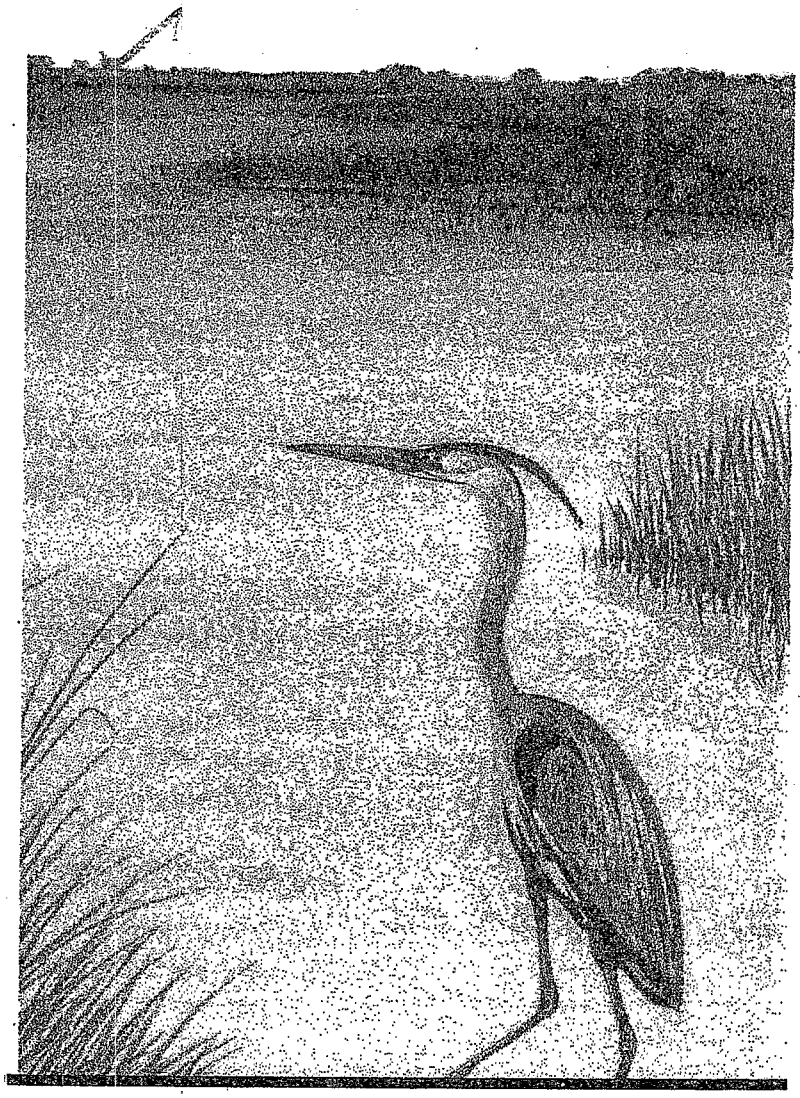
United States Environmental Protection Agency
EPA 823-F-93-009
May 1993
Office Of Water (WH-585)

EPA

Questions And Answers About Contaminated Sediments



1 Question What are sediments?

Answer

Sediments are the unconsolidated materials at the bottom of water bodies such as lakes, rivers, estuaries, and oceans. Sediments consist of mineral particles, organic material, and water. Mineral particles are most familiar to us as clay, silt, sand, and gravel. Organic material in sediments results from the activities of living organisms. Some organic material is solid, like plant debris, while other organic material is dissolved in the water in sediments. Water is a large component of the sediments, occupying as much as 60 percent of its volume by filling in the spaces between the particles. Certain kinds of contaminants are attracted to the organic material that can coat sediment particles. Contaminated sediments are those that "contain chemical substances at concentrations that pose a known or suspected environmental or human health threat," according to the National Research Council.

