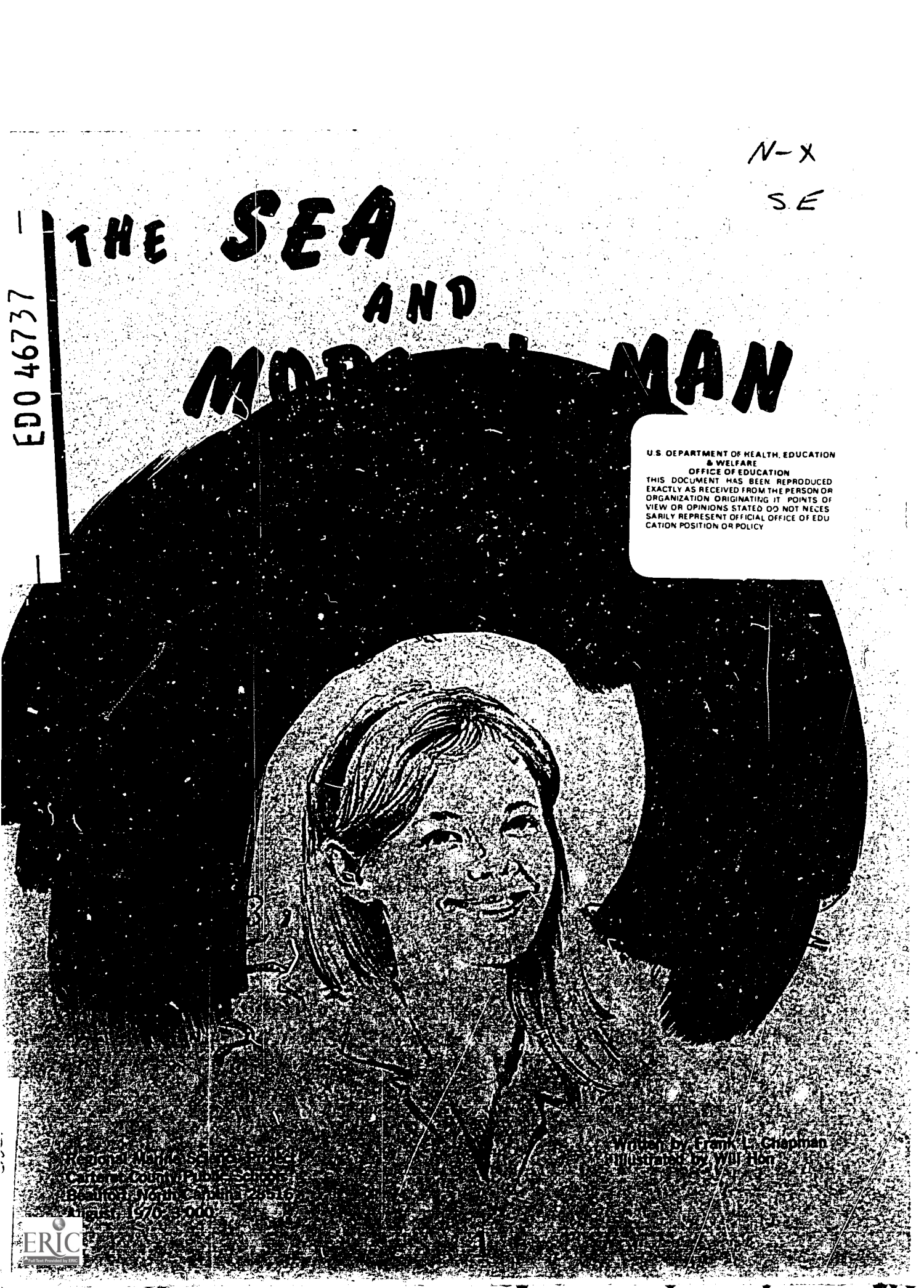
THE SEA AND MAN



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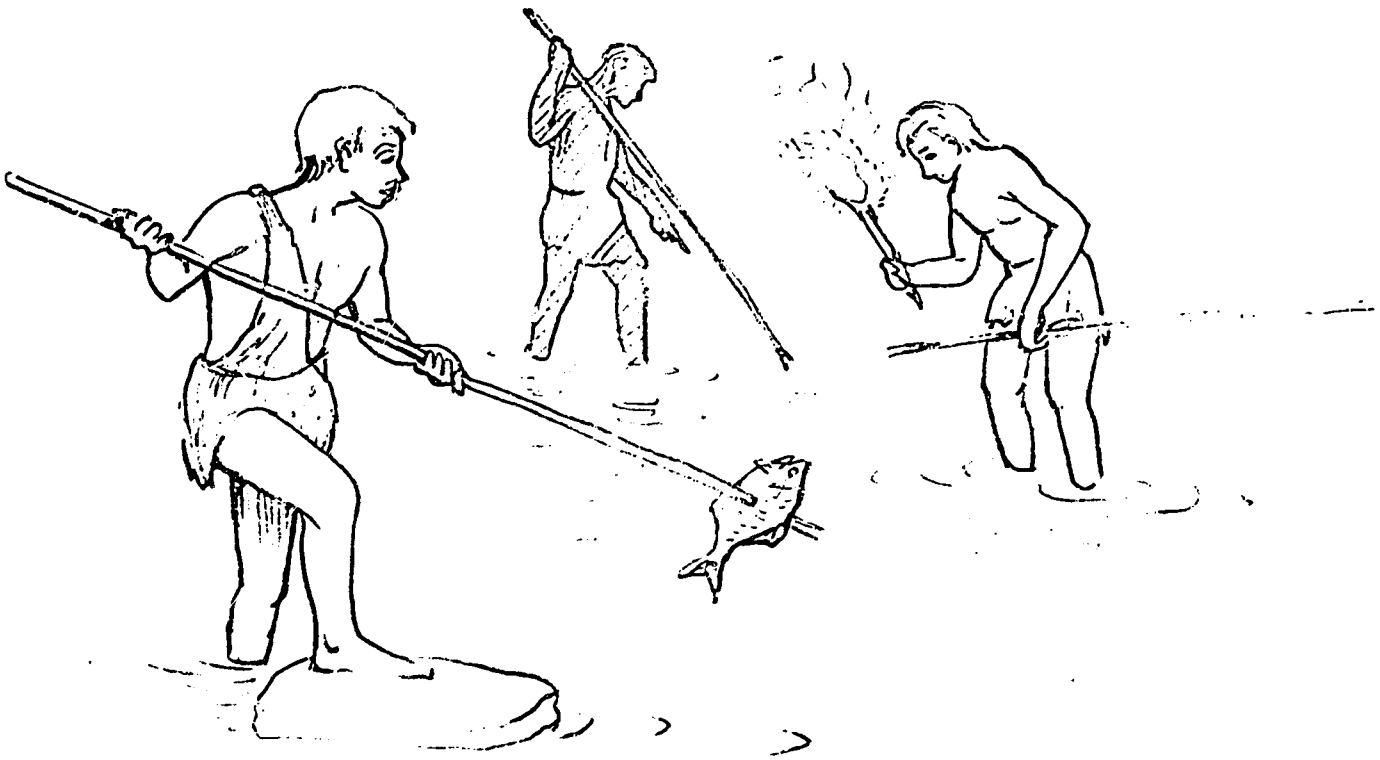
August 1970 5000

FOOD AND RECREATION

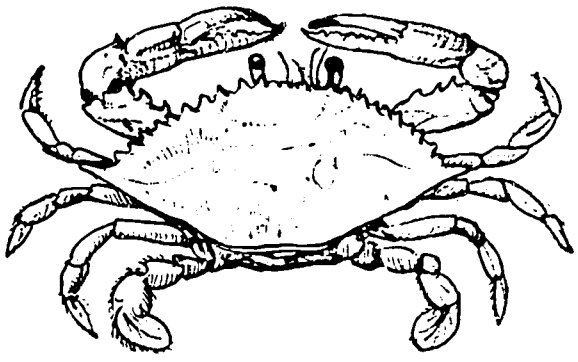


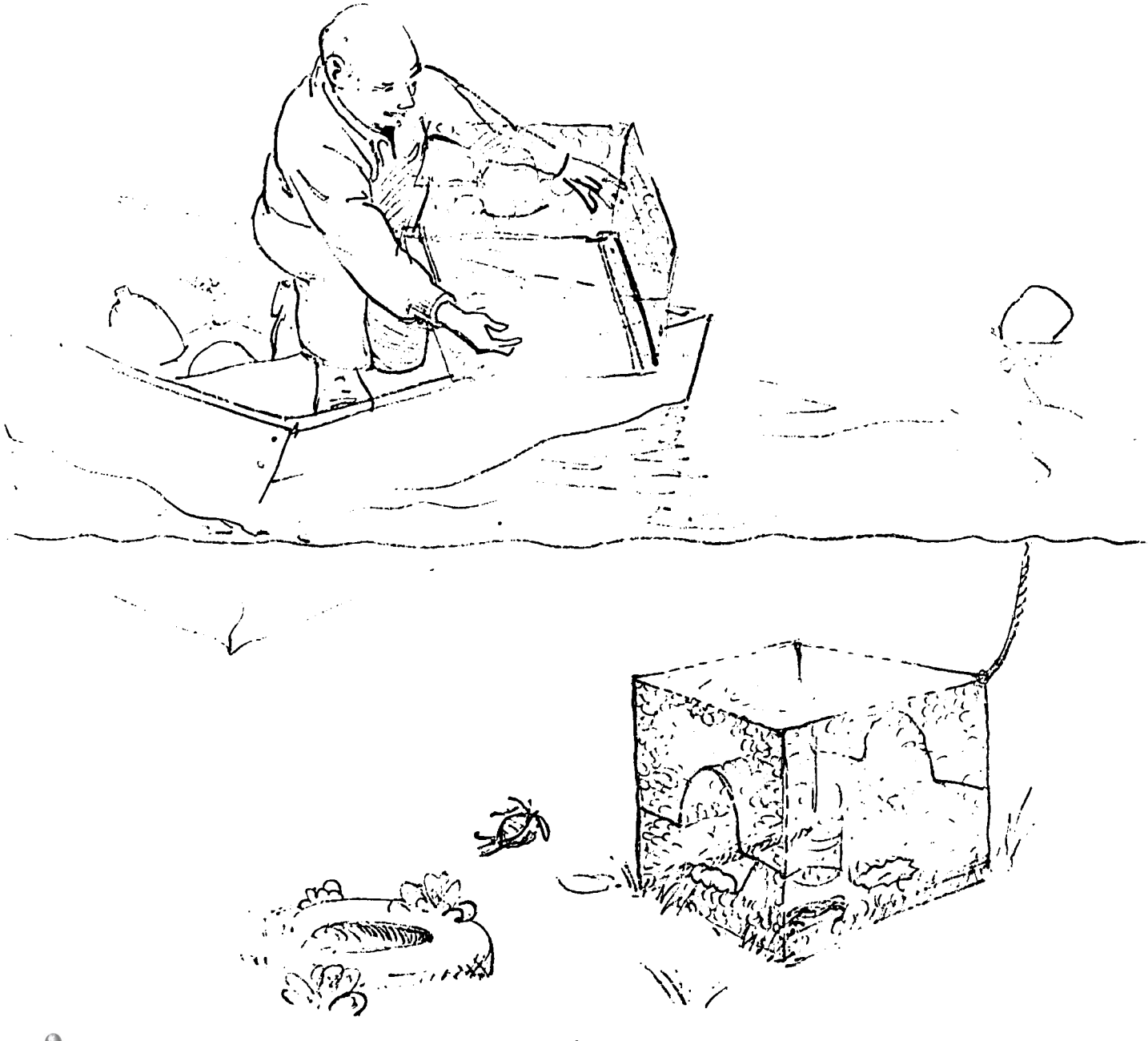
For ancient man, life at the edge of the sea was good. The shallow water provided him with plenty of food. All he needed to do was dig some clams or spear a few fish. He didn't have many mouths to feed. Then civilizations sprang up and human population increased. Coastal people were called upon to help supply food to large towns. But their fishing methods were not good enough to supply this large amount of food. They had to find new methods that would. Today man uses modern vessels and improved fishing gear to supply fisheries products to the population.

