

A Cornell Cooperative Extension Publication  
INFORMATION BULLETIN 203

# HANDLING YOUR CATCH



*A Guide for  
Saltwater Anglers*

Ken Gall  
New York Sea Grant  
Extension Program

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# Introduction

Anglers sometimes wonder why the fish they catch don't taste as fresh as the fish served in their favorite restaurants. They may also be puzzled and disappointed when what seem to be perfectly good fish go bad in the refrigerator or freezer. Fortunately, it's easy enough to avoid these unhappy experiences by using good handling techniques.

Fish is highly perishable food, and storing or processing it improperly can cause serious problems. A successful fishing trip requires planning. Equipment for handling the catch is as important as tackle and other gear. Home processing and storage methods also affect how well fish keep. This publication should be helpful to anyone who enjoys the sport of saltwater fishing. It explains the principles of careful handling and describes how to maintain the quality of the various fish likely to be caught in the middle and northern Atlantic Ocean.

Of course, every fishing trip is different. Fishing locations, the species sought, the weather—many things can vary. It will not always be possible to use all the suggestions offered here. With a basic understanding of good handling practices, however, and with a little planning and creativity, you should get much more enjoyment from each of your fishing expeditions—and a great deal more satisfaction from the fish you bring home.

# Part 1

## Basic Fish Handling

### Fish Biology

Good handling practices—techniques for keeping fish fresh after they are caught—are based on the principles of fish biology. To understand why proper fish handling is important, a basic understanding of fish biology is helpful.

Although saltwater finfish come in many shapes, sizes, and colors, they do have several things in common. They all have some type of backbone, they all breathe through gills, and they are all cold-blooded (Some species of tuna and shark maintain a body temperature higher than that of the surrounding water.) Recreational anglers most frequently encounter two classes of fish.

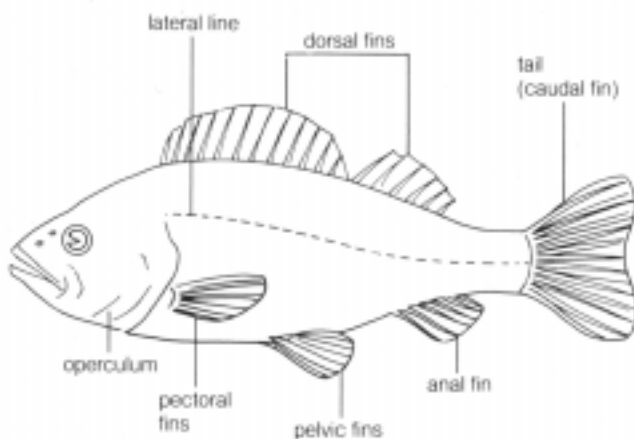


Figure 1. A Bony Fish

Bony fish have a backbone and a skeleton made of bones. Most of the familiar commercial species, such as cod, flounder, and bluefish, are bony fish. Cartilaginous fish, or Elasmobranch fish, have a skeleton made of cartilage instead of bones. This class includes sharks, dogfish, rays, and skates.

The part of the fish usually used for food is the muscle. Other parts, such as roe, liver, and the fins of sharks, are sometimes eaten, but most fish is consumed as fillets or steaks. Fish muscle is actually small blocks of fibers bound together by connective tissues. When cooked, these blocks of fibers flake. The raw muscle of fresh fish is translucent

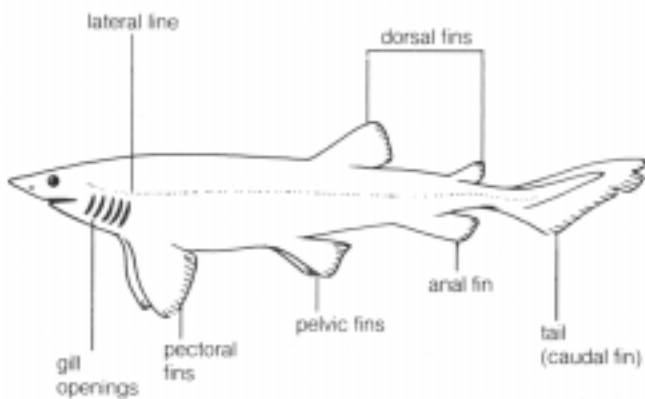
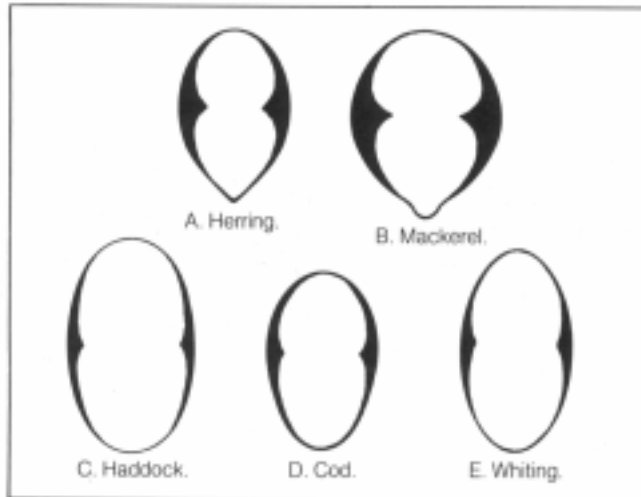


Figure 2. An Elasmobranch (Cartilaginous) Fish

and slightly rubbery, and its color varies. Most species have white or light-colored flesh, but some species, such as tuna, mackerel, and bluefish, have darker flesh. Generally, darker flesh has a higher fat content. Most fish have a layer of dark, fatty tissue just under the skin, but the amount varies enormously among species.

Fish use darker muscle for steady, continuous swimming. The lighter muscle serves as an energy reserve for sudden bursts of speed. Active fish like bluefish and tuna have more dark muscle, while fish that spend much of their time near the sea floor—bottom fish like cod and flounder—have little dark muscle.

Fish have very active digestive systems. They do not chew their food, and they can gorge themselves when a large amount of food is available. Feeding causes digestive enzymes to pour into their stomachs, and the digestive process accelerates greatly when they feed heavily.



**Figure 3. Sections Through the Body of Several Species Showing Depth of Dark Muscle**

## Fish Composition

Fish muscle is mostly water, protein, and fat. The protein content of fish varies, but it generally amounts to 15 to 20 percent of the tissue. Water and fat account for most of the remaining 80 to 85 percent. Fat content varies greatly among species and fluctuates seasonally within species. Lean fish like cod and flounder generally have less than 2 percent fat; fattier species like mackerel, bluefish, and tuna may have from 5 to 30 percent. Fat content depends on the season and on the fish's size, age, and sex. It tends to be higher during warmer months, when food is more plentiful.

Fish provides important nutrients for the human diet. Fish protein is a complete protein that contains all the essential amino acids. It is also easily digested. The fat in fish is highly unsaturated, and research has shown that this type of fat can be associated with a reduced risk of coronary disease. Most fish have a low sodium content, and most species can be used in low-sodium diets. Fish are a good source of other minerals—large amounts of phosphorus, potassium, and iron as well as the trace minerals iodine and fluoride. Lean fish contain adequate amounts of the B vitamins, and fatty fish are good sources of vitamins A and D.

## How Fish Change After They Are Caught

Changes take place in a fish after it is caught because of its biological composition and its environment. These changes begin when a fish is hooked, and they continue after it dies.

When a fish is hooked, it is engaged in a struggle for its life. It gets energy for this struggle from the glycogen in its muscles. (Glycogen is the animal kingdom's version of starch.) The longer the fish struggles, the more it depletes its energy reserve. This depletion can cause physiological changes. The fish's flesh may lose some of its natural sweetness, and metabolic products that can affect its flavor and texture begin to accumulate. These changes begin even before the fish is landed. Thus, even though a good fight is important to the angler, a fish that will be used for food should be landed quickly.

As soon as a fish dies, an irreversible spoilage process begins. This process occurs through the activity of enzymes and bacteria. Enzymes that normally regulate a fish's metabolism can work unchecked after it dies. Digestive enzymes may begin to digest the fish itself, causing belly burn or softening of the flesh around the gut. This is especially likely if a fish is caught while feeding, since its digestive enzymes

will already be active. Other enzymes in fish muscle can also begin to affect the flavor and texture of the fillet. These enzymes work rapidly at warm temperatures.

Fish are also subject to bacterial degradation after death. Natural barriers that protect fish while they are alive break down when they die. Bacteria from the environment and the gut can grow and multiply in fish tissue. This activity diminishes fish quality and eventually causes spoilage. Bacteria also grow rapidly at warm temperatures.

Finally, the highly unsaturated fat in fish is also affected by oxygen in the air. Oxygen reacts with this fat to produce the odors and flavors associated with rancidity. Fat oxidation can be a serious problem if the fish is to be frozen or stored for very long. This is one reason why fattier fish like bluefish do not remain in good condition during frozen storage as long as leaner fish like flounder.

### Handling Your Catch

Many fish are wasted because of mishandling. The quality of the fish you bring home ultimately depends on how far the normal spoilage processes have progressed. Although you cannot stop these processes, by handling your catch properly you can control the rate at which they occur.

### Temperature Control

What will slow a fish's natural deterioration? The factor that is easiest and most important to control is temperature. Try to keep the internal temperature of fresh, unfrozen fish as close as possible to 32° F (the temperature of melting ice). The best way

to do this is to pack fish in ice or ice water that is 35° F or colder. Ice cools fish from the outside, and it can take considerable time for the center of a large fish to reach 32° F. Make an effort to store fish on ice as soon as possible for complete and rapid cooling.

Table 1 gives the shelf life of lean fish at various storage temperatures. ("Shelf life" means the amount of time before fish is judged unacceptable by those who taste it.)

Temperature control is even more important if you plan to refrigerate fresh fish for several days or freeze it. At summer temperatures above 80° F fish can lose most of its shelf life in a few hours. Cool your catch quickly to keep it from deteriorating to an unacceptable level of quality before it is refrigerated or frozen.

### Ice

Ice is the easiest and, usually, the least expensive way to cool fish. As it absorbs heat from the fish or the environment, ice melts. In contact with the fish, melting ice cools it, washes bacteria from its surface, and keeps it from drying out. Crushed or flaked ice is best, because a greater amount of ice surface in contact with the fish ensures maximum cooling. Large pieces of ice can also crush, tear, or bruise fish more easily than smaller pieces. Large pieces of ice, however, are better than no ice at all. If possible, break or crush large cubes or blocks before using them. One pound of ice to three pounds of fish is usually sufficient.

Pack fish in ice made from clean, potable water. Commercial ice and ice made at home work equally well. Use saltwater ice only if it is clean. The freezing point of salt water is lower than 32° F. Although saltwater ice will cool fish faster, it can also stick to the skin and cause surface discoloration. It is therefore best to use saltwater ice in a slush or slurry.

Cooling methods that use chilled or refrigerated sea water are also effective. Chilled sea water (CSW), or "slush ice," is a mixture of sea water and crushed or flaked ice. Making CSW requires clean sea water, ice, and an insulated bucket, cooler, or tank. Partially fill the container with ice and add clean sea water. A mixture of eight pounds of ice to one gallon of sea water makes a good slush. More ice may be needed on very warm days. Refrigerated sea water (RSW) systems work on the same principle as

**Table 1. Shelf Life of Gadoid Fish Fillets at Selected Temperatures**

Temperature (°F)	Shelf life
90	1 day
60	2.5 days
42	6 days
32	2 weeks
29	3-4 weeks
10	2 months
0	1 year
-10	2 years
-20	2 years +
-40	indefinitely



CSW, except that, instead of ice, a mechanical compressor cools the sea water in the container. Because of the equipment and maintenance costs, RSW systems may be too expensive for the average angler.

### Landing Your Catch

When you hook a fish the ensuing struggle begins to affect its quality even before you remove it from the water. The thrill of the fight may be one of the most exciting aspects of sportfishing, but excessive struggling can decrease the fish's sweetness and make its flesh soft. If possible, avoid bruising, gaffing, or puncturing the fish as you land it. Breaks in the skin can cause bruises and bloodspots and allow bacteria to enter the fish. Bruised flesh looks bloody, and bruises and bacterial growth cause soft spots in a fillet and reduce its quality. If it is necessary to use a gaff or pick, make sure the puncture is made in the head, away from the edible part of the fish.

Once you've landed the fish, stun it to prevent it from beating itself on the deck or in the cooler. To stun the fish, give it a sharp blow on the head with a mallet, bat, or other dull object. Hit the fish with just enough force to stun it without crushing or severely damaging its head. Be careful not to hit the body or the gut cavity. Bruising the edible parts of the fish or rupturing its internal organs can cause rapid deterioration.

In general, it is not a good idea to keep the fish on a stringer. Doing so will prolong its struggle and increase the likelihood that it will damage itself. Holding the fish in water that is above 50° F can also cause it to spoil more quickly after it dies.

### Bleeding and Gutting Fish

To ensure the quality of fresh fish, the commercial fishing industry bleeds and guts many species. These practices enhance the appearance, shelf life, and overall quality of some commercially important fish. Although the beneficial effects of bleeding are still undocumented for many species, it is reasonable to assume that anglers can also use this technique to maximize the quality of the fish they catch.

#### Bleeding Fish

Removing the blood from fish retards quality deterioration in several ways. It decreases the cooling time, since the fish loses heat as it bleeds. Bleeding also gets rid of waste products and removes oxygen, which can cause rancidity by oxidizing fats in fish flesh—an especially important consideration if fatty fish are to be stored for several months. Bled fish also tend to have lighter-colored fillets with fewer bruises, blood spots, and other defects.

To bleed fish, make a tail or throat cut or gut them.

Stunning a fish before it is bled will make it easier to handle. Be careful not to kill it; more blood will flow out if the heart keeps pumping.

Make a tail cut about an inch from the caudal or tail fin. Slice across the tail until the knife touches bone. To ensure maximum bleeding in some species, such as dogfish, it is better to cut the tail completely off just behind the anal fins. The tail portion of the fillet may, however, spoil faster when the entire tail is removed unless the fish is kept clean and iced down quickly.

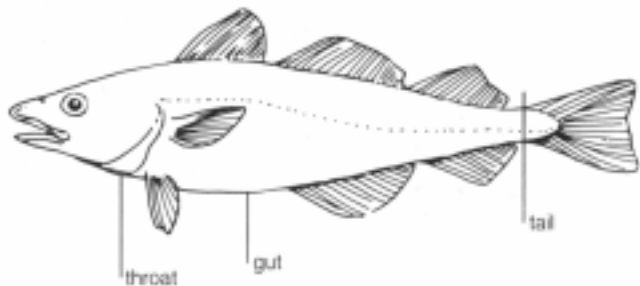


Figure 4. Bleeding Cuts

The throat cut minimizes the risk of bacterial contamination to the edible part of the fish. Make a single cut, severing the main artery that runs from the gills to the heart. Be sure to make the cut ahead of the heart, which must be undamaged if it is to continue to pump blood.

Gutting a live fish will cause significant bleeding through the internal organs and gut cavity.

Fish should be bled for ten to twenty minutes. Bleeding will be more effective if you immerse the fish in clean water or sea water after making the cut. The water you use should be as clean and as cold as possible. Use a bucket, cooler, or tub, and change the water in the bleeding container frequently. If containers are not available, hang the bleeding fish over the side of the boat in a mesh bag. If this method is not practical, the fish can be bled without a container. Pour water over it from time to time to remove the blood before it coagulates.

