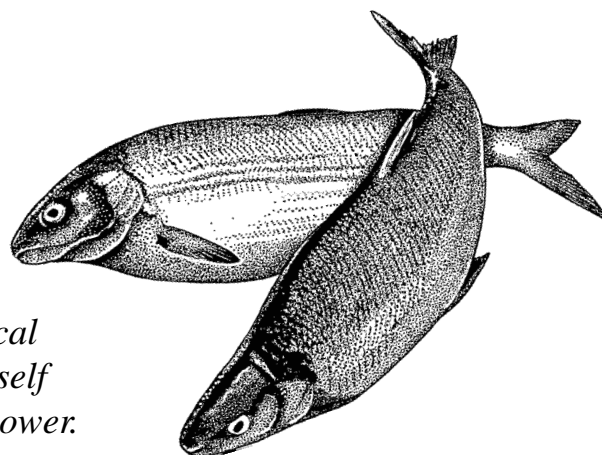


Home Freezing of Seafood



Home freezing is not only an excellent method for preserving seafood, but it's also an economical alternative, whether you catch the seafood yourself or buy it in season—when prices generally are lower.

Seafood products from the Pacific Northwest are a delightful addition to your family meals. They provide excellent nutritional value and add variety to the family's menus.

Because most fresh seafood is seasonal, it's important to learn what the availability of seafood is in your area at certain times of the year. Your local fish dealer can provide you with this information and indicate which varieties are the best value. Fresh fish may be purchased by the pound in any of the following forms—dressed, steaks, fillets, and chunks.

Keep in mind that seafood products are more susceptible than most other food items to changes in color, flavor and texture from exposure to air through a process called oxidation. Commercial and custom processors may use vacuum packaging, antioxidants such as vitamin C (ascorbic acid), and other techniques to control these changes. Seafood products can also spoil more quickly because the bacteria associated with them can grow at low temperatures. This means that they have a shorter shelf life than red meat. Because aquatic foods are so sensitive to deterioration, freezing is an important way to maintain seafood quality.

Your family can enjoy seafood from the freezer that tastes almost as fresh and delicately flavored as the day it was caught, if you follow a few rules during preparation and storage.

If you catch your own fish

Fishers should be aware that the process of stiffening (rigor mortis) of freshly caught fish has a significant influence on the quality of the frozen product. The best quality frozen fish is produced from fish that have been handled and frozen immediately *after the process of rigor is over* and the fish muscle is relaxed.

Fish should be bled as soon as they are caught and iced immediately. Under these conditions, a fish will pass through rigor slowly, and there is less of a chance for gaping (separations in the meat) to occur. Passing through rigor could take up to a day for large fish. Make sure that ice completely surrounds the fish, and that fish do not touch the sides of the container if at all possible, since this will cause the fish to cool faster. On a warm day, fish that have not been iced suffer a harsh rigor by going through the process quickly—this causes the flesh to tear and damages the muscle structure, especially if the fish is in rigor or stiff when you handle it.

Fish flesh that has been frozen *before* going through rigor should have excellent flavor, but it may be slightly tough if you thaw it before six to eight weeks in storage.

If you have little influence over how your catch is handled or filleted, the best advice is simply to keep fish as cool as possible after catching it, ice the fish immediately after butchering or filleting, and freeze it as soon as possible.

Remember: if you're ever in doubt as to the freshness of seafood, then by all means, *don't freeze it*. If you have a serious doubt about the quality or safety of the product, discard it.

Freezing can never improve the quality of bad product. Handling fish poorly before freezing will make it impossible to obtain good results. Freezing can only slow the loss of quality of the fish—it can't put any quality back.

In some cases, poor handling can start chemical changes that even freezing can't stop, such as oxidation of fats that lead to undesirable flavor and sometimes color changes.

Choosing the right package

You can prepare fish for freezing in any of several ways—dressed or pan-dressed, steaks, and fillets (Figure 1). It's usually best to freeze fish in a tightly wrapped package that will exclude air. An additional advantage is that these types of packages take up less storage space. It is also a good idea to wrap fish in meal size portions, so that only the product that is needed is removed from the freezer at one time.

Most of the undesirable seafood flavor and color changes are caused by oxidation of sensitive unsaturated fatty acids and pigments. These "heart healthy" unsaturated fatty acids are one of the most important nutritional aspects of seafood products, particularly in fattier fish such as salmon and tuna.