Besides food for man, fisheries products are used for fertilizers, animal foods, oils and many other things.

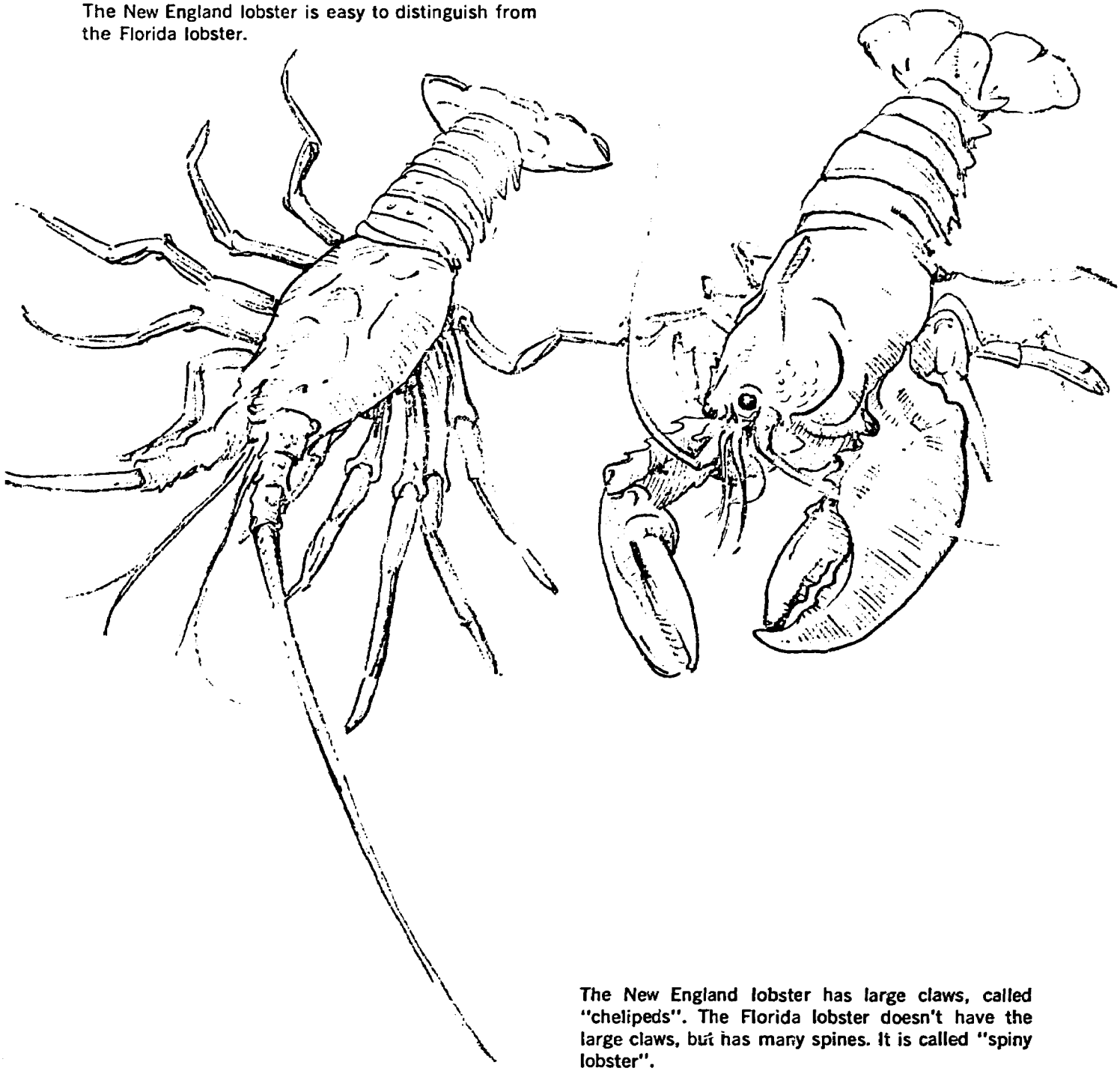
The important commercial fisheries along the east coast of the United States are for blue crabs, shrimp, lobsters, scallops, clams, oysters, bluefish, menhaden, flounder, trout and cod.

Blue Crabs are caught in crab pots. The pots are usually made of wire, because wire is the cheapest material. Bait lures the crabs inside the pot. Fishermen check the pots each day. Some of these crabs go to market alive. Others go to processing plants to be cooked and cleaned. The meat is canned and shipped to large inland markets.

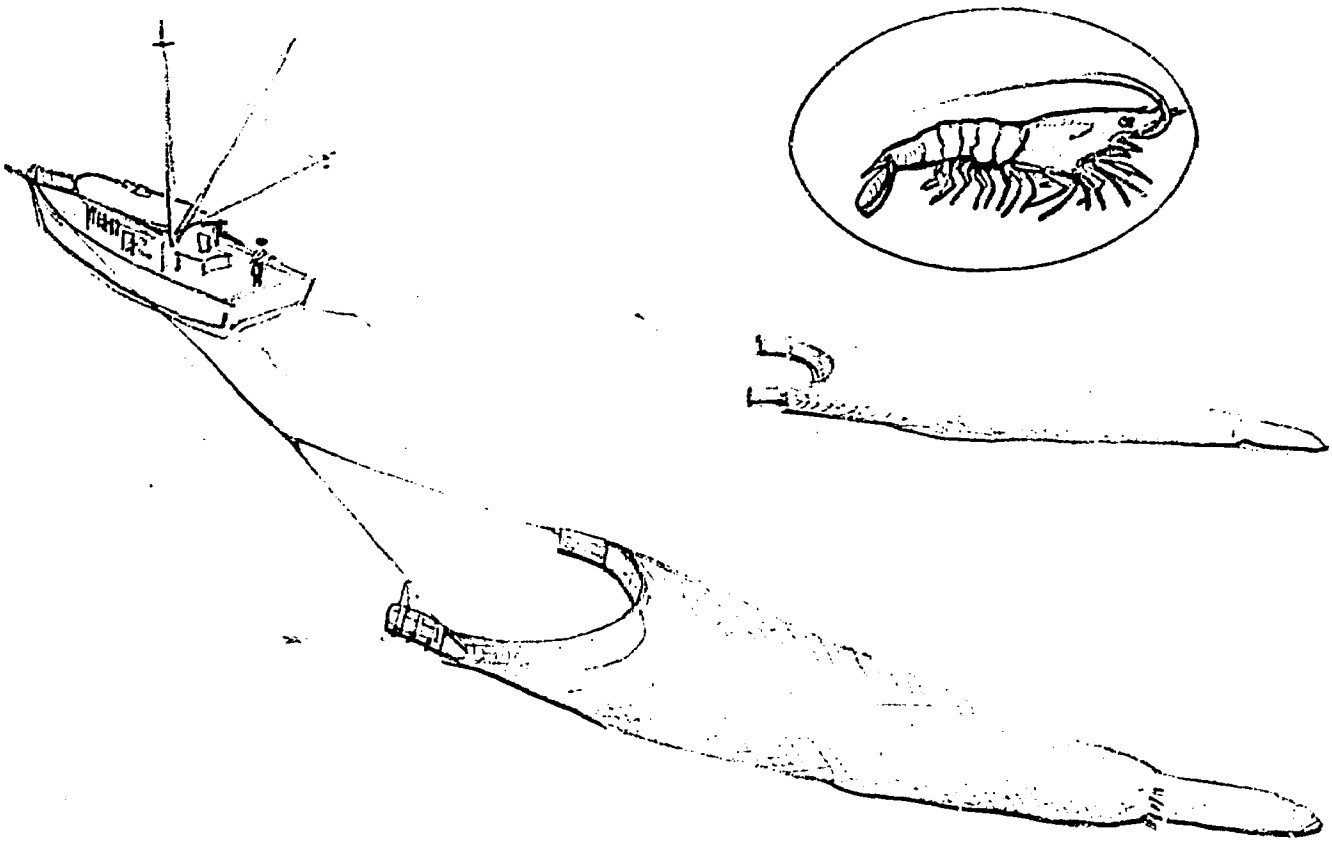




Lobsters are also caught in pots. Most lobster fishermen still use wooden pots. They are built much like the wire pots of the blue crab fisherman. Some modern fishermen are using trawls. Lobsters are caught mostly in New England and south Florida. The New England lobster is easy to distinguish from the Florida lobster.



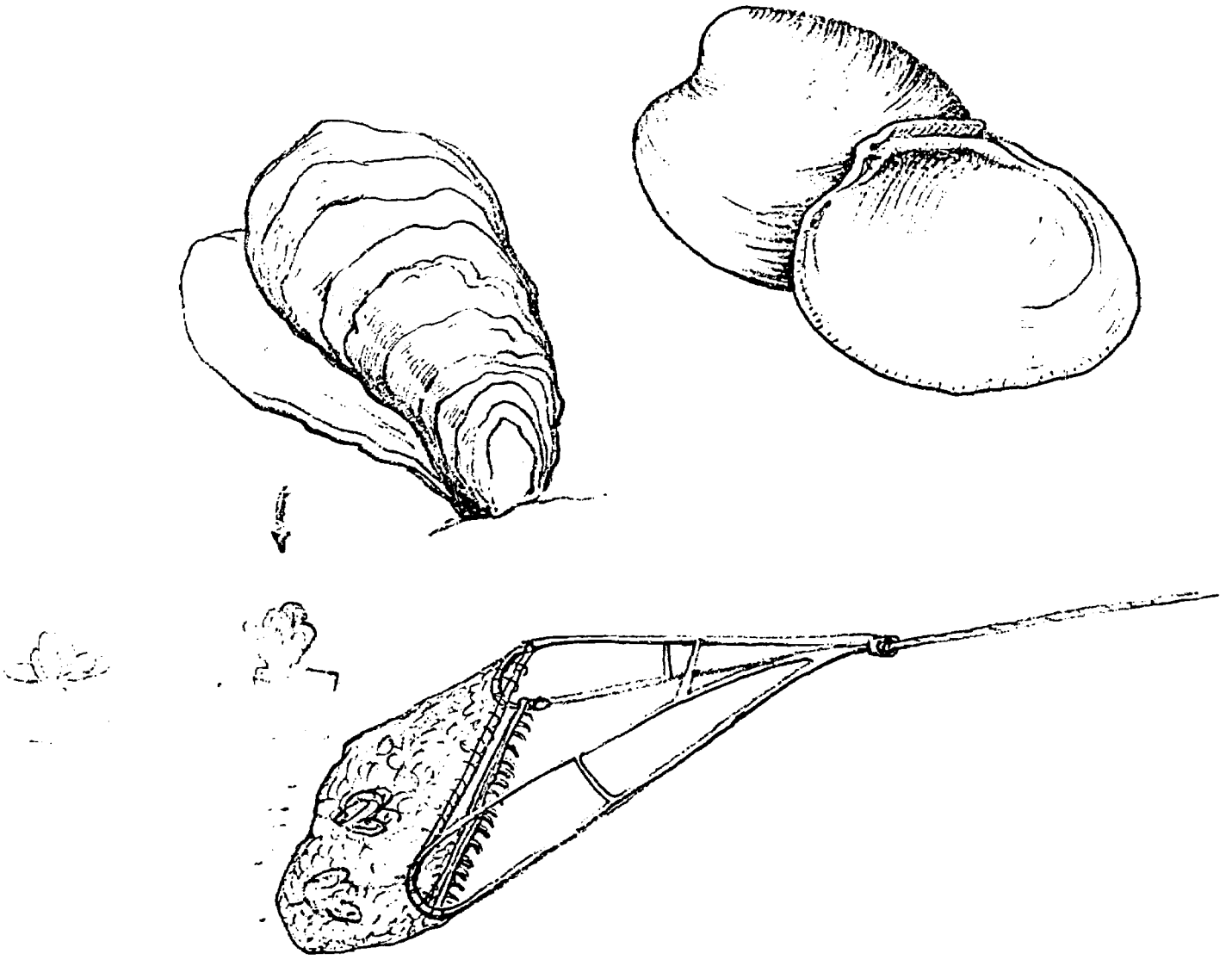
The New England lobster has large claws, called "chelipeds". The Florida lobster doesn't have the large claws, but has many spines. It is called "spiny lobster".