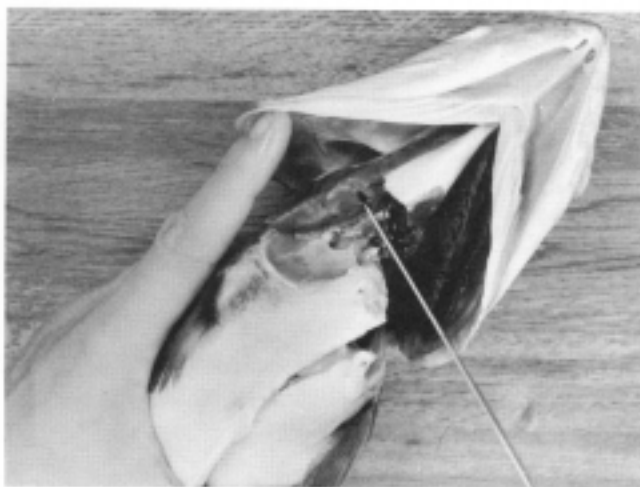
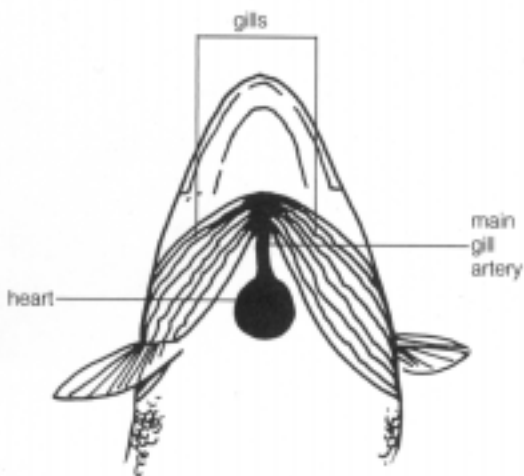


Figure 5. Throat Cut

### Gutting Fish

Gut fish as soon as possible after you catch them. Keep the entrails intact if possible. The stomach and intestines contain enzymes and bacteria that can contaminate the edible part of the fish and accelerate spoilage. Bile from the gall bladder will also taint any part of the fish it touches, and it is very difficult to wash away. Rinse the gut cavity to remove blood, slime, and bits of viscera.

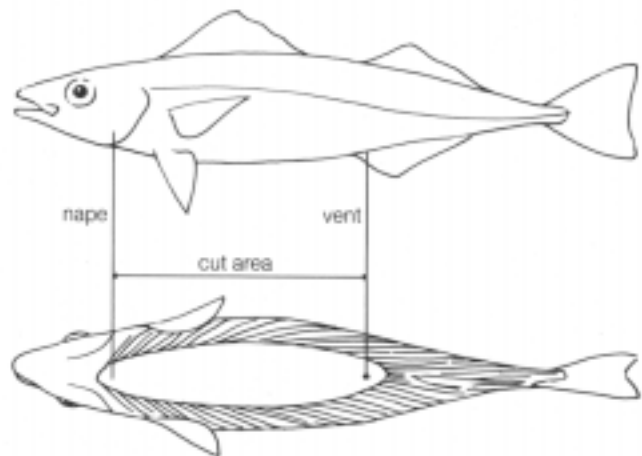
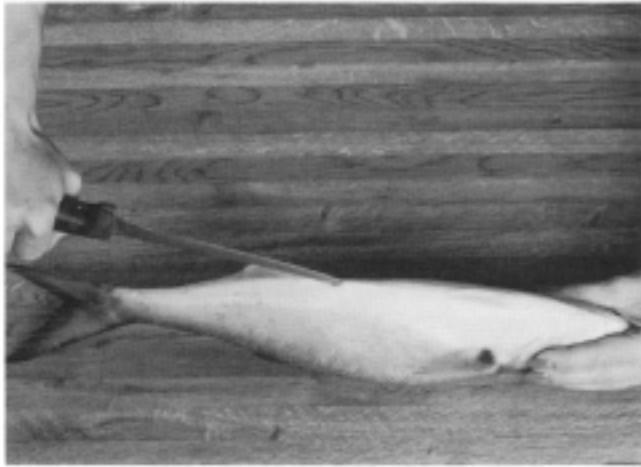


Figure 6. Gutting Cut

Flatfish have a smaller gut cavity than roundfish, but they can be gutted in the same way. A flatfish can also be headed and gutted in one operation by cutting the head off behind the pectoral fin and pushing the viscera out of the gut cavity. Clean the cavity thoroughly with your fingers and wash it out. (See pages 10 and 11.)

Keep your work area clean and avoid contaminating other fish with the gut contents. Wash your work area and knives after each gutting operation. Finally, do not allow your fish to become tainted by coming into contact with oily or dirty areas of a boat or dock.

**Figure 7. Gutting a Roundfish**



A. Make cut from anus to nape.



D. Break membrane covering backbone and scrape out kidney.



B. Open belly cavity and cut bridge that attaches gills.

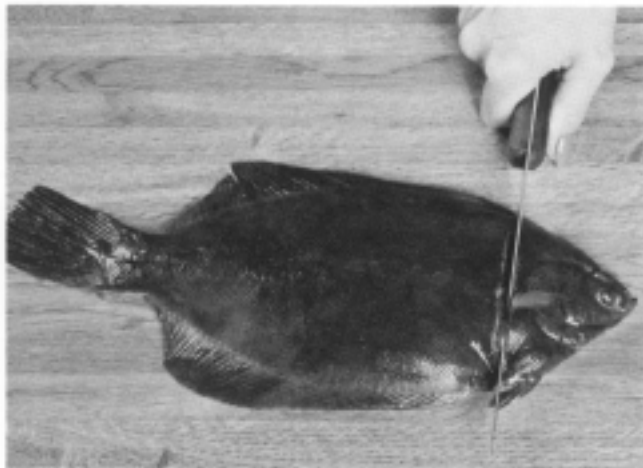


E. Rinse gut cavity.



C. Remove gills and entrails by pulling gillarch towards tail.

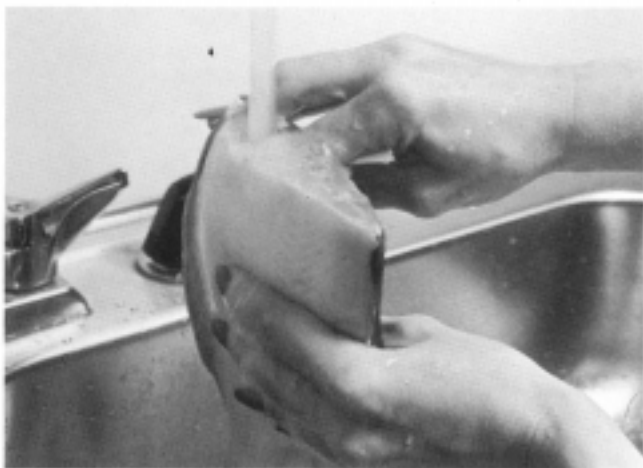
Figure 8. Gutting a Flatfish



A. Remove head.



B. Push viscera out of the gut cavity.



C. Wash gut cavity thoroughly.

## Stowing Your Catch

Store fish on ice as soon as possible after they are caught. If possible, bleed them and gut them first. If the fish are biting and you don't have time to gut them as you catch them, bleed them and put them on ice. Avoid leaving fish on the deck or shore for very long. If you can't bleed and gut them right away, at least stun them and pack them on ice.

It is best to pack fish on ice in an insulated cooler or other clean container. Be sure the container can be drained easily with a spigot, or use a false bottom to keep the fish out of the meltwater. For maximum cooling, mix the ice and the fish thoroughly. Start with a three-inch layer of ice, and then add fish and more ice in alternating layers, leaving room for two or three inches of ice on top. If the fish are gutted, store them with the gut cavities down to prevent meltwater from collecting. Packing the gut cavities with ice will also speed cooling. If you cannot bring enough ice to pack fish in this way, bring enough block ice to cool a container of sea water to 35° F or less. If the sea water is cold and completely surrounds the fish, this method will also ensure rapid cooling.

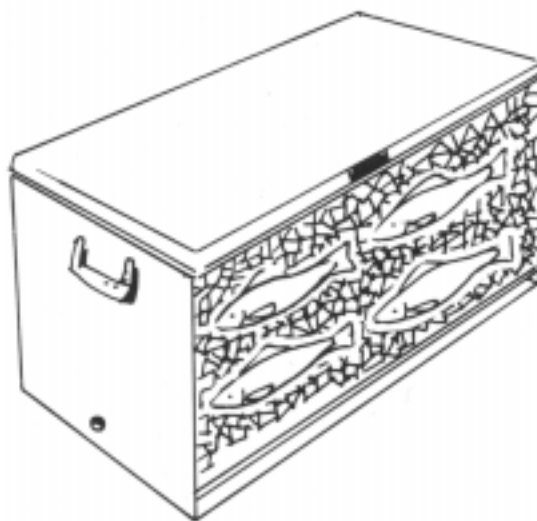


Figure 9. A Properly Packed Cooler

Sometimes—for example, when a surf caster hikes several miles down the beach—it may not be practical to carry a cooler full of ice. On such occasions, consider taking along a small amount of ice in a clean burlap bag. Put the bag in the shade or bury it in moist sand to keep the ice from melting for as long as possible.

It is also possible to use table salt and a burlap or similar bag when ice is not available. When you catch a fish, gut it and wash it. Rub about one tablespoon of salt for each pound of fish into the gut cavity, and then lightly salt the skin. Put the fish and enough wet seaweed to surround it into the bag. Keep the bag in the shade or bury it in moist sand.

If no container is available, bury the fish in the sand near the waterline. To avoid losing your fish, mark the location carefully and watch the tide.

### Transporting and Processing

To preserve the quality of the fish you catch, handle them as little as possible. If you do a good packing job while you are fishing, your cooler or container of iced fish can go right into your vehicle. Check to make sure there is enough ice left to keep the fish cool until you get home. (Remember: the trunk of a car left sitting in the sun all day can reach temperatures well above 100° F.)

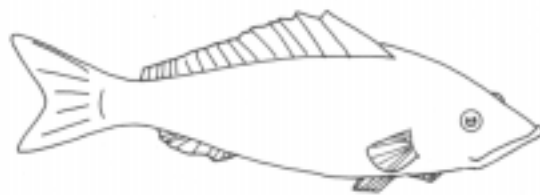
As soon as possible, decide how the fish will be used, and then finish preparing them for consumption or storage. Fish are generally cooked or stored in drawn or dressed form or as fillets or steaks.

Fish that will be eaten with the skin on should be scaled. Remove the scales by scraping from the tail to the head with a fish-scaling utensil or the dull side of a knife. To prevent scales from scattering, hold the fish under water while you scale it. Wash the fish to remove loose scales.

You should now have a clean, whole fish with the entrails and scales removed. To dress the fish, cut off the head and tail. Prepare steaks for broiling or barbecuing by cutting the dressed fish into cross sections about one inch thick. If you plan to fillet the fish, leave the head and tail on to give you something to grip while you work. Fillets take less room in the refrigerator or freezer and cool more quickly. If the fillets will be used right away, prepare them as soon as possible. If, however, you plan to use fresh fillets several days later, and if you have room to refrigerate the whole fish, wait and cut the fillets just before they are needed. Fish stored whole lose less water. Use the remaining rack (skeleton) to prepare fish stock or stew.

Filleting a roundfish requires a sharp knife and practice. Although different species have slightly different bone and rib structures, all fish can be filleted using the same basic procedure. Your skill will increase as you practice. Skin fillets either before or after cooking. (See page 14.)

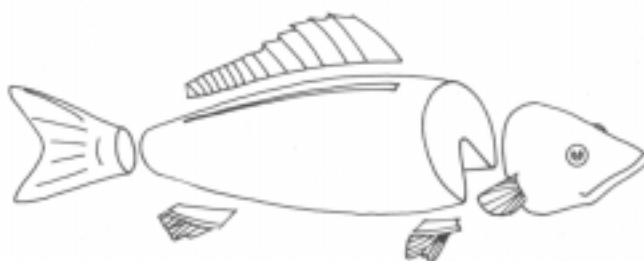
Figure 10. Market Forms of Fresh Fish



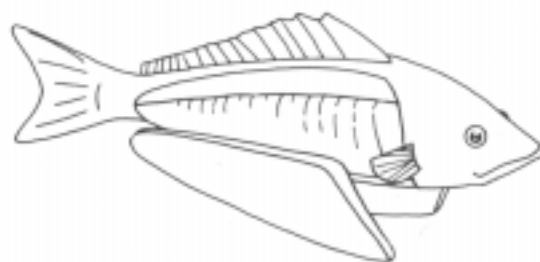
A. Whole fish. Fish as they come from the water.



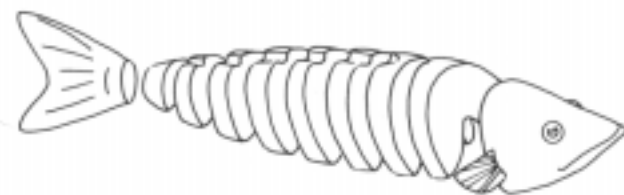
B. Drawn fish. Whole fish with insides removed.



C. Dressed fish. Fish with scales and entrails removed; sometimes the head, tail, and fins are also removed. Dressed fish may be cooked, filleted, or cut into steaks or chunks. Small dressed fish are called pandressed.

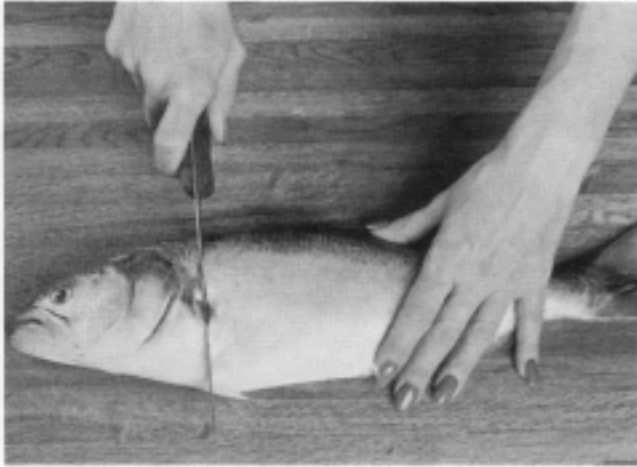


D. Fillets. The sides of the fish cut length-wise away from the backbone. The fillets may or may not include the skin. Only two fillets can be cut from a fish.



E. Steaks. Cross-section slices from large dressed fish cut  $\frac{1}{2}$ " to 1" thick. A cross section of the backbone is the only bone in a steak.

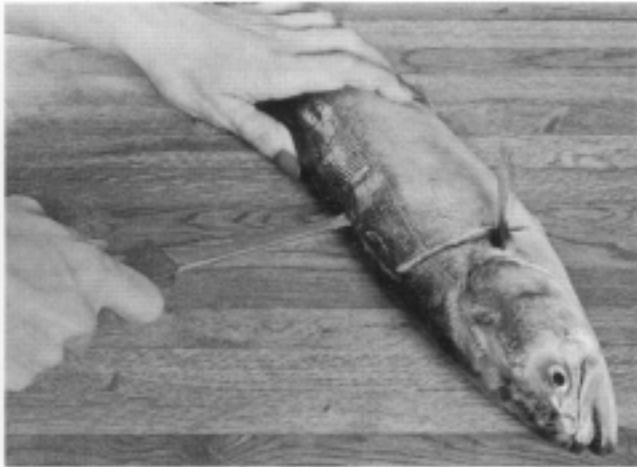
**Figure 11. How to Fillet a Roundfish**



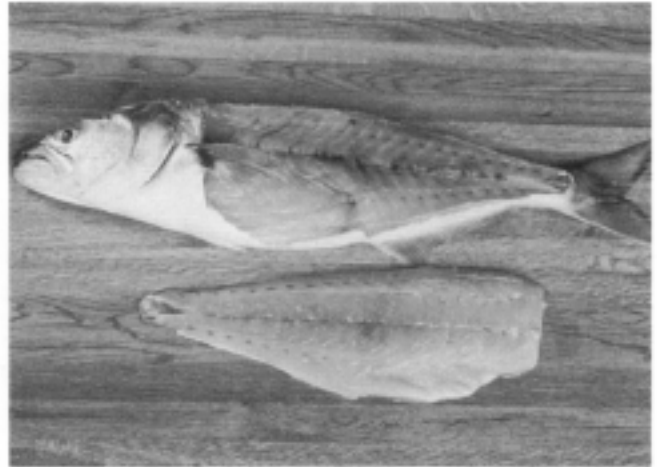
A. Place fish with its back facing you. Make single cut across fish behind pectoral fin.



