CONNECTICUT CURRENTS

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STORMWATER RUNOFF CAN DEGRADE FISHERIES HABITATS

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Stormwater runoff is a flow of water and suspended material that occurs when rain hits relatively impervious surfaces, such as asphalt and concrete, and is thus prevented from percolating into the ground. This runoff results mainly from the paving of urban areas for roads and parking lots. Land use changes in watershed areas determine the sources of stormwater and may disrupt natural drainage systems. These changes in land use can increase the transportation of sediment by stormwater into the fragile ecosystems of streams, rivers and coastal embayments. Sedimentation can become an acute problem if watershed or natural drainage systems are disrupted or bypassed. It is estimated that one million acres of land in the United States are converted to urban use every year (The Connecticut Council on Soil and Water Conservation, 1984).

As transportation projects (i.e. the national highway system) increased, stormwater engineering was developing to remove excess water from paved surfaces. This prevented road flooding and increased travel safety. However, the piping of stormwater from such surfaces increased sedimentation, which in turn, caused fishery habitat degradation.

When stormwater is piped directly into a river or stream, the water level will rise and flow rates increase. As the amount of stormwater entering a watercourse increases, its “rise” period becomes shorter. This difference in rise (the time it takes for the water level to increase) is quite noticeable after a heavy or prolonged rainstorm. A watercourse that is severely impacted by stormwater discharges may exhibit an almost instantaneous rise during rainfall and may be susceptible to flash flooding.

Negative Impacts Upon Fisheries

One of the negative effects of stormwater run-off is increased sedimentation, resulting in the degradation of fishery habitats. A rapid rise and increased flow rates of water courses can erode banks, wash soil and silt from adjacent land, and, in extreme conditions, cut new stream channels. Once suspended, the silts and clays newly eroded from the streambed can be transported downstream and eventually deposited in coastal embayments and creeks. The first impact of sedimentation is often on valuable trout habitat. Fine silts and clays fill the pore spaces of stream gravel beds, suffocating newly laid maturing eggs.

The consequences of this sedimentation downstream can include gill damage/decreased gas exchange of fishes, increased mortality of juvenile estuarine fish, burial of shellfish beds and the filling of important inter-tidal habitats. Clay/silt substrates, for instance, support the lowest abundance of the hard clam Mercenaria mercenaria. (Pratt & Campbell, 1956; Canario & Gray, 1968; Russel, 1969; Sission, 1972; Rask, 1986). In Raritan Bay, buried pre-colonial oyster beds (Crassostrea virginica) were found in the Arthur Kill Waterway. The burial of these oyster beds was attributed directly to land use changes that resulted in increased sedimentation rates *(A History of Oystering in Raritan Bay*, Clyde L. MacKenzie, Jr., 1983).

Soil particles carried by stormwater may cloud or color water, blocking light to aquatic plants. In a New York study, estuarine species such as the White Perch *(Morone Americana)*, Killifish *(Fundulus spp)* and Atlantic Silversides *(Menidia menidia*) exhibited gill tissue damage and changes in blood chemistry when subjected to suspended solids (Essman, 1989).

In a 1988 study, urban stormwater drains were found to have carried pollutants into Quincy Bay, Massachusetts. Quincy Bay, once the site of a famous flounder fishery, has contaminated sediments. Flounder sampled from the site exhibited cancerous lesions of the liver, stomach and nerve tissue. Researchers cited several conditions found in Quincy Bay fish and shellfish that could be associated with environmental stress and poor health. *Assessment of Quincy Bay Contamination Summary Report,* United States E.P.A. Region 1, 1988).

Importance of Natural Drainage

Natural drainage patterns and the placement of wetlands are determined by topography. Vegetation and soil types also play important roles in natural drainage by influencing the amount of water that is absorbed. The ability of wetlands to “soak up” excess rainwater is critical to natural drainage systems. Plants slow the stream flow and take up water through their root systems. Sandy and gravelly soils allow water in infiltrate readily, preventing or reducing the amount of run-off. Wetlands adjacent to watercourses can delay rise rates by hours or days, reducing stream channel erosion. Reducing the piping of watercourses helps to protect wetlands, lessening the impacts on natural drainage patterns.

Restoring Natural Drainage/Fish Habitats

Stormwater damage to the environment can be lessened by replacing or restoring natural drainage. The creation of “water recharge areas” or sediment basins can, in such instances, repair disrupted drainage and reduce sedimentation of water courses. Here, instead of letting stormwater run directly into receiving waters, man-made depressions collect stormwater run-off, recharging it back into the ground water. The basins can separate sediments while allowing continuous water flow. These man-made depressions, or engineered basins, are very common in areas that rely heavily on ground water aquifers such as Cape Cod and Long Island. Grassed waterways and periodic sediment traps are also effective ways to reduce sedimentation. Citizen groups can play an important role in restoring natural drainage and fisheries habitats. For example, Trout Unlimited, a National Conservation Organization, has re-established miles of trout stream banks, restoring trout habitat across the country. Other improvement associations have monitored maintenance of street stormwater basins so that sediments are regularly removed. Some communities have established programs for prompt removal of street sand left from winter applications.

Further Reading

"Materials For Use in the Adoption of Local Erosion and Sediment Control Regulations." 1984. The Connecticut Council on Soil and Water Conservation. Available from Soil and Water Conservation Districts/USDA Soil Conservation Services Offices.

"The Connecticut Guidelines for Soil Erosion and Sediment Control" 1986. Available from the Connecticut Department of Environmental Protection, Office of Information and Education.

"Watershed Management Guide for Connecticut Lakes." 1982. Connecticut Department of Environmental Protection Water Compliance Unit.

"Raritan Bay – Its Multiple Uses and Abuses." Proceedings of the Walford Memorial Convocation. 1983. National Marine Fisheries Service, Sandy Hook Laboratory, Technical Series Report No 30, Sandy Hook, New Jersey.

To learn more about stormwater contaminants, review: "Assessment of Quincy Bay Contamination Summary Report." 1988. Metcalf & Eddy, Inc., U.S. EPA Environmental Research Laboratory, Narragansett, RI.

"Nonpoint Source Pollutants Add Up in New York's Waters. Essman. New York Department of Environmental Conservation.

Long Island Sound Study Fact Sheet #7- "Nonpoint Source Pollution in Long Island Sound." 1989. New York Sea Grant Extension Program and the Connecticut Sea Grant Marine Advisory Program.

Long Island Sound Study Fact Sheet #10 – Toxic Contamination in Long Island Sound." 1990. New York Sea Grant Extension Program and the Connecticut Sea Grant Marine Advisory Program.

Long Island Sound Study Fact Sheets may be obtained by writing to Ms. Margaret Van Patten, Communicator, Connecticut Sea Grant Office, University of Connecticut at Avery Point, Groton, CT 06340.