Once oxidation starts, it's almost impossible to stop. This is why careful handling and proper packaging *before* freezing are essential.

Loss of water during frozen storage (freezer burn) not only dries the fish out and toughens it, but it also promotes oxidation. Freezer burn is always accompanied by an "off" flavor, color change, and odor.

A vacuum sealing machine is one of the best ways to prepare seafood for freezing. Thawed fish will only "keep" for a couple of days, so do not thaw out more than you plan to consume right away.

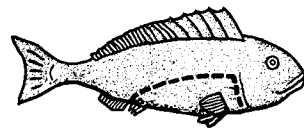
Glass jars and plastic containers made for canning and freezing can also be good choices for freezing fish, as long as you make sure not to overfill the containers (allow for about 10% expansion during freezing) and have enough water frozen along with the product (glaze or otherwise) so that the fish is not exposed to air—which would encourage both oxidation and freezer burn. Freezer paper, as well as plastic bags and cling plastic wrap manufactured for freezer use, can also prevent moisture loss and keep oxygen from contacting frozen seafood.

Preparing seafood for freezing

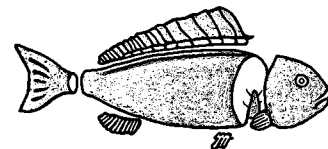
To clean and dress fish, remove the scales by scraping with the dull edge of a knife and then:

- remove the entrails by cutting the entire length of the belly from vent to head;
- remove all blood and kidney tissue;
- cut off the head above the collar; remove fins and backbone if desired;
- wash the fish thoroughly in cold running water. It's now ready for the freezer.

Prepare steaks by cutting the fish crosswise into slices about $\frac{3}{4}$ inch thick. Cut fillets with a sharp knife from each side of the fish from head to tail. Flat fish and smaller fish, like small perch, can be filleted without eviscerating.



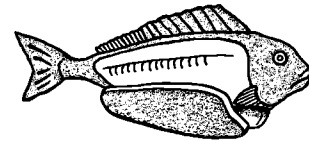
A.



B.



C.



D.

Figure 1. Some of the forms in which fish are cut for freezing. A. Drawn—whole fish with entrails removed; B. Dressed or pan-dressed—whole fish with scales and entrails removed, usually with head, tail and fins removed; C. Steaks—cross-section slices from large dressed fish; D. Fillets—sides of the fish, cut lengthwise away from the backbone.

Shrimp

The small pink Pacific shrimp available on the market are already cooked, peeled, and ready to eat or freeze. Larger prawns may be either raw or cooked. Shrimp freezes well in either vacuum bags or re-sealable freezer bags.

Whole crab

To prepare crab meat for freezing, removing the back shell and break the crab in half, front to back, shaking out viscera. Thoroughly clean the crab under a flow of fresh water. Remove any newly forming shell (a jellylike substance containing dark pigments).

Cook in boiling salt water, $\frac{1}{4}$ cup of salt per gallon (or less; 2–4 Tblsp, according to your taste preference) for 12 to 15 minutes. Some people prefer the flavor of crab cooked with the back left intact. If you use this method, add 10 minutes to the cooking time. Add two to three minutes to the cooking time if the water doesn't boil within a few minutes after adding the crab.

To remove the meat, cool the crab, preferably on ice or in the refrigerator, until it is cool enough to handle. Then shake the meat from the legs and body cavity. It is easier to clean

crab while they are still somewhat warm. Do not return the cooked crab or cooked crab meat to any of the baskets or trays used for the raw crab, to avoid cross contamination.

Clams

Remove visible sand and dirt. Sometimes, allowing the clams to sit in cool fresh seawater or a weak salt water solution for several hours will remove most internal dirt and sand. Wash all clams carefully in fresh water.

Open raw clams with a knife (cut both adductor muscles with knife point) or pour boiling water over them until they open. Remove the shell (and neck "skin" on some species). Slit the neck (or siphon) lengthwise and open the stomach to clean. Wash the meat thoroughly.

Oysters

Wash with a strong spray before you remove the whole meat, including the eye (adductor muscle), from its shell. Collect the meats in a strainer to allow drainage.

Wash the oyster meats thoroughly in a mild salt solution to free them of sand and dirt, and then drain. Commercially shucked oysters are ready to freeze.