D. When tail portion is free, fold fillet over and cut it free from ribs.



B. Cut along backbone of fish holding knife at an angle so that you feel it slide along the bone.



E. Your fillet should have all of the edible muscle. Repeat same procedure on other side.

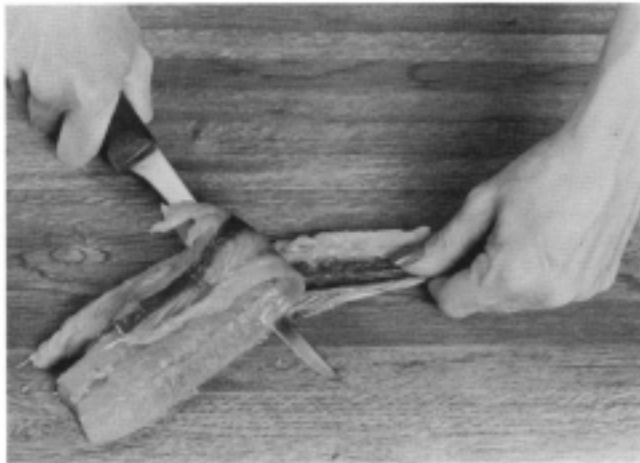


C. At vent, push knife through skin and continue cutting back to tail.

**Figure 12. How to Skin a Fillet**



A. Starting at tail, cut at twenty-degree angle to skin until you free enough skin to grip.



B. Pull skin back and forth against blade, keeping knife almost parallel to skin.

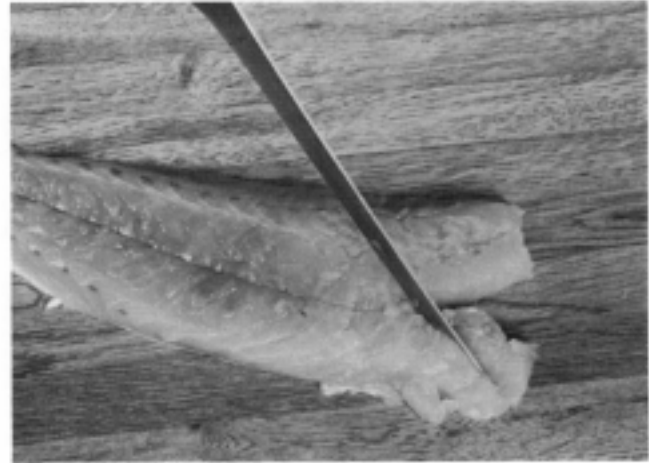


C. Skinned fillet.

**Figure 13. Producing a Boneless Fillet**



A. Remove rib bones from belly portion and pin bones.



B. Pin bones are located by passing finger along lateral line in head-to-tail direction.

## Home Storage

If you plan to store dressed fish, steaks, or fillets in the refrigerator for several days, temperature control is critical. Because many home refrigerators operate at 40° F or more, fish can spoil fairly rapidly. Pack dressed fish on ice in the refrigerator. Seal fillets or steaks in plastic bags or containers and then cover them with ice in trays or pans. The vegetable bins in the lower part of the refrigerator make convenient containers. Empty the meltwater regularly and add more ice as necessary.

Fish stored for more than two to five days (depending on the species) should be frozen. When freezing fish, remember that if a poor quality fish is put into the freezer, it will be in even worse condition when it is taken out. Freezing slows quality deterioration, but it does not stop it altogether. Wash whole fish, steaks, or fillets under cold running water if necessary before wrapping them for the freezer. Frozen fish needs a protective barrier to keep it from drying out and getting "freezer burn." It is also important to keep oxygen in the air away from the fish to prevent rancidity caused by oxidation. To avoid these quality changes, wrap fish or fillets well.

The best wrapping material prevents oxygen penetration and water vapor loss. Plastic wraps, aluminum foils, freezer wraps, or wax cartons can be used. Plastic wraps are best because they fit more tightly and exclude more air. Cling wraps also fit tightly around the product, and plastic "poly" or "zip lock" bags do a good job of preventing dehydration. A good way to freeze fish is to wrap it in cling wrap and then put it into a plastic bag, removing as much air as possible. This method is especially useful if the fish is to be stored in a frost-free freezer, which can remove considerable moisture in a short time. Freezing fish in meal-size individual packages reduces handling, speeds up freezing time, and makes defrosting easier.

Glazing also inhibits oxidation and dehydration. To glaze a fish, dip it into cool water and then put it into the freezer. The water will form an ice glaze. Repeat the process two or three times to form a thicker glaze. Some sources suggest glazing with a solution of about six tablespoons of corn starch or gelatin dissolved in a gallon of water. This thicker glaze may adhere to the fish better. Handle a glazed fish carefully and wrap it in freezer paper, foil, or a plastic bag to keep the glaze from chipping or breaking.

The length of time that a fish can be kept frozen depends on its condition at the time of freezing, its fat content, and freezer temperature. Fattier fish will

become rancid faster; their quality can only diminish in the freezer. Rapid freezing and lower-temperature storage preserve quality best, so keep the freezer as cold as possible. Large bulky packages and poor air circulation prolong freezing time. To ensure fast freezing, do not overload the freezer. Temperature fluctuations can also promote quality deterioration. For long-term storage, it is best to keep fish in a freezer that is not opened frequently.

Table 2 gives accepted recommendations for frozen storage. At the maximum storage times fish will be safe to eat, but the eating quality will have deteriorated. See table 3 for additional storage suggestions.

Thawing fish properly preserves its quality. Slow thawing in the refrigerator is best. To thaw fish more rapidly, hold it under cold running water or put it into a microwave oven. It is also possible to cook frozen fish directly simply by doubling the normal cooking time. Never thaw fish at room temperature or in warm water.

**Table 2. Maximum Recommended Frozen Storage Times**

Type of fish	Examples	Maximum storage time
Fatty fish (More than 5% fat)	Herring Mackerel Salmon Lake trout	3 months
Lean fish (Less than 5% fat)	Cod Haddock Flounder Red snapper	6 months



## Part 2

# Handling Guide to Saltwater Species

This section provides background information and handling tips for common saltwater species from the middle and northern Atlantic Ocean. These tips take into account the composition, behavior, and culinary qualities of each species. Groupings include species that undergo similar quality changes and those that should be processed, stored, and prepared in similar ways. By following the suggestions offered here, anglers can preserve the quality of the fish they catch and help ensure the success of their favorite recipes. Table 3, at the end of this section, lists specific recommendations for refrigerating and freezing typical species. Table 4 describes edibility characteristics (flavor intensity, fat content, color after cooking, and firmness) and common cooking methods.

### Flatfish

Flatfish include all of the flounders and soles found along the Atlantic coast of the eastern United States. The winter or blackback flounder and the summer flounder or fluke are common species. These two species are identified by their prevalence during the seasons associated with their names, by their mouths, and by the orientation of their eyes. The winter flounder is abundant near the shore in winter, has a small pointed mouth, and is a right-eyed flounder. The fluke is abundant inshore in the summer months, has a large mouth, and is a left-eyed flounder.

To determine whether a fish is a right- or left-eyed flounder, lay it with the colored side up and the belly and pelvic fin closest to you. The eyes of a right-eyed fish face right, and those of a left-eyed fish face left.

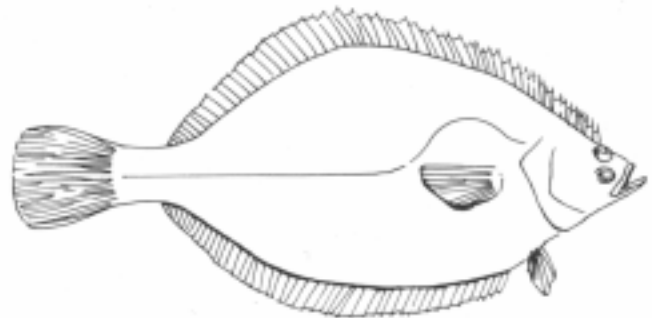


Figure 14. Right-eyed Flounder

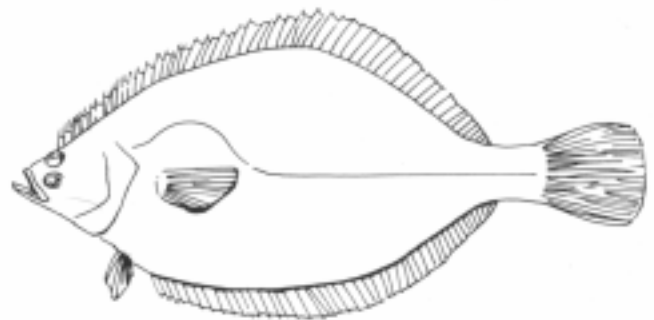


Figure 15. Left-eyed Flounder

Other common flatfish include the yellowtail flounder, the American plaice or dab, and the southern flounder. Anglers may also encounter two flatfish that are marketed as soles. The witch flounder, also known as gray sole, is a northern Atlantic species. Lemon sole is the commercial name of large winter flounders that weigh more than three and one-half pounds. You may also catch windowpane flounders and hogchokers. Because of their small size and low fillet yield, these two species are not commonly used by the seafood industry. They can, however, be eaten.

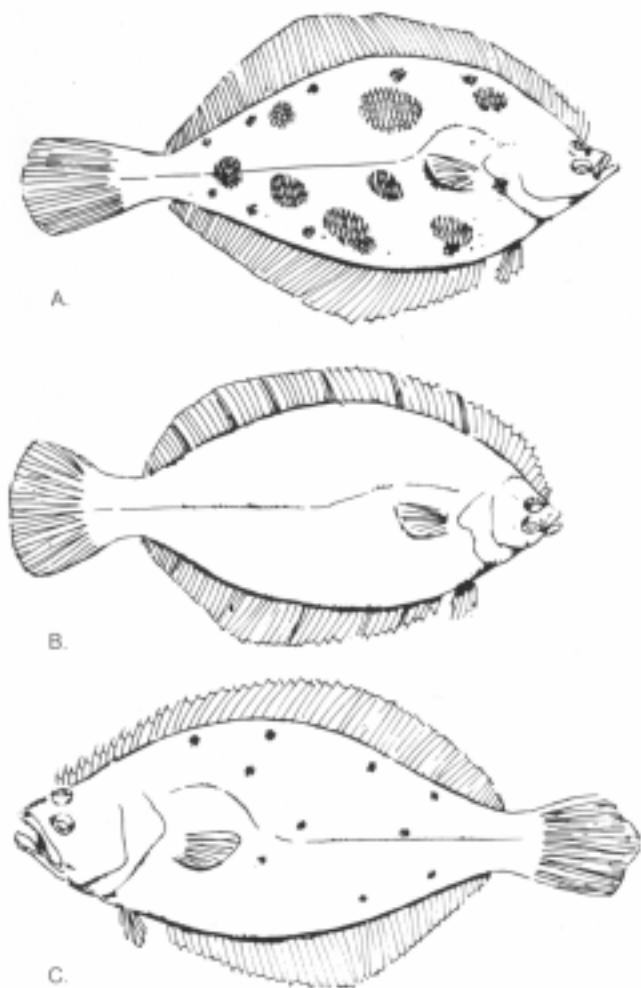


Figure 16. Common Flounders. A, Yellowtail flounder. B, Blackback (winter flounder). C, Fluke (summer flounder).

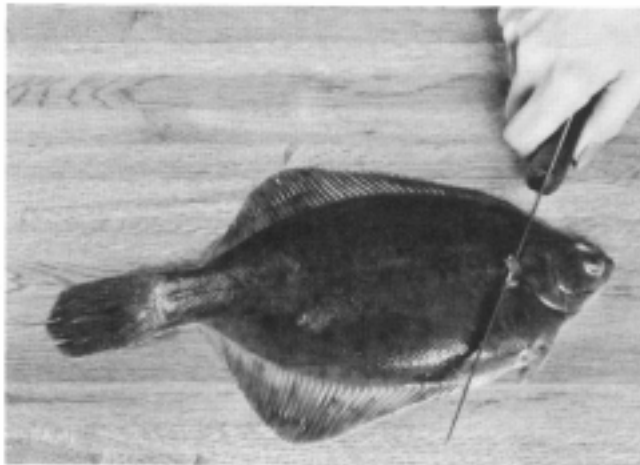
Compared with some other species, the flatfish that inshore anglers usually catch are relatively small. Most of them average from one to five pounds, although some species—such as fluke—may grow as large as fifteen to twenty pounds. Flatfish generally have mild-flavored white flesh that has a low fat content (1 to 2 percent).

Land flatfish carefully, stun them, and pack them on ice as soon as possible. Although bleeding is not as important for flatfish as it is for other species, the larger ones do keep better if they are bled. Bleed flatfish by gutting them or making a tail cut. If regulations prohibit altering the fish before taking it ashore, do not remove the head or tail. Chill flatfish on ice or in chilled sea water as soon as possible. As might be expected, temperature control is more important if you are fishing for fluke, since air temperatures are higher in the summer and the fish tend to be larger. When making provisions for icing your catch, consider air and water temperatures, fish size, and the intended duration of the fishing trip.

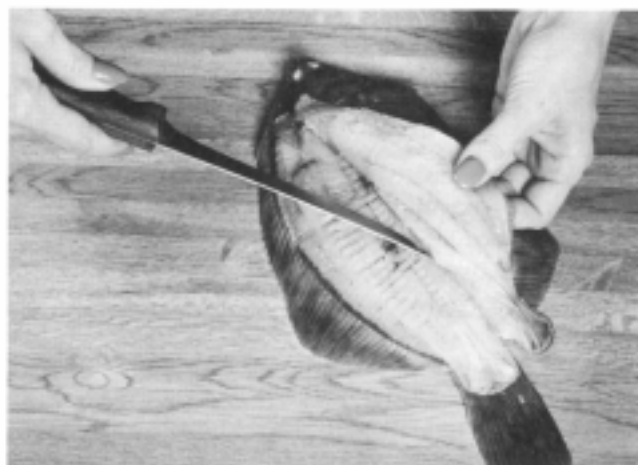
Flatfish are usually sold whole, headed and gutted, or cut into fillets. The gutting section of this booklet describes how to gut a flatfish. Filleting flatfish is very much like filleting roundfish. A sharp fillet knife is used to cut the fillet free across the width of the fish. Large fish can be cut into quarters to yield four fillets each. (See pages 18 and 19.)

Whole or quartercut fillets are usually skinned before they are prepared. Quartercut fillets are easier to skin because they are smaller. Flatfish fillets have a sweet, mild taste and should be handled carefully because of their fragile texture. Fillets from the dark side of a flatfish may have a slightly stronger flavor and, because of a more highly developed vascular system, may lose their quality faster than fillets from the white side. Some anglers recommend using fillets from the dark side first.

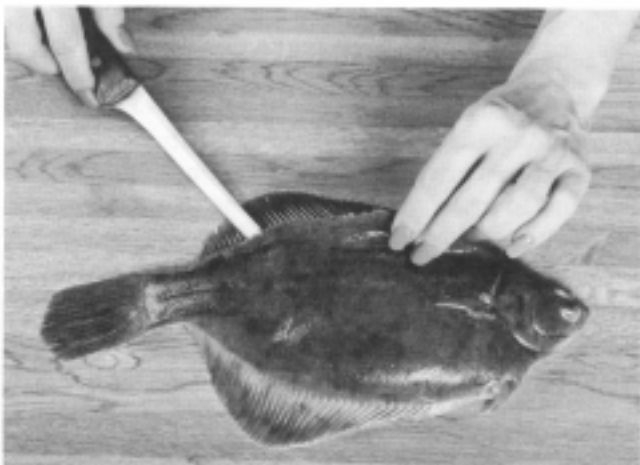
**Figure 17. How to Fillet a Flatfish**



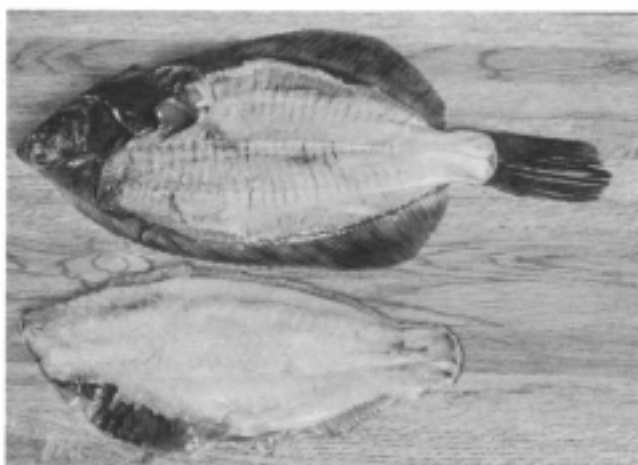
A. Make single cut across fish behind pectoral fin until knife touches bone.