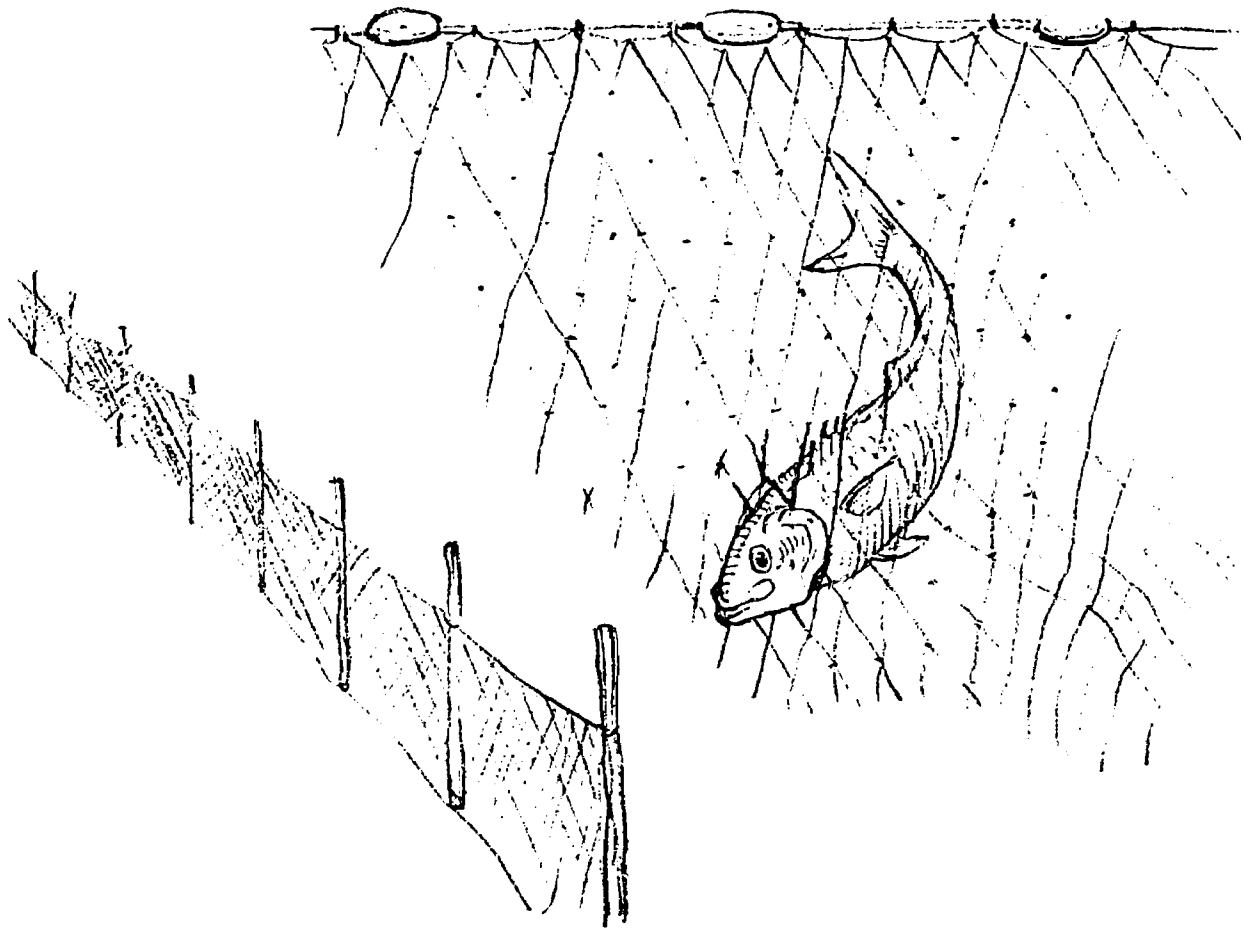


Boats with powerful engines and large trawl nets catch most of the shrimp used as food. The trawl net is shaped like a large bag. Two wooden doors called "otter boards", hold the mouth of the net open as the boat pulls. These trawls are efficient for catching shrimp. But other animals also get caught by the net. These usually die when the net is pulled up because they remain out of the water too long. Shrimp are the most important of the group of marine invertebrates caught in North Carolina. Fishermen can always sell them for high prices at the market. Channel nets and hand seines are also used by the shrimp fisherman, but not as much as the trawls.

Two other invertebrate animals are important to the North Carolina fisherman: the hard clam and the bay scallop. Bay scallops are caught mostly with scallop dredges. These are made of metal frames with bag-like nets fastened around them. They are pulled behind boats. The bottom edge of the metal frame scrapes the scallops off the bottom and guides them into the net.

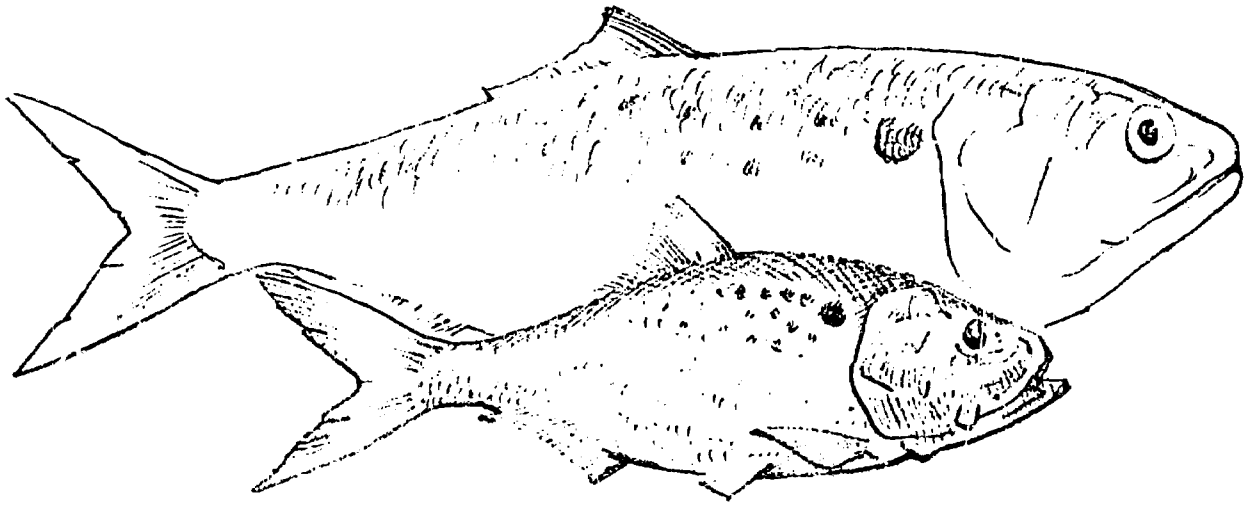
Most clams and oysters are still gathered by hand, but in some places they are dredged. Oyster dredges have sharp rake-like projections that break the oysters away from the bottom.





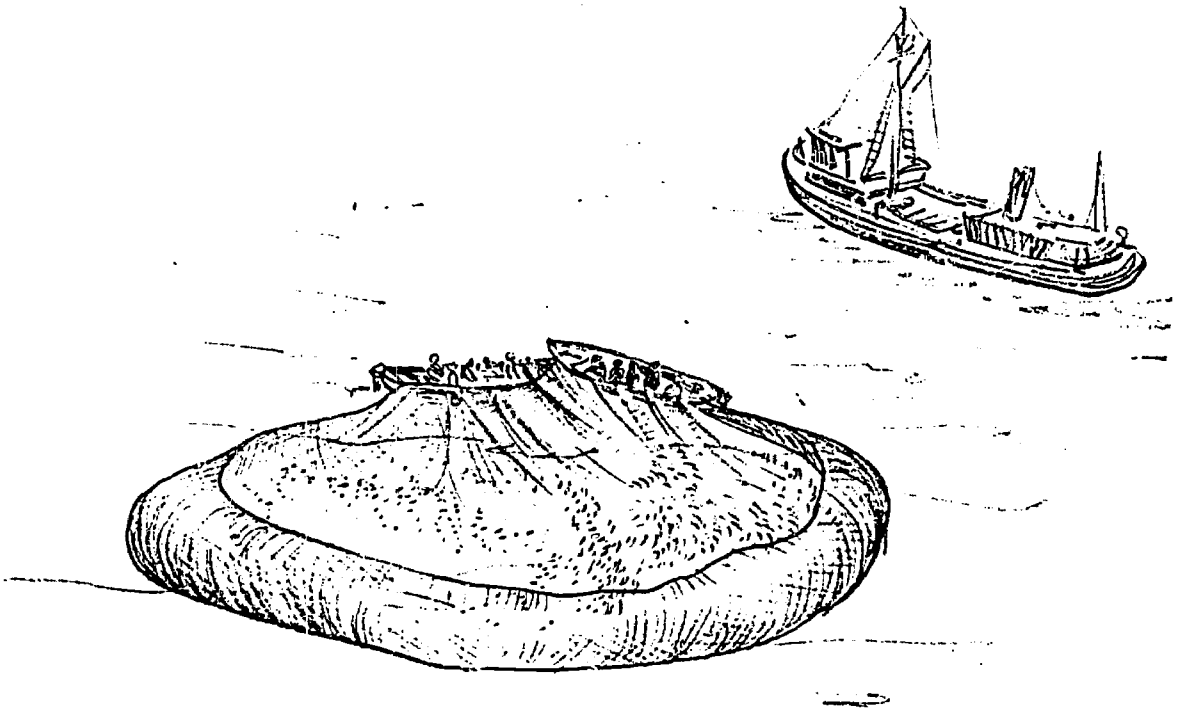
Bluefish and flounder are probably the most important vertebrate animals caught for food along the eastern shore. Bluefish are caught in gill nets. These nets allow the fish to stick their heads through, but they can go no further. If they try to back out, their gills catch on the net. Flounders are caught with trawls, pound nets and hand gigs. Hand gigs are used at night. A powerful light blinds the flounder and the fisherman can see to gig them on the bottom. Pound nets are long nets that lead the flounder to a trap bag. When the flounder swims into the net, he follows along until he goes into the trap.

The most important fishery along the east coast is for menhaden. Once menhaden were used as food, but they were so oily and bony that they didn't sell very well. Now menhaden are processed for the oil and for fish meal. Although the oil is still used, the meal is the most important. Fish meal goes into cattle feed, poultry feed and fertilizers. Modern menhaden fishing is well organized. Early in the morning, well before daybreak, the vessels leave dock. Most are equipped with radar, modern radios and powerful engines. Since before daylight, aircraft have been out scouting the ocean and have found the fish. The boats will meet the airplanes where the schools of fish are most plentiful. Some boats are capable of carrying a million fish. When the aircraft pilot spots the right school of fish, he contacts the boat and guides them near it. Two smaller boats with powerful engines are dropped off of the large vessel. They are called "purse boats" because they each carry one-half of the purse net. From the air, the fish spotter directs the purse boats, still together, toward the school of menhaden. At just the right minute the purse boats spread apart and encircle the school of fish. Although the top of the



net forms a curtain around the fish, the bottom is still open. The menhaden are kept in the net by pursing the bottom. A large weight, called a "tom" is thrown overboard. It is attached to a rope which acts as a drawstring to close the bottom of the net. Once this is completed, the large boat comes alongside. Equipped with powerful pumps, it simply sucks the fish out of the net and into the ship's hold.

When its hold is full, the boat heads for the processing plant. Here the fish are cooked in huge boilers. The oil is removed and the rest of the material is ground up into fish meal.

