

# Retail Seafood Temperature Control

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Temperature control is the most effective way to slow bacterial growth, delay seafood spoilage, and maintain seafood quality.

## Seafood Spoilage

Bacteria are the major cause of seafood spoilage. Millions of bacteria are on the surface, on the gills, and in the gut of living fish and shellfish. After harvest, bacteria invade the flesh of fish and shellfish through the gills, along blood vessels, and directly through the skin and belly cavity lining. These bacteria grow and multiply in the flesh. They produce the "fishy" smelling and tasting compounds associated with old seafood. If food-poisoning bacteria are present, they can multiply and cause illness.

Enzymes also cause spoilage. Enzymes in living seafood help build tissue, contract and relax muscles, and digest food. After harvest, enzymes continue to work and start to digest or breakdown the flesh. This causes the flesh to soften and lowers the quality. Enzymes also produce more food for bacteria which increases the rate of spoilage.

Oxygen in the air attacks the oils in seafood and causes rancidity, off-odors and off-flavors. This commonly occurs in fatty fish such as salmon and mackerel.

## Temperature Control and Shelf Life

High temperatures increase rates of bacterial growth, enzyme activity, and chemical reactions. Low temperatures slow bacterial growth and chemical activity. For many seafoods, increasing the temperature from 32°F to 40°F doubles the rate of spoilage and cuts the shelf life in half. The approximate shelf life for fresh fish fillets is:

Holding Temperature (°F)	High Quality Shelf Life	Edible Shelf Life
90	14 hours	1 day
60	1½ days	2½ days
42	3 days	6 days
32	8 days	14 days
30	10 days	17 days
29	12 days	20 days

Seafood shelf life relates directly to storage time and temperature. Your supplier cannot guarantee a shelf life for a seafood product without knowing the catch date and the temperature history. Ideally, time-temperature monitors should accompany seafood from the fishing vessel to the retail store, but this is rarely feasible.

## Temperature Recommendations

1. Inspect seafood shipments at the central warehouse before distribution to local stores.
2. Train store personnel to conduct seafood delivery inspections. They should have the ability and authority to accept or reject any shipment. Rejection may be for odor, appearance or temperature.



12 days      8.3

	<b>Example</b>		
	<b>Actual Elapsed Time</b>	<b>Temp.</b>	<b>Equivalent Age at 32°F</b>
Fish Caught	2 hours	60°F	0.5 days
Storage on vessel	3 days	34°F	3.7 days
Processing	12 hours	45°F	1.5 days
Distribution	12 hours	36°F	0.7 days
Retail case	1 day	38°F	1.8 days
<b>TOTAL</b>	<b>5.1 days</b>		<b>8.2 days</b>
Remaining high quality shelf life at		32°F	5 hours
Remaining edible shelf life at		32°F	5.8 days
		40°F	2.7 days

### References:

Doyle, J.P. 1989. Seafood shelf life as a function of temperature. Alaska Sea-Gram No. 30. Marine Advisory Program, University of Alaska, Fairbanks.

Ronsivalli, L.J. 1982. A recommended procedure for assuring the quality of fish fillets at point of consumption. Mar. Fish. Rev. 44:8.

Shipman, D.L. and Wyler, R.L. 1989. Fish market guidelines tested in retail food stores. Dairy, Food and Environ. San. 9:16.

Strasdrine, G. 1983. A guide to estimating shelf life of fresh groundfish fillets. Industry Information Report No. 9, B.C. Research, Vancouver, B.C.

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