D. Continue cutting until fillet is free.



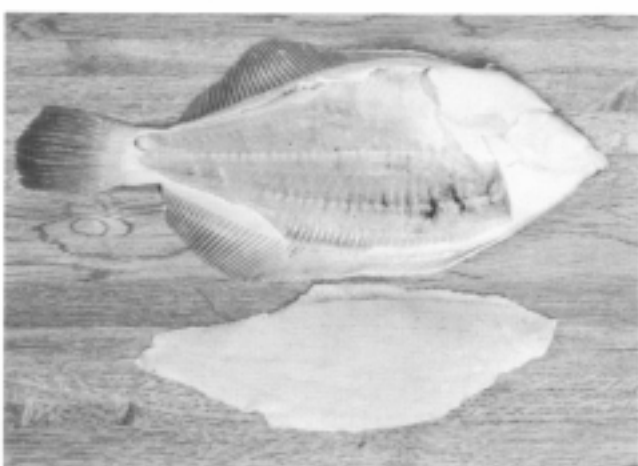
B. Make cut along entire length of back of fish.



E. Fillet should contain all edible meat.

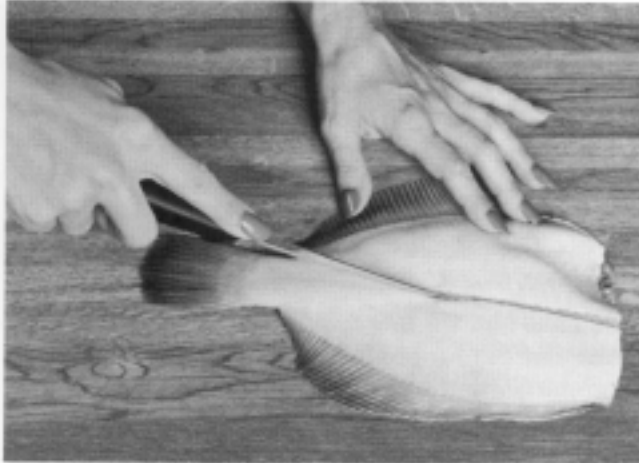


C. Cut fillet free from bone using tip of knife turned at angle against backbone.

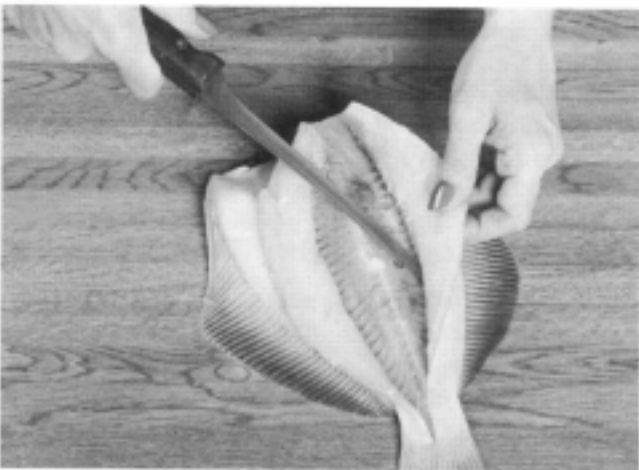


F. Turn fish over and cut other fillet using same procedure.

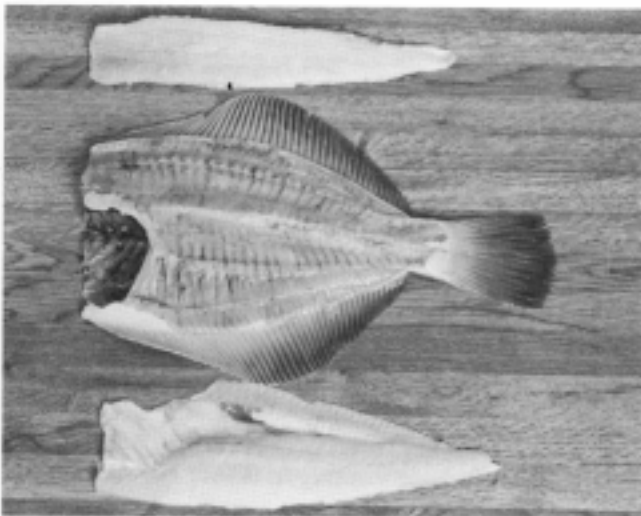
Figure 18. How to Quartercut a Flatfish



A. Cut to bone along center of fish. Use lateral line as guide.



B. Cut fillet free from each side of first cut. Use tip of knife to cut along bone.



C. Quartercutting produces two fillets from each side.

## Groundfish

Groundfish is a commercial fishing industry term for the Gadoid family of fish—especially Atlantic cod, haddock, pollock, and the hakes. These species are the primary targets of the offshore fishing fleet on fishing grounds like the Georges Banks. Cod, haddock, and pollock have white flesh and similar edibility characteristics. The hakes are similar in many ways to these three species, but they warrant a separate discussion because their texture and storage characteristics are different.

Cod and haddock have long been the mainstays of commercial fishing in the North Atlantic. Pollock is becoming increasingly popular because of its abundance and lower price. Cod weigh from one to twenty pounds and are more abundant close to shore in the colder months. Cod can be identified



A.



B.



C.

Figure 19. Groundfish. A, Atlantic cod. B, Haddock. C, Pollock.

by a large barbel on the lower jaw, a pale lateral line, and a slightly concave tail fin. Haddock are generally smaller than cod. They can be distinguished by a dark lateral line and a black patch, called the St. Peter's mark, on the side of the fish near the pectoral fin. Atlantic pollock, also known as saithe or coalfish, vary in size from two to thirty-five pounds. They can be identified by a pale lateral line, a deeply forked tail fin, and a lower jaw that is longer than the upper jaw. The colors of these fish can vary and are not consistent for identification.

Land cod with care and stun them to prevent bruising. On many commercial vessels cod are bled and gutted as soon as possible. Making a throat cut is the most effective way to bleed a cod. After bleeding is completed, gut the fish as soon as possible. If it isn't practical or possible to bleed and then gut the fish, gutting alone will achieve some bleeding in a one-step operation. After thoroughly washing the gut cavity in clean sea water, ice the cod in a cooler. It's a good idea to pack the gut cavity with ice, since large fish take a long time to cool.

Handle haddock and pollock similarly to cod. According to scientists at the Torry Research Station in Britain, bleeding pollock reduces the flesh discoloration that can occur after the fish dies. Pollock fillets are not as white as those of cod and haddock and will take on an increasingly reddish color if the fish is not bled. Pollock also have a higher fat content and a band of brownish-red flesh under the skin. Unless they are bled, this band can become discolored and take on a bloody appearance.

Cod and pollock are generally used dressed or as fillets or steaks. Haddock is generally used as fillets or smoked fillets (finnan haddie). Scale these species if the skin is to be left on. Cut fillets or steaks from them as you would from any other roundfish.

Pollock has a firmer texture than cod and haddock. Pollock fillets are also darker, but they turn white when cooked. All three species can be used interchangeably.

## Red Hake and Whiting

The hakes are also members of the Gadoid fish family. Red hake (ling) and silver hake or whiting are the hakes anglers most commonly encounter.

Red hake and whiting are small slender fish that average one to four pounds. Red hake may grow somewhat larger and weigh ten pounds or more. Whiting are also known as "frost-fish" because they sometimes die in large numbers when the water temperature off the coasts of New York or New Jersey drops suddenly. These fish wash ashore and can be collected from the surf at night before the sea gulls get to them.

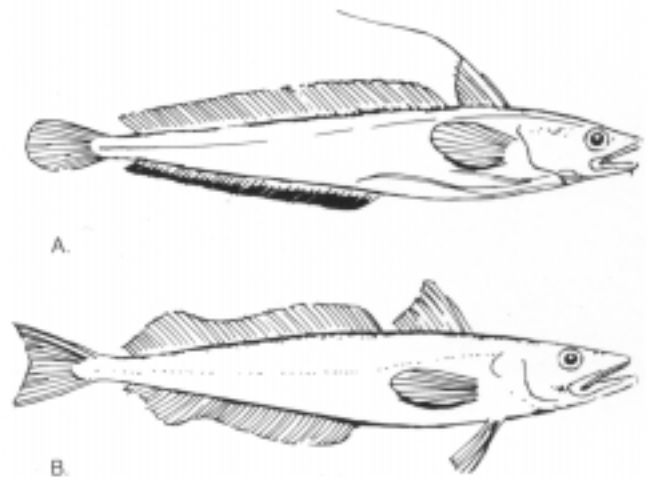


Figure 20. Hakes. A, Red hake. B, Whiting.

Handle hakes similarly to cod, haddock, and pollock. Their flesh is much softer than cod's and bruises easily, so land them carefully and handle them as little as possible. Bleed large fish with a throat cut. To minimize handling, stun hakes, gut them, and pack them on ice as soon as possible. Take care not to pack too much ice on these fish; their soft bodies can be easily crushed.

Whiting are generally used whole or headed and gutted. Red hake are used dressed or as fillets. Hake and whiting fillets have a very soft texture that can get mushy and spoil rapidly in direct contact with ice or ice water. Red hake and whiting are also poor candidates for freezing, which can change their texture significantly. Hake fillets become increasingly tough and rubbery during frozen storage.

## Bluefish

Bluefish, a popular game fish, are usually plentiful in the summer and fall. Anglers regard them highly for their fighting abilities. They have aptly been called the "wolves of the sea" because they move in schools (packs) and eat everything within reach of their sharp teeth. Bluefish are so gluttonous that when their stomachs become full they throw up and continue feeding. Juvenile or baby bluefish under one pound are usually called snappers (which should not be confused with the highly valued red snapper or other tropical snappers).

Bluefish should be respected and handled carefully when they are being landed. Reports suggest that they can see equally well whether in or out of the water, and fingers and toes can be vulnerable targets for their sharp teeth. Stun bluefish as soon as possible to lessen the risk of damage both to the fish and to yourself. It's also a good idea to wear heavy gloves when handling bluefish.

Bleed bluefish as soon as possible for maximum quality. After stunning the fish, make a throat cut while it is still alive. The throat cut allows the fish to bleed and also kills it. Bleeding is important because of the high fat content and dark color of bluefish filets. Removing the blood prevents further darkening of the flesh and decreases the number of blood spots and bruises. Removing the blood also slows the development of rancidity. Because even frozen bluefish can rapidly develop rancid odors and flavors, bleeding is especially important.

Bluefish should also be gutted as soon as possible. Because they are such aggressive eaters, they have very active and powerful digestive enzymes that can cause the entire fish to spoil rapidly. Rinse the gut cavity thoroughly to remove any stomach contents spilled during gutting, and then pack the gutted bluefish on ice with the gut cavity facing down to prevent meltwater from collecting inside the cavity.

For bluefish of the highest quality, stun the fish as soon as it is landed. Then make a throat cut and allow the fish to bleed in clean salt water for about fifteen minutes. Finally, gut the fish, wash it, and pack it on ice. If possible, complete the entire operation within thirty minutes. Because bluefish travel in schools, many fish may be landed in a short time. If bleeding and gutting are not possible, pack the

stunned fish on ice immediately and gut them as soon as it is practical.

Bluefish are generally used as whole dressed fish or filets. The flesh is usually dark because of its high fat content, and it has a strong, characteristic flavor. Larger fish tend to have a more pronounced flavor. Bluefish caught in North Atlantic waters in the summer have a stronger flavor than those caught in the spring. The distinct bluefish flavor can be reduced by trimming the dark, fatty areas away and by cooking the fish in a manner that will allow fat drippings to drain away. Soaking filets in solutions such as milk and lemon juice has been suggested as a way to reduce the characteristic flavor, but the effectiveness of this practice is a matter of personal judgment. For the best results, use fresh or frozen bluefish as soon as possible.

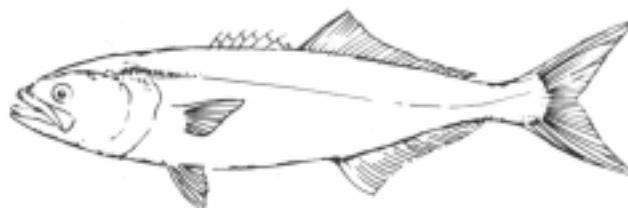


Figure 21. Bluefish

### Weakfish (SeatROUT)

Weakfish are the most common seatrouts in mid-Atlantic coastal waters. The weakfish, also known as the grey seatrout, is a popular game fish. It is abundant in the summer and migrates south and offshore in the winter. The weakfish gets its name from its fragile mouth structure, which allows a hook to tear out easily. Anglers may also encounter the speckled or spotted seatrout and the silver seatrout. The speckled seatrout is abundant off the southern and gulf coasts, where it is a popular game fish. The silver seatrout is similar to the speckled seatrout and is primarily a gulf species. Weakfish often travel in small schools. Although they average from two to five pounds, they sometimes grow as large as ten to twelve pounds.



Figure 22. Grey Seatrout or Weakfish

Weakfish have fragile muscles and should be handled with care. Land them gently to prevent their escape and to avoid damaging them. They are likely to continue struggling after they are out of the water. Stun weakfish and bleed them with a throat cut. Bleeding will minimize blood spots and help preserve the flesh's delicate flavor and texture. Chill weakfish immediately; quality can change rapidly. If possible, bleed, gut, and ice these fish as soon as possible to minimize rehandling. If you cannot bleed or gut them immediately, ice them whole and process them as soon as possible. If weakfish are not properly iced, their flavor will change after only a few hours at summer temperatures. (They may, however, still be safe and edible.) Pack gutted weakfish on ice with the gut cavity down to prevent melt-water from collecting. Pack the gut cavity of large weakfish with ice to speed cooling.

Weakfish filets are fairly fragile. Improper handling may cause large gaps to appear in the filets (gapping), and the flesh may become soft if improperly stored. Weakfish are best when used as soon as possible.

### Porgy (Scup)

The scup or porgy is a member of the sea bream family. It is abundant in the Middle Atlantic States, and anglers commonly encounter it as far north as Cape Cod. The porgy or scup derives its name from a Narraganset Indian word. "Porgy" should not be confused with "pogy," a name commonly used in the northeast for the menhaden or bunker, an unrelated, inedible fish. Porgies have a deep body, a silvery color, large scales, and long spiny fins.

Porgies swim in schools, staying close to the shore in warm months and moving offshore as the water temperature drops. Porgies are small, averaging about one pound. An occasional fish may grow to five pounds.

Porgies are more resistant to rapid quality deterioration than most other fish. Although the highest quality can be achieved by gutting and icing this fish immediately after capture, it will keep well for several days if you simply stun it and ice it. If it is adequately iced, it can be dressed later.

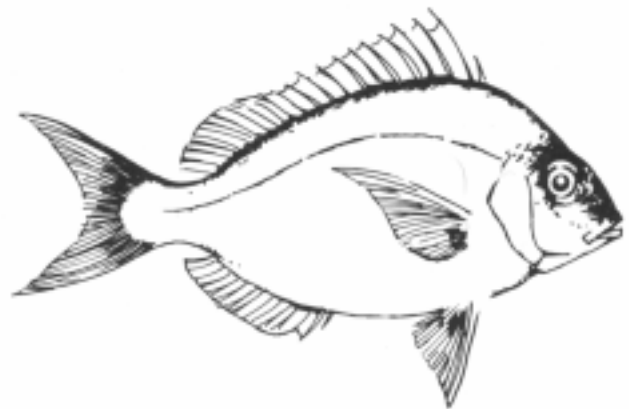


Figure 23. Porgy (Scup)

Porgies are a saltwater "panfish." They are very bony and are usually not filleted. They must be scaled before cooking, but the scales are large and

thick, and scaling can be difficult if the fish is allowed to dry out. Porgies are commonly used dressed. They can be filleted, but the fillets are small.

