Oil Pollution of the Detroit and Rouge Rivers

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Background

Industrial pollution of the Detroit and Rouge rivers dates back to the end of 19th century. However, the problem did not become a priority until the late 1940s when oil pollution resulted in massive winter duck kills (Hartig and Stafford, 2003). Historically, the lower half of the Detroit River froze from bank to bank during the winter. With the southward spread of industry, effluent along the western banks of the river caused the river to warm in pockets, leaving only patches of open water by the mid-1930s (Miller and Whitlock, 1948). The lower half of the river is distinct from the upper half in that it is divided and separated with shoals and islands, which provide an increased abundance of food for waterfowl (Hartig and Stafford, 2003). The combination of open water and food availability soon provided resting and feeding grounds for migrant waterfowl, which began to winter in these areas. Given their proximity to the industries, the open patches of water also contained high concentrations of oil. The result was waterfowl mortality, which occurred in varying degrees beginning in the mid-1930s. Oil spills continue to occur, including the largest oil spill in the Great Lakes in the last 12 years that occurred in 2002 (Figure 1).

Figure 1. Oil spill on the Rouge River in 2002 (photo credit: U.S. Coast Guard, Sector Detroit).

Waterfowl are affected by oil in many ways. External feather oiling causes loss of buoyancy which can result in drowning. Feather insulating properties are lost when feathers become matted (Figure 2), which can result in death due to exposure of cold water (Hartig and Stafford, 2003). Reduced swimming or flying mobility may result in starvation. Ingestion of oil can result in internal pathological changes, causing sickness and/or mortality. If eggs are contaminated, the result is decreased hatchability and increased embryonic mortality (Hartig and Stafford, 2003).

Figure 2. Oil soaked duck (photo credit: U.S. Fish and Wildlife Service).

In years of heavy ice cover, the impact of oil on waterfowl was magnified due to limited availability of open water (Hartig and Stafford, 2003). In 1948 the situation climaxed when approximately 11,000 ducks were killed due to oil pollution in the Detroit River (Table 1). Sportsmen were outraged and collected the oil-soaked waterfowl and threw them on the lawn of the State Capitol building in Lansing, in hopes that policymakers would address the overlooked issue (Cowles, 1975). This event marked the commencement of industrial pollution control programs in Michigan.

Table 1. Waterfowl mortality in the Detroit River due primarily to oil pollution (Hartig and Stifler, 1979; U.S. Department of Health, Education, and Welfare, 1962).

Year	Estimated Waterfowl Mortality
1948	11,000
1949	76
1950	871
1951	250
1952	1,000
1953	345
1954	238
1955	2,600
1956	191
1960	12,000

1967	5,400

Status and Trends

A series of relevant legislative events followed the massive 1948 winter duck kill. In 1949, the Michigan Legislature amended the water pollution control statute to establish the Michigan Water Resources Commission (Cowles, 1975). In addition, the definition of pollution was broadened and state approval was required for all new uses of state waters. Still, oil slicks were reported on the Detroit River one-third of the time during the winter and spring between 1950 and 1955 by the U.S. Department of Health, Education, and Welfare (1962).

Other sources of oil pollution in the Detroit River, in addition to industry, were soon recognized. Some of these include municipal wastewater treatment plants, government installations, combined sewer overflows, and shipping (International Joint Commission, 1968). As these sources were identified, pollution control efforts became increasingly effective. According to the U.S. Department of Health, Education, and Welfare (1962), there was a 97.5% reduction in oil discharges to the Detroit River between the late 1940s and early 1960s (Figure 3). The Michigan Department of Natural Resources (1977) reported that there was an additional 80% decrease in point source discharges of oil between 1963 and 1976. As would be predicted, winter duck kills associated with oil pollution also decreased dramatically.