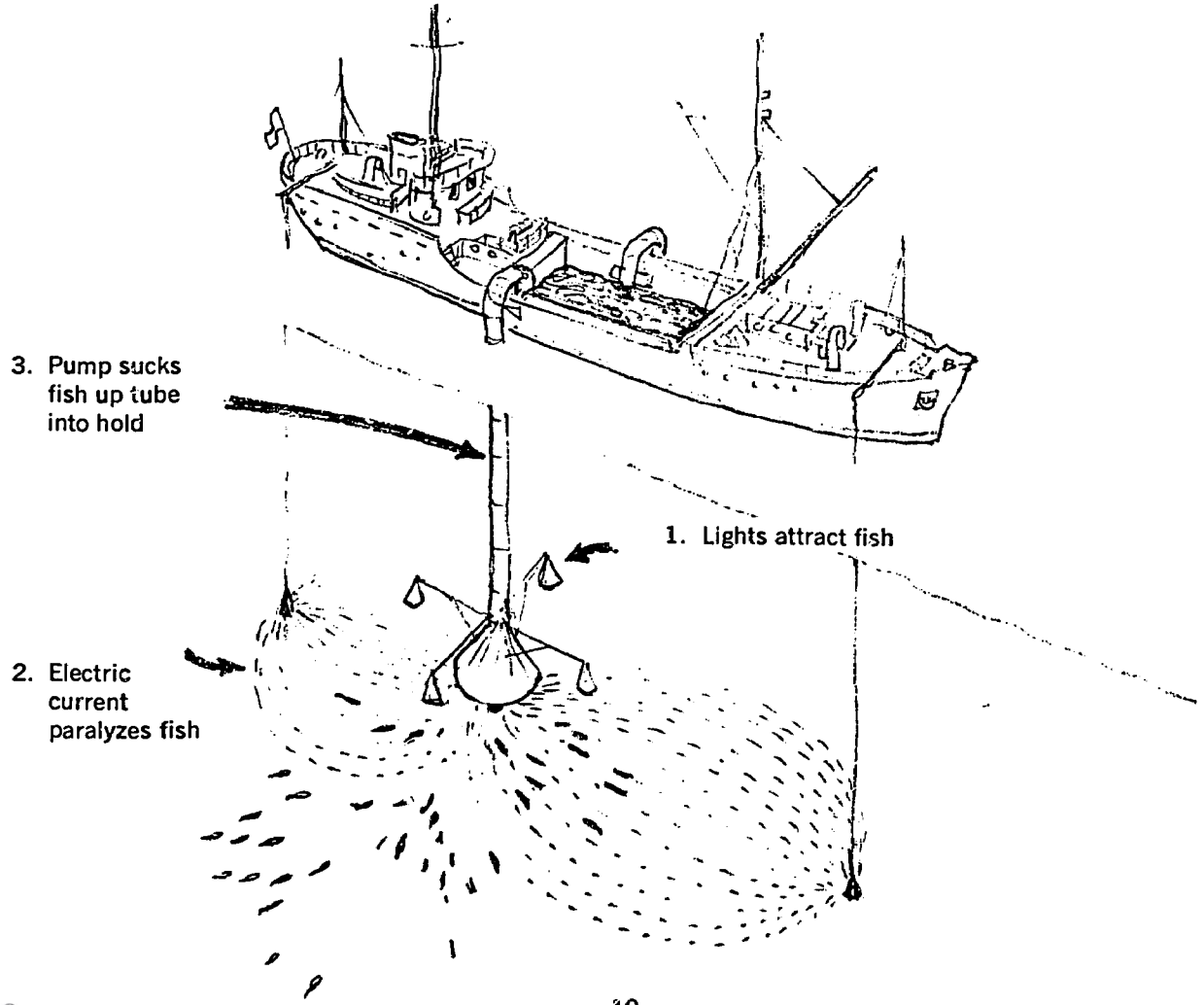


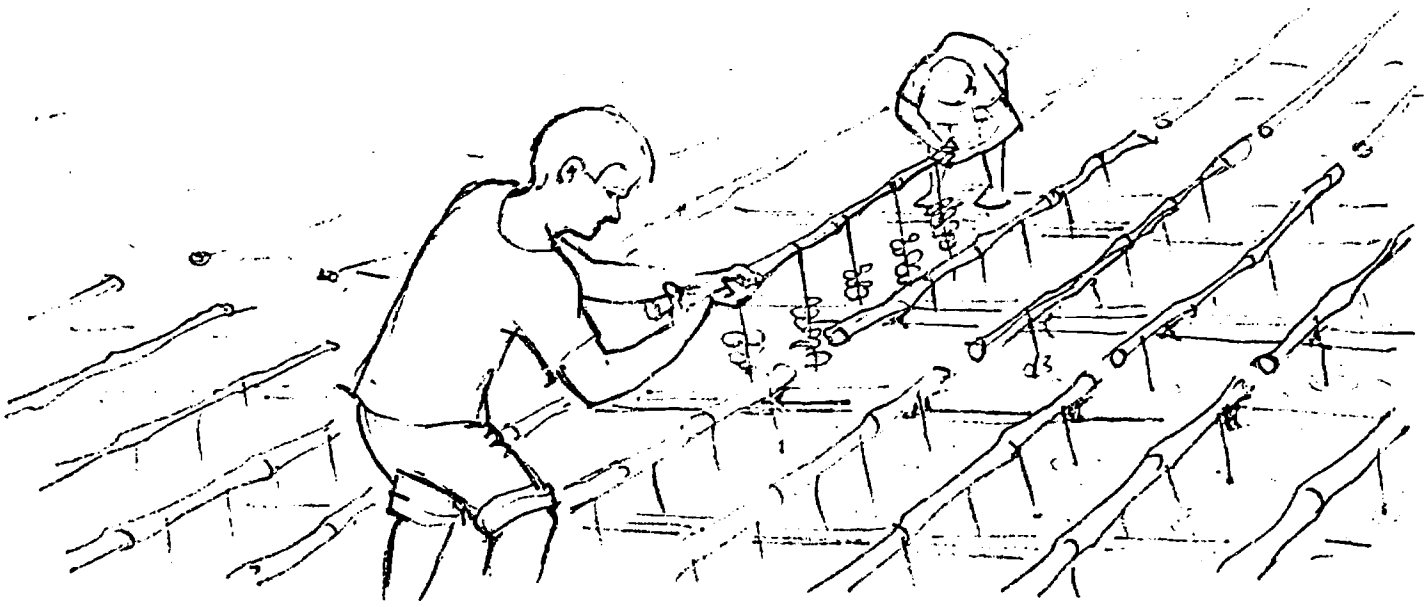
Future fishermen will be called on to supply fish to the world's growing population. In order to do this, they need better methods of catching and processing fisheries products. Scientists and technicians are working to solve the fishermen's problems.

Fisheries research vessels are looking for new fishing grounds and for new kinds of sea animals for people to eat. Other research vessels are equipped to try new methods of catching these animals.

In many cases, the eating habits of a country can be a real problem to the fishermen. Americans are beef-eaters by habit, eating fish for variety. The Japanese eat much more seafood than Americans and use other meats for variety. Some other countries use many seafoods we consider distasteful. For example octopus is a delicacy in Japan. If Americans could create a market for more seafood and other types of sea animals, American fishermen could catch more types of seafood. American eating habits must change and our fishermen must try to catch up with the rest of the world in equipment and methods.

Electricity may be important to future fishermen. Mild electrical currents attract fish. If a school of fish could be subjected to electrical current, a pump could suck the fish on board the boat. Some modern boats have electrical apparatus that direct fishes to pumps after they are caught in the net. Perhaps some day nets will not be used at all. A series of attracting lights can also lead fish into an electrical current and then to a catcher. Shrimp fishermen are experimenting with electricity too. They know that some species of shrimp bury in sand or mud and can only be caught when they come out to feed. Electrodes are placed in front of the shrimp trawl net. These electrodes emit pulses of electricity that cause the shrimp to jump up out of the bottom. They are then caught in the net.





Even if these new methods do make it easier to catch fish, fishermen still have to find the fish. Fishery biologists study the life cycles of marine organisms to see if they can find out where and when the organisms can be found. If they know what water conditions the animals prefer, then they can find out where these conditions are and find the animals.

Another way that fishermen can ease the job of hunting fish is by mariculture. Mariculture simply means farming the sea. Commercially important fresh water fish have been farmed for thousands of years. In China fishes are raised in ponds and caught when they reach the right age and size.

In salt water, the Japanese have been active in this type of fishing. They raise oysters in protected areas where they are not subjected to predators. They increase the number of places for oysters to attach by suspending wires in the water.

In the United States, small estuarine areas have been blocked off for raising shrimp. Many of the natural enemies of the shrimp are removed. The shrimp are allowed to grow to marketable size and harvested. Pompano and other edible fish have also been raised in this manner.

Processing of fisheries products must also be modernized to meet future food demands. F.P.C. (fish protein concentrate) was the result of attempts to find a way to eat the whole fish. A flour-like material comes from the processing. It can be added to bread or any food without changing the taste. It provides proteins necessary for growth that are not in plain bread.

F.P.C. is often called "fish flour". For many years, it was not legal for human use in the United States, while other countries found it a valuable addition to the diets of poor people. The laws have recently been changed and one company is producing F.P.C. for use in the United States.

These modern methods are only a few steps in the right direction. Scientists and technicians will have to develop many more ways to feed us.

One rapidly increasing use of the sea is recreation. Multitudes of people are going there to swim, boat, and fish. To the people who live along the edge of the sea this is important. Tourists bring much of the money that comes into the area. Many of the fishermen have switched from catching commercial fish to carrying others out to catch sport fish. Almost any seacoast town has a sport fishing fleet. Some boats in the fleet go after fast surface swimming fishes. They catch these by trolling artificial lures behind the boat. When the fish grabs the lure, the fisherman and boat crew have their hands full.

Other boats of the sport fishing fleet go to good bottom fishing areas. In North Carolina these boats are called "head boats". They search for rocks, or other good fish-attracting areas, with sonar. In fact, the fish can also be seen on sonar. Sonar works by bouncing a beam of sound off of objects.

WORDS YOU SHOULD KNOW:

1. Channel net: a long net, with a bag in the middle, kept open by the current; often used for shrimp.
2. Crab pot: a box-like trap for catching crabs.
3. Dredge: a metal frame and net for scraping up bottom dwelling animals.
4. Fish Protein Concentrate (FPC): flour made from fish that has no taste, odor, or color. It supplies needed proteins.
5. Fishery biologist: a man who studies the life history of organisms important in fisheries.
6. Gill net: a net used to catch fish by their gills.
7. Invertebrate: an animal without a backbone.
8. Lobster pot: a box-like trap for catching lobsters.
9. Mariculture: farming the sea.
10. Otter boards: a pair of wide door-like boards that keep the mouth of a trawl open.
11. Pound net: a long net, staked to the ground, that guides fish into a trap.
12. Processing plant: the factory where fisheries products are prepared for use.
13. Purse boat: one of two boats used to set the purse seine.
14. Purse seine: a net used to completely surround fishes by closing the bottom.
15. Trawl: a net pulled on the bottom behind a boat.
16. Tom weight: a large weight thrown overboard to close a purse net.
17. Trolling: pulling an object through the water to atttract fish.
18. Vertebrate: an animal with a backbone.