Good porgies have a delicate flavor and a sweetness that decreases as the fish ages.

## Mackerel

Mackerel are members of the Scombroid family, which also includes the tunas. The three most abundant species found along the Atlantic coast are the Atlantic mackerel (also called Boston or blue mackerel), the Spanish mackerel, and the king mackerel. The Atlantic mackerel is most abundant in middle

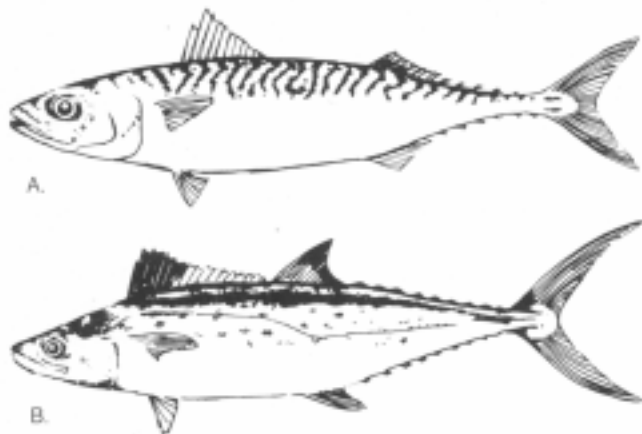


Figure 24. Mackerel. A, Atlantic mackerel. B, Spanish mackerel.

and northern Atlantic waters. It has an iridescent color and dark wavy stripes on its back. Spanish mackerel is primarily a southern species, but it has been known to range as far north as Cape Cod. It has no distinct stripes on its body and has golden spots on its sides. King mackerel do not range farther north than North Carolina. They are large fish that average twenty pounds. Atlantic mackerel are smaller, averaging one to two pounds, and Spanish mackerel are intermediate in size, averaging two to four pounds.

Mackerel have a high fat content (5 to 15 percent) that varies with the season and the abundance of food. Atlantic mackerel are fattest in the fall. Because of their high fat content, it is necessary to

handle mackerel with care. Pack them in ice as soon as possible to maintain their quality and to ensure that they will be safe to eat.

All members of the Scombroid family have large amounts of the amino acid histidine and related compounds in their flesh. If bacteria are allowed to grow after these fish are caught, these compounds can be converted to histamine and other related compounds. This conversion can occur rapidly if fish are left at a high temperature for several hours. Histamine-contaminated fish often has a peppery taste. In some people, these compounds can cause an allergic reaction called scombroid poisoning. This poisoning can be very uncomfortable—and even dangerous—depending on the dose and individual sensitivity. It is important to remember that if a mackerel or tuna has been left at normal summer temperatures for several hours, even though it retains a fresh, high-quality appearance with no signs of spoilage, it can still contain enough histamine to cause scombroid poisoning. The symptoms of scombroid poisoning include headache, nausea, cramps, thirst, hives, a burning sensation in the throat, swelling of the lips, diarrhea, and vomiting. If these symptoms occur, call a physician.

Mackerel flesh is fatty and soft; land and handle these fish carefully. Bleed mackerel with a throat cut and then gut and ice them immediately. Gutting mackerel as soon as possible is critical when they are feeding heavily in the summer months. If immediate gutting is impossible, pack mackerel in ice quickly to preserve their quality and ensure the safety of those who will eat them. Handle them gently and as little as possible to avoid bruising and further softening of the flesh.

Mackerel are generally used as fillets or steaks, but some recipes call for whole fish. Atlantic mackerel have soft, dark flesh and a strong, characteristic flavor. Spanish mackerel have a fairly light color and a milder flavor. They are generally considered to taste better than other mackerel. King mackerel have a strong flavor and are usually marinated before cooking. If properly handled, mackerel will remain in good condition for several days. To freeze them, glaze them or wrap them well to prevent rancidity. Mackerel can also be smoked or pickled.



## Tuna

Tuna, like their close relative the mackerel, are members of the Scombroid family. Saltwater anglers may encounter several species in middle and northern Atlantic coastal waters. These fish may range in size from five to 1,000 pounds. This section describes some of the most common tunas and provides general tips for handling them. Large

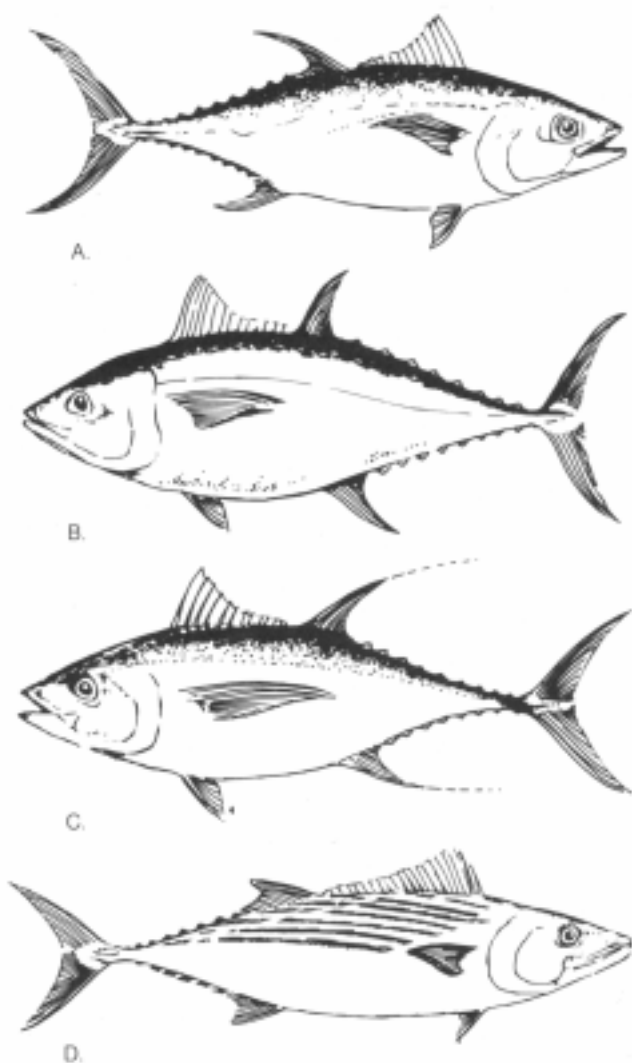


Figure 25. Tunas. A, Bluefin. B, Bigeye. C, Yellowfin. D, Bonito.

tunas and those intended to be used raw for sushi or sashimi require special handling. For additional information, please refer to the publication *Tuna Handling Tips*, which is mentioned in the reading list at the end of this book.

The largest tuna is the bluefin tuna, which can grow as large as 1,000 pounds or more. Bluefin tuna are highly valued in Japanese and American markets. The bluefin tuna fishery is carefully regulated, and permit requirements and season restrictions must be followed. Anglers may also encounter the bigeye tuna. Usually smaller than the bluefin, bigeye most often weigh from 100 to 300 pounds. The albacore—the “white meat” species available in cans—is similar to the bigeye in appearance. It is somewhat smaller, weighing up to forty pounds, and is more prevalent in the Pacific Ocean and tropical regions of the Atlantic Ocean. The yellowfin tuna is common in the summer months from Long Island and New Jersey southward. It is recognized by its yellow color and averages from twenty to 120 pounds.

The smallest tuna is the little tunny—also called the false albacore—which ranges from five to fifteen pounds. Little tunny can be distinguished from other tuna by their size, the scattered dark spots under their pectoral fins, and the wavy black lines on their backs.

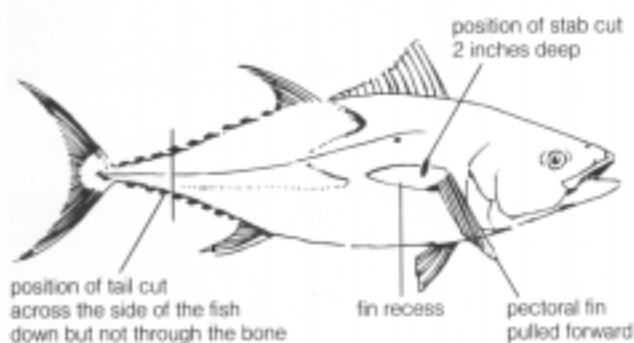
The bonito is a small tuna-like fish that generally does not get larger than twelve pounds. Bonito can be identified by their size and by the oblique black stripes that cover their backs.

Since tuna, like mackerel, are Scombroids, proper handling is essential to preserve their quality and ensure safety. Histamine and related compounds can develop rapidly in improperly handled tuna, causing the same type of scombroid poisoning associated with mackerel. Tuna have a high fat content, and their body temperature is higher than that of the surrounding water. A unique heat exchange system of parallel arteries and veins causes this temperature elevation. These two factors—high fat content and warmer body temperature—accelerate histamine production. They also promote the development of the off odors and flavors associated with rancidity and bacterial spoilage.

Tuna flesh is fragile. Land these fish quickly and handle them as carefully as you can. If possible,

bring large fish alongside the boat, secure them with a tail rope, and let them cool in the water for up to an hour. Smaller fish can be landed immediately. If a gaff is needed to land a fish, gaff it through the lower jaw or elsewhere in the head, well away from the edible part of the fish.

Tuna bruise easily, and their skin is susceptible to scratches and tears. Handle the fish on a work surface that is as smooth as possible—for example, one that is covered with a piece of carpet or a rubber sheet. Rubber gloves are also helpful, because even the heat of a hand placed on the carcass can mar the flesh. Stun the fish and keep it moist while dressing it. Like other fatty fish, tuna keep better if they are bled as soon as possible. Use either a tail cut or a throat cut. Slice the tail to the bone between the second and third finlets. Make a throat cut on small tuna as you would on other fish. Make an additional bleeding cut in large tuna by stabbing a sharp knife two inches into the side of the fish one hand width behind the base of the pectoral fin. Be sure the blood flows freely, and keep the fish moist.



**Figure 26. Bleeding Cuts**

Gut tuna as soon as the bleeding stops. Small fish can be gutted and gilled as you would other fish. Be sure to remove all of the intestines and kidney. Scrub the gut cavity thoroughly to remove blood and slime. *Tuna Handling Tips*, mentioned earlier, describes special gutting procedures that preserve the quality of the belly flaps and prevent distortion during rigor mortis. Follow these recommendations for larger tuna and for fish to be used for sushi or sashimi.

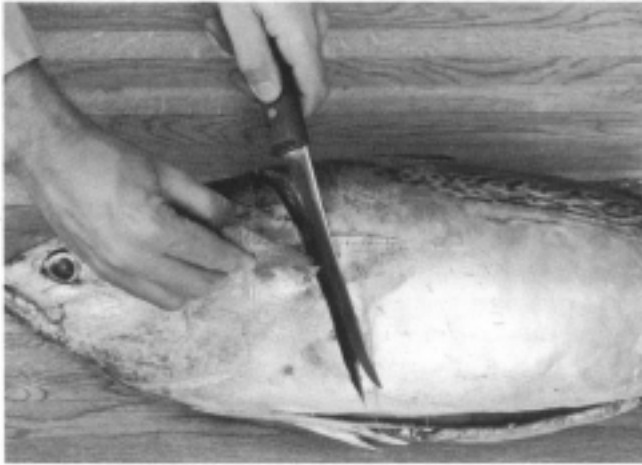
The bled and gutted tuna must be chilled immediately. Use an iced-seawater slurry to lower the temperature as quickly as possible. For smaller tuna, make the slurry in a cooler, using two parts ice to one part sea water. If it is not possible to chill the fish in a slurry, pack it in crushed or flaked ice. Fill the gut cavity with ice to speed cooling. If the fish is too large for any available container, wrap it with plastic or some other material that will hold ice against the fish. Commercially produced flexible body bags are available for this purpose. Flaked ice is best; large cubes or blocks can scratch or tear the skin. Dressed tuna can be cut into fillets, loins, or steaks.

The fat content of tuna varies widely among species and is related to the condition of the individual fish. Each species has its own distinct color, texture, and flavor. Albacore, the lightest colored tuna, has the lowest fat content and a delicate flavor. Federal law mandates that only albacore can be called “white meat tuna.” Yellowfin tuna meat is darker than that of albacore but lighter than other tuna meats. It has a delicate flavor and a higher fat content than albacore. The bigeye tuna has even darker flesh, a higher fat content, and a more pronounced flavor and texture. Bluefin tuna ranges from intermediate to dark red in color. Little tunny, or the false albacore, has a flesh that is very different from that of the true albacore. It has very dark meat and a very strong flavor. Bonito is generally considered the least valuable tuna. The meat is dark, and its strong flavor is closer to mackerel’s than to that of other tuna.

Tuna can be brined before it is prepared to lighten the color of dark flesh and to remove some of the strong, oily taste in species like bonito. Using a brine of roughly one-half cup of salt dissolved in one gallon of water, soak oily tuna for one to two hours before cooking. The brine should be cold and kept in the refrigerator while the tuna is soaking. Cutting out the dark strip of meat in the center of tuna steaks will also reduce strong, oily flavors.

Although all tuna should be handled carefully, the quality of fattier species is likely to deteriorate faster than that of leaner species. For best results, use fresh or frozen tuna as soon as possible.

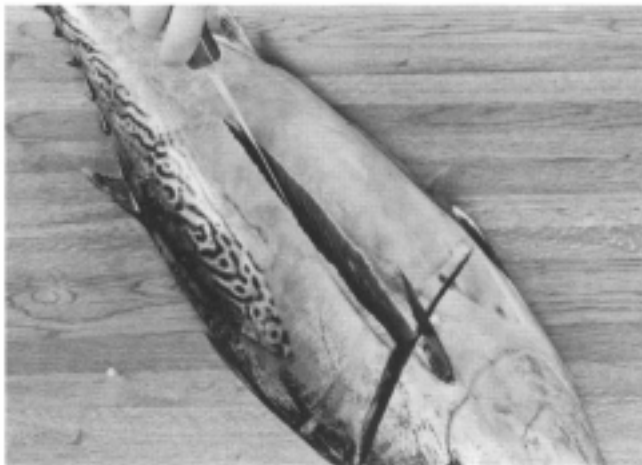
**Figure 27. Cutting Loins from Tuna**



A. Make forty-five-degree angle cut behind gill and pectoral fin from top of head to lateral line.



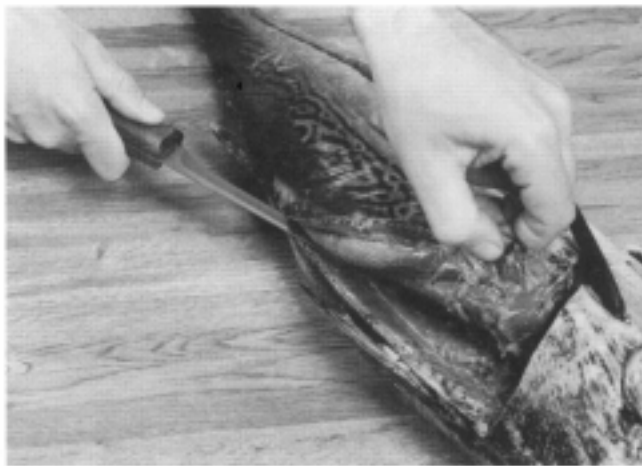
D. Working from head to tail, ease loin away from backbone with fingers or knife.



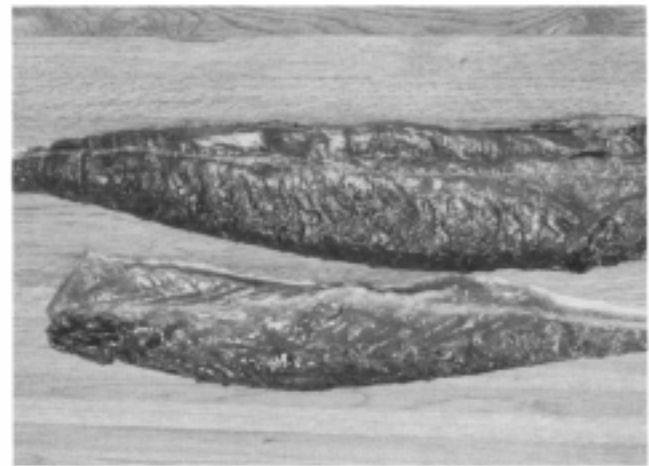
B. Make second cut from head to tail along lateral line.



