

# RECREATIONAL SEAFOOD SAFETY

A Guide for Marine Recreational Fishing

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***"Most seafoods available to  
the U.S. public are wholesome  
and unlikely to cause illness in  
the consumer."***

--- Institute of Medicine  
National Academy of Sciences  
Report of Seafood Safety  
May 1991

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**Seafood Safety  
A Guide for Marine Recreational Fishing**

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**R**ecreational fishing produces a significant portion of all the edible fish and shellfish harvested annually in Florida. Current estimates by the National Academy of Sciences suggest the nationwide recreational catch contributes more than 20 percent of the annual amount of seafoods consumed in the United States. These estimates emphasize the importance of protecting both the quality of the catch and the quality of our inland and coastal waters.

Sport-caught seafoods from marine waters offer many noted nutritional attributes. The basic benefits of high quality, easily digested protein and low fat content are accompanied by a full complement of minerals, vitamins and the unique, healthful omega-3 fatty acids. Recent studies have linked seafood consumption with a variety of health benefits including decreased risk from cardiovascular disease. These benefits further enhance the enjoyment of recreational fishing.

The vast majority of recreationally caught seafoods are wholesome and safe to eat. Nevertheless, as for all foods, there are some health risks associated with consumption of certain types from certain locations, and there is the chance that mishandling of the catch can create a health risk. The intent of this brochure is to outline some of the more problematic concerns in order to avoid and prevent seafood-borne illnesses from the recreational catch in Florida. Likewise, this advice should encourage concern for maintaining the quality of Florida's waters.

# SEAFOOD HEALTH RISKS IN PERSPECTIVE

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**T**hrough the last decade, reported illnesses from seafood consumption have averaged less than 10 percent of all the types of reported foodborne illnesses. In 1989, the Commissioner for the U.S. Food and Drug Administration stated, "...fish is by far the safest source of muscle protein available." When problems do occur, they are usually caused by contaminants present prior to capture or due to mishandling of the catch. For these reasons, a significant portion of the annually reported seafood-borne illnesses involve a recreational catch and/or at home preparation.

**Illnesses associated with seafood consumption can be grouped into four general categories:**

- **consumption of raw seafoods,**
- **eating certain types of seafood from certain locations,**
- **mishandling, and**
- **chemical pollutants.**

Avoidance and prevention of these problems require common sense and awareness of the potential causes.

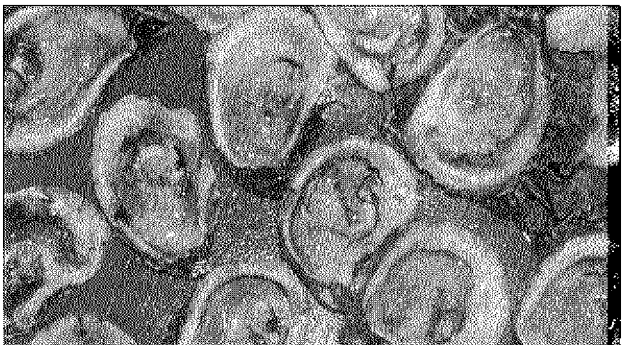
# CONSUMPTION OF

## *Raw Seafood Concerns:*

**Eating raw fish or shellfish** is the most frequent cause of seafood-borne illnesses. These raw foods carry bacteria and other contaminants that may be harmful to consumers. This eating preference is of particular concern for consumers with health conditions that impair their health defense systems.