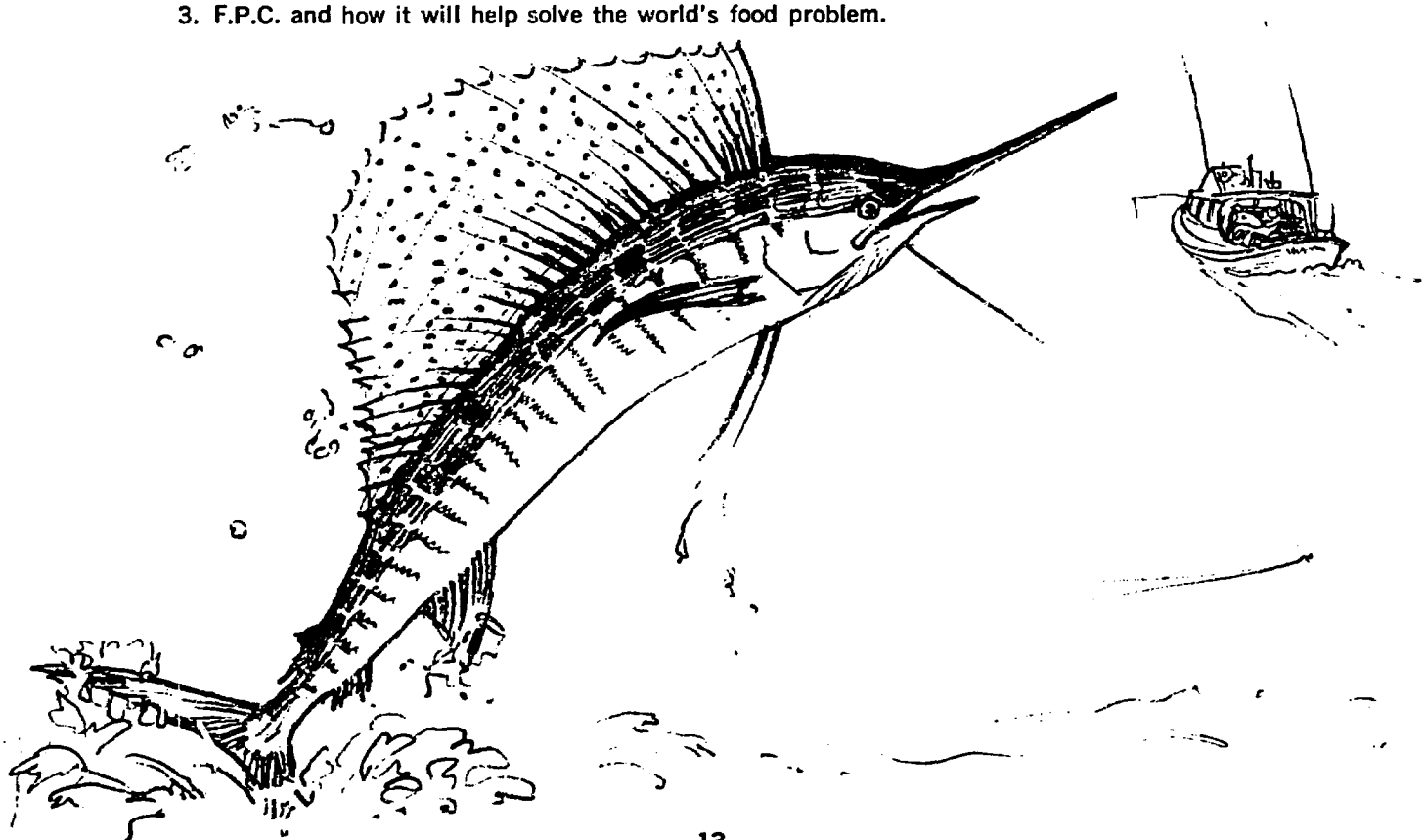
NOW YOU CAN ANSWER:

1. The mouth of trawl nets are held open by _____ boards.
2. Lobsters can be caught off North Carolina, but fishermen catch most of them in _____ and _____.
3. _____ are the most important group of invertebrate animals caught for food in North Carolina.
4. Flounders can be caught with trawls, hand gigs and _____ nets.

5. The most important fisheries on the east coast are for _____.
6. Menhaden are processed to obtain _____ and _____.
7. In order to close the bottom of a purse seine, fishermen throw a weight called a _____ overboard.
8. Modern fishing boats may use the power of _____ to direct fishes to giant pumps.
9. Fishery biologists study the _____ _____of marine organisms.
10. Farming the sea is called _____.
11. F.P.C. stands for _____ _____ _____.

NOW YOU CAN DISCUSS:

1. Modern methods of catching menhaden.
2. Ways in which man may soon improve fisheries.
3. F.P.C. and how it will help solve the world's food problem.



TRANSPORTATION

Not too long ago man took his first trip on the water. He was probably perched on top of a log he found floating down the river. It was a very wet trip. Soon he discovered that if he tied several logs together, or hollowed out one log, he could stay dry. The so-called "dug-out canoe" was so successful that it is still used in may parts of the world for trade, transportation and fishing.

There were probably many variations of these canoes. Polynesians in the South Pacific build their dug-out canoes with outriggers. These are extensions with floats that help keep the canoe from turning over easily.

Log rafts were also successful. In fact, Thor Heyerdahl set out to prove that Polynesians could have come from South America. He built a raft made out of balsa logs, which float very well. With only the power of a single sail and the ocean's current, he sailed 6,000 miles across the Pacific Ocean. He named his raft "Kon Tiki". The "Kon Tiki" proved that man could cross the sea on a raft in the direction of prevailing winds and currents.

Sailing vessels were the first to make intercontinental travel back and forth possible. When man learned to use the sail, he opened up new areas for trade and discovery. Sailing ships carried cargo to every port in the world. The most famous of the sailing ships were the clipper ships. Built by Americans, they were the fastest of all the freighter sailers and famous all over the world.

Sailing ships were also used in wars, but their most important use was for commerce.

Sail power was a means of propelling the vessel that required a crew with great skill and knowledge of wind and weather. Sometimes sailing vessels were becalmed for days between ports. When they left port they depended on the outgoing tide currents to carry them to sea. Modern vessels can go and come as they please. Their power is an engine that propels the ship no matter what the tides and currents are doing.

With these modern methods of propelling ships came faster and more efficient means of transporting cargo. Today vessels may load and unload their cargo at facilities called port terminals.

Boats come from all over the world to load and unload cargo at ports.

Ships approaching port are met at sea by a harbor pilot. The harbor pilot guides the ship into the port. Tug boats wait near the wharf to help push the ship into its berth. When the ship gets into the proper spot, stevedores moor the boat to the wharf with large ropes called "hawsers". The hawsers are fastened to several posts called "stanchions". The hawsers will have some flat metal disks attached to them. These are called rat shields because they keep rats from climbing on or off the ship.

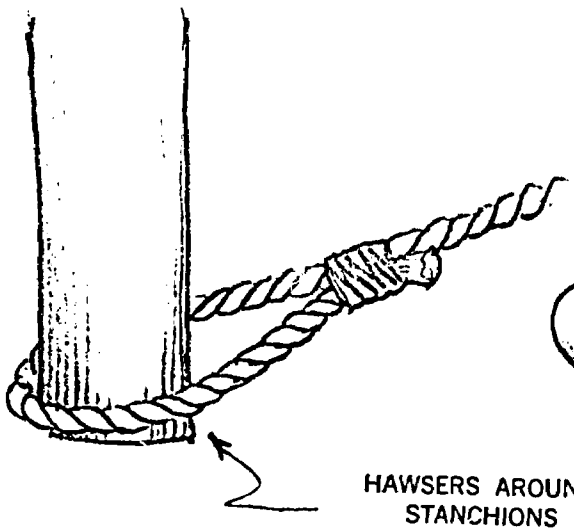
Before anyone can leave the ship, customs agents and port authorities inspect the ship's cargo. Then the gangway can be lowered so the captain and crew may come ashore. You can tell what country the ship is from by looking at the flag flying from its stern. All ships in port wear their country's flag on the stern. The country's flag they are visiting flies from the mast. The ship's name is painted on the bow and the home port on the stern. You can also tell what company owns the ship by looking at the funnel or smokestack. All ships belonging to the same company have their funnels painted the same way.

If the ship is heavily loaded the water level will come up to the plimsoll line. Ships must be loaded only enough that the plimsoll line will not be under water. Draft marks on the bow and stern indicate how much of the ship is below water.

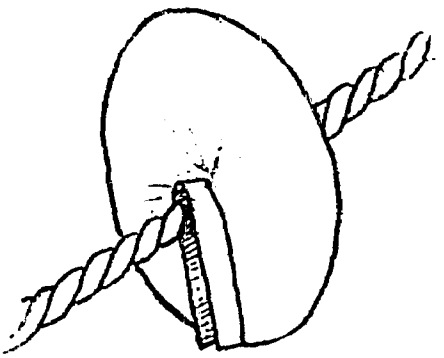
Ships coming to the port may be freighters or tankers. Tankers carry liquids or powder-like freight in their holds. The hold is where the cargo is stored. Tankers may carry gasoline, oil, phosphate, or even molassas. Freighters carry solid things like tobacco, lumber, fruit, and machinery. You can tell if a ship is a freighter or tanker by looking at is superstructure.

The superstructure is all of the ship's structure above the main deck. A tanker's deck is plain, but a freighter's deck is cluttered with tall posts and machinery. The posts are actually two posts. The vertical or up and down post is called the "king post." The horizontal one near the bottom of the king post is called the "boom." These posts are connected by cables to a piece of machinery called a "winch." The winch is a strong motor that pulls the cable by rolling it on to a round drum. The winch and the king post work together to lift cargo in and out of the ship's hold. Tankers use large pumps and big pipes to get their cargo in and out of the hold.

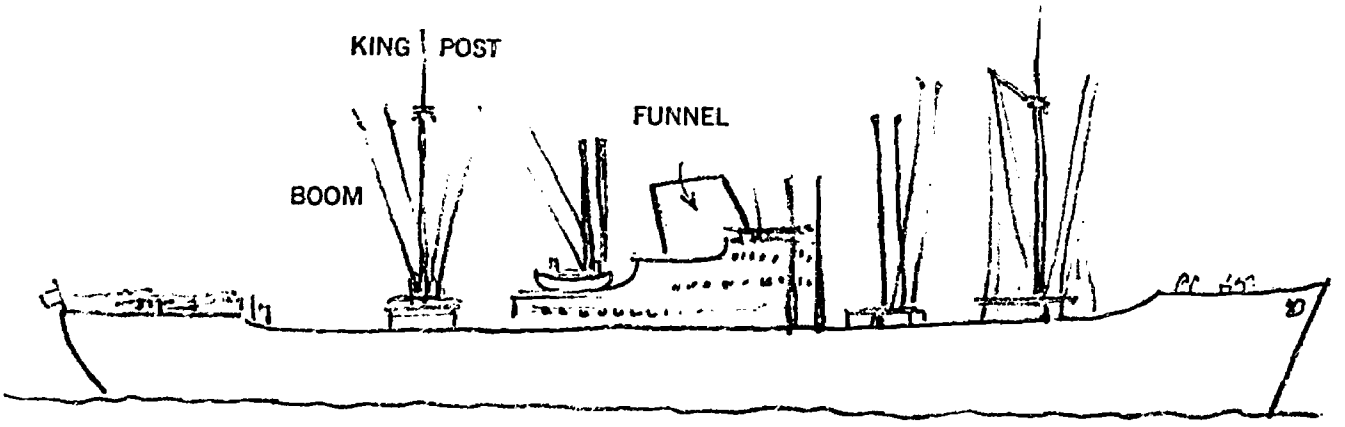
The large house-like structure above the deck is where the crew lives and the ship is operated. It contains the galley (kitchen), the sleeping quarters, the head (toilet), showers, the chart room, the helm (where the ship is steered), and the bridge where the captain can walk outside and see the whole ship.