E. Use same procedure to cut belly loin.



C. Make third cut along dorsal fin to backbone.



F. Loins.

## Striped Bass

The striped bass or rockfish, a popular sportfish since colonial times, has been the subject of much controversy and environmental concern. It is an anadromous fish—it lives its adult life in salt water but returns to fresh water to spawn. Young bass remain in estuarine waters for two years after birth. For this reason striped bass are particularly susceptible to contamination from polluted fresh and in-shore waters. Because of declining populations and the potential for contamination, recreational striped bass fishing is likely to be subject to changing management and conservation plans. Check local laws and advisories before fishing for striped bass and eating your catch.



Figure 28. Striped Bass

Striped bass have a shiny silver color characterized by dark stripes that run the length of their bodies. These fish can grow to be quite large, but as the populations decline the average size is generally between five and ten pounds. Large, trophy-size fish are fifty pounds or larger.

Striped bass are renowned for their fight, but when you land one, handle it with care. Bleeding and gutting can help maintain quality. Larger fish will cool faster, fillets may be lighter in color, and the meat will keep better in the freezer if the fish has been bled. Bleed striped bass with a throat cut, gut them, and ice them as soon as possible. Although the striped bass does not deteriorate as rapidly as some other species, it may take on a slightly sour taste if icing and gutting are delayed for very long. When fishing in areas where you can't take a cooler, carry along some ice in a bag or basket to cool fish of various sizes. If no ice is available, gut the fish, wash it thoroughly, and keep it as moist and cool as possible. Some states may have size restrictions that

make it illegal to remove the head or tail in the field.

Striped bass are highly regarded for their culinary appeal. Fresh fish between six and eight pounds have the best flavor and texture. As the fish get larger, the flesh becomes coarser and less flavorful. Striped bass are used in all forms—dressed, as fillets, as steaks, and in chunks—depending on the size of the fish and the preparation method. Larger fish are usually cut into steaks and smaller fish are filleted.

You may want to reduce the risk of consuming contaminants that can accumulate in a fish's fatty tissue. Special trimming and cooking methods will reduce fat levels and, consequently, any contaminants that have built up. Trim away the belly flaps, the dark strip of tissue that runs through the center of fillets, and the dark, fatty tissue just under the skin. Choose cooking methods that allow fat to drain away. Local health departments, fisheries management agencies, and Sea Grant or Cooperative Extension offices can provide specific information on contaminant levels and recommended trimming and cooking techniques.

### Black Sea Bass

The black sea bass is a member of the Serranidae family of fish, which includes the highly prized southern groupers. Strictly an ocean species, it is characterized by its dark color, large scales, and spiny fins. Black sea bass stay inshore in the spring and summer and move offshore as the water temperature drops. They are commonly found near rocky bottoms, reefs, or wrecks. Black sea bass are lean fish that feed on crustaceans and other shellfish, and they are relatively small, averaging from one and one-half to three pounds.

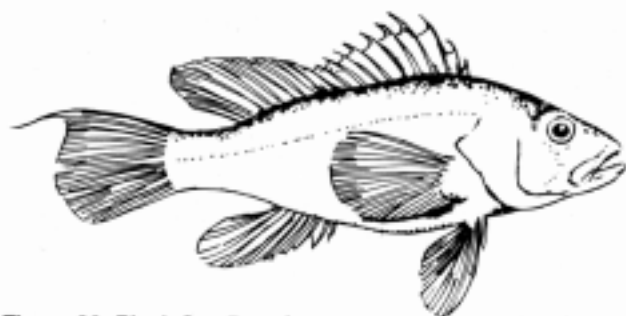


Figure 29. Black Sea Bass

Land and handle black sea bass carefully to avoid damaging them and to avoid being pricked by their pointed fins. Ice them and gut them as soon as possible to maintain them in the best condition. If it is not practical to gut them while fishing, their quality will not be severely affected as long as they are properly iced.

Black sea bass are most commonly used as skinned fillets or fillets cut into pieces or chunks. They have firm, white meat and a delicate flavor that is similar to the shellfish they feed on. They are widely used in Asian dishes.

### Blackfish (Tautog) and Bergall (Cunner)

The tautog, a member of the Wrasse family, is commonly known as blackfish in the mid-Atlantic region and New England. It should not be confused with the black sea bass or other fish that are called blackfish in other regions of the country. The tautog is dull gray to black, and it is characterized by its thick lips and large teeth, which it uses to crush the shells of crustaceans. Blackfish close to the shore average two to four pounds, but they can grow as large as twenty-five pounds.

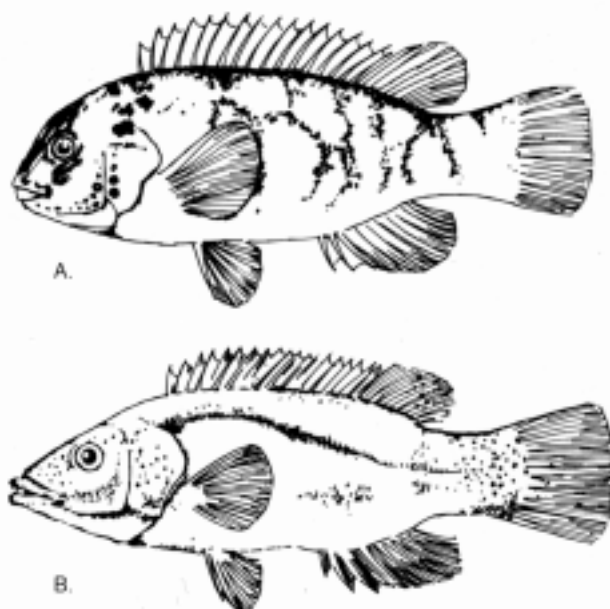


Figure 30. A, Blackfish (Tautog). B, Bergall (Cunner).

The cunner, commonly known as the bergall, is a close relative of the tautog. These fish are also members of the Wrasse family and are abundant from New Jersey through New England. The bergall is smaller than the tautog and generally weighs less than one pound. The color of bergalls varies greatly. They have a mouth structure similar to the tautog's and they, too, feed on shellfish. Both species are bottom dwellers that prefer rocky areas, pilings, piers, or ledges.

The fat content of blackfish and bergall is relatively low, although it may increase slightly in the summer months, when they feed heavily. As with other fish, it is important to land them carefully and stun them to minimize damage to the flesh.

Both species keep better if packed on ice and gutted as soon as possible.

Use blackfish dressed or as fillets. Some anglers report that fillets and bones from blackfish and cunner may take on a brilliant green color, but this color change is not believed to affect quality or safety. Because cunner (bergall) are usually small and very bony, they are often used dressed and panfried with the skin on. Remove the scales if the skin is to be left on either species. The scales are large, and it may be difficult to remove them if they are allowed to dry out.

### Butterfish

Butterfish—also called harvest fish or dollar fish—have a deep body, a shiny silver color, and very fine scales. They are most abundant inshore from the summer months until late fall. Butterfish are small and seldom get larger than one and one-half pounds.



Figure 31. Butterfish

Butterfish have a relatively high fat content and a very soft texture. Handle them as little as possible and ice them immediately to maintain quality. Take care to ensure that they are not crushed at the bottom of a cooler full of ice.

Butterfish are generally used headed and gutted or dressed. Fillets can be cut, but the skin should be left on to keep the fillet intact. The scales are so fine that they can be rubbed off with the fingers. The flesh is a light color, and the high fat content gives it a soft texture. Butterfish are usually panfried.

### Skates and Rays

Skates and rays are frequently caught. Unfortunately, their appearance is so unusual that they are commonly killed and tossed overboard. They are, however, established in the European and Asian culinary traditions. They can be used interchangeably, although some species are considered superior to others.

Skates and rays are related to sharks. They are Elasmobranch fish; that is, they have skeletons made of cartilage instead of bone. Skates live in salt water and differ from rays in certain physical and biological characteristics. Most skates have rough, thorny skin. All rays have smooth skin. Rays have distinct barbs or spines at the base of their tails, and skates do not. Poison glands are attached to the barbs of some species of rays. These rays, called sting rays, can inflict painful wounds. Skates are generally sluggish and less active than rays, which tend to group into larger schools and hunt for food. Skates reproduce by laying eggs enclosed in horny capsules that often wash onto beaches. Rays do not lay eggs; embryos develop inside the mother.

Common skates in mid- and northern Atlantic waters include the big skate, the little skate, the clear-nose skate, and the winter skate. Sting rays are most abundant in warmer waters south of the Chesapeake Bay, but some species range as far north as New England. Common rays include the bullnose and cownose rays.

Skates and rays are strong swimmers. It can take considerable effort to land them. When using a gaff or pick, avoid puncturing or damaging the wings (the edible portion). It's a good idea to stun rays and skates as soon as you land them. This is especially important with rays, which can cause injuries with their sharp spines. Use heavy gloves when handling them. Cut off the tails and spines of rays to prevent injuries.

The wings are the only edible part of both skates and rays. Remove them promptly and discard the rest of the body or use it for bait or chum. A sharp knife and a flat surface are required for removing the wings. (See page 31.)

Pack the wings on ice in a cooler and then refrigerate or freeze them later. If you plan to refrigerate skate or ray wings for several days, leave them

whole and packed in ice in the refrigerator. Some sources report that skate actually improves if left in the refrigerator for forty-eight to seventy-two hours. The texture is said to get firmer during this aging process. Skate can, however, be eaten earlier with good results.

To prepare skates or rays for cooking or freezing, fillet the meat from the whole wing. A sharp knife and cutting board are the only tools you need. (See page 32.)

To freeze skate or ray, leave the skin on to keep the fillet intact. Wash each fillet carefully and freeze it as you would any other fish fillet. If the fillet is large, skinning will be much easier if it is first cut into strips two or three inches wide. Another way to skin the fillets is to poach them for several minutes in a solution of three parts water to one part vinegar. The skin should peel off easily after poaching.

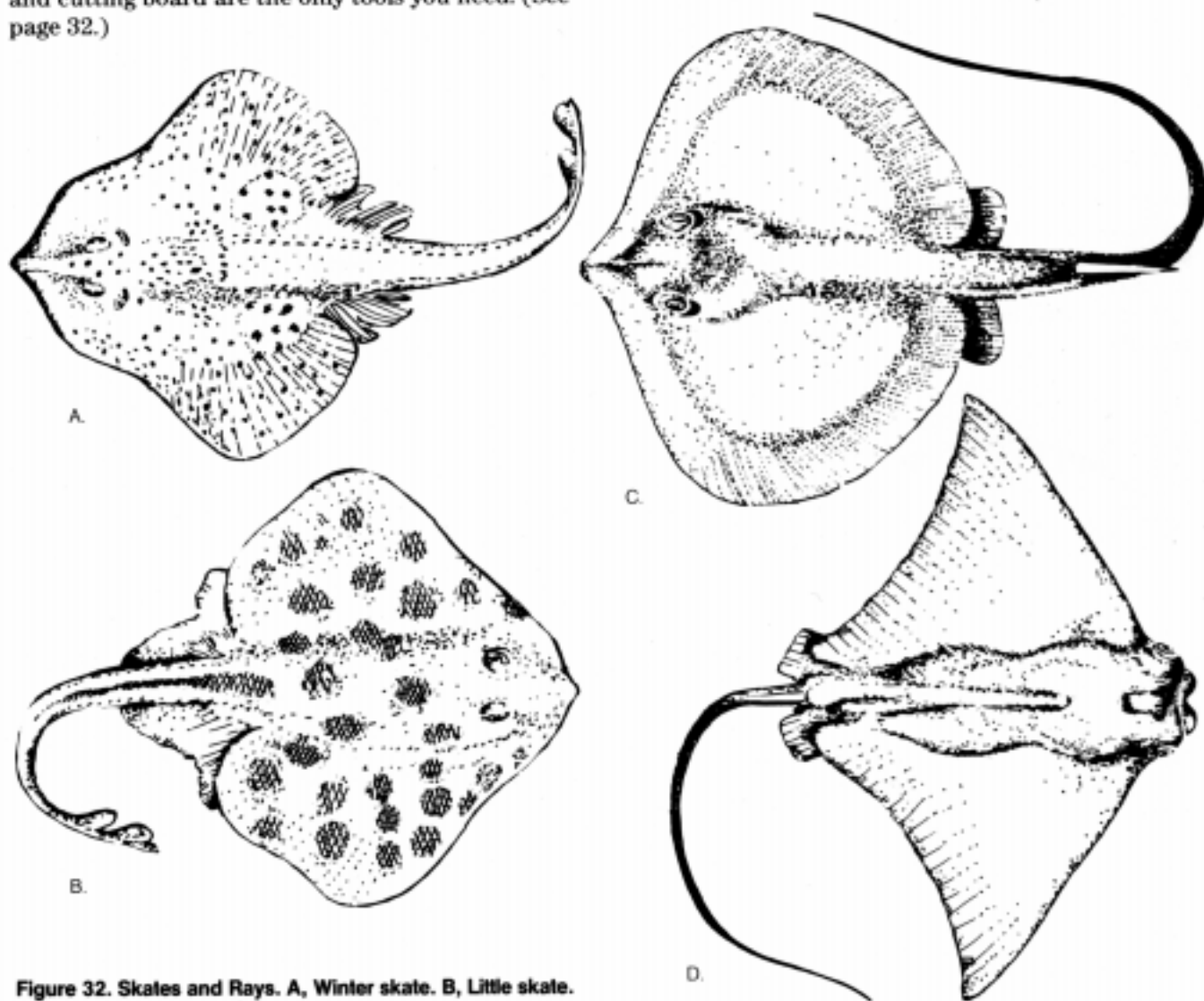


Figure 32. Skates and Rays. A, Winter skate. B, Little skate. C, Atlantic stingray. D, Cownose ray.

Some cookbook authors suggest soaking skate and ray fillets in chilled salt water or vinegar water for several hours before preparing them. This will remove any ammonia or other off flavors that may have developed. If you have handled your catch properly, however, ammonia flavors should not be present. If you do wish to soak your fillets, use a solution of one cup of salt or one-half cup white vinegar for each gallon of water.

Skate and ray fillets are lean and light colored. An unusual delicacy, they have a firm texture and can be prepared by any cooking method used for fillets from fish with similar characteristics. Poach them, bake them, bread them, or fry them in the oven, a pan, or deep fat.

**Figure 33. Removing Wings from a Ray or Skate**



A. Place ray or skate belly side down.



C. Cut through wings until they are free of body.



B. Start cutting at head end, staying as close to middle portion of body as possible.



**Figure 34. Preparing Skate Wings**



A. Place wing on board with thickest part of wing facing you. You should be able to see the light band of cartilage about halfway through the thickness of the wing. This will be your guide.



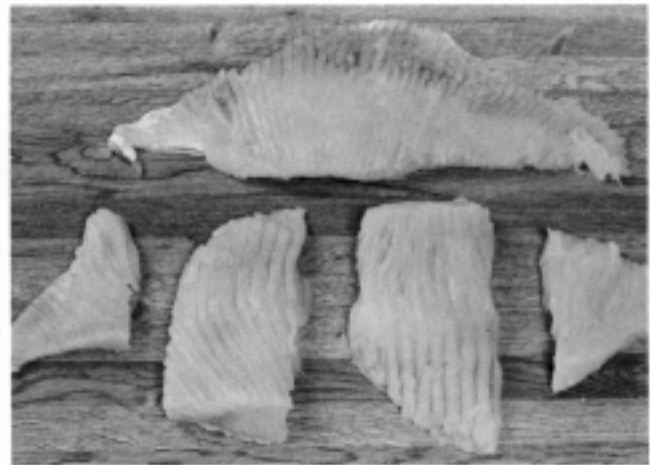
B. Cut along cartilage plate, using it as you would the backbone when filleting fish.