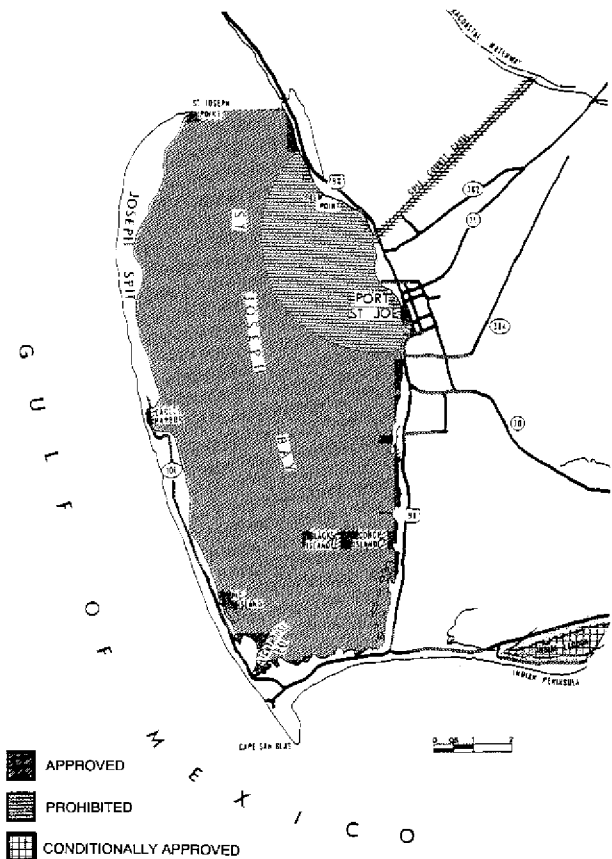
Live oysters and clams filter enormous amounts of water to obtain food. This same water may contain potentially harmful types and amounts of bacteria and virus that can concentrate and survive in the shellfish. Mishandling of the recreational harvest can further contribute to the growth and survival of bacteria.

Similarly, some live fish can carry parasites which are part of the natural ecology of the marine environment. In most instances these marine parasites are not harmful to humans and are simply destroyed by human digestion. Although the occurrence of a marine parasite infection in humans from eating raw fish is very rare, the unpleasant thought of eating a parasite is enough reason for caution.



*Raw oysters are delicious, but they can contain harmful bacteria.*

# RAW SEAFOODS



*The Florida Department of Natural Resources designates waters that are "approved" for shellfish harvesting. By restricting shellfish harvesting to these areas, the quality and purity of the product can be greatly enhanced for consumers.*

# CONSUMPTION OF

## *Raw Seafood Safety:*

**Live shellfish, clams and oysters** should only be taken from 'approved' coastal waters. A continuous coastal water monitoring and approval program is conducted by the Florida Department of Natural Resources (FDNR). Advice and maps on "approved shellfish waters" are available from local FDNR offices or cooperating city and county health departments. Approved waters apply to all clams and oysters whether they are to be eaten raw or cooked, and also apply to scallops if they are to be eaten raw and whole (viscera and muscle).

Consumers with compromised health conditions that impair their health defense systems should **not** eat raw shellfish! Despite regulatory monitoring and approval of waters, certain bacteria which can infect compromised consumers may be present on raw oysters or clams. One example is *Vibrio vulnificus* which has caused death in consumers who are in the so-called 'health risk categories.' These bacteria are easily destroyed by thorough cooking.

All raw shellfish must be stored in refrigeration to slow or minimize bacterial growth. Direct storage in ice is not recommended as it may kill

### **Health conditions which impair**

- **liver disease, including cirrhosis and hemochromatosis,**
- **chronic alcohol use,**
- **cancer (especially if taking anti-cancer drugs or radiation treatment),**
- **lymphoma, leukemia, AIDS, Hodgkin's disease,**
- **diabetes mellitus,**
- **chronic kidney disease,**
- **inflammatory bowel disease,**



# RAW SEAFOODS

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the shellfish. Dead shellfish, those that remain gaping open even when tapped, should not be eaten. Live shellfish have a better flavor and less chance to cause illness. The recommended storage for live shellfish is 'indirect' icing in a cooler or box with insulation (towels, paper) that prevents direct contact with the ice. While the melting ice provides an essential moist atmosphere, the shellfish should not be exposed or immersed in the melted water. Freshwater exposure can kill marine shellfish.