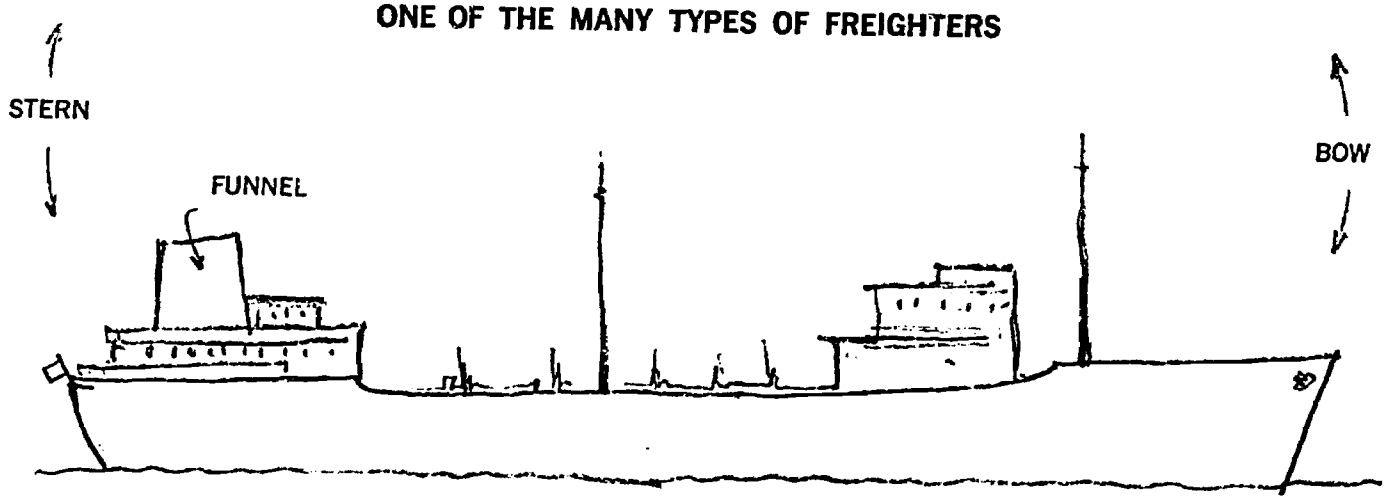
HAWSERS AROUND STANCHIONS



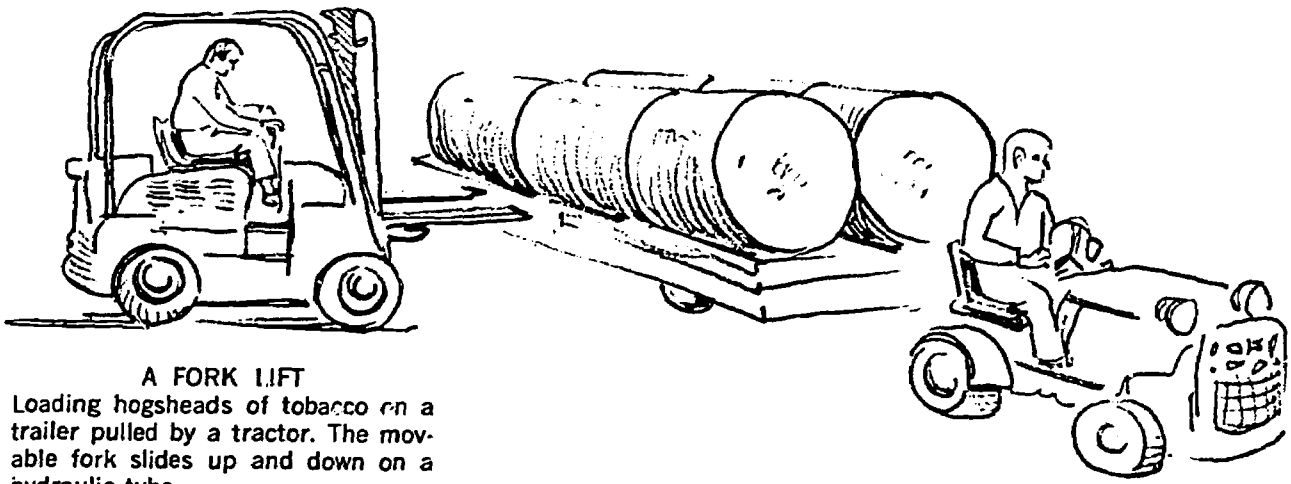
HAWSER PASSING THROUGH A METAL RAT SHIELD NEAR THE BOW OF A SHIP



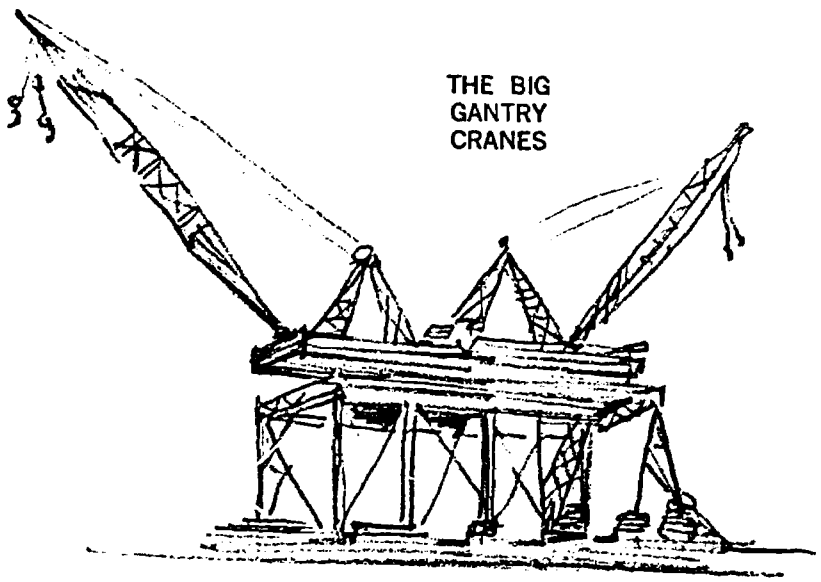
ONE OF THE MANY TYPES OF FREIGHTERS



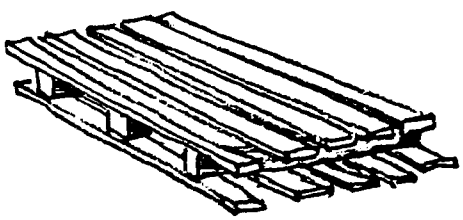
TANKERS HAVE MUCH OF THEIR SUPERSTRUCTURE AFT



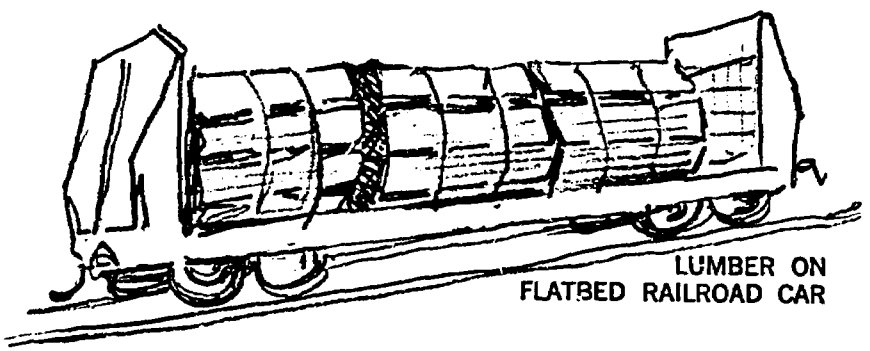
A FORK LIFT
Loading hogsheads of tobacco on a trailer pulled by a tractor. The movable fork slides up and down on a hydraulic tube.



THE BIG GANTRY CRANES



To pick up flat boxes, fork lift operators use a palette under it.



LUMBER ON FLATBED RAILROAD CAR

Under the main deck of the ship and usually near the stern is where the machinery that drives the ship is found. The ship's electricity is also generated by this machinery. The machinery turns a large shaft that is connected to the propeller. Behind the propeller is the rudder. The rudder steers the ship. It is turned at the helm.

When a freighter is unloaded its cargo is temporarily stored in long buildings called "transit sheds." It can also be stored for a long period in warehouses. Unloading and moving the cargo is the job of the longshoremen. They use modern methods to handle the cargo.

If the cargo is containerized for protection, or very heavy, the king posts may not be able to lift it from the hold. Huge gantry cranes on the side of the wharf can do the job. Gantry cranes look like long-legged spiders on wheels. They can lift cargo separately or together. Each crane operator sits high on the crane in the cab.

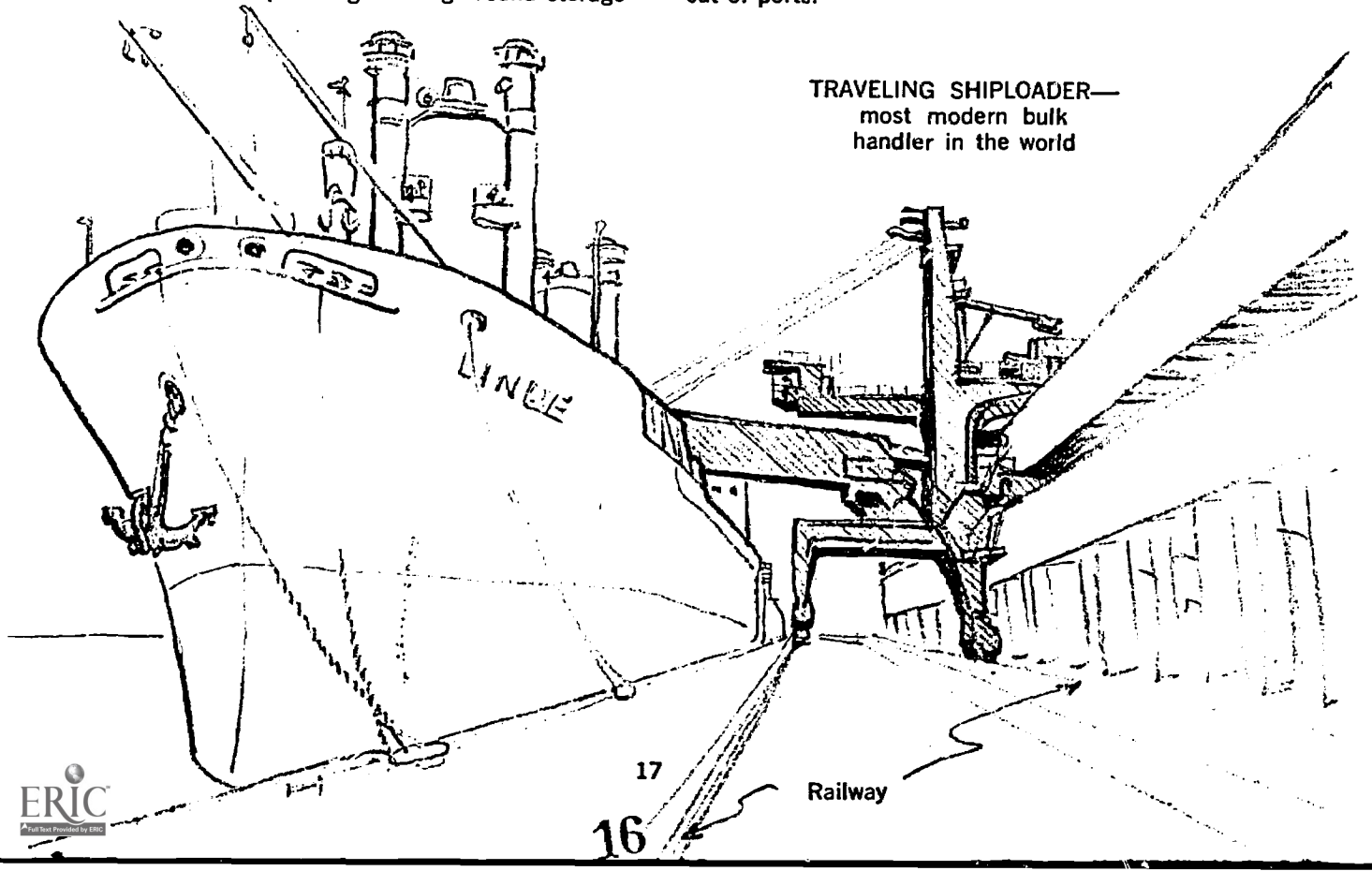
Once the cargo is out of the boat, it is carried to storage by fork lifts, or tractors pulling trailers. Fork lifts can pick the cargo up as high as ten feet. This way it can be stacked in the warehouse to provide more space. The trailers are usually loaded by the fork lifts. They carry the cargo to storage sheds away from the wharf area.

Tankers store liquid cargo in huge round storage tanks. Tankers with powdery cargo, such as phosphate or fish meal, store their cargo in special warehouses. This kind of cargo is usually unloaded by conveyer belts that transport it to waiting trucks or directly to the warehouse.

Some cargo from foreign countries may be infested with insects or other animals. If these are allowed to escape, they can cause great damage to farm crops, other animals, forests, or even diseases to humans. Of course we have plenty of insects and diseases of our own, but we fear strange new ones because they sometimes cause far more damage in a foreign country than in their home country. The port Health Officer and Customs Officer order this cargo fumigated. The cargo is placed in a large steel chamber full of a poison gas. The gas kills the harmful organism.

Since ports store so much valuable equipment, they must be protected. A well-trained security force is on duty twenty-four hours each day. They are trained not only to protect the cargo, but to watch for anything that may cause injury to the people that work at the port.

All ports are provided with railroad sidings. Trains can move right up to the warehouses. This makes it easier to load and unload. From a siding, cargo is carried all over the country to be used in business and industry. Trucks also carry much cargo in and out of ports.



