

#5 ABOUT FREEZING FISH

INFORMATION SHEETS

for fishers, vendors
and consumers



WHY

When fish are frozen solid, the activity of the enzymes and bacteria that cause fish to spoil can be partly or entirely stopped.

This means that frozen fish can be stored for longer periods (sometimes many months), and can also be transported long distances more easily without being spoiled.

This information sheet will give you some information about how to prepare your fish for freezing properly, and how to make sure your fish don't spoil when they are frozen.



WHAT

A fish is only considered frozen when all of the liquid water within it has become solid ice.

Properly freezing a fish has three stages:

1. The temperature must fall rapidly to about -1 degree Celsius
2. The temperature will remain constant at -1 degree Celsius for a period while most of the water inside the fish freezes (bacteria can still be active now, so it is important that the temperature drops quickly through this stage)
3. Once most of the water in the fish has frozen, the temperature drops again to freeze the remaining water.



HOW

Once a fish is frozen, it should be stored in a freezer that maintains a temperature of -30 degrees Celsius.

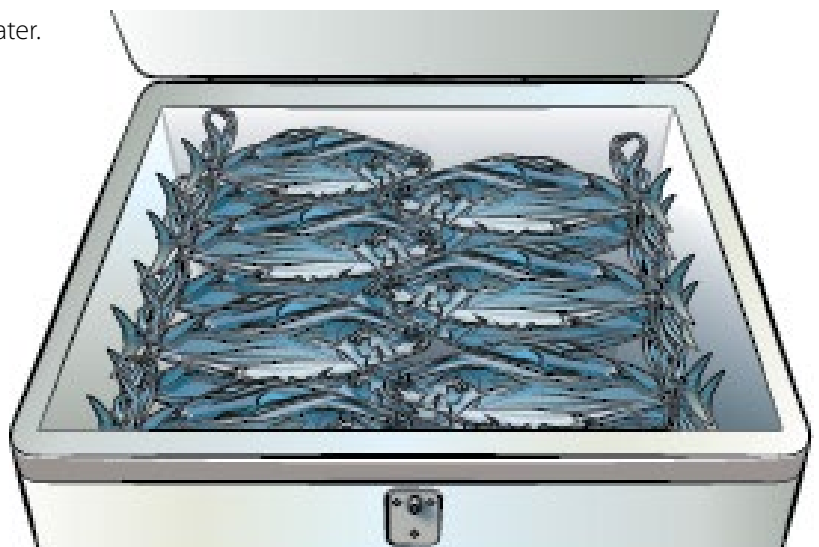
For 12V/24V solar-powered freezers that may not have the capacity to deep freeze, temperature settings need to be adjusted based on the weather, time of day, battery level and freezer content. At higher temperatures the fish will not store for long.

Fish that are frozen should be stored in a way that allows cold air to move freely between each fish, and so that they can be rotated easily.

If cold air cannot move freely between each fish, the cold temperature might not be maintained for all your fish, and they might spoil, even if they are in a freezer. You can use pieces of bamboo to ensure there is space between your frozen fish.

Make sure to have a system for tracking how long a fish has been frozen, and sell the fish that have been stored the longest first.

Do not re-freeze your fish if they have become partially or fully defrosted. Doing so can increase the risk of food poisoning.



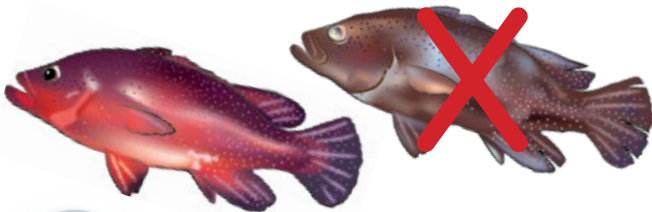


CARE

Be gentle with your fish.

Fish that are bruised, have broken skin, or burst guts will not freeze and store well.

- Handle your fish as little as possible
- Use sharp knives when gutting, gilling and cleaning your fish
- Make sure your fish are not crushed while they are being processed, packaged or stored



CLEAN

Even though freezing can reduce the activity of bacteria, a fish that was contaminated by bacteria or dirt before freezing, will still be unsafe to eat once it is defrosted.

Bacteria and dirt can be found:

- On the fish, and in their gut
- In the surrounding area
- On equipment
- On people

Any place used to clean and store fish should be kept as clean as possible, and be washed immediately after the fish have been moved.

Fish should never be placed on the ground.

To prevent bacteria and dirt from spoiling fish and making them unsafe to eat:

- Use clean water to wash the fish
- Use clean ice to cool the fish
- Use clean containers to store the fish
- Keep the fish as cool as possible
- Keep the fish covered as much as possible
- Do not allow raw fish to come into contact with cooked fish
- Keep the work area and surfaces clean
- Keep yourself clean
- Wash your hands thoroughly and regularly
- Do not handle fish if you are unwell
- Keep animals and insects away
- Keep any garbage well away from the fish



QUICK

Bacteria grow quickly, so make sure any fish you plan to freeze has spent the least possible amount of time out of the water.

The less time a fish spends traveling, being stored, or displayed, the better.

To prevent fish losing their texture, make sure they are frozen quickly. Freezing fish slowly, makes large ice crystals, which ruin the flesh texture.

CONSIDERATIONS

Fish that were spoiled or damaged before freezing, will not improve with freezing. Only freeze fish that have been handled **carefully** and **hygienically**.

Freezing can change the quality of some fish. Some may dry out, lose their texture, or their oils may become rancid.

To prevent fish from **drying out**, use protective packaging, or glaze the fish by dipping them in iced water, giving them a protective coating of ice.

To prevent the **oils in some fish from becoming rancid**, use protective packaging to stop air from reaching the flesh, and also make sure the storage temperature is very low (preferably -30 degrees Celsius). Also, fish with lean, white flesh are less likely to have their oils become rancid.