Some **raw marine fish** can contain parasites often called 'worms' or 'cysts.' Those visible about the gut or surface of the fish muscle can be easily removed with a knife. Ones that are not removed are easily destroyed by customary cooking.

An added safety measure for consumers desiring raw fish or sushi is to place the seafood in frozen storage (ideally below 0° F for at least 48 hours prior to serving). This technique kills the parasites. Much of the desired raw fish quality can be retained by rapid freezing methods such as packing fillets in a thin, 1-inch layer and then laying them in frozen storage with ample cold air exposure. Frozen fillets should be slowly thawed in refrigeration (32-38°F).

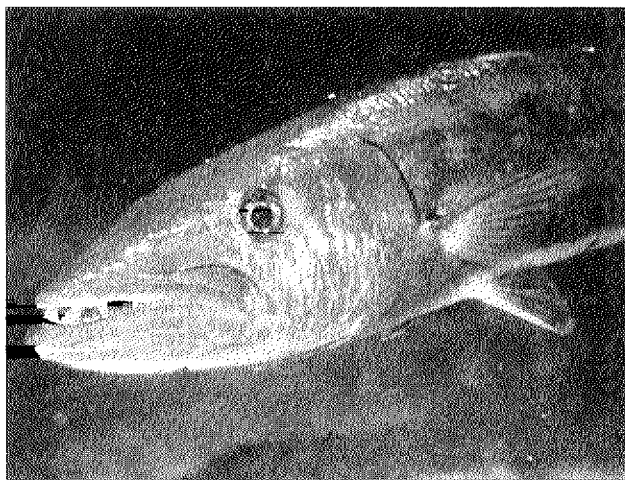
## **health defense systems include:**

- **any person receiving immunosuppressive drugs,**
- **steroid dependency (as used for conditions such as chronic obstructive pulmonary disease),**
- **achlorhydria (a condition in which the normal acidity of the stomach is reduced or absent),**  
**and**
- **medicines that reduce stomach acid.**

# SEAFOOD FROM

## *Ciguatera Concern:*

**Ciguatera** is a form of seafood poisoning caused by natural toxins that can occasionally be found in certain marine fish from specific tropical reef waters. The natural toxins are formed by microplankton and accumulate in the food chain. Potentially any tropical marine fish participating in a food chain with ciguatoxin could become ciguatoxic, but documented illnesses and some recent analyses indicate some fish are more suspect. In the Caribbean region, the fish with the worst reputations are -- amberjacks and other jacks, moray eels and barracuda. Other fish with concerned reputations are hogfish, scorpion fish, certain triggerfish, and some snappers and groupers.



*Because of their feeding habits, barracuda are likely to be ciguatoxic and should not be eaten.*

# SPECIFIC LOCATIONS

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Ciguatera is most common in certain true tropical reef areas as in the Caribbean region. Ciguatoxic fish cannot be detected by appearance, taste or smell. Raw and cooked whole fish, fillets or parts have no signs of spoilage, discoloration or deterioration. The toxins present cannot be completely destroyed or removed by cooking or freezing.

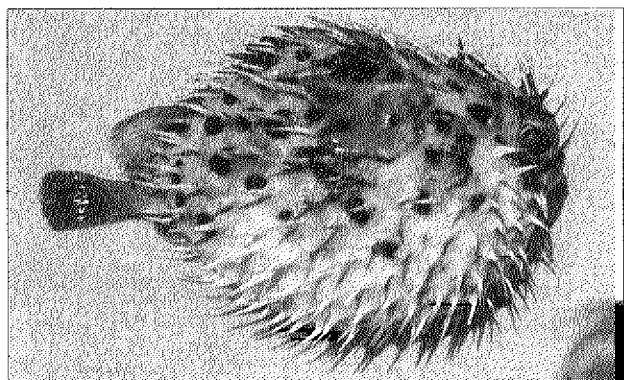
## *Ciguatera Prevention:*

Unfortunately, the documentation, verification and utility of a reliable ciguatoxic fish list is seriously compromised by the diversity of fish species and variable nomenclature. For example, local fishermen may refer to a variety of fish as "jacks" or "snappers" when they are actually a mackerel, wrasse or other species. Certain species of snapper and grouper are never implicated in ciguatera, yet their popular reputation suffers from species misidentification.