Aboard: on or into a boat.
Aft: toward the stern.
Ahead: toward the bow, forward.
Anchor: a device to hold a boat in position.
Antenna: a metal device for sending or receiving radio waves.
Berth: a place where a ship comes to the wharf.
Boom: a long rod projecting from a mast to support or guide an object to be lifted.
Bow: the front of a boat.
Bumper: a device to cushion boats when they bump into a dock.
Cargo net: a large net used to catch cargo accidentally dropped.
Cast off: to untie mooring lines.
Compass: an instrument that shows direction.
Chandler: a man that sells supplies to ships.
Conveyer belt: a wide belt used to carry cargo onto a vessel.
Containerized shipping: freight put in large packages so that it can be protected from damage.
Davit: support that holds a life boat.
Deck: the floor of a boat.
Draft: depth of water needed to float a boat.
Ebb: an outgoing tide.
Fathom: a nautical measure of six feet.
Fender: bumpers placed along a boat to keep it from rubbing something outside.
Flag: on the stern is the ship's country, on the mast is the port's country.
Flood: incoming tide.
Forward: toward the bow.
Freighter: a ship that carries freight.
Fumigate: to apply a gas to kill organisms.
Funnel: the smoke stack of a ship.
Galley: the place where food is prepared for eating.
Gangway: a walkway from the dock to the ship's deck.
Hatch: the cover of a hold.
Hawser: a large rope used to moor ships.
Head: toilet compartment.
Helm: the place where a ship is steered.
Hold: large room for holding cargo.
Hull: the body of a boat.
Keel: the "backbone" of a boat running fore and aft along the bottom.
King post: a mast-like post that holds the cargo boom.
Leeward: side protected from the wind.
Life boats: small boats used in case of emergencies.
Log book: a diary of happenings aboard.
Mast: a long up and down pole to hold ship's equipment.
Mate: next in command to the captain.
Moored: tied up.

Plimsoll marks: marks on the side of a ship that show how deep the cargo load pushes the boat under water.
Port: left side of the boat.
Pitch: the up and down movement of the bow and stern.
Rat shield: a metal shield to keep rats from coming on board or leaving the ship.
Roll: the sideward rocking of a boat.
Rudder: a flattened structure found at the stern of a ship and used to turn the ship.
Stevedore: men that unload boats.
Sound: to find the depth of water.
Starboard: right side of the ship.
Stern registry: the name of the ship and its home port written on the stern.
Superstructure: all structures above the ship's main deck.
Stow: to put away.
Tanker: a ship that carries liquid cargo.
Transit shed: a large warehouse for temporary storage of cargo.
Trim: to arrange the weight of a boat so it balances.
Wharf: a dock.
Winch: a machine for pulling.
Windward: on the side toward the wind.

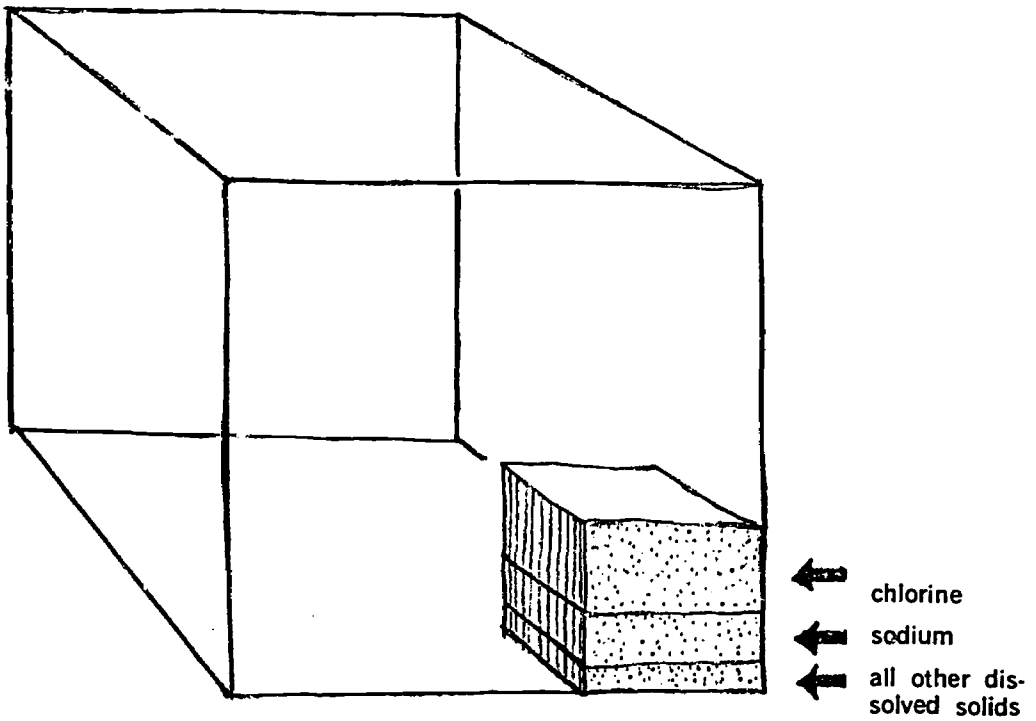
NOW YOU CAN ANSWER:

1. Extensions on canoes are called _____.
2. Thor Heyerdahl sailed his log raft "_____" from Peru to the Polynesian Islands.
3. The fastest of the American sailing cargo ships were called _____ ships.
4. Men that guide ships into ports are called _____.
5. A ship's smokestack is called its _____.
6. The _____ line shows if the ship has too much cargo on board.
7. The king post, boom, and cables lift cargo with the help of a strong engine called a _____.
8. All of a ship's structure above the main deck is called the _____.
9. Cargo is temporarily stored in _____
10. Cargo treated with gas to kill harmful insects has been _____.

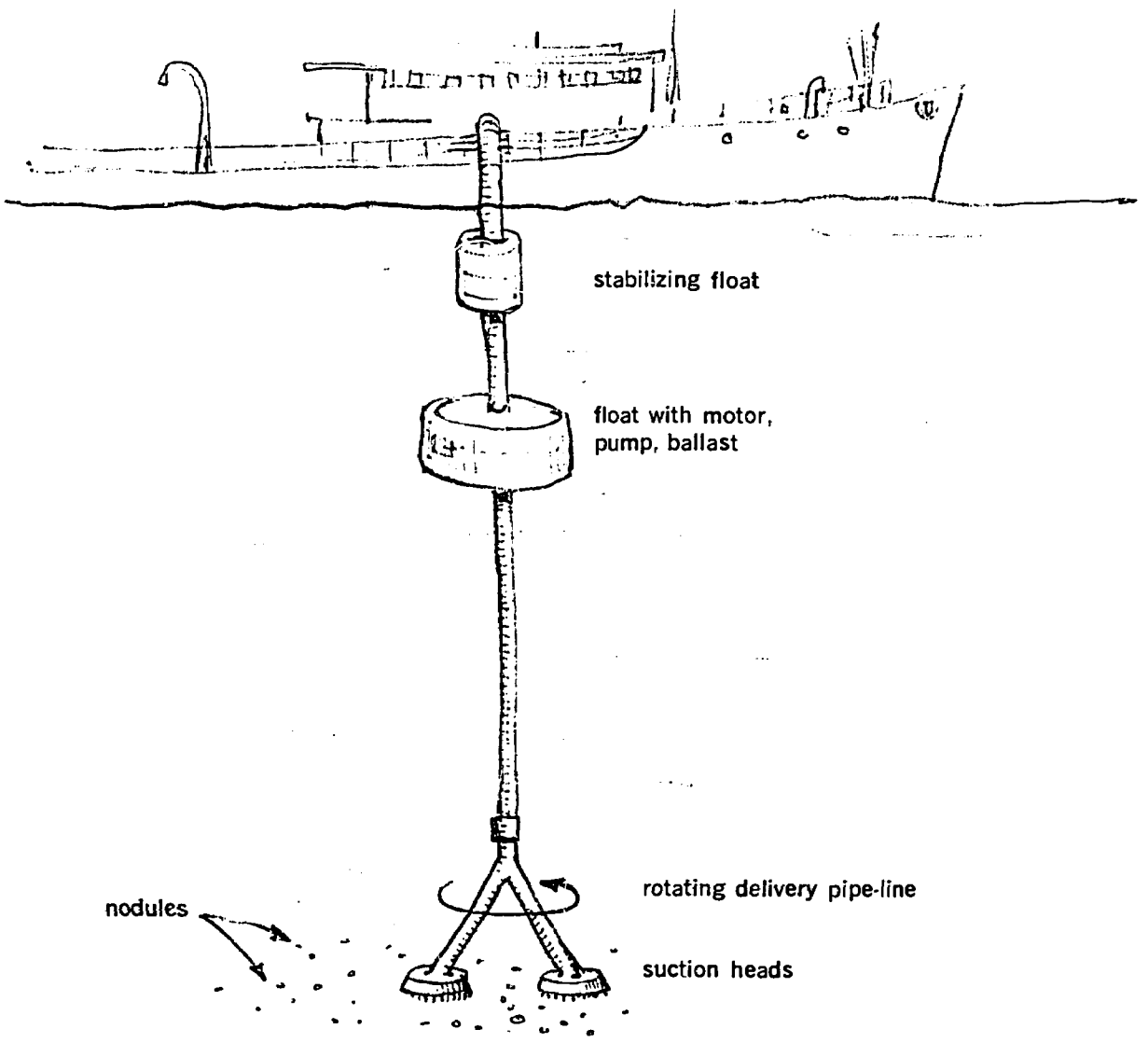
MINERALS

Besides food and recreation, the sea can give man the crude oil and minerals that he needs. At present, oil and minerals are taken from the land, but how long will these deposits last? Scientists don't believe they will be adequate much longer.

The sea is a huge storehouse of minerals and the sea's floor may contain all the oil deposits man needs. It is estimated that the sea contains about 300,000,000 cubic miles of water. Think of a box full of sea water with each side one mile long (about ten city blocks). If the water could be removed there would be about 89,500,000 tons of chlorine, 49,-500,000 tons of sodium, 6,125,000 tons of Magnesium, 306,000 tons of Bromine, 38 tons of Gold and 1½ tons of silver. The problem is that these minerals are hard to get out.



Another source of metal in the ocean may come from rock-like formations on the ocean's floor called "nodules." Oceanologists using deep dredges find them abundant in some places. The nodules commonly contain manganese, cobalt, nickel and copper. The problem with the nodules is how to get them up from thousands of feet of water. John Mero, a mining engineer, may have the answer. He believes that a giant vacuum cleaner-like machine could sweep the ocean floor, picking up the nodules and pumping them into a barge at the surface. The barge would be taken directly to the refinery.