Wrapping seafood for the freezer

Figure 2 shows several types of wrappings and containers. Generally speaking, pan-dressed or small whole fish such as trout, and fish steaks or fillets (raw or cooked) are easy to prepare for freezing. First, wrap them tightly and individually (double thickness, if possible) in cling plastic wrap, forming a tight “skin” around the product.

Put the individually wrapped items into a “master bag.” A heavy-duty polyethylene freezer bag is recommended—but avoid placing more than 1 pound of product per master bag. Wrapping in foil is also satisfactory.

Wrapping smaller portions of seafood individually lets you thaw pieces separately and more quickly and allows you to thaw only the quantity you want to use.

Large fish and shellfish and crabs in their shells have large exposed surface areas that are difficult to protect from oxidation and freezer burn. The best way to handle these fish

is simply to freeze them unwrapped or in a loose plastic bag. Then, after they are frozen, cover the fish with a protective glaze of ice. To glaze fish or shellfish, dip the frozen product in cool water, coating the entire surface with a thin layer of ice. This will serve as a protective coating during frozen storage. Then, place the fish in freezer storage bags. Because the glaze can be lost as a freezer “cycles,” you may need to reglaze the product every five to six weeks.

Another technique for smaller fish is to freeze them in a can or carton filled with water. If you can’t tightly pack the fish in the container, add ice-cold water after the fish is frozen. This will allow quicker freezing of the individual fish, and it will add a protective glaze. Note that this method has two disadvantages:

1. You will need more time to thaw the entire package to remove any portion of its contents.
2. Some seafood items, such as shucked shellfish or shrimp, have a tendency to leach flavor and colors into ice and lose quality if this method is used.

Raw or cooked seafood can be frozen in a canning jar or in a new waxed or plastic carton. If natural juices don’t cover the product, you can add a small amount of water to cover the contents to reduce freezer burn.

Be sure to leave at least 1/2 inch of space at the top of the container for ice expansion during freezing. This is very important to prevent glass jars from breaking due to the volume expansion of water when it freezes into ice. For containers with a great deal of headspace, it may help to protect the top layer of food by topping off the container with fresh water after the bulk of material in the container has frozen.

Again, the importance of excluding as much air as possible from the package to limit oxidation can’t be overemphasized!

Besides promoting oxidation, air will act as an insulator and slow the freezing process. Any pocket of air between the package wall and its

contents will promote the formation of larger ice crystals that can damage the product, increase drip, change the texture or flavor, and cause surface dehydration. After the food has been frozen, water molecules remain active and will migrate from inside the muscle cells, out of the cell, and to packaging surfaces as the freezer cycles and each time the freezer door is opened. During these cycles, the product warms up slightly and a small amount of melting occurs, the moisture released moves out from the tissue to product surface or from product surface to the inside the package. When the package is cooled down again, the liquid water will settle on existing ice crystals making them larger. As this cycles repeats itself, a large quantity of water can be removed from the food leaving it severely dehydrated and of very poor quality.

Vacuum packaging can reduce both this effect of freezing and the oxidation that accompanies it. If you use a vacuum packaging machine, be sure to follow the manufacturer’s directions and freeze the package immediately after sealing.

Labeling seafood for the freezer

Trying to guess the age and contents of a frozen package of seafood can be frustrating and wasteful. Many times, people discard food because they don’t know how long it has been stored. Although properly frozen and stored food isn’t likely to become harmful after long term storage, the product will no longer be top quality if it has been held for a long period of time.

Label each package with the date, the species and form of seafood (for example, “tuna steak” or “trout fillets”), and the approximate weight or number of servings or pieces. A crayon, grease pencil, or permanent marker is ideal for this purpose.