Selecting smaller fish, which are likely to accumulate less toxin, offers limited guidance due to variable sizes per species. Particularly large fish of any tropical species from Caribbean reef zones should be avoided. Likewise, barracuda is a reef fish eater that is not recommended for consumption.

Learning about potential ciguatoxic areas and fish remains the best method for avoiding this unusual form of food poisoning. Consumers purchasing tropical marine fish known to occur about reef waters should patronize reputable dealers and restaurants. Vacationers and experienced recreational fishermen should exercise caution in areas of concern for particular tropical fish.

# SEAFOOD FROM



*Pufferfish may contain a potentially lethal toxin.*

## *Pufferfish Poisoning (PFP):*

**Tetrodotoxin** can be used in reference to a rare, but potentially severe illness that can result from consumption of a small group of fish -- the pufferfish or so-called blowfish or balloonfish. Certain species of pufferfish have been known to produce this toxin which can be stored in the viscera or edible muscle of the fish. If consumed, this toxin can cause a potentially lethal condition known as "fugu poisoning" in some oriental countries.

## *PFP Prevention:*

The edible muscle from pufferfish is tasty and many species are eaten, yet most consumers are not able to distinguish the potentially dangerous vs. safe species. For example, in Florida there are six to eight species of pufferfish and studies have shown some of these species can produce toxins. Experience and training are necessary to properly distinguish the species. For these reasons, the safest recommendation is **do not** eat pufferfish caught in Florida.

# SPECIFIC LOCATIONS

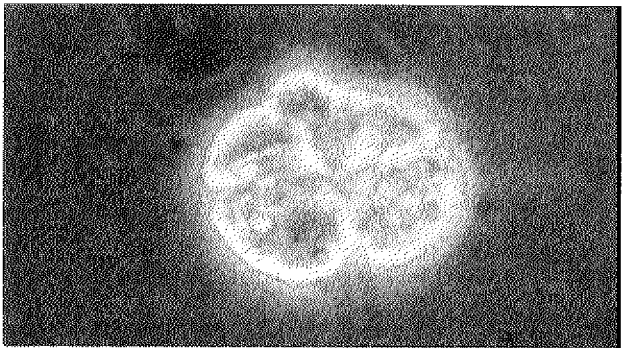
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## *Red Tide Concern:*

**Florida's Red tides** are produced by massive growths of certain types of microplankton that kill fish and contaminate filter-feeding molluscan shellfish like clams. The toxins produced by these plankton are persistent in raw, frozen and cooked forms. Likewise, the toxins can be airborne in rough coastal surf and if inhaled can cause respiratory and eye irritation.

## *Red Tide Safety:*

Do not harvest shellfish or dying fish from known regions of red tide. Occurrence is typically seasonal (spring and early summer) along Florida's southwest coast, yet cases have been recorded out of season and in nearshore regions of the east and Gulf coasts of Florida. Consult regional offices of public health and the Florida Department of Natural Resources for advisories. Toxic regions will recover after the plankton and toxins dissipate.



*Red tides are caused by the sudden and intense growth of this and other types of microplankton. This natural phenomenon can cause serious seafood quality problems wherever it occurs.*

# MISHANDLING

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## *Scombroid Poisoning*

### *Problem:*

**Scombroid poisoning** is a type of food intoxication caused by the consumption of scombroid and scombroid-like marine fish species that have begun to spoil with the growth of particular types of bacteria. Fish most commonly involved are members of the Scombridae family (tunas and mackerels), and a few non-scombridae relatives (bluefish, dolphin or mahi-mahi, and amberjacks). A few additional species have been implicated, but they are of less concern relative to popular fish consumption. The suspect toxin is an elevated level of histamine produced by bacterial breakdown of substances in the muscle protein. The potential toxins are not destroyed by freezing, cooking, smoking, pickling or canning.