2 Question How are they contaminated?

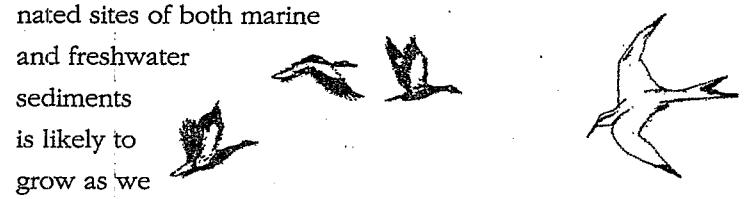
Answer

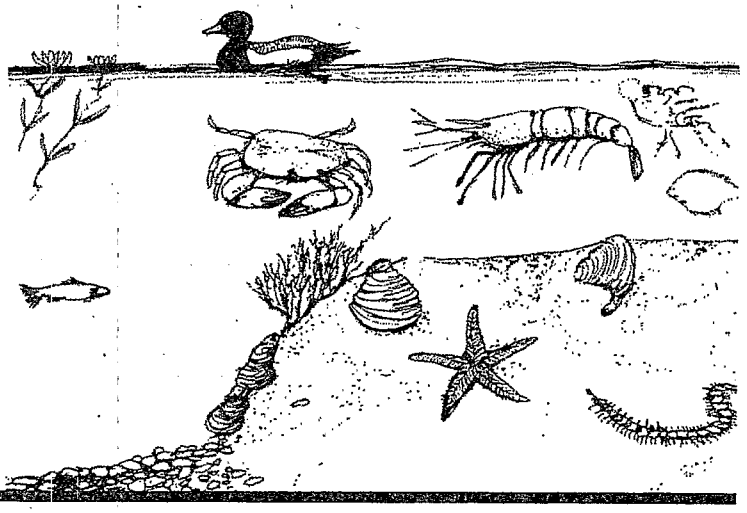
Contaminants are introduced into aquatic systems through many routes including runoff from cropland, lawns, and urban areas; chemical spills; municipal and industrial plant discharges; and airborne pollutants. Common contaminants are pesticides, herbicides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and metals such as lead, mercury, and arsenic. Once these pollutants are in the water, they tend to accumulate in sediments. Problem sediments most often contain toxic levels of long-lived contaminants like metals that can directly kill aquatic life, or contaminants like pesticides that can have long-term effects on wildlife health and reproduction. Mercury and PCBs also pose risks to human consumers of contaminated seafood.

3 Question How extensive is the problem?

Answer

The extent of contaminated sediments is still unknown because comprehensive assessments have not been completed. A great deal of work has focused on marine sediments in harbors and waterways. Over 50 sites on coastal areas have been identified as contaminated including Boston Harbor, Hudson-Raritan estuary, Long Island Sound, Puget Sound, Oakland estuary of San Francisco Bay, and the Southern California Bight. Recently, attention has been directed to freshwater sites. In the Great Lakes, 43 "Areas of Concern" have been found to contain toxic pollutants in sediments. Contaminated sediments also have been identified at 85 wildlife refuges, which pose potential problems for managing wildlife resources. As a result of toxic contaminants in sediments and overlying water, more than 1,000 fish consumption advisories have been issued in the U.S. The list of contaminated sites of both marine and freshwater sediments is likely to grow as we look in more and more locations.

