

petroleum at the same rate at which it is absorbed. Once the shellfish is removed from the pollutant, there is a marked decrease of the pollutant in the tissue levels with the highest percentage being removed in the first few days. Hence, immediate removal of the pollutant is of paramount importance.

**Oil or Chemical Spill  
Notification**  
call the National Response Center at  
**800-424-8802**

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**Oil Spill Response**  
in the Region IV Coastal Zone,  
contact the U.S. Coast Guard  
Marine Safety Office (MSO):

MSO Wilmington, NC 910-792-8408	MSO Charleston, SC 843-724-7616
MSO Savannah, GA 912-652-4353	MSO Jacksonville, FL 904-247-7310
MSO Miami, FL 305-732-0160	MSO Tampa, FL 813-228-2189
MSO Mobile, AL 334-441-5121	

In the Region IV Inland Zone,  
contact the U.S. Environmental  
Protection Agency:  
404-562-8700

Inland Zone U.S. Coast Guard Offices are:

MSO Huntington, WV 800-253-7465	MSO Louisville, KY 800-253-7465
MSO Paducah, KY 502-442-1621	MSO Memphis, TN 901-544-3912

State Pollution Response Contacts are:

North Carolina 919-733-3867	South Carolina Spill: 888-481-0125 Office: 803-896-4000
Georgia 404-656-4300	Florida 850-413-9911
Alabama 334-242-4378	Mississippi 601-352-9100
Tennessee 800-258-3300	Kentucky 800-928-2380

# What are the Effects of Oil on Marine Shellfish?



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Region IV  
Regional Response Team

RRT IV Co-Chairs:  
U.S. Coast Guard 305-536-5651  
U.S. EPA 404-562-8721

For more informational pamphlets  
concerning various subjects go to the RRT  
IV Web Site at [www.nrt.org](http://www.nrt.org)

## WHAT ARE SHELLFISH?

The term shellfish covers a broad range of animals from sessile organisms such as mussels and oysters to highly mobile animals such as shrimp, including:

- Crustaceans- shrimp, lobster, crab
- Bivalves- oyster, clam, mussel, scallop
- Cephalopods- squid, octopus

One of the major concerns with shellfish is the possibility of loss of the resource either through death or contamination as a result of a petroleum or chemical spill. Based on analysis of waterborne transport patterns in U.S. ports, petroleum products, acids and bases, and anhydrous ammonia are the most frequently shipped chemicals. In addition, chlorinated organics and heavy metals are very common and persistent in the estuarine environment.

## LIFE CYCLES

All species of shellfish have planktonic larval stages, meaning that the larvae are small, free-floating organisms with limited ability for self-propulsion. The larval stage is the most sensitive stage of the shellfish life cycle because the larvae are near the water surface and could be exposed to high pollutant concentrations, particularly pollutants, like petroleum, that float. Larvae are very weak swimmers, limited to vertical movement within the water column, and thus are unable to actively avoid pollutants. In many cases, larvae are found in shallow estuarine waters where pollutant concentrations may reach very high levels. These behavior patterns make larvae the most susceptible, in addition to the most sensitive, stage of the shellfish life cycle.

Postlarval and juvenile stages of shellfish are characterized by the beginning of a benthic (or

bottom-dwelling) existence. For oysters and clams, their movements become very limited and they do not yet have the shell protection that adults have. Crustaceans are also bottom dwellers but are relatively mobile during the juvenile stages and inhabit the intertidal and subtidal areas of estuaries and other sheltered areas. Generally, behavior patterns of juveniles place them in shallow and nearshore environments that are heavily utilized and most frequently polluted.

Of all the life stages, adult shellfish are the least sensitive to pollutants. Some of the more mobile species such as adult shrimp and lobster live offshore over the continental shelf, while non-mobile species such as oysters inhabit the intertidal and subtidal estuarine areas. Major concerns with the adult shellfish population are sublethal effects and bioconcentration. Adults are economically important in many areas of the country, and a spill that results in mortality, sublethal effects, or tainting of the adult population can have a substantial impact on part of the local



economy and on human health. When dealing with adult shellfish, uptake of a pollutant that causes no lethal effect can have the same economic impact as a high mortality rate, if

the pollutant causes tainting or is above a safe health level.

## EFFECTS OF OIL

The effects of oil on shellfish are dependent on many different factors. The three primary factors are oil type, life stage of the shellfish, and species of the shellfish. The early growth stages of shellfish are when they are most susceptible to damage by oil products. With mortality unlikely in adult shellfish, the main concern during pollution incidents would be sublethal effects. Some sublethal effects are decreased or abnormal growth, increased



mucous production, damage to soft tissues, and decreased respiration rates.

The primary interest in protection of shellfish is to prevent contamination of the animals. “Uptake” of petroleum hydrocarbons takes place at all levels of water concentration, and petroleum is concentrated in the animals. Uptake and subsequent tainting of shellfish have long-term repercussions, because the fishery must be closed until the shellfish are determined to be clean. Shellfish reach a maximum body burden at which point the natural elimination process removes the