C. At wing tip, cut through skin until fillet is free.



D. Cut second fillet free.



E. Each wing provides two filets.



F. Skin skate or ray filets as you would skin any other fish fillet.

## Dogfish and Sharks

Sharks are well known for their razor-sharp teeth and aggressive eating habits, but they are often overlooked as food. Inshore anglers are not likely to encounter large sharks, but they are quite likely to hook a dogfish or other small shark. A considerable amount of confusion and myth is associated with different kinds of sharks, not all of which are used for food. Six types of sharks visit mid-Atlantic coastal waters regularly: the common hammerhead, the Atlantic mako, the sand shark, the smooth dogfish, the spiny dogfish, and the sandbar shark. Off-shore anglers may encounter larger species, such as blacktip, blue, and thresher sharks. The mako shark, sandbar shark, spiny dogfish, and smooth dogfish are the most commonly encountered species used for food.

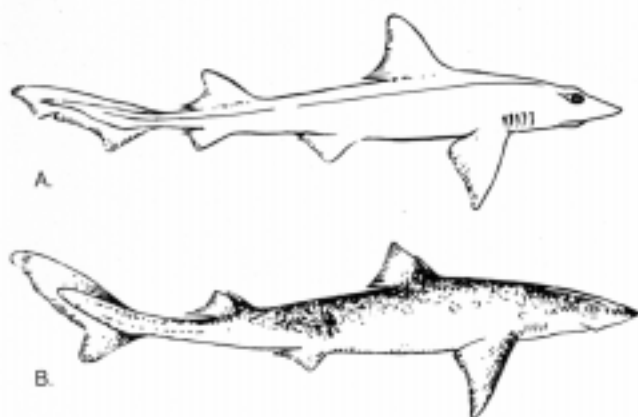


Figure 35. Dogfish. A, Smooth dogfish. B, Spiny dogfish.

Sharks are Elasmobranch fish. Their skeletons are made of cartilage instead of bones. Because sharks must swim continually to stay afloat and obtain oxygen, they die quickly out of the water. They also differ from bony fish in that they maintain a high concentration of urea, a metabolic waste product, in their bodies. After the shark dies, urea can quickly degrade to ammonia, causing shark meat to develop off odors and flavors.

Dogfish are the most common edible sharks found close to the shore in northern and mid-Atlantic waters. Their low, flat teeth, which they use to crush and grind, make them easy to distinguish from other sharks, which have the notorious razor-sharp teeth used for biting and tearing. The handling information presented in this section refers specifically to dogfish. They are abundant, useful as food, and less likely than other sharks to cause injuries. Handle other sharks in a similar manner to ensure a good-quality catch. In all cases, however, give the highest priority to safety considerations.

Two species of dogfish—the smooth dogfish and the spiny dogfish—inhabit the coastal areas of the middle and northern Atlantic states.

The smooth dogfish moves inshore during the summer months, and the spiny dogfish is more abundant when the water cools. The smooth dogfish grows to three or four feet and feeds on shellfish and crustaceans. It is often mistakenly called a sand shark because it is found near beaches or sandbars in the summer. The spiny dogfish is similar to the smooth dogfish and averages four feet in length. It can be distinguished from smooth dogfish by the rows of small white spots on its side and by the two sharp spines that protrude in front of its large dorsal or back fins. Spiny dogfish feed on small fish as well as shellfish and are most often encountered during winter cod fishing trips.

Land dogfish with care to minimize damage to the fish and to avoid injury. Be careful of the spiny dogfish's spines; they may be slightly poisonous and can cause painful wounds. Stun dogfish and bleed them immediately by cutting off the tail. As soon as the tail is cut off, gut and dress the fish.

Adequate ice is essential to preserve the quality of dogfish. Surround dressed dogfish completely with ice to preserve its flavor and to prevent the flesh

**Figure 36. Cleaning and Dressing Dogfish**



A. Be careful of spiny dogfish's spines.



B. Remove dorsal fin by cutting from tail to back of head.

from developing an ammonia flavor. Unless dogfish are properly chilled to prevent bacterial growth, strong ammonia smells and flavors can develop rapidly. If you cannot process your catch immediately, ice down the whole fish and dress it as soon as possible.

Before freezing or preparing fresh dogfish, cut fillets away from the cartilage backbone or cut the fish into steaks. Because ammonia flavors may develop, it is widely suggested that dogfish meat be soaked to neutralize minor taints. A brine or acid solution—vinegar, lemon juice, or milk—is often used to marinate dogfish and leach out any ammonia that may be present. Soak the fish in milk if it will be deep-fried and in lemon juice if it is to be broiled. The marinating time will vary; larger fillets or pieces require longer soaking.

If an ammonia smell is detected, it is also a good idea to soak dogfish meat before freezing it. Properly handled dogfish, however, should not develop ammonia or other off flavors, and soaking should not be necessary. Dogfish is widely consumed in England as the fish in "fish and chips."



C. Repeat to remove fin on belly side.



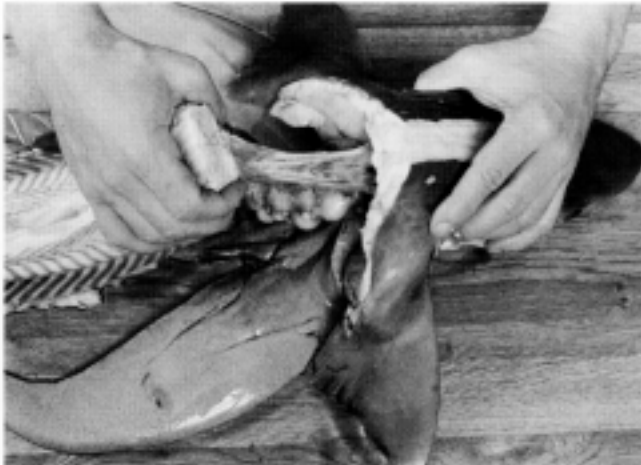
D. With fish belly side down, make cuts perpendicular to first cut on both sides of head.



E. Use a knife or pliers to pull skin toward tail.



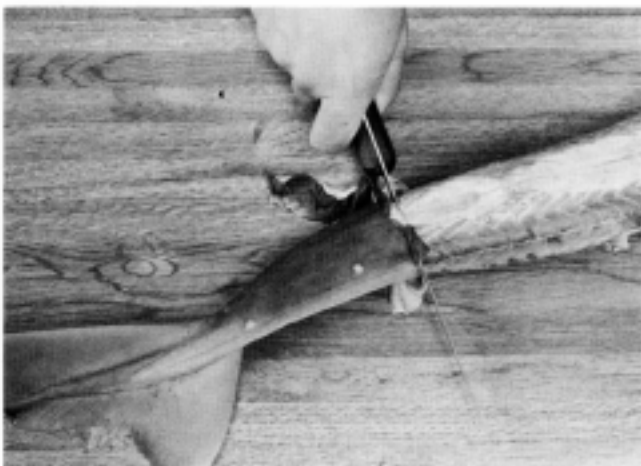
H. Wash fish thoroughly.



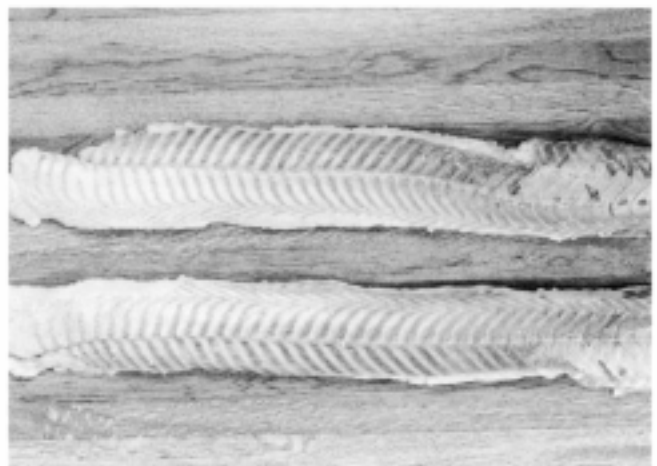
F. Sever backbone and pull head and viscera away together.



I. Cut fillets away from cartilage backbone.



G. If tail was not removed during bleeding, do so now.



J. Two fillets.

## Searobin

The searobin, called gurnard in Europe, is a strange-looking fish that most inshore anglers consider a nuisance. Searobins are so abundant in bays and shallow coastal waters in the summer that most anglers in search of more highly prized species catch at least one on each fishing trip. Although anglers often toss the searobin overboard, it is an excellent foodfish, widely used in Europe. It is characterized by a large bony head and huge pectoral fins that resemble wings. The searobin uses its fins to "walk" on sandy bottoms, stirring up small shellfish, which make up the bulk of its diet. The northern searobin is the most common species in middle and northern Atlantic waters. Most searobins are small, rarely growing larger than one and one-half to two pounds.



Figure 37. Northern Searobin

Because of their size, searobins are easy to land. Stun them as soon as they're landed and pack them in ice if you cannot dress them immediately. Bleeding searobins is not usually necessary. Gutting them will help maintain quality, but thorough icing is generally considered to be sufficient.

Most anglers consider searobins "trash" because they are unusual looking and have little edible flesh. Processing searobins, however, is simple and well worth the effort. Cut fillets from a searobin as you would from any other fish. A little practice is required because the searobin is bony, but the filleting process is essentially the same.

Skinning the fillets may result in an even lower yield, so some sources suggest skinning searobins before filleting. To do this, cut the skin (don't cut into the flesh) around the head behind the large "wing" fins. Then make cuts around the back fins and the anal fins. Grab the skin with pliers—or with fingers that have been dipped in salt for a better grip—and pull the skin off toward the tail. A wooden skinning board with a spike will be useful. Hook the fish's lower jaw on the spike for better resistance when you pull the skin away. Cut fillets from the skinned fish.

Another way to handle searobins is simply to cut the edible tail portion off behind the large "wing" fins. Discard the head and gut cavity contents and store the edible portion on ice. Remove the backbone to produce two fillets or a single butterfly fillet.

Searobin fillets are light colored and have a firm texture. They have a low fat content and a mild, sweet taste characteristic of the shellfish the searobin feeds on. Searobin is an important ingredient in the traditional French bouillabaisse. Its fillets can also be broiled, deep-fried, or poached as a substitute for any other lean white fish.

## Eels

Eels are unusual looking fish that many people confuse with snakes because of their long snake-like bodies. The eel that anglers most commonly encounter in the northern and mid-Atlantic waters is the American eel. It is a true fish, but it has an unusual life cycle. These eels are born in the Sargasso Sea in the area popularly called the Bermuda Triangle. Adult eels travel to the Sargasso Sea to spawn, and then they die. The young eels hatch, and as juveniles they undertake a reverse migration to the freshwater lakes and streams once inhabited by their parents. They can live in these freshwater areas for ten years or more before they swim back to the Sargasso Sea to reproduce and die. Eels are caught in the northern Atlantic during all seasons except winter, when they hibernate in the mud.

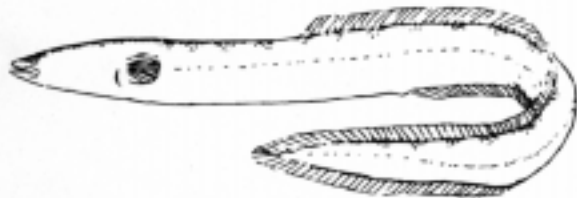


Figure 38. American Eel

American eels are known by several different names, depending on their size and stage of maturation. Eels up to three inches long are called elvers. Brown eels are those in the juvenile stage that are migrating to fresh water to grow. They are most common and usually weigh between one and three pounds. Adults returning to the sea to spawn are called silver eels and may weigh as much as twenty pounds.

Anglers catch eels in both fresh and salt water, and connoisseurs disagree about which type is better. Observe caution, however, when deciding to eat eels from the fresh or estuarine waters in which they spend much of their adult lives. These areas may be contaminated by natural, industrial, or municipal wastes. Some states advise anglers to limit their consumption of eels from contaminated waters. If you are unsure that it's safe to eat the eels you catch, consult your local health department or fisheries management agency.

The American eel is regarded highly as food throughout the world and is an important part of traditional holiday meals in many cultures. Although many anglers are reluctant to deal with them, learning how to handle eels is well worth the effort.

Eels are considered a nuisance because they often tangle fishing lines with their fighting. They should be killed as soon as possible after they are landed—although doing so is difficult because they continue to squirm and fight after they have been taken out of the water. Even with their heads cut off, eels continue to squirm for several hours. The best way to kill and deslime eels is to put them into a container deep enough to keep them from squirming out, pour enough salt on them to completely cover them without burying them, and barely cover them with water. Soak the eels in this solution for two to three hours or until they are completely stunned. After soaking the eels, rinse them thoroughly in clean, cool water and scrub them to remove the salt and slime. (See page 38.)

Gut eels as soon as possible; the quality can deteriorate rapidly after death. If the head is to be left on, open the eel as described and carefully scrape out the gut cavity contents and the kidney without breaking open the organs. Wash the belly cavity thoroughly to remove all blood, kidney, and viscera.

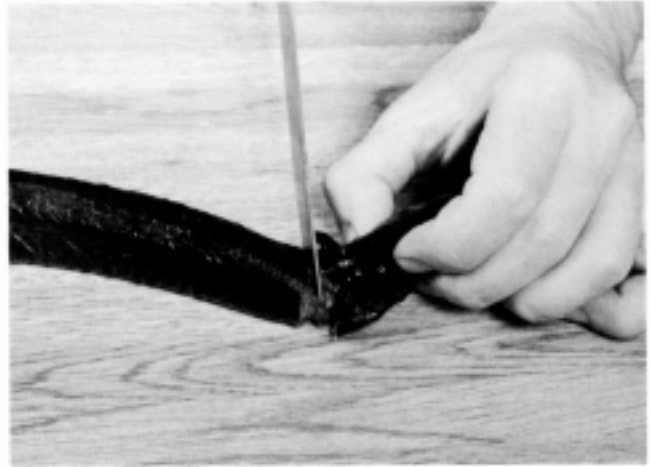
If you plan to skin the eel, do so before cutting off the head. You may wish to use a skinning board, in which a nail is run through the head to give you leverage to pull the skin off. (See page 38.)

Store dressed eels as you would store any other fish fillets. Eels that weigh less than one pound are often panfried. Larger eels will take longer to fry, and the outside may burn before the center cooks. Eels can also be poached, baked, or broiled and used in soups, stews, or chowders. Smoked eels are considered *première cuisine* in Europe and Asia.

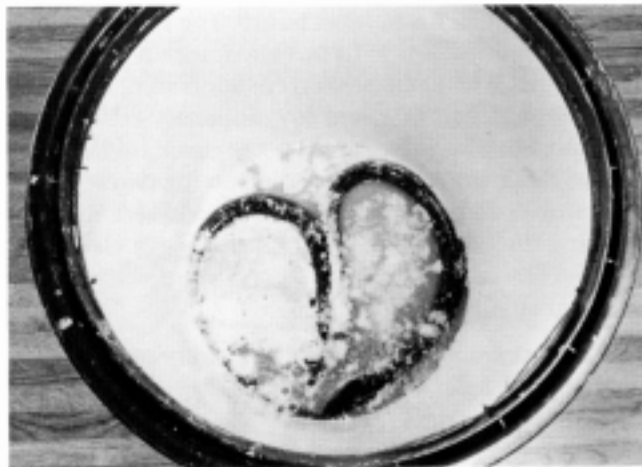
**Figure 39. Handling and Cleaning Eels**



A. Cover eel with salt in deep container.



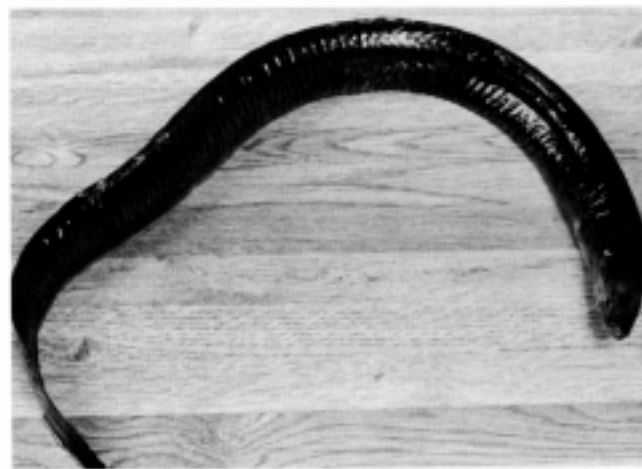
D. Cut around eel about three inches behind head.