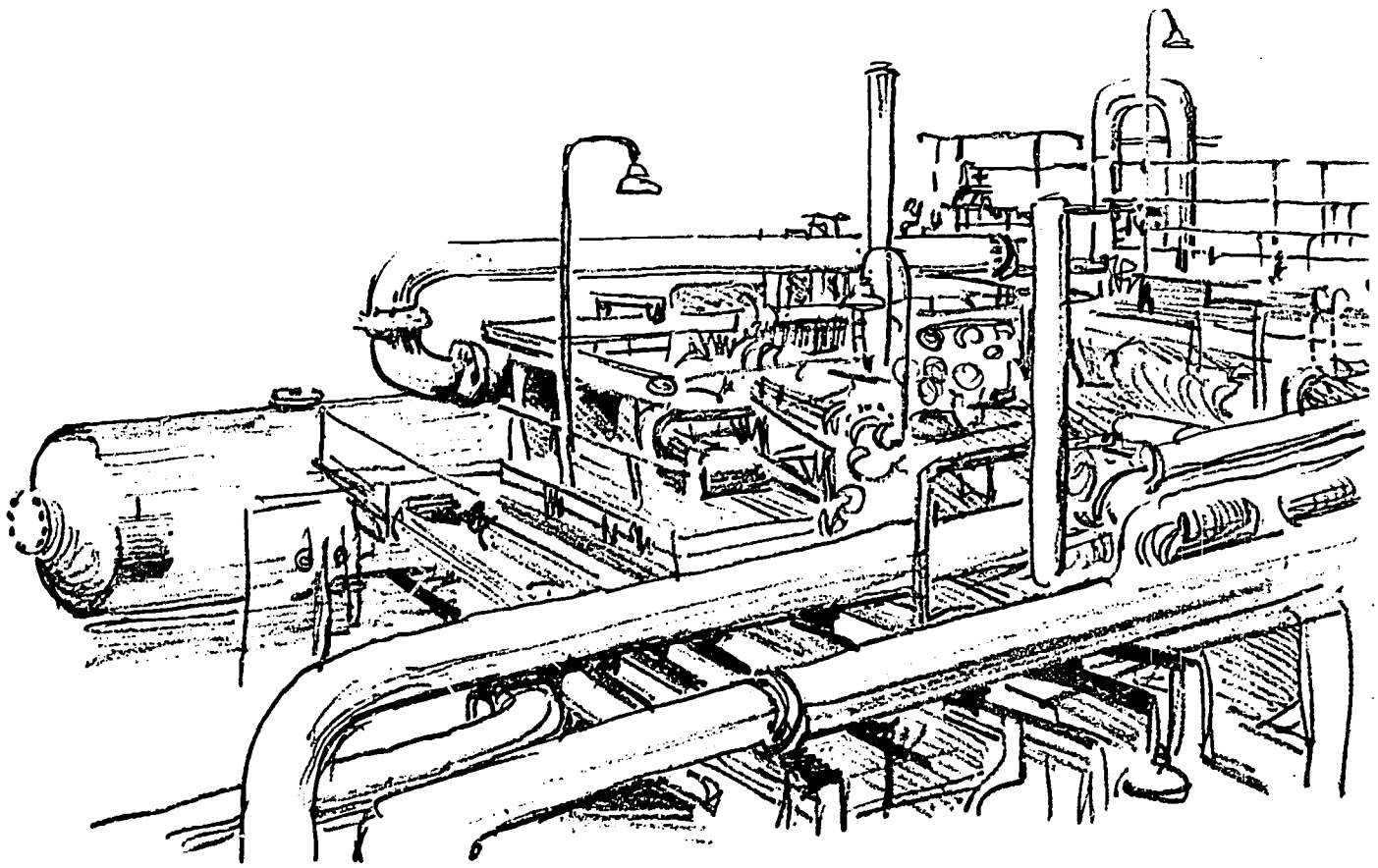


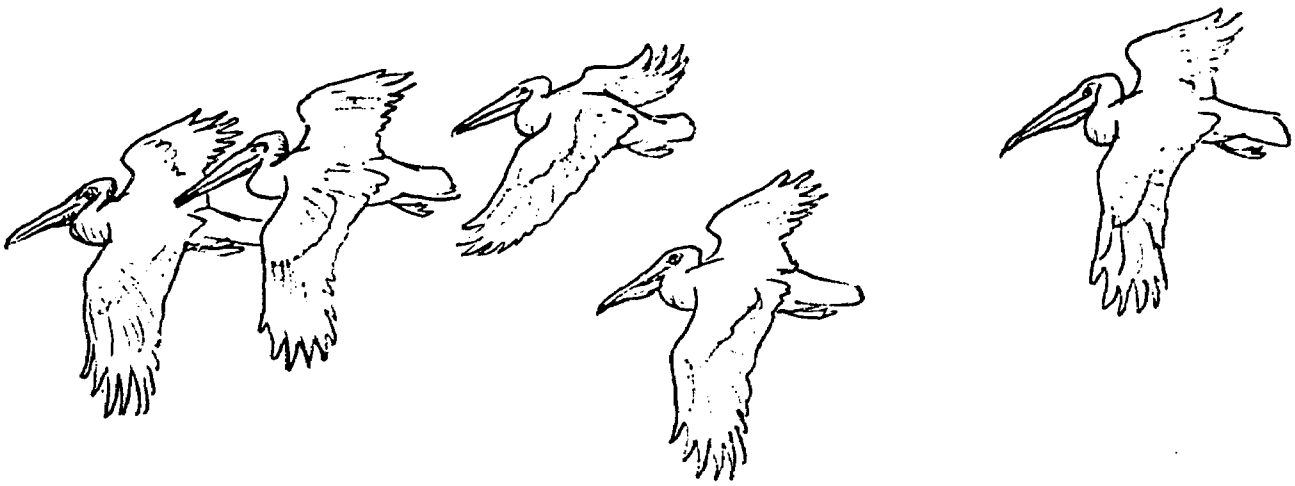
Most of the minerals in the sea come from the land. They come to the sea dissolved in river water, from volcanic eruptions and from the dissolving of ocean floor materials. The minerals now in the sea have been accumulating for many millions of years.

Water shortage is a problem in many parts of the world, which are often close to the sea's edge. With all of that sea water available, it seems likely that some of it could be used for drinking. Sea water can be made fresh by distilling it to remove the minerals. The only problem is that it takes so much time and is so expensive. The process is called "desalination" (pronounced de-sa-li-nashun). The sea water has to be heated and the evaporated water collected for drinking. There are several desalination plants in the United States.

The most ancient sea water mining was done to get sodium chloride (table salt). Sea water was collected and allowed to evaporate, for when the water was gone the salt was left behind. Of course there are other elements mixed with the sodium chloride, and table salt has been processed to remove these. The large amount of sodium chloride is what makes the sea taste salty.

Although modern man still uses this method to obtain sodium chloride, he has developed some better ways to get other materials out of sea water. Magnesium and bromine are taken from the sea by using other chemicals to attract them. Water is pumped through a plant and the minerals are extracted. This is much faster than evaporating the water and then separating the magnesium and the bromine from all the other minerals left behind.





CONSERVATION

Marshes and estuaries are great nursery grounds for many commercial and sport fishes. Shrimps, crabs, clams, oysters, and scallops thrive there. Since rivers empty into the estuaries, any pollution carried by the rivers may kill these animals. Much of the nutrients necessary for plant and animal growth form in marshes. If they are filled in for building houses, the young animals will no longer be able to get needed food.

Besides creating pollution, man may damage his fishing grounds by overfishing. Some fishery biologists believe that shrimp, blue crabs, menhaden, and even trout have been overfished. They say that if too many are caught there will not be enough left to reproduce young.

State and Federal governments try to keep overfishing from happening by imposing regulations on certain fishery products. Regulations limit the amount and times of year that the fishermen can catch these animals. In addition to the regulations, commercial fishermen are required to buy a fishing license. The money for the fishing license goes to scientists trying to find ways to help increase the fishing.

Sports fishermen are also limited by certain regulations. Usually these limit the fish as to size and how many they can catch. Sports fishermen do not have to have a license in marine waters. Certain federal tax supplies money for research of sports fishes.

Americans are finally becoming aware of the damage they are doing to their marine environment. With better understanding we can save our natural resources from destruction.

The sea is unspoiled now. Man must do everything in his power to keep it this way. Already the coastal waters in many places are showing signs of damage, and the government is alarmed. This does not mean that man should not fish, mine or otherwise use the sea. It means that man must practice conservation. Conservation means using natural resources wisely. Natural resources are the plants, animals, and minerals. Wise use does not mean no use at all. To keep civilizations operating, man needs to use these natural resources for food, fuel and shelter. However, using too much of a natural resource destroys its future value to mankind. For instance, open pit mines are dug at the surface. These mines ruin a lot of good land. Forests cut bare of trees usually erode good topsoil and may even cause floods. Natural water sources are used in industry. When the industrial plants put the water back into the stream, it may go back polluted. There are many ways water can be polluted. Pollution is changing the water in any undesirable manner. Silt, oil, detergents, sewage, pesticides and even heat are a few of the things which can cause problems when added to water.

If the bottom is dredged or marshes covered, then it is pollution. Man must find out if the damage done by using resources in this manner is greater than the benefit of using the resources.

NOW YOU CAN ANSWER:

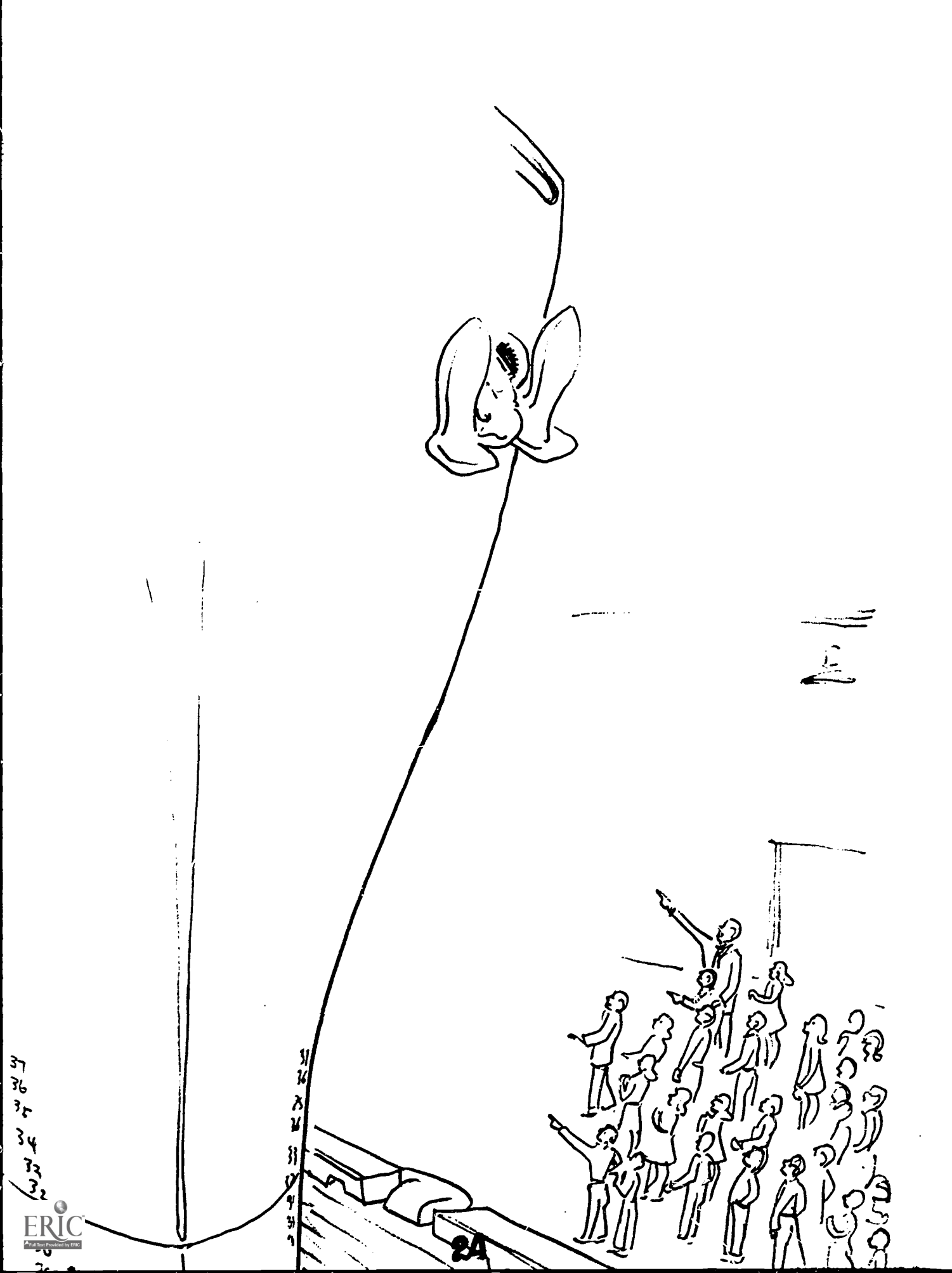
1. The most ancient sea water mining was done to obtain _____.
2. Manganese _____ are found on the deep ocean floors.
3. Minerals in sea water come from _____, _____, _____.
4. The process of removing minerals from sea water to leave drinking water is called _____.
5. Using natural resources wisely is called _____.
6. When water is changed in any way which we consider undesirable we say that it is _____.

NOW YOU CAN DISCUSS:

1. Why marshes are important to commercial and sport fishes.
2. How John Mero has suggested we get manganese from the ocean's bottom.

WORDS YOU SHOULD KNOW:

1. Conservation: The using of natural resources in such a manner as to keep soil available.
2. Desalination plant: A factory to remove the minerals from sea water.
3. Distillation: The process for removing materials from a solution by evaporation.
4. Nodule: A small rounded lump of mineral.
5. Sodium chloride: The chemical compound we use as table salt.



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