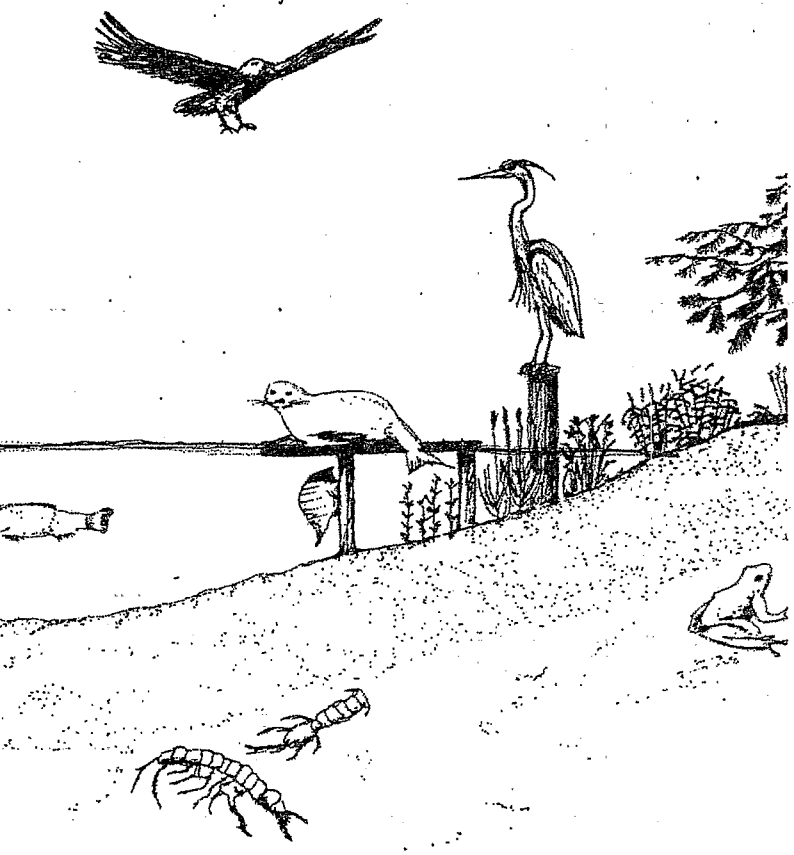




4 Question Why do we care?

Answer

Sediments are important because they are the home to a wide variety of aquatic life, such as worms, clams, crustaceans, and insects. These benthic or bottom-dwelling organisms are key links in the aquatic food web leading from nutrients in the water and sediment to fish and wildlife. Sediments can serve as a "reservoir" from which fish and benthic organisms take up contaminants. These contaminants may then be passed along the food chain to larger fish, birds, and mammals until they accumulate to levels that may be toxic to them or to humans. People also may be exposed to contaminants directly through contact with sediments during recreational activities. Thus, people such as fisherman, hunters, waders, and swimmers could be affected by contaminated sediments.



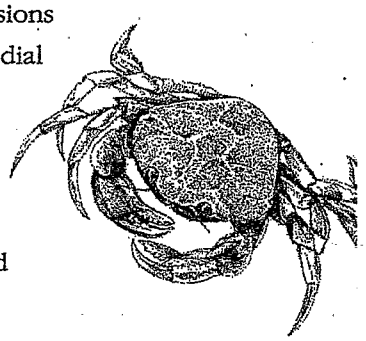
5 Question What can be done?

Answer

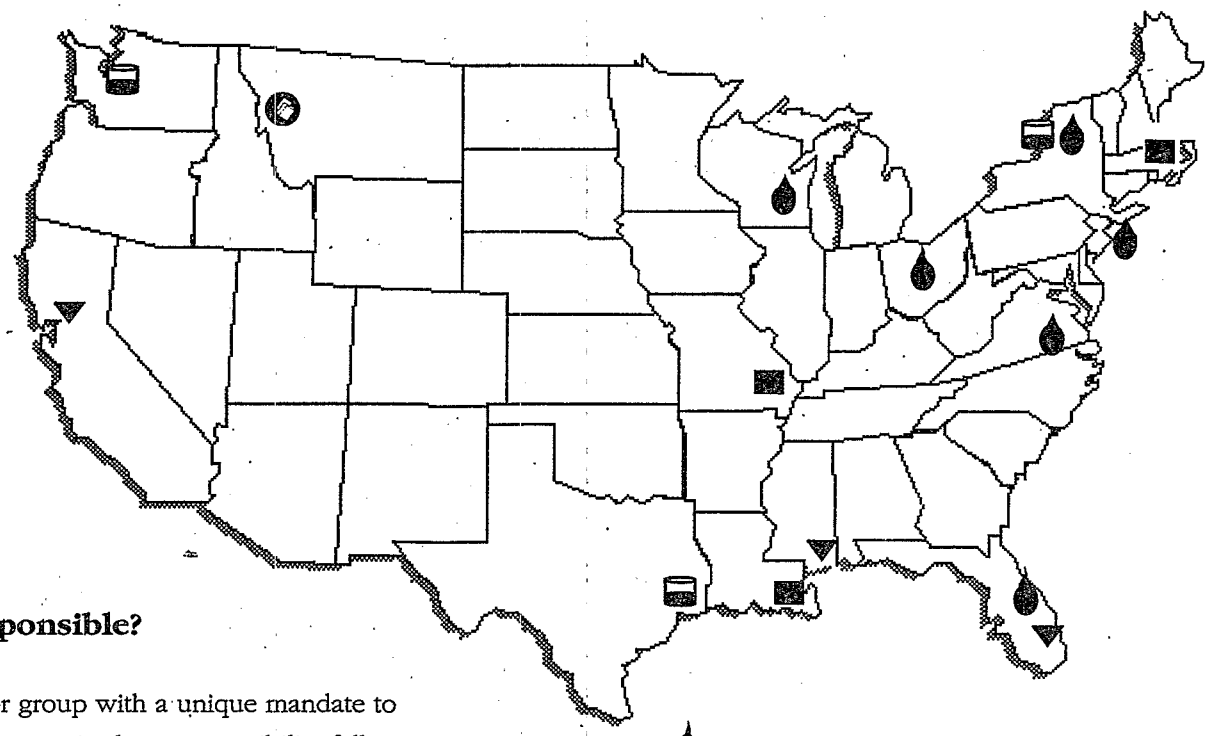
Once sediments are polluted, measures must be taken to contain or treat contaminated material to minimize exposure to humans or wildlife. Contamination in sediments can be greatly reduced by pollution prevention efforts and cleanup activities. In order to identify existing problem areas requiring cleanup, states and the EPA are developing sediment quality criteria and bioassays to measure sediment toxicity and bioaccumulation potential.