B. Barely cover with water and soak for two to three hours.



E. Grip skin with pliers.



C. Rinsed and scrubbed eel is ready to be cleaned.



F. Pull skin toward tail.



G. Remove skin completely.



I. Remove head.



H. To gut eel, make cut from head to about two inches behind vent.



J. Cut eels into steaks (shown), cut filets from backbone, or prepare whole.



## Blowfish or Puffers

Northern puffers, also known as blowfish, swellfish, globefish, and—in Japan—fugu, are popularly called sea squab or “chicken of the sea” along the middle Atlantic and southern New England coasts. The popularity of this unusual fish has increased or waned during the past several decades as its abundance has fluctuated. The puffer gets its name from its ability to inflate its body with air or water when it is threatened. Most anglers encounter puffers in this inflated state.

Many species of puffers inhabit the world's oceans. They can be extremely poisonous, and their level of toxicity depends on the species, locality, and spawning season. Most information about the effects of puffer toxin on humans comes from Japan, where fugu is a delicacy. Accidental puffer poisoning is responsible for more deaths in Japan than any other type of food poisoning. Japanese fugu chefs must undergo a rigorous training program and then be

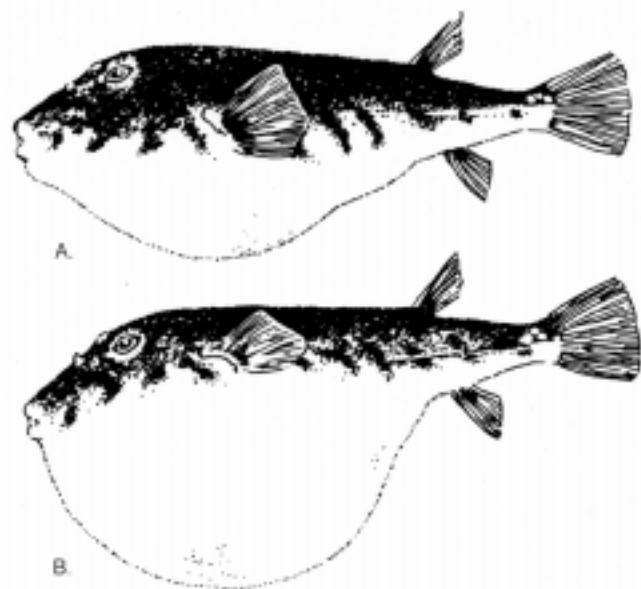


Figure 40. Northern Puffer. A, Normal size. B, Inflated.

certified by the government before obtaining a license to serve puffers.

Puffers in the tropical and subtropical waters of the Atlantic and Pacific oceans or the Gulf of Mexico can be highly toxic. The northern puffer is generally considered to be less harmful, and puffer poisonings are rare in middle and north Atlantic states, where many people consume this fish. It is not advisable, however, to eat large quantities of puffer, and those who do eat puffers should be aware of the potential danger.

Puffer poisoning is caused by tetrodotoxin, an extremely potent nerve poison. The toxin tends to be more concentrated in the fish's skin, liver, and gonads (especially in the ovaries or roe). It may also be found throughout the flesh. In general, the occurrence and amount of toxin is related to the fish's reproductive cycle. More toxin is usually present during peak reproductive (spawning) times. The northern puffer spawns through the summer months, and late May and June are the peak spawning times in southern New England and Long Island.

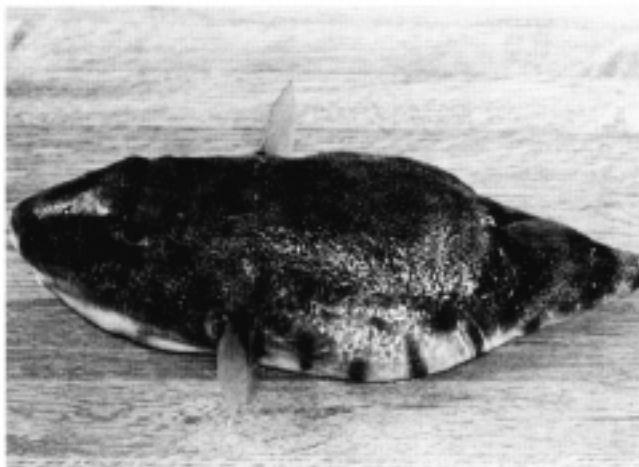
Anglers who catch northern puffers and decide to eat them should learn how to handle and clean them. The internal organs and skin are thought to contain more toxin, so handle blowfish gently and avoid damaging the liver and other internal organs. Dress blowfish as soon as possible, or, if necessary, pack them on ice until they can be dressed.

For cleaning blowfish, there is no substitute for practice. When done properly, the entire process takes less than a minute, with no contamination of the flesh. If the flesh is stained or if you suspect that it has been contaminated by the entrails, it would be wise to discard the fish rather than risk exposure to the puffer toxin.

The lean, light-colored flesh of the blowfish has a delicate flavor. Although it can be cooked in a variety of ways, frying is often suggested. Use properly dressed blowfish as soon as possible.

Many people eat blowfish, yet the decision to do so must be a personal one. The information provided here is intended to help you make that decision and to offer you one method for handling and dressing the blowfish you catch.

Figure 41. How to Clean a Puffer



A. Place fish on smooth, hard surface.



D. Turn fish on its back and pin down backbone with dull side of knife.



B. Grasp it firmly on each side of head and cut down through backbone.



E. Pull head toward tail to remove skin and entrails in one operation.



C. Do not cut past backbone and into gut cavity.



F. Rinse remaining, edible portion well.

## Storage Suggestions

Storage and preparation recommendations are based on the biological, chemical, and physical composition of different fish as well as on historical and cultural customs. The first section of this bulletin describes the proper ways to refrigerate or freeze the fish you catch. The amount of time each kind of fish can be kept in a refrigerator or freezer depends on the initial quality of the fish, storage temperature, and the fish's fat content. Specific biochemical processes in certain species are also a factor.

The storage times suggested here are based chiefly on the fat content of the fish and on the assumption that the fish to be stored is of high quality. For

instance, most people would judge a flounder—a low-fat fish—"acceptable" after four days of proper refrigeration. Individual tastes and preferences, however, may vary. "Good" quality flounder may be acceptable to some after six to seven days in the refrigerator; the same flounder may be unacceptable to others after only three days. Use table 3 to estimate how long to store the fish you catch, but remember that you may have to make adjustments based on personal experience and on your own and your family's preferences.

**Table 3. Average Fat Content and Suggested Storage Times for Fresh Fish**

Species	Average Fat content	Refrigerated storage time (days)	Frozen storage time (months)
Blackfish and cunner	low	3-4	3-6
Black sea bass	low	4	6
Bluefish	medium	2	2-3
Butterfish	low to medium	2-3	3
Cod	low	4-5	6
Dogfish and shark	low to medium	1-3	2-3
Eel	medium to high	2-3	3-6
Flatfish (flounder and sole)	low	4	6
Haddock	low	4-5	6
Hake	low	3-4	3-6
Mackerel	medium to high	2-3	2-3
Pollock	low	3-4	3-6
Porgy (scup)	low	4-5	6
Searobin	low	3-4	6
Skates and rays	low to medium	4	6
Striped bass	low	4-5	3-6
Tuna	medium to high	2-3	2-3
Weakfish (seatrout)	low	2-3	3-6
Whiting	low	3-4	3-6

All fish are grouped into three categories: low-fat fish generally have less than 5% fat; medium-fat fish have between 5% and 15% fat; and high-fat fish have more than 15% fat. The fat content of individual fish is highly variable. It depends on the size, the season of catch, and the fish's overall health.

Storage times are given as a *general* guideline for estimating how long high quality products will remain at an acceptable level of quality under proper refrigerated or frozen storage conditions.

## Edibility and Preparation Suggestions

If you've done a good job handling and storing your catch, almost any cooking method you choose will be successful. The mistake novice chefs most commonly make is cooking fish too long, causing it to become dry, tough, and tasteless. A general rule for fish cookery is to cook one-inch thick fillets for ten minutes. Adjust the cooking time according to the thickness of the fish, fillet, or steak you are cooking. Fish flesh is extremely delicate; cook it in a way that keeps it moist and intact.

Hundreds of recipes have been developed for every variety of fish caught in the Atlantic Ocean. Most recipes are intended to enhance the unique flavor and texture of particular kinds of fish. Sauces, condiments, and flavor enhancers add further variety and can be adapted to suit individual tastes and preferences.

Fish and seafood cookbooks can be found in any good bookstore. General cookbooks, as well as cookbooks that cover particular cooking methods such as microwave cooking or barbequing, usually have a

section on seafood. Books that focus on traditional regional cuisines are growing in popularity. Newspapers and magazines have increased their coverage of seafoods and often include excellent recipes. In addition, community and educational organizations such as Cooperative Extension home economics programs, Sea Grant programs, and seafood marketing and educational groups offer the public a wide variety of materials about seafood preparation. Public libraries, local fish markets, supermarkets, and homemakers' groups are also likely to be good sources of seafood recipes.

When selecting preparation methods it's a good idea to know a little about the culinary characteristics of the species you're preparing. Table 4 gives an edibility profile and common cooking methods for most of the species mentioned in the text. Once you've acquired a basic knowledge of the culinary attributes of each species you catch, your only preparation limitations will be your own imagination and creativity.

**Table 4. Edibility Profiles and Methods of Preparation**

Species		Edibility profile	Common cooking methods
Albacore tuna	Flavor intensity	Mild . . . . Strong	Broil, grill, bake, poach
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
American eel	Flavor intensity	Mild . . . . Strong	Pan-fry, bake, broil, stew, poach
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Atlantic mackerel	Flavor intensity	Mild . . . . Strong	Broil, grill, bake
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Bigeye tuna	Flavor intensity	Mild . . . . Strong	Broil, grill, bake poach
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	

(continued)

**Table 4. Edibility Profiles and Methods of Preparation (continued)**

Species		Edibility profile	Common cooking methods
Blackfish (tautog)	Flavor intensity	Mild . . . . Strong	Deep-fry, bake poach, stew, broil
	Fat content	Low < . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Black sea bass	Flavor intensity	Mild . . . . Strong	Deep-fry, steam bake, broil
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Bluefin tuna	Flavor intensity	Mild . . . . Strong	Broil, grill, bake
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Bluefish	Flavor intensity	Mild . . . . Strong	Broil, grill, bake,
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Bonito	Flavor intensity	Mild . . . . Strong	Broil, grill, bake
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Butterfish	Flavor intensity	Mild . . . . Strong	Pan-fry, bake, broil
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Cod	Flavor intensity	Mild . . . . Strong	Bake, broil, fry, poach
	Fat content	Low > . . . . High	
	Color (after cooking)	White > . . . . Dark	
	Firmness	Firm   . . . . Not firm	
Fluke	Flavor intensity	Mild . . . . Strong	Bake, broil, saute, fry
	Fat content	Low < . . . . High	
	Color (after cooking)	White < . . . . Dark	
	Firmness	Firm < . . . . Not firm	
Pollock	Flavor intensity	Mild . . . . Strong	Bake, broil, fry, poach
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	

(continued)

**Table 4. Edibility Profiles and Methods of Preparation (continued)**

Species		Edibility profile	Common cooking methods
Porgy (scup)	Flavor intensity	Mild . . . . Strong	Pan-fry, bake
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Red hake	Flavor intensity	Mild . . . . Strong	Bake, fry, poach, broil
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Smooth dogfish	Flavor intensity	Mild . . . . Strong	Broil, deep-fry, bake, grill
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Spiny dogfish	Flavor intensity	Mild . . . . Strong	Broil, deep-fry, bake, grill
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Weakfish	Flavor intensity	Mild . . . . Strong	Bake, broil, fry, poach, stew
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Whiting	Flavor intensity	Mild . . . . Strong	Bake, broil, fry, poach,
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Winter flounder	Flavor intensity	Mild . . . . Strong	Bake, broil, saute, fry
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Yellowfin tuna	Flavor intensity	Mild . . . . Strong	Broil, grill, bake, poach
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	
Yellowtail flounder	Flavor intensity	Mild . . . . Strong	Bake, broil, saute, fry
	Fat content	Low . . . . High	
	Color (after cooking)	White . . . . Dark	
	Firmness	Firm . . . . Not firm	

These edibility profiles are based on information generated by the National Marine Fisheries Service of the US Department of Commerce as reported in the New Jersey Fishery Products bulletin produced by the NJ Department of Commerce and Economic Development, Division of International Trade, Newark, NJ.

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## Common and Scientific Names of Species

Common Name	Scientific Name
Albacore	<i>Thunnus alalunga</i>
American eel	<i>Anguilla rostrata</i>
American plaice (dab)	<i>Hippoglossoides platessoides</i>
Atlantic (blue) mackerel	<i>Scomber scombrus</i>
Atlantic bonito	<i>Sarda sarda</i>
Atlantic cod	<i>Gadus morhua</i>
Atlantic stingray	<i>Dasyatis sabina</i>
Big skate	<i>Raja binoculata</i>
Bigeye tuna	<i>Thunnus obesus</i>
Blackback (winter) flounder	<i>Pseudopleuronectes americanus</i>
Black sea bass	<i>Centropristis striata</i>
Bluefin tuna	<i>Thunnus thynnus</i>
Bluefish	<i>Pomatomus saltatrix</i>
Bullnose ray	<i>Myliobatis freminvillei</i>
Butterfish	<i>Peprilus triacanthus</i>
Clearnose skate	<i>Raja eglanteria</i>
Cownose ray	<i>Rhinoptera bonasus</i>
Cunner (bergall)	<i>Tautoglabrus adspersus</i>
Fluke (summer flounder)	<i>Paralichthys dentatus</i>
Haddock	<i>Melanogrammus aeglefinus</i>
Hammerhead shark	Family <i>Sphyrnidae</i>
Hogchoker	<i>Trinectes maculatus</i>
King mackerel	<i>Scomberomorus cavalla</i>
Little skate	<i>Raja erinacea</i>
Little tunny	<i>Euthynnus alletteratus</i>
Mako shark	<i>Isurus oxyrinchus</i>
Northern puffer	<i>Spheroides maculatus</i>
Northern searobin	<i>Prionotus carolinus</i>
Pollock	<i>Pollachius virens</i>
Red hake (ling)	<i>Urophycis chuss</i>
Sand shark	<i>Carcharias taurus</i>
Scup (porgy)	<i>Stenotomus chrysops</i>
Silver seatrout	<i>Cynoscion nothus</i>
Smooth dogfish	<i>Mustelus canis</i>
Southern flounder	<i>Paralichthys lethostigma</i>
Spanish mackerel	<i>Scomberomorus maculatus</i>
Spiny dogfish	<i>Squalus acanthias</i>
Spotted seatrout	<i>Cynoscion nebulosus</i>
Striped bass	<i>Morone saxatilis</i>
Tautog (blackfish)	<i>Tautoga onitis</i>
Weakfish (grey seatrout)	<i>Cynoscion regalis</i>
Whiting (silver hake)	<i>Merluccius bilinearis</i>
Windowpane flounder	<i>Scophthalmus aquosus</i>
Winter skate	<i>Raja ocellata</i>
Witch flounder (graysole)	<i>Glyptocephalus synoglossus</i>
Yellowfin tuna	<i>Thunnus albacares</i>
Yellowtail flounder	<i>Limanda ferruginea</i>



## The Author

Ken Gall is a regional extension specialist in seafood technology in the New York Sea Grant Extension Program.

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