## *Scombroid Poisoning*

### *Prevention:*

Potential scombrotoxic fish belong to a particular group of species that have begun to spoil due to mishandling after catch. These species should always receive special care in handling, washing, and proper icing, refrigeration or immediate freezing to prevent bacterial growth and spoilage. Studies have demonstrated that, depending on the weather and location, toxic histamine levels can be generated within 12 hours (sometimes within as little as 2 hours) if the catch is not placed on ice or refrigerated. Thus, species of concern left lying on a warm deck, dock, or beach are likely to produce histamine and could cause serious illness.

# THE CATCH

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## *Ready-To-Eat Seafood*

### *Concern:*

**Cross-contamination of ready-to-eat seafoods** refers to contamination by bacteria that, if allowed to grow, could pose a health threat. Potentially harmful bacteria can come from the immediate surroundings, other foods, and/or individuals handling the foods. The prefix "cross" means that clean or ready-to-eat items have come in contact with a surface or food that harbors the harmful bacteria. A typical example of cross-contamination is preparing and storing cooked seafoods like boiled crab and shrimp in the same container previously used for raw seafoods or other uncooked foods.

## *Ready-To-Eat Seafood*

### *Safety:*

Ready-to-eat seafoods should always be handled carefully to reduce any potential transfer of bacterial contaminants from other foods, particularly raw seafoods. Keep raw or live seafoods separate from cooked seafoods. Do not store seafoods in a manner such that the raw items could drip or drain on the cooked items during storage or handling. Do not package cooked seafoods in the same materials, boxes, wrapping, etc., as previously used for raw seafoods. Storage temperatures must be maintained near or preferably below 35°F. Do not handle cooked seafoods with knives, towels, cutting boards or containers that have not been thoroughly washed after any previous contact with raw seafoods.

# CHEMICAL

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## *Chemical Contamination Concern:*

**Recreational health risks** from pollutants such as heavy metals (mercury), various pesticides, and other chemicals are difficult to assess because any possible related illnesses are not obvious and are not limited to one particular exposure or cause. Prior publicity and public reaction has heightened concern, but there are no data to warrant alarm.

Responsible federal and state health and environmental agencies will issue specific warnings for locations or species if their continuing tests determine concerns. Presently, concern is primarily focused on aquatic species from inland, freshwater sources.

## *Chemical Contamination Safety:*

Public health advisories are sometimes issued as guidelines for the consumption of seafood. These advisories are based on water and seafood analyses, and health risk judgments. There is growing concern for the quality of some of Florida's freshwaters because of continuing development and pollution.

A recent state-issued health advisory for limiting the consumption of sharks was based on an analysis of retail samples originating in numerous locations, not all within Florida



# POLLUTANTS

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waters. The warning concerned the detection of methyl-mercury in shark muscle at an average level of 1.48 ppm (parts per million) while the current federal alert level is 1.0 ppm. This health advisory included guidelines for the amount of shark certain individuals should eat. This recent warning realized that the detected level did not warrant undue alarm. Consumption should simply be limited. This recent warning is typical of numerous advisories for marine pollutants around the world. These warnings incorporate a significant risk assessment to assure consumer safety.

Fishermen should be mindful of future advisories, carefully distinguishing official releases from publicity and local reports. The state authority for public health advisories is the Florida Department of Health and Rehabilitative Services. These advisories can be accessed through local, city and county health departments.

Official advisories attempt to account for variations in contaminants, predicted consumption patterns and probable long-term consequences. Fishermen should not generalize about advisories on one fish, contaminant or area. Contaminated fish from one area do not imply that the same fish from other areas or other fish in the same area are also contaminated. Environmental contamination, in terms of seafood safety, is usually a site specific problem.