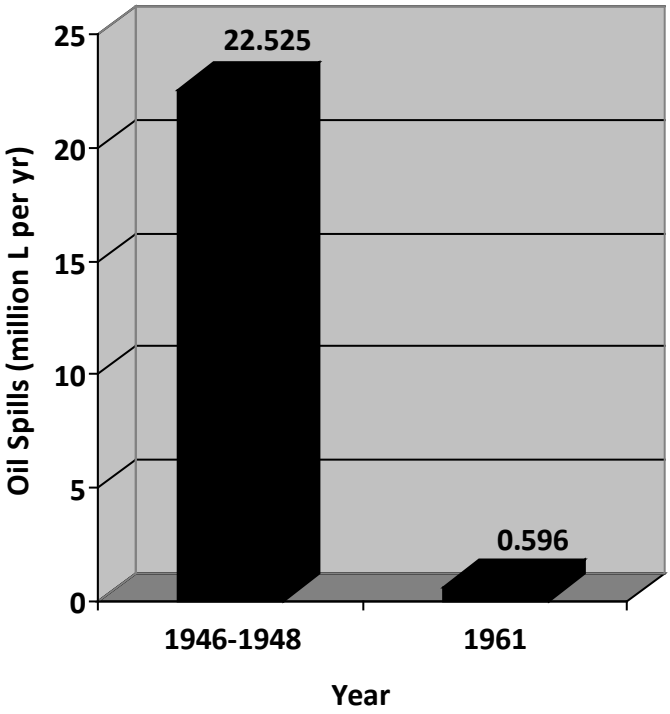

Figure 3. Total volume oil/other petroleum products spilled in Detroit River in gallons per year (1946-1948 and 1961).

Oil spill data collected by the U.S. Coast Guard National Response Center and the U.S. Environmental Protection Agency show a substantial reduction in the volume of oil spilled, however, indicate that there are still years in which total volume of oil and other petroleum products spilled in the Detroit and Rouge rivers is comparable to estimated oil releases in 1961 (Table 2). In April 2002, a more than 380,000-liter oil spill occurred in the Rouge River. The U.S. Coast Guard and other governmental and industrial partners undertook a $7.5 million cleanup on 43 km of the lower Rouge River and U.S. Canadian sides of the Detroit River (Hartig and Stafford, 2003). Ten ducks and geese died as a result of the oil pollution. While this number may seem insignificant to years past, it reminds us that oil pollution continues to be a threat to waterfowl.

Year	Volume of Oil/Other Petroleum Products Spilled into the Detroit River (liters)
1995	5,920
1996	7,129
1997	11,548
1998	3,903
1999	19,583
2000	15,983
2001	12,574
2002	383,222
2003	2,288
2004	83,763
2005	353
2006-2016	No Data
2017	11,476

Table 2. Total annual volume of oil/other petroleum products spilled into the Detroit River, 1995-2017. Data from 1995 to 2005 were collected by the U.S. Coast Guard National Response Center (2005). Data from 2017 to 2019 were collected through emergency response activities of U.S. Environmental Protection Agency's On-Scene Coordinators.

It is important to note that the data presented in Table 2 represent reported incidents. There are undoubtedly unreported smaller spills and releases through combined sewer overflow events that are not accounted for. These figures are therefore conservative. Concern remains for oil pollution from both combined sewer overflow events and industrial releases.

Management Next Steps

Even with state and federal enforcement programs, there are still small oil spills. Greater emphasis must be placed on prevention. Key management recommendations include:

- Lower the allowable limits of oil and other contaminants from industrial contributors to Detroit and other municipal wastewater treatment plants;
- Identify high priority outfalls that empty into the Rouge and Detroit Rivers and target them for implementing early warning systems;

- Heighten Michigan Department of Environmental, Great Lakes, and Energy and U.S. Environmental Protection Agency enforcement of industrial pretreatment programs;
- Educate the business community that it shares the responsibility of preventing the problem and becoming a part of the solution to oil pollution;
- Encourage industrial companies pursuing the voluntary ISO 14000 certification to identify oil as a "significant environmental aspect" in order to prevent accidental release of oil; and
- Increase public awareness of the need to prevent pollution, notice changes in water quality, and report problems immediately.

Research/Monitoring Needs

An early warning system is key to protecting the Detroit and Rouge Rivers from oil pollution, and the wildlife that depends on these river ecosystems. It is recommended that governments pursue funding to expand implementation of early warning systems and sensors for water systems.

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