In general, contaminated sediments can either be left in place or removed. If left in place, the contaminated sediments can be buried by natural sedimentation, covered by clean sediments or sand, degraded through natural processes, or treated in place through technologies currently under development. Covering or burying are good options when the risk posed by the sediments is not too large, and when the contaminated area is in a relatively undisturbed environment.

The other main option is to remove or dredge sediments. These sediments can be buried in a depression or hole in the sediment bottom, contained behind a berm along the shoreline, or taken out of the water altogether for upland disposal or treatment. If the removed sediments are highly contaminated with organic chemicals, they may have to be incinerated, which can be extremely expensive. A recent evaluation of Superfund Records of Decisions identified 49 sites where remedial actions were selected for contaminated sediment. At 30 sites, excavation and treatment were selected, and at 19 sites, excavation and containment were chosen.



Examples and locations of current Superfund remediation sites with contaminated sediments and selected remedial options are shown.

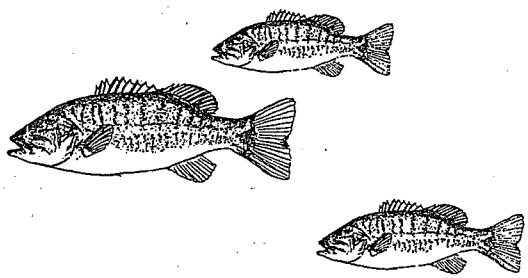


6 Question Who is responsible?

Answer

There is no single agency or group with a unique mandate to address contaminated sediments. Rather, responsibility falls to several agencies, primarily at the federal level through a number of laws and regulations. Some of these laws are the Clean Water Act (1970, 1987), Superfund (1980, 1987), and Marine Protection, Research and Sanctuaries Act (1972). However, none were written specifically to deal with contaminated sediments.

The most comprehensive federal program to manage contaminated sediments has been initiated by the EPA, which has established a Sediment Steering Committee chaired by the Office of Water. This committee will coordinate EPA's assessment, prevention, remediation, and dredged material management programs. The Army Corps of Engineers also plays an important role through its oversight of dredging activities. Others important players include the National Oceanic and Atmospheric Administration and the Fish and Wildlife Service. States are just beginning to take a more active stance through their respective environmental agencies. Presently, only one state (Washington) has legally-binding sediment standards.



7 Question What can I do to help?

Answer

Preventing further sediment contamination is the responsibility of every person. The small amount of cleaners, solvents, motor oil, and other toxic materials dumped down the drain of a single household may seem insignificant. But when thousands of people contribute to this pollution, the effect is substantial. Therefore it is important to explore "environmentally friendly" alternatives to household cleaners, recycle your motor oil, and dispose of paint cans, household chemical containers, and garden insecticides in a responsible manner. Many towns and counties sponsor hazardous waste disposal centers - please make use of them. You can also support local water quality protection legislation in your area.

8 Question Where can I get more information?

Answer

Local, state, and federal agencies can give you more information on local regulations as well as the locations and status of sites with contaminated sediments. Your state health department can give you information on fish consumption advisories. Information can also be obtained from EPA's Office of Water and Office of Science and Technology at **(202) 260-7049**.

The EPA's Emergency Planning and Community Right-To-Know Hotline **(800-535-0202)** is a good number to call, and the Superfund Hotline is a useful information resource on sites listed under Superfund **(800-424-9346).** For sites listed in your state, contact your state's environmental agency. Your local library can also be an excellent source of information as well as local environmental groups.