# MAINTAINING QUALITY

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## *Handling:*

Proper handling should begin when landing the fish. Always try to minimize bruising caused by contact with hard surfaces (decks, gunwales, etc.). If possible, a padded surface should be provided in the area of the boat where the fish are landed. The fish should be washed immediately, either with a simple hosing down, if available, or by bucket rinses to remove slime and spoilage bacteria. The wash water can be clean seawater. However, the washing should not be done near harbors, marinas, large boat bilging, or any suspect area. When in doubt, use potable water.

If fish remain exposed to the sun and the air on deck or shore, summertime temperatures and solar insulation can cause quality problems in less than one hour. However, simply chilling seafood can prevent quality deterioration and reduce the health risks which can result from elevated temperatures. Proper icing can be accomplished with a little advance planning and some relatively inexpensive equipment.

The most effective chilling method available to recreational anglers on a one-day trip is the use of a brine slush solution. This is simply made by adding clean sea water to ice

# IN THE CATCH

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(equal portions by weight) in a water proof container. Immediately after washing, the fish (alive or dead) should be immersed in the brine slush and kept there until ready to dress (at the end of the trip). Care should be taken when making up the brine slush to avoid using sea water contaminated with oil, fuel or dirt and slime. The slush should be checked periodically to ensure it still contains ice.

## *Cleaning:*

Clean fish as soon as possible after catching them. Scientists say that fish tissue is almost sterile but the skin surface and viscera contain many types of bacteria. The skin slime and viscera also provide food for bacterial growth. Avoid rough treatment while cleaning the fish. Gouges or wounds in the flesh are openings which may allow the spread of bacteria. Gut the fish with a smooth, not excessively long, belly cut and leave no blood or viscera in the body cavity. Thoroughly wash all cleaned fish and ice immediately with fresh, clean ice. Do not dip cleaned fish in the original brine slush. Do not immerse cleaned fillets in a prolonged freshwater soak which could dilute and reduce meat flavor and texture.

# MAINTAINING QUALITY

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## *Icing:*

Both crushed or flaked freshwater ice are good for rapid chilling of cleaned fish. Fish stored in crushed or flakes of ice remain moist and glossy and do not dry out as fast as fish placed in refrigerated storage without ice.

Each vessel operator should decide how much ice is needed for each fishing trip by taking into account the length of the trip, water and air temperatures, and as nearly as possible, the size of catch expected. It's better to throw out ice than fish at the end of a trip.

**In general, fish stored in coolers will be well-chilled when:**

- **three (3) inches of ice covers the bottom of the box;**
- **fish are laid in the cooler and mixed with ice, and the contents are covered with another layer of ice three inches deep.**
- **the cooler contains one pound of ice for each pound of fish stored in it.**

After unloading, throw out all remaining ice to prevent bacterial buildup between

# **FOR ADDITIONAL INFORMATION:**

## *Regulatory Authorities:*

**For general advice and specific information on harvestable shellfish waters and red tides write:**

*Florida Department of Natural Resources*  
Shellfish Environmental Assessment Section  
Mail Station 205  
3900 Commonwealth Blvd.  
Tallahassee, FL 32399

**For information on obtaining public health advisories from state agencies and local/county health programs, write:**

*State Health Office*  
Florida Dept. of Health & Rehabilitative Services  
1317 Winewood Blvd.  
Tallahassee, FL 32399-0200

## *Educational Information:*

**For general advice and related publications, contact your local county extension office or write:**

*Florida Sea Grant College Program*  
Building 803, Rm. 4  
University of Florida  
Gainesville, FL 32611-0341

**Educational Materials  
available from the Florida  
Sea Grant College Program:**

- **SGEP-10**-- *Vibrio vulnificus* -- An Advisory Note
- **SGEF-11**-- Ciguatera -- An Advisory Note
- **SGEF-12**-- Scombroid Poisoning-- An Advisory Note
- **SGEF-13**--Ready-to-Eat Seafoods
- **MAFS-6**--Land Your Catch Fresh
- **MAP-24**--Judging Tournament Fish