Attaching a record near the freezer will also allow you to keep track of inventory. It should carry the same information you placed on the package, as well as the location

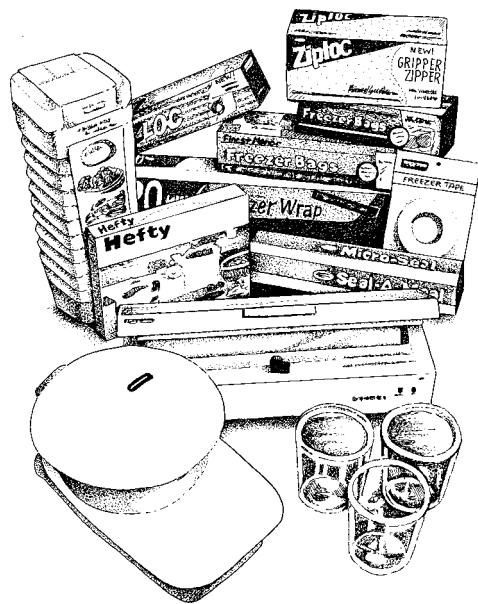


Figure 2. Types of containers and wrappings for freezing seafood, readily available at your local market (brand-name products are shown here as examples only; no endorsement of products is intended).

of each package in the freezer, the package size, and a current record of the number of packages you've put into or removed from the freezer. This prevents unnecessary searching for a particular package—and the harmful practice of warming of the contents while the freezer door is open.

Storing seafood in the freezer

Usually, the faster any food is frozen, the better the quality and the longer the storage life. This is partly because there is less cell destruction during freezing as smaller, and therefore less damaging, ice crystals are formed. Slow freezing may actually encourage food spoilage through enzyme reactions that occur at low temperatures because reactants can be more concentrated while the food is in a semifrozen state.

Home freezers are designed for storage, but not for rapid freezing. A good rule of thumb is a home freezer can properly freeze about 1 to 2 pounds per cubic foot in 24 hours. Don't overload your freezer, and don't pack the unfrozen seafood too tightly—either of these practices can greatly reduce the freezing rate, extend the time it takes to freeze the product and result in reduced quality.

To obtain the fastest freeze, place the packages in direct contact with the freezer floor or walls until they're frozen. If the packages take more than

5 to 6 hours to freeze, they are too large to be frozen in your freezer.

Store your packages at 0°F or colder, in a place in the freezer where the temperature fluctuates the least amount. Generally, the farther away from the freezer door, the more stable the temperature. As mentioned above (“Wrapping”), temperature fluctuations can harm the quality of frozen seafood.

Although commercial packaging may allow more than a year of good shelf life, freezing methods available in the home won't generally permit storing seafood that long *while still maintaining its flavor and texture*.

Most home-frozen seafood should not be stored more than six months—not more than three months for salmon and crab to maintain optimal quality.

A good rule for a continuous supply of high-quality frozen foods is “first in—first out.”

For really good eating, store seafood one to two months—no more. These foods deserve to be eaten at the peak of their quality.

Thawing seafood

Properly thawing seafood is almost as important as properly freezing it. Usually, the quicker you thaw a product, the better. However, avoid the use of hot water, as it can cause the seafood to cook.

Thawing in the refrigerator is a slow process and it can take several days to thaw a large fish if the refrigerator is near 40°F.

Seafood can be thawed in a microwave oven using defrost cycles, but make sure to follow the manufacturer's instructions and rotate or turn the product often to avoid scorching.

Bacterial spoilage from microbes growing on the surface of the product can take place quickly if you thaw seafood products at room temperature or in warm water. This practice should not be used if it will take more than a couple of hours to thaw the product out and if the food is not to be cooked thoroughly prior to consumption.

For example, we do not recommend thawing molluscan shellfish or smoked seafood at room temperature.

One of the best methods for thawing involves running cold tap water on containers and large packages. For this to be successful, the containers must be watertight (if they have been properly packaged, they *should* be watertight). As soon as you can pull the package contents apart, continue thawing the product in the refrigerator.

Important: *Smoked and kippered seafood is perishable, and has a shelf life that is only a little longer than fresh fish. Always keep smoked or kippered fish in the refrigerator and consume within two to three weeks.*

For more information see:

PNW0183, *Fish Pickling for Home Use*
PNW0194, *Canning Seafood*
PNW0450, *Home Canned Smoked Fish*

Revised by **Dr. Barbara Rasco**, Washington State University, from Oregon State University Extension publication EC 1363, originally prepared by **Kenneth S. Hildebrand, Jr.**, OSU

Pacific Northwest extension publications are produced cooperatively by the three Pacific Northwest land-grant universities: Washington State University, Oregon State University, and the University of Idaho. Similar crops, climate, and topography create a natural geographic unit that crosses state lines. Since 1949, the PNW program has published more than 550 titles, preventing duplication of effort, broadening the availability of faculty specialists, and substantially reducing costs